

To: MPR's Morning Edition
From: Mark Seeley, Univ. of Minnesota Extension, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, January 4, 2008

HEADLINES:

- Jet Streaming podcast this week
- A music contest continues
- The January Thaw
- Weekly Weather Potpourri
- The snow season so far
- Almanac for January 4th
- Oddities in our temperature climatology
- The Cloud Bar
- Outlook

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, includes a discussion about the weather and climate headlines of 2007. What were some of the most significant events and consequences? What evidence of climate change surfaced? The weather geeks all take a turn at such topics and Cathy Wurzer has another interesting web site of the week.

You can listen at the following web sites.....

http://minnesota.publicradio.org/radio/programs/morning_edition/
or
http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: A music contest for your consideration....

If you are an MPR "Morning Edition" listener, you may have noticed that we've been trying out some new music to introduce our conversations about the weather on Friday mornings. For many years we played Mark O'Connor's fiddle tune, "Soppin' the Gravy," but we feel it's time for something new. We are experimenting with new tunes. If you like any of the new ones, or you prefer the old one, we'd like to know. You could even compose something yourself and play it into our answering machine if you're so inspired.

We are looking for a short musical introduction with a lively start and a strong finish that is in tune with Mark's personality. If you have any ideas, call the Morning Edition comment line at 651-290-1080. If your piece of music is selected as the new theme for Friday's WeatherTalk segment, Mark will send you a signed copy of his book "Minnesota Weather Almanac."

Topic: The January Thaw - A variable feature of the Minnesota climate

Most residents of the Twin Cities area consider the January thaw to be a given each year. They know it will come, just not precisely when. This time it comes early with the Saturday through Tuesday period expected to see daily highs above the freezing mark.

Indeed for many central and southern Minnesota locations a January thaw is quite common. The definition of a January thaw is variable. Some consider it to be any single day with a temperature above 32 degrees F. But consequences associated with a January thaw, like loss of snow cover, melting and drying of street surfaces and sidewalks, softening of lake ice, etc are generally not realized unless temperatures rise above the freezing mark for two or more days. Using this as a sorting criteria we can look at the historical frequency of such temperatures for various locations in Minnesota. These frequencies of January thaws (listed below) indeed show great reliability in most of southern Minnesota, and even parts of central Minnesota, but more like a 50/50 probability in the northern sections of the state.

Historical frequency of January thaws at various locations since 1948
(here defined as two or more days with daytime temperatures greater than 32 F)

Twin Cities 92 percent	Rochester 95 percent	Pipestone 92 percent
Fairmont 93 percent	St Cloud 87 percent	Morris 80 percent
Crookston 62 percent	Duluth 60 percent	International Falls 50 percent

It is interesting to note that the three consecutive years of 1977, 1978, and 1979 brought no January thaw to most of Minnesota. All three were dominated by abundant January snow cover and are ranked among the top 15 coldest Januarys in state history. The last year without a January thaw in most places was 1994.

Topic: Weekly Weather Potpourri.....

Locally in the Twin Cities, the Active Life and Running Club (ALARC) achieved a world record on New Year's Day with 689 people taking the Lake Minnetonka plunge. This is believed to be a new record for the number of people diving into a frozen lake at one event. Elsewhere a heavy New Year's Eve snowfall, up to 8 inches or more, disrupted most celebrations in eastern Canada. It was reported that officials cancelled a number of public events in Nova Scotia, Newfoundland, and New Brunswick as a result of the snow storm.

It appears that the Weather Channel is up for sale. It was reported this week that the current owner, Landmark Communications, is interested in selling one of the last privately owned cable stations. One of the most successful cable stations, it may be worth as much as \$5 billion. The Weather Channel is based in Atlanta, GA.

Speaking of Atlanta, the National Weather Service reported this week that a year ending rain in the city prevented the driest year on record there. Prolonged drought in 2007 was threatening to break the all-time driest record from 1954 (31.82 inches), but four consecutive days of rain to end the year brought the 2007 total precipitation up to 31.87 inches, still only about 63 percent of normal for that city.

Also in the SE USA a cold snap and frost occurred in the citrus and vegetable growing areas of Florida. Sprinkler irrigation was used to protect some of the crops and it appears that damage was not extensive. Many growers hustled ahead of the frost to pick mature fruit from the trees.

A cold spell hit parts of India this week and was blamed for up to 50 deaths, mostly among the homeless and slum dwellers. New Delhi fell to 36 degrees F on Wednesday, but some northern parts of the country reported lows in the teens and twenties F.

Government officials were taking steps to curb further deaths by opening shelters, distributing blankets and encouraging the use of roadside bonfires to keep warm overnight.

Scientists reported this week that one of the drivers of climate change overlooked in the recent international talks in Bali is that of aviation emissions. Some project that the effect of aviation emissions is up to five times that of ground transportation. Apparently there was little discussion about curbing aviation emissions compared to other features of climate change.

It was also reported by scientists this week that it may be possible to design a new fuel cell that utilizes the action of bacteria in breaking down organic waste to make electricity. Almost any form of waste will do. Called the microbial fuel cell (MFC), NASA scientists and others are working on the research needed to develop efficient biofilm anodes.

MPR listener question: Given that December brought over 18 inches of snowfall to the Twin Cities, is it likely that will be our snowiest month for this winter?

Answer: There are two ways of answering this question climatologically: How often is December the snowiest month in the Twin Cities and how often is our maximum monthly snowfall for the winter season 18 inches or greater?

Since 1884 (a period of 123 years) December has been the snowiest month of the season 23 times, a little less than 20 percent of the time. The last time this happened was the winter of 2000-2001 when it snowed over 30 inches in December. Nevertheless, historically December is the snowiest month about one out of every five years, but when the total snowfall has exceeded 18 inches it has been the snowiest month 11 out of 12 years.

Another way of looking at it is to note that the snowiest month of the year has exceeded 18 inches only 39 times in the last 123 years, about one third of the time. So regardless of the month, 18 or more inches of snowfall is a great deal and very likely not to be surpassed. There have been only 7 snow seasons when two months recorded 18 inches or more of snowfall, and only one when three months recorded over 18 inches of snowfall (winter of 1961-62). Thus, the historically probability suggests a greater than 90 percent chance that December of 2007 will be the snowiest month of the season for the Twin Cities.

Twin Cities Almanac for January 4th:

The average MSP high temperature for this date is 21 degrees F (plus or minus 13 degrees F standard deviation), while the average low is 5 degrees F (plus or minus 14 degrees F standard deviation).

MSP Local Records for January 4th:

MSP weather records for this date include: highest daily maximum temperature of 41 degrees F in 1898 and 2007 (Pioneer Era shows 42 degrees F in 1839 and 1858); lowest daily maximum temperature of -10 degrees F in 1924; lowest daily minimum temperature of -23 degrees F in 1924 (Pioneer Era shows -32 degrees F in 1834 and 1884); highest daily minimum temperature of 33 F in 2007. Record rainfall

for this date is 0.57 inches in 1997. Record snowfall is 6.0 inches in 1910.

Average dew point for January 4th is 5 degrees F, with a maximum of 37 F in 1946 and a minimum of -39 degrees F in 1924.

All-time state records for January 4th:

The state record high temperature for this date is 50 degrees F at Worthington (Nobles County) in 1930. The state record low temperature for this date is -48 degrees F at Breese (Marshall County) and Leech Lake (Cass County) in 1896, and at Red Lake Falls (Red Lake County) in 1968. The state record precipitation for this date is 2.90 inches at Coleraine (Itasca County) in 1949. Record snowfall for this date is 24.0 inches at Wheaton (Traverse County) in 1997.

From "Minnesota Weather Almanac":(available in bookstores or write the author)

Some interesting temperature climatology for Minnesota:

January is the only month on the calendar where a temperature of 70 degrees F or higher has never been recorded in Minnesota. The closest was 69 F at Montevideo on January 24, 1981.

In the modern Twin Cities climate records (1891-2007), there are six dates that have something unexpectedly in common with respect to the weather. What might this be?

Surprisingly there are only six dates on the calendar that have never seen the daily minimum temperature remain above the freezing mark (32 F). These are January 2, 8, 11, 14, and 18, as well as February 2nd. On these dates the overnight low has always dropped to 32 degrees F or colder.

From an opposite perspective and on a statewide basis, there are only three dates on the calendar where the Minnesota landscape has never recorded a low temperature of 32 degrees F or colder anywhere. Those are July 17 (coldest 33 F at Bigfork in 1971); July 21 (coldest 34 F at Angus in 1947); and August 8 (coldest 33 F at Thorhult in 1964).

Words of the Week: The Cloud Bar

The Cloud Appreciation Society reported this week that artist Michael Trainor plans to develop a disused beach hut located at Anderby Creek in Lincolnshire (United Kingdom) into a unique bar. Specially designed recliners will allow bar patrons to gaze at the skies above while sipping on their favorite drinks. In addition parabolic mirrors will be set up to bring images of the sky into' the bar itself and allow for viewing of cloud forms as they pass over the beach. Cloud charts will be available to help identify the various cloud types. I suspect this "Cloud Bar" will become a tourist attraction for visitors to Lincolnshire. It is scheduled to open in March of 2008.

Outlook:

Milder temperatures on the weekend will soften the snow cover and produce some melting. Fog, overcast and a chance for light rain, freezing rain or light snowfall will be with us, especially in eastern sections of the state,

late Saturday and into Sunday. The warmth will last until Tuesday when a cold front may bring more snow and a sharp drop in temperatures.

Minnesota WeatherTalk for Friday, January 11, 2008

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota Extension, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk for Friday, January 11, 2008

HEADLINES

- Jet Streaming podcast this week
- A music contest continues
- January Thaw brings record temperatures
- Weekly Weather Potpourri
- A La Nina update
- Almanac for January 11th
- Historical cold and blizzards of the past
- Upbank thaw
- Outlook

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, includes a discussion about the very heavy snowfalls and strong winds that recently hit California, a state that was significantly short of water in 2007. Near record amounts of snow fell near the Heavenly Valley areas (up to 9 ft). We also talk with an expert on blizzards, including their historical frequency and patterns. In addition Mark Seeley highlights another interesting web site of the week.

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Topic: January thaw brings some record-setting temperatures....

Warm southerly winds brought a January thaw to most areas of the state over the January 5-7 period. Some observers reported new record-setting daily high temperature values, including

41 degrees F at International Falls on the 6th

48 degrees F at Grand Rapids on the 5th

47 degrees F at Collegeville on the 6th

42 degrees F at Fergus Falls on the 5th

44 degrees F at Olivia on the 6th

48 degrees F at Marshall on the 5th tied the record high, 44 F on the 6th was a new record

45 degrees F at Cass Lake on the 6th

44 degrees F at Little Fork on the 6th

46 degrees F at Brainerd on the 6th

In some areas of the state the warm temperatures diminished the snow depth by 3 to 5 inches.

Topic: Weekly Weather Potpourri.....

An unusual severe weather outbreak Monday (Jan 7) brought reports of 37 tornadoes to the nation's midsection, including areas of northern Illinois (3 reports) and southeastern Wisconsin (4 reports). Twelve homes were destroyed in Kenosha County, WI and at least 55 homes damaged. Other states reporting tornadoes that day included Arkansas and Missouri, where two people were killed. The Storm Prediction Center also received 105 hail reports on Monday. Temperatures hit record highs in at least 138 cities across the Midwest and Central Plains states with many daytime readings in the 60s and 70s F. This is only the 2nd time in 58 years of records that a tornado has hit northern Illinois in January, and the second time since 1844 that a January tornado has occurred in Wisconsin. It's also the earliest tornado ever to hit Wisconsin.

A strong January storm also hit Pakistan earlier this week, bringing torrential rain to the lower elevations and very heavy snow to the higher elevations. Some mountain passes received over 2 feet of snow that blocked roads and stranded travelers. In some areas heavy rains washed out roads and disrupted commerce for several days.

Earlier this week areas around the Loot Desert in central Iran reported the first snowfall ever measured there. Government officials in the province of Kerman reported both the coldest temperatures and first ever snowfall as a cold front swept down from the higher latitudes of Asia. Snow and ice brought travel to a standstill in many areas. Some observers reported up to 22 inches of snowfall. Many schools and business offices were closed, and up to 20 deaths were blamed on the snow and cold.

Faculty from the Mississippi State University College of Architecture have won an award for the design of a new "green" mobile home, called GreenMobile. Designed on sound construction principles and with energy conservation concepts, the GreenMobile will likely replace the other temporary housing units that have been used by FEMA for sheltering those affected by natural disasters. This new design features structurally sound foundations, better insulation, energy-efficient appliances, interior space better suited to use natural day-lighting and ventilation, and it meets all International Residential Codes. The GreenMobile is expected to cost around \$50,000.

Each January the United Kingdom Meteorological Office along with the University of East Anglia issue a climate forecast for the year. Earlier this week they predicted that 2008 will be another warmer than normal year globally but cooler than many recent years, perhaps the coolest since 2000. Part of this is based on a continuing La Nina episode (cooler surface waters) in the equatorial Pacific Ocean.

Parts of Australia continue to experience a very hot January. New Year's Day was the hottest on record with a high of 106 degrees F at Melbourne. Some parts of the country have seen 15 consecutive days with daytime highs of 86 degrees F or higher, and several have reported daily temperatures above the century mark. Thankfully a cooler air mass is expected to arrive this weekend.

MPR listener question: How long is the current La Nina episode in the equatorial Pacific Ocean expected to last?

Answer: Climate Prediction Center scientists use several different models to assess this. Their latest assessment suggests that the current moderate La Nina (cool water) episode will last into the spring and end somewhere between April and June as neutral conditions return to the equatorial Pacific. This historically means a bit higher probability for cooler temperatures across Minnesota for the balance of winter and

early spring (some will arrive next week), but there is no historical association with a specific trend in precipitation.

Twin Cities Almanac for January 11th:

The average MSP high temperature for this date is 22 degrees F (plus or minus 13 degrees F standard deviation), while the average low is 5 degrees F (plus or minus 13 degrees F standard deviation).

MSP Local Records for January 11th:

MSP weather records for this date include: highest daily maximum temperature of 44 degrees F in 1986 (Pioneer Era records show that 44 F also occurred in 1835); lowest daily maximum temperature of -19 degrees F in 1912; lowest daily minimum temperature of -31 degrees F in 1977; highest daily minimum temperature of 32 F in 1928 and 1992. Record precipitation for this date is 0.47 inches in 1930. Record snowfall is 6.0 inches in 1905. Snow depth on this date in 1969 was 17 inches.

Average dew point for January 11th is 5 degrees F, with a maximum of 36 F in 1980 and a minimum of -38 degrees F in 1977.

All-time state records for January 11th:

The state record high temperature for this date is 56 degrees F at Canby (Yellow Medicine County) in 1990 and at Montevideo (Chippewa County) in 1958. The state record low temperature for this date is -53 degrees F at St Vincent (Kittson County) in 1888. The state record precipitation for this date is 2.70 inches at Beaver Bay (Lake County) in 1866. Record snowfall for this date is 24.0 inches at Riverton (Crow Wing County) in 1975.

From "Minnesota Weather Almanac":(available in bookstores or write the author)

Episodes of arctic cold are evident in the climate history of this week across Minnesota. Records from Ft Snelling and St Paul report temperatures ranging from -35 to -45 degrees F on January 12 and 13 in 1868, following nearly 11 inches of snowfall over the first week of the month. Abundant snow made sledding easy and ice harvesting was a common activity from the Mississippi River. January 11 of 1888, 1909, and 1912 brought a number of readings of -50 degrees F or colder around the state. The 1912 January cold was record-setting in duration and extreme cold. The Twin Cities area endured continuous below zero temperatures for the first 7.5 days of the month, while places in the north, especially in the Red River Valley were

continuous below zero F for over 12 days, bottoming out at -53 degrees F at a number of places.

More recently 1974, 1979, 1996, and 1999 brought major outbreaks of arctic air during the first half of January, when a number of observers reported lows of -40 degrees F or colder for several days.

This week also is notable for two of the worst blizzards in Minnesota history: January 12, 1888 brought the "Children's Blizzard" that killed over 200 people in IA, SD, NE, and MN. Striking in the afternoon, this storm was noted for its sudden onset, ferocity of winds, blinding snow, and extreme windchill conditions. Many school aged children were killed trying to get home. January 10-11, 1975 brought the Blizzard of the Century to much of the state with 12 to 20 inches of snow falling in a wide swath west to east, leaving 20 foot drifts. Travel was impossible and many roads were closed for up to 11 days. The storm was blamed for 35 deaths in the state.

Words of the Week: Upbank thaw

This refers to the marked rise in temperature with elevation that is sometimes observed early in the day as upslope areas are the first to lose the appearance of frost, sometimes many hours ahead of the valley bottoms and lower elevations. It is especially true during winter in Minnesota when freezing fog or hoar frost may dominate the lower elevations where the colder air settles, but the warm, clear air several hundred feet above the surface will help thaw the landscape and it will lose its white coated appearance first.

Outlook:

Cloudy with continued near normal temperatures into the weekend. A chance for some light snow flurries north and eastern sections. A sharp change in air mass by the middle of next week, will bring a chance for snow and much colder air to the state as an arctic air mass descends from Canada.

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Minnesota WeatherTalk for Friday, January 18, 2008

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HEADLINES

- Jet Streaming podcast this week
- A music contest continues
- Cold weather coming means lake effect snowfalls
- Weather and Pro Football
- Weekly Weather Potpourri
- question about stretches of cold weather
- Almanac for January 18th
- Cold weather stories from the recent and distant past
- Shram....what does that mean
- Outlook

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, includes a discussion about space weather and the solar cycle, including solar storms. These storms can produce effects on cell phones, radio broadcasts, and GPS systems on Earth. Paul Huttner and Craig Edwards also hear from guests on Weekend America about the many words for snow and ways of describing snow features. Nolan Doesken, State Climatologist from Colorado loves all things related to snow. In addition Craig Edwards highlights another interesting web site of the week, the Amateur Radio Relay League, a valuable asset in communicating severe weather.....

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Topic: Cold weather coming.....lake effect snowfalls

With low temperatures ranging from -15 to -30 degrees F Thursday morning (Jan 17) across northern Minnesota, and many of our Canadian neighbors to the north reporting readings of -25 to -35 degrees F, it is clear that polar air is about to descend upon us. It is notable too that it will stick around for the rest of the month, though moderating a bit from time to time. Nevertheless it appears we'll experience below normal temperatures into early February. With Lake Superior water temperatures ranging from 33 to 36 degrees F, the contrast between the surface waters and the overlying air temperatures will be extreme, producing some significant lake effect snowfalls over the balance of the month. Lake effect snowfalls along Minnesota's north shore are common, and further there have been some phenomenal ones historically. In 1927, 1939, 1991, 1994, 2003, 2005, 2006, and 2007 very significant falls of snow ranging from 20 to 30 inches have occurred in the upland areas of the Lake Superior shores. In fact, the Wolf Ridge Environmental Learning Center near Finland, MN in Lake County reported an incredible 45 inches of snowfall over January 6-7, 2003. Given that some north shore locations have already reported 8 to 18 inches for the month so far, some record monthly totals may be approached by January 31st if a number of lake effect snowfall events materialize.

Topic: Weather and Pro Football

With the NFC and AFC Championships being contended in Green Bay, WI and Foxboro, MA this Sunday, it's pretty clear that the weather will be a factor, as it often is for outdoor games in January. The forecast for Sunday afternoon in Foxboro, MA is for a temperature of 16 to 20 degrees F, with a wind chill of -5 to 5 F, windy conditions (gusts to 25-30 mph), and a slight chance of lingering snow flurries. The forecast for Sunday evening in Green Bay, WI is for a temperature of 0 to -3 degrees F, with a wind chill of -15 to -20 F, not much wind, and dry conditions. Such weather will have impact on throwing, catching and carrying the football, as well as on gaining traction on the field. This weather tends to equalize the talents of the highly skilled

players on the field, and place more importance on who wins the battle in the trenches at the line of scrimmage among the offensive and defensive lines. Thus, the games may be more competitive and go down to the wire.

There have been some famous NFL games where the weather has had significant impact (in chronological order):

1934 Championship game between the Giants and Bears played in New York in single digit temperatures on a icy field, where the Giant players changed into tennis shoes for the 2nd half to gain better traction and won the game.

1948 Blizzard Bowl was played in Philadelphia between the Eagles and the Chicago Cardinals with visibility affected by the blowing snow and the Cardinals winning their last ever championship.

1967 Ice Bowl played at Green Bay between the Packers and the Dallas Cowboys in temperatures as cold as -13 degrees F and wind chills of -33 to -36 F. The ground was frozen solid. Won by the Packers on a quarterback sneak by Bart Starr.

1972 game in Bloomington, MN between the Vikings and the Chicago Bears was probably the coldest game ever played at the old Met Stadium. Temperature was -2 degrees F with a wind chill of -22 F. Vikings won on field goals and a defensive touchdown. The very next week they played the Packers in 0 degrees F with a wind chill of -15 degrees F at the old Met Stadium, but the Vikings turned the ball over four times and lost.

1981 AFC Playoff game in Cleveland between the Browns and the Oakland Raiders was contested in snow with a temperature of just -5 degrees F. In a rare turn of events the west coast team won in a tight contest, and Oakland went on to become the first Wild Card team to win a Super Bowl.

1982 AFC Championship game in Cincinnati, OH between the Bengals and the San Diego Chargers was played in a temperature of only -9 degrees F with a wind chill of -38 F (coldest WC ever). One player suffered frostbitten ears as winds gusted to 35 mph.

1996 AFC playoff game in Kansas City between the Chiefs and the Indianapolis Colts played in a temperature of -6 degrees F with plenty of snow. The game was decided by a field goal on a slippery field.

The last really cold NFL playoff game was 2004 between New England and Tennessee at Foxboro, MA where the temperature was 4 degrees F and the wind chill was -15 F. This game was won by New England with a field goal.

Topic: Weekly Weather Potpourri

Mid January has brought cold weather to Afghanistan, with some of the coldest temperatures in years. Combined with heavy snow and avalanches, exposure has caused up to 85 deaths according to government officials there. Livestock loss was expected to be heavy as well in places. Further to the west in eastern Turkey low temperatures as cold as -29 degrees F froze water pipes and sewer lines causing sanitation problems for many cities. In addition up to a foot of new snow brought road closures to some parts of the country.

The Iraqi capital of Bagdad reported its first snowfall this week, perhaps the first in decades according to meteorological services there. The snow melted as it hit the warmer ground, but some residents claimed Bagdad had not seen snow in over 100 years. Temperatures rarely fall below 32 degrees F there.

The arctic cold also settled over Siberia bringing temperatures of -40 to -50 degrees F this week.

Since the rainy season started in November, persistent heavy rains have brought flooding to many parts of Mozambique and Zimbabwe in southern Africa. Thousands of people have been displaced by rising rivers and several have perished in the floods. The extra heavy rainy season is expected to continue there and have significant impact on agriculture.

An article by several scientists, including some from the NASA Goddard Earth Science Center, reports this week in the Journal of Climate that recent warm summers at high latitude have accelerating the rate of ice melting in Greenland to the highest level seen in perhaps 50 years. The summers of 2003, 2005, and 2007 brought extraordinary rates of melting measured both on the surface and from satellite.

The highly destructive wildfires that occurred in California during October of 2007 have caused the state to revise its building codes for new construction. The new laws will require that materials used be not just fire-resistant but ignition-resistant as well, to help prevent fires starting from drifting embers that travel some distance. Wooden fences around property are not allowed to touch houses and use of wooden mulch in the garden is discouraged.

MPR listener question: After experiencing what has been a relatively mild January, I hear we are going to be colder than normal the rest of the month and perhaps even into early February. What is the longest winter stretch of colder than normal weather for the Twin Cities area and will we approach that?

Answer: The answer to this question is not simple because so-called "normal" temperatures keep changing with the addition of each new decade of data. However applying the smoothed statistics to the winter months only it appears that continuous stretches of two weeks or longer with below normal temperatures in winter is rather rare, occurring only about one winter in every six. The last time this happened was in 1996 from January 22 to February 5, a 15 day period of below normal temperatures. By far the longest stretch of below normal winter temperatures in the Twin Cities area was from January 13 to February 22, 1936 a period of 41 consecutive days.

Twin Cities Almanac for January 18th:

The average MSP high temperature for this date is 22 degrees F (plus or minus 14 degrees F standard deviation), while the average low is 4 degrees F (plus or minus 15 degrees F standard deviation).

MSP Local Records for January 18th:

MSP weather records for this date include: highest daily maximum temperature of 48 degrees F in 1880 and 1891; lowest daily maximum temperature of -16 degrees F in 1994; lowest daily minimum temperature of -31 degrees F in 1967 (it was -36 F on this date in 1887 predating the National Weather Service in Minnesota); highest daily minimum temperature of 32 F in 1944. Record precipitation for this date is 0.31 inches in 1895. Record snowfall is 3.0 inches in 1967. Snow depth on this date in 1970 was 20 inches.

Average dew point for January 18th is 7 degrees F, with a maximum of 39 F in 1973 and a minimum of -40 degrees F in 1967.

All-time state records for January 18th:

The state record high temperature for this date is 57 degrees F at Caledonia (Houston County) in 1996. The state record low temperature for this date is -48 degrees F at Cotton (St Louis County) in 1967. The state record precipitation for this date is 3.10 inches at Stewart (McLeod County) in 1996. Record snowfall for this date is 18.0 inches at Sibley (Sibley County) in 1866.

From "Minnesota Weather Almanac":(available in bookstores or write the author)

This time of year often brings the coldest temperatures and that's what's in store for us this time around. On January 18-20, 1866 a heavy snowfall (18 inches in Sibley County) ushered in an arctic air mass that brought six days of below zero temperatures to parts of southern Minnesota (including -25 degrees F to St Paul). Similarly a blizzard on January 16, 1967 (4-10 inches of snowfall in many places) was followed by an arctic air mass that brought 4 consecutive days of below zero nighttime temperatures. Twenty Minnesota communities bottomed out at -40 F or colder on the 18th. Seven people died of exposure or snow-related accidents, as wind chills values ranged from -40 to -50 F. January of 1982 brought one of the snowiest months in Minnesota history, with six communities reporting over 40 inches of snowfall, including 46.4 inches in the Twin Cities. With the consistent and abundant snowfall 17 Minnesota communities reported a nighttime low below zero F for every day of the month, and some reported as many as 18 days with highs that were below zero F. January 18, 1994 (Tuesday) brought such cold weather to the state that Governor Arne Carlson order all public schools closed for the day, a very rare action by the Governor's Office. Wind chills ranged from -40 to -45 F, and 18 communities reported actually lows of -40 degrees F or colder. The DNR observer at Tower reported 4 consecutive mornings with readings of -40 F or colder. Most recently January 18, 1996 brought a very strong storm system to the state. Preceded by a warm, moist air mass, the precipitation was a mixture of rain, freezing rain, sleet and snow. Heavy snowfall and blizzard conditions were reported by a number of observers, with 10 to 15 inches common. Over 20 hours of continuous precipitation produced a state record of 3.10 inches at Stewart. An ice storm in some counties produced a glaze that was 0.5 to 1 inch in thickness resulting in numerous traffic accidents, power outages, and tree damages. Dangerous wind chill readings (-30 to -40 F) caused the closure of nearly 500 schools. The extreme cold remained for the balance of the month. Eight observers reported -50 degrees F or colder.

Word of the Week: shram

This is an old English word, SW area dialect probably from Wiltshire, that was suggested by Michael Russelle, a colleague and USDA-ARS researcher. It is used as a verb and an adjective and means benumbed, shrunken, shiveled by the cold, or "chilled to the bone" is probably the more common expression. Given the forecast for our area it is quite appropriated to say we are all about to get shrammed.

Outlook:

Cold with chances for light snow to begin the weekend, then just plain cold right through the Martin Luther King Holiday on Monday. Some moderation in temperature by Tuesday, but still colder than normal. Some chance for light snow in southeast

sections of the state by late Monday into Tuesday or Wednesday, but continued colder than normal temperatures.

Minnesota WeatherTalk for Friday, January 25, 2008

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota Extension, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk for Friday, January 25, 2008

(PLEASE NOTE THERE WILL BE NO MINNESOTA WEATHER TALK NEWSLETTER NEXT WEEK, FEB 1, 2008; BACK ON FEB 8, 2008

HEADLINES

- Jet Streaming podcast this week
- A music contest continues
- Frost depths take a plunge
- Big snows in SE Minnesota
- Weekly Weather Potpourri
- question about record lake-effect snows
- Almanac for January 25th
- Historical cold winter of 1856-1857, warmth of January 1981
- peel-a-bone....what does it mean?
- Outlook

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, includes a discussion about lake effect snowfalls, their frequency, amplitude, geographic extent, and how they are forecasted. Our guest, Tom Niziol is the meteorologist-in-charge of the National Weather Service Forecast Office at Buffalo, NY, and he has plenty of experience with this type of weather. Our second guest is Tom Piazza, from Murray and Trettel in Chicago, IL. They are one of the largest private operational forecasting services in the country and specialize in storm forecasts and load (energy demand) forecasts for public utilities. Talk about pressure, there is a lot of money on the line when they make a forecast! Craig Edwards highlights another interesting web site of the week as well.

You can listen at the following web sites.....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: A music contest for your consideration....

If you are an MPR "Morning Edition" listener, you may have noticed that we've been trying out some new music to introduce our conversations about the weather on Friday mornings. For many years we played Mark O'Connor's fiddle tune, "Soppin' the Gravy," but we feel it's time for something new. We are experimenting with new tunes. If you like any of the new ones, or you prefer the old one, we'd like to know. You could even compose something yourself and play it into our answering machine if you're so inspired.

We are looking for a short musical introduction with a lively start and a strong finish. If you have any ideas, call the Morning Edition comment line at 651-290-1080. If your piece of music is selected as the new theme for Friday's WeatherTalk segment, Mark will send you a signed copy of his book "Minnesota Weather Almanac."

Topic: Frost depths take a plunge....

The combined effects of an early January thaw, loss of snow cover, consolidation of the remaining snow cover, and the recent arctic air mass (lows of -15 to -30 degrees F) has driven frost deepen into the soil. Frost depths vary generally from 14 to 24 inches around the state in most agricultural soils. Where soils are covered by snow and/or mulch, frost depths are shallower. Under Minnesota roads and highways, frost depth is deeper as reported by Mn/DOT. In southern Minnesota locations frost depth ranges from 12 to 25 inches under the pavement, while in western and northern areas it is over 40 inches. Frost depths do not generally reach a maximum until late February or early March.

Topic: Big snows in SE Minnesota over the past week....

Warm, moist air from the south flowed up and over the top of the entrenched cold air mass over southeastern Minnesota on the 17th and 18th and produced some significant snowfalls there. Rochester Airport reported a new daily record amount of 2.2 inches on the 17th, while La Crosse, WI reported a record 4.4 inches. In addition Spring Grove (Houston County) reported a record amount of 2.6 inches. The next day, January 18th, Altura (Winona County) reported a record 2.7 inches, while Theilman (Wabasha County) tied their daily record snowfall amount with 2.5 inches. This was only a precursor to an even bigger snow event on January 21st (Monday, Martin Luther King Day) when a surface low pressure system moved toward the state out of Kansas and combined with an upper level disturbance from the west to produce a prolonged period of snow over the southeastern counties.

In this case, the snow was extremely fluffy and light, having formed in very cold air aloft. The snow to water ratios were on the order of 30:1 to 40:1. A total of 5 to 8 inches of new snowfall fell south of Wabasha and Goodhue Counties and east of Olmsted County. Some new record total snowfall values for January 21st were: 8.2 inches at La Crescent, 8 inches at Houston, 6.5 inches at Grand Meadow, 6 inches at Spring Valley, 5 inches at Spring Grove, 5 inches at Winona, and 4 inches at Altura. These were the largest daily amounts so far this month, except for some of the north shore areas along Lake Superior.

Topic: Weekly Weather Potpourri

Despite being in the grip of arctic cold, Minnesota has reported the lowest temperature in the 48 contiguous states only three times this month, most recently -39 degrees F at Embarrass on January 24th. This is partly the result of the widespread grip of cold air across the northern tier of states which has brought near record cold to parts of Wyoming, Montana, Colorado, and Wisconsin as well.

Snow made headline news in a number of countries this week: three days of snow totaling over 6 inches around Moscow, Russia closed many roads, as snowploughs were unable to keep up, and there were over 1500 car accidents to compound these travel problems; a rare snow storm hit Jordan (up to 2 inches), disrupting traffic in Amman and invoking de-icing procedures at the International Airport; widespread six inch snows and high winds across Ontario, Canada closed a 60 mile stretch of the Trans-Canada highway this week; further north in Nunavut, Canada, the communities of Rankin Inlet and Baker Lake were cut off by week long blizzards this week. Snow depths were so great that snowmobilers traveling across the surface were coming dangerously close to overhead power lines; and finally the city of Fulton, NY east of Lake Ontario recorded a mammoth lake-effect snowfall on January 21st, totaling 36 inches.

In the southern hemisphere, remnants of Cyclone Funa hit parts of New Zealand this week with winds of 70-75 mph. The associated rain was welcome relief for the North Island which has been experiencing drought this summer, but the high winds also drove some wildfires out of control taxing the resources of the National Rural Fire services.

NASA scientists released a new study of the Antarctic Ice Sheet this week. It shows that since 1996 there has been a sharp jump in annual ice loss, especially in West Antarctic's Pine Island Bay sector. The study suggests that this acceleration is due mostly to the warmer coastal waters which cause the floating sections of glaciers to thin and collapse. Overall they estimate that ice loss was at 112 gigatonnes per year back in 1996 and it is now about 196 gigatonnes per year.

MPR listener question: You mentioned in the MPR weather blog UPDRAFT last week the record lake effect snowfall at the Wolf Ridge Environmental Learning Center near Finland, MN over January 6-7, 1994, a remarkable 45 inches. Around the Great Lakes Region, what are other record setting lake effect snowfall values.

Answer: Over January 11-12, 1997 the community of Montague, NY, just east of Lake Ontario reported 77 inches of snowfall in 24 hours. This rivals amounts received in very heavy mountain snowfalls. A little closer to our state, Marquette, MI reported a seasonal total of nearly 320 inches of snowfall during the winter of 2000-2001, much of it in the form of lake effect snowfall. The all-time seasonal amount is astounding - 467 inches of snowfall at Hooker, NY (elevation 1765 feet) east of Lake Ontario during the winter of 1976-1977.

Twin Cities Almanac for January 25th:

The average MSP high temperature for this date is 20 degrees F (plus or minus 15 degrees F standard deviation), while the average low is 4 degrees F (plus or minus 15 degrees F standard deviation).

MSP Local Records for January 25th:

MSP weather records for this date include: highest daily maximum temperature of 58 degrees F in 1944; lowest daily maximum temperature of -16 degrees F in 1904; lowest daily minimum temperature of -31 degrees F in 1904 (it was -32 F on this date in 1850 at old Ft Snelling); highest daily minimum temperature of 42 F in 1944. Record precipitation for this date is 0.50 inches in 1950. Record snowfall is 7.5 inches also in 1950. Snow depth on this date in 1982 was 32 inches.

Average dew point for January 25th is 5 degrees F, with a maximum of 48 F in 1944 and a minimum of -35 degrees F in 1972.

All-time state records for January 25th:

The state record high temperature for this date is 67 degrees F at Springfield (Brown County) in 1981. The state record low temperature for this date is -55 degrees F at Pokegama Dam (Itasca County) in 1904. The state record precipitation for this date is 2.65 inches at Theilman (Wabasha County) in 1967. Record snowfall for this date is 16.5 inches at Isabella (Lake County) in 1982.

From "Minnesota Weather Almanac":(available in bookstores or write the author)

The winter of 1856-1857 was one of the harshest of the 19th Century in Minnesota. Just a year ahead of statehood, pioneer residents in the Minnesota Territory were challenged by blizzards, and severe, persistent arctic cold. Smithsonian observers reported as much as 104 inches of snowfall that winter in St Paul, with especially heavy amounts in December and January, and even a trace of snowfall in May of 1857. The months of December, January and February all show readings of -30 degrees F or colder, with -50 degrees F up at Ft Ripley. There were numerous blizzards with exceptionally strong winds, but of course no wind chill values were kept back then. Bear in mind this helped to build the new state's reputation as the American Siberia. Despite this there was a large population growth in the state during the 1850s and 1860s as pioneers came to seek a new life.

January 25, 1981 brought one of the warmest January days in Minnesota history as at least a dozen communities reached a temperature of 60 degrees F or higher. Some western Minnesota residents were seen sporting short-sleeved shirts and driving with the convertible top down.

Word of the Week: a peel-a-bone day

This is an old Scottish expression that is still sometimes used by the United Kingdom Meteorological Office. It is only used to describe the very harsh, bone chilling kind of conditions produced by a strong, damp wind. The descriptive inference is that the cold is so extreme it peels your skin away to the bone....in other words there is no protection from it. I imagine some Minnesota citizens felt like that during this past week.

Outlook:

Much warmer weather for the weekend, with highs reaching the 20s and 30s F. There will be a chance for some snow in the Arrowhead region and some snow or light freezing rain, mostly in eastern sections late on Sunday. A more active weather pattern next week will bring oscillating temperatures and more frequent chances for precipitation, particularly in eastern sections during the Monday through Wednesday period.

Minnesota WeatherTalk for Friday, February 8, 2008

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota Extension, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk for Friday, February 8, 2008

Headlines:

- Jet Streaming podcast this week
- A music contest continues
- Frost depths take a plunge
- ThreadEx project reveals some new climate extremes
- Rare large temperature swings last week
- Weekly Weather Potpourri
- Question about record windchills
- Almanac for February 8th
- Minnesota February weather history
- Cacimbo days (or daze)
- Outlook

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, includes a discussion about highly localized weather forecasting of convective storms (thunderstorms) using the latest technologies. Our guest is Lloyd Treinish of IBM, the company that uses the Deep Thunder Plus modeling system to image and forecast weather systems down to a 1 or 2 km spatial resolution. Craig Edwards highlights another interesting web site of the week, related to avalanche risks.

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or

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Topic: Music contest continues....

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the Gravy," but we feel it's time for something new. We are experimenting with new tunes. If you like any of the new ones, or you prefer the old one, we'd like to know. You could even compose something yourself and play it into our answering machine if you're so inspired.

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Topic: ThreadEx....a NOAA data base project that changes our climate extremes....

NOAA National Climatic Data Center has been working on a project to merge some of the older 20th and 19th Century Signal Corps data sets and other pioneer era data with the National Weather Service data sets so that they could depict longer-term climate extremes at a number of locations in the USA. Called ThreadEx, for threaded data extremes, this data set is now available for use from NOAA.....

<http://threadex.rcc-acis.org/>

As a result, some of the all-time extreme values for daily climate have been altered for Minnesota locations. As an example, the following all-time minimum temperature extremes now apply for these locations....

Location Previous all-time Minimum Daily Temperature Reading New ThreadEx
Extreme Value (date)

Twin Cities -34 degrees F (Jan 1970) -41 degrees F (1/21/1888)

Fargo-Moorhead -39 degrees F (Feb 1996) -48 degrees F (1/8/1887)

La Crosse-La Crescent -37 degrees F (Jan 1951) -43 degrees F (1/18/1873)

Rochester -35 degrees F (Feb 1996) -42 degrees F (1/7/1887)

Duluth -39 degrees F (Jan 1972, Feb 1996) -41 degrees F (1/2/1885)

International Falls -46 degrees F (Jan 1968) -55 degrees F (1/6/1909)

Topic: Big temperature swings last week....some record-setting

The La Crosse, WI National Weather Service Office reported last week that on January 29th their temperature fell from a high of 43 degrees F at 2:03 am in the morning to a low of -10 degrees F at 11:43 pm in the evening, a drop of 53 degrees F over a 22 hour period. This dramatic drop in temperature equaled the record drop that occurred on February 17, 1874 in less than 24 hours. Other dramatic temperature drops that occurred over a 30 to 36 hour period included:

Twin Cities 56 degrees F (from 43 F to -13 F)
Alexandria 55 degrees F (from 38 F to -17 F)
Eau Claire, WI 59 degrees F (from 45 F to -14 F)
International Falls 57 degrees F (from 36 F to -21 F)
Rochester 53 degrees F (from 41 F to -12 F)
St Cloud 55 degrees F (from 39 F to -16 F)
Duluth 60 degrees F (from 41 F to -19 F)

Historically, temperature swings of 50 degrees F or larger over such a short period of time occur in only about 15 to 20 percent of all years. So, indeed, this is somewhat rare. Though this arctic cold front ushered in a very cold period, it did not last long, as temperatures moderated into the 20s F by the first of February.

Topic: Weekly Weather Potpourri

In the midst of a big day politically on Tuesday, February 5th, a super outbreak of tornadoes occurred across the SE USA and brought widespread destruction and death. Starting after 4:00 pm in the afternoon and running past midnight on Tuesday night the Storm Prediction Center of NOAA received 78 tornado reports from seven different states. Many of these states were also experiencing record high temperatures for the date. Up to 54 deaths were reported, with the most in Tennessee (30). The number of tornado deaths is the highest for the month of February since 134 lost their lives in 1971. Some of these tornadoes were long-lived (25 mile path length or longer) and estimated to be EF-3 (136-165 mph) or EF-4 intensity (166-200 mph).

(FOOTNOTE: Besides being a super Tuesday in the election cycle, Tuesday, February 5th was National Meteorologist's Day, the anniversary of when in February 1870 that the U.S. Congress sent legislation for President U.S. Grant's signature forming a telegraphic weather service within the U.S. Army Signal Service. This organization was a predecessor to the present National Weather Service. The day has been said to also commemorate the birthday of Dr. John Jeffries in 1744. He was one of America's first weather observers, taking daily weather observations in Boston starting in 1774. Later as a loyalist he moved back to England where he, along with Frenchman Jean-Pierre Blanchard, became the first to cross the English Channel in a balloon in 1785.)

Over the same time period that tornadoes were ravaging the SE, a winter storm was dumping up to 20 inches of snowfall across southeastern sections of Wisconsin. Blizzard conditions prevailed in some areas, producing four foot drifts and closing roads.

Many observers reported record-setting snowfall amounts for February 5-6.

The same winter storm system brought problems to Toronto, Canada over February 4-6 as heavy snow, ice pellets, freezing rain caused the cancellation of over 100 flights from Pearson International Airport. Snowplows were out continuously to keep roads open as many observers reported 8 or more inches of snowfall.

Parts of the Big Island of Hawaii experience record-setting rainfalls last weekend that brought a good deal of flood damage. Hilo on the eastern shores of the Big Island reported 10.82 inches of rainfall in 24-hours, while other parts of the island recorded weekend totals that exceeded 30 inches.

An AP story this week highlighted a new NASA funded study of agriculture in the midwest. Scientists at South Dakota State University are coordinating a climate modeling study to determine how a conversion of land from corn and soybean production to grasses in order to accommodate the development of a biofuels industry will alter weather patterns across the region.

Another study this week released by NASA-Goddard Space Flight Center found that rain storms over the southeastern USA peak in intensity, longevity and areal extent during mid-week when air pollution is at a maximum. This weekly storm trend analysis also showed lesser storm prevailed over the weekends when the air pollution load was at a minimum.

MPR listener question: I heard that some windchill values last week exceeded -40 and -50 degrees F. What has been the coldest recorded windchill in Minnesota?

Answer: Bearing in mind that the windchill calculations used by the National Weather Service changed in 2001, the old tables to convert temperature and wind speed to windchill were discarded and new ones were deployed. January 9-10, 1982 brought temperatures in the -30 degrees F range with wind gusts of 40 mph. This translates to windchills of -100 to -108 F in the old system, but -71 to -78 F in the new system. Nevertheless, such conditions will freeze exposed skin in less than 5 minutes. Perhaps the coldest windchill in the Twin Cities was on January 22, 1936 when the temperature was -34 degrees F with a wind of 20 mph, producing a WC reading of -67 F.

This weekend we'll get one more dose of nasty WC values in the -30 to -40 F range late Saturday and into Sunday.

Twin Cities Almanac for February 8th:

The average MSP high temperature for this date is 22 degrees F (plus or minus 14 degrees F standard deviation), while the average low is 5 degrees F (plus or minus 14 degrees F standard deviation).

MSP Local Records for February 8th:

MSP weather records for this date include: highest daily maximum temperature of 50 degrees F in 1991 and 2002; lowest daily maximum temperature of -19 degrees F in 1899; lowest daily minimum temperature of -29 degrees F in 1899; highest daily minimum temperature of 36 F in 1966. Record precipitation for this date is 1.08 inches in 1966. Record snowfall is 5.0 inches in 1905. Snow depth on this date in 1967 was 22 inches.

Average dew point for February 8th is 3 degrees F, with a maximum of 39 F in 1966 and a minimum of -32 degrees F in 1971.

All-time state records for February 8th:

The state record high temperature for this date is 66 degrees F at Madison (Lac Qui Parle County) in 1991. The state record low temperature for this date is -55 degrees F at Warroad (Roseau County) in 1933. The state record precipitation for this date is 1.35 inches at St James (Watonwan County) in 1947. Record snowfall for this date is 15.0 inches at Grand Marais (Cook County) in 1937.

From "Minnesota Weather Almanac":(available in bookstores or write the author)

On February 9, 1899 an arctic high pressure system had a grip on Minnesota, bringing temperatures of -50 degrees F and colder to four Minnesota communities. A reading of -59 degrees F at Leech Lake stood as the all-time state record low until Tower reported -60 degrees F on February 1, 1996. The strength of this high pressure system can be seen in the temperature fall at Alexandria, MN in 1899. After a daytime high of 17 degrees F, the temperature dropped 56 degrees in less than 24 hours to -39 degrees F.

This week in 1937 brought one of the snowiest spells of weather during the dry Dust Bowl years in Minnesota. Over February 7-8, 1937 the following snowfall totals were reported: 10.5 inches at Itasca State Park, 10 inches at Park Rapids, 16 inches at Brainerd, 15 inches at Grand Marais, 13 inches at Two Harbors, 10.5 inches at Virginia, 11 inches at Orr, 11 inches at Morris and Wheaton, 13.5 inches at Little Falls, 12 inches at Collegetown, 11 inches at Wadena, Cloquet, Mora, and Pine River. Snowfall totals for the week totaled 20 or more inches in places, marking one of the snowiest Februarys in state history.

Word of the Week: Cacimbo (kuh-sim-boh)

Since the MPCA issued an air pollution health advisory for southern Minnesota this week due to poor air quality, it might be a good time to acknowledge what air quality means to others elsewhere in the world. This is a word used in central Africa (Congo) to refer to a spell of poor air quality caused by fog, mist, or smoke. A cacimbo obscures the view of most landscape features that are visible on clear days, and can even greatly diminish local visibility. Regional belief is that it is not wise to travel on a cacimbo day, as you may not see that danger (wildlife) is approaching.

Outlook:

Some snow early Saturday, especially north and east, and very much colder with plenty of wind. Windchill values will plummet later on Saturday and linger until Sunday morning. Sunnier on Sunday, but still very cold with highs below zero to single digits above. Gradual warming begins on Monday, but only bringing us back up to near normal temperature values. A chance for snow on Monday and Tuesday, as well as Thursday and Friday next week, as temperatures moderate around normal.

Minnesota WeatherTalk for Friday, February 22, 2008

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minn Extension, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk for Friday, February 22, 2008

Headlines:

- Help with the Sesquicentennial
- Jet Streaming podcast this week
- A music contest continues
- More cold invades this week
- Weekly Weather Potpourri
- MPR listener question about wind
- Almanac for February 22nd
- Minnesota's snowiest February, 1922
- Nib-nebs
- Outlook

Topic: Fund Raiser for the Sesquicentennial

On Friday, February 29, 2008 the St Paul Hotel will host a storytelling event to help commemorate the state's Sesquicentennial. Stories about Abraham Lincoln's candidacy, the 1st Minnesota Regiment in the Civil War, the Dred Scott Decision, and how early settlers coped with fire, floods and droughts will be shared. Former Governor Al Quie, Supreme Court Justice Paul Anderson, Senate Majority Leader Larry Pogemiller, First Lady Mary Pawlenty, WCCO Anchor Don Shelby, and Mark Seeley will be on hand to share their stories about Minnesota. The event runs from 6-9 pm and will help raise funds for the state's Sesquicentennial Celebration. If you are interested in attending, please call 612-803-4029 or go to www.mn150year.org

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, includes a discussion about the lunar eclipse on February 20th and whether or not the current La Nina episode has contributed to our winter weather patterns. Dr. Terry Jones from the University of Minnesota Astronomy Department and Mike Halpert from the NOAA Climate

Prediction Center are guests on the program. In addition the web site of the week features the University of Minnesota Starwatch program.

You can listen at the following web sites.....

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Topic: Cold continues and sets records in places

After a February thaw over the weekend, arctic air invaded the state again, causing temperatures to fall by 40 to 50 degrees F. Many communities reported record setting lows on Wednesday morning (February 20th) including, -33 degrees F at Grand Forks, -31 degrees F at Fargo, -33 degrees F at Embarrass, -32 degrees F at Perham, -26 degrees F at Alexandria, -21 degrees F at Lamberton, -22 degrees F at Worthington (tied record low), -28 degrees F at Morris (tied record low), and -19 degrees F at Sioux Falls. The cold air hung around long enough for Crookston to set a new record low as well on February 21st with a reading of -31 degrees F.

Minnesota has reported the lowest reading in the 48 contiguous states five times so far this month. The month has also brought at least four days with dangerous wind chill conditions ranging from -30 to -50 degrees F. If a dramatic and constant warm period does not surface before the end of the month, this may be the coldest February statewide since 1994.

Topic: Weekly Weather Potpourri

Another outbreak of tornadoes plagued the SE states on February 17th. The NOAA Storm Prediction Center received 49 reports of tornadoes from North Carolina, Georgia, Alabama, and Florida. Many homes were damaged or destroyed, with a number of injuries reported as well. Damage was especially widespread around Montgomery, Alabama. These areas continued to need rain as a result of ongoing drought, but they seem to be getting a high frequency of severe weather this winter season. Most of the 212 tornado reports in February have come from SE states.

In the southern hemisphere, Madagascar was hit on February 17th by Cyclone Ivan which developed in the Southern Indian Ocean during last week. It packed winds of 125 mph and produced a large storm surge, and heavy rains. At least 22 people died as a result of the storm and damages are still being assessed, particularly to agricultural areas. Though diminished in strength, the remains of Cyclone Ivan were headed for Mozambique next.

Strong shamal winds brought a dust storm to Kuwait on Tuesday, February 19th. Visibility was so poor that ports were closed and flights delayed from the airport. This was the second dust storm to hit Kuwait in the past week. They are far more common in the summer season than winter, but it has been a dry winter season over there.

Drought continues to plagued Spain and Portugal. Lack of winter precipitation and low reservoir water storage has caused government officials to formulate plans for water restrictions this spring and summer. Spain's Meteorological Service has forecasted that the country may see its driest October through March period in 60 years.

A study released by NOAA's National Climatic Data Center this week shows that the 1970s media hype about an impending ice age, came primarily from only a few research articles, most associated with the study of some of the severe winters of that decade. Much of the other scientific literature of the 1970s was about climate change in the context of increasing temperatures, but this research did not garner as many headlines.

MPR listener question: How can I estimate the wind speed from visual observations?

Answer: This is difficult to answer. There is no visual technique that is very precise. You can categorically estimate wind speed in some cases. For example, when you observe smoke or stack plumes maintaining a somewhat continuous vertical column as they rise through the air, the wind speed is typically less than 7-8 mph. Small branches on trees often move when wind speeds range from 13-18 mph, and small trees move when wind speeds exceed 25 mph. This is also the approximate threshold

for wind to start making a whistling or howling sound. Empty garbage cans blow about the yard when wind speeds exceed 30 mph. I don't know about full garbage cans! Twigs and branches are subject to breakage when wind exceeds 40 mph. So far this month some communities have reported wind gusts of 40 mph or greater on three days.

Twin Cities Almanac for February 22nd:

The average MSP high temperature for this date is 29 degrees F (plus or minus 12 degrees F standard deviation), while the average low is 11 degrees F (plus or minus 13 degrees F standard deviation).

MSP Local Records for February 22nd:

MSP weather records for this date include: highest daily maximum temperature of 57 degrees F in 1930; lowest daily maximum temperature of -2 degrees F in 1889; lowest daily minimum temperature of -22 degrees F in 1873; highest daily minimum temperature of 38 F in 1930. Record precipitation for this date is 1.13 inches in 1922. Record snowfall is 5.3 inches also in 1913. Snow depth on this date in 1967 was 27 inches.

Average dew point for February 22nd is 14 degrees F, with a maximum of 37 F in 1906 and a minimum of -21 degrees F in 1965.

All-time state records for February 22nd:

The state record high temperature for this date is 66 degrees F at Whitewater State Park (Winona County) in 1943. The state record low temperature for this date is -46 degrees F at Bemidji (Beltrami County) in 1939. The state record precipitation for this date is 3.00 inches at Willmar (Kandiyohi County) in 1922, the most single day precipitation ever in the month of February statewide. Record snowfall for this date is 13.1 inches at Chatfield (Fillmore County) in 1940.

From "Minnesota Weather Almanac":(available in bookstores or write the author)

One of the worst winter storms to ever hit the state during this month occurred on February 22, 1922, 86 years ago. This intense low pressure system brought thunder, lightning, rain, freezing rain, sleet, and snow. In the SE counties of Minnesota this system produced an ice storm that coated trees and powerlines with enough ice to cause breakages and power outages. The weather observer at Grand Meadow called it the worst ice storm to ever hit Mower County. Further to the north roads were blocked by snow drifts as winds gusted to 40 mph and hit 50 mph at Duluth and Collegeville.

The blizzard lasted across central and northern counties from the 22nd into the 23rd, leaving over a foot of snow in many locations. Thanks to this storm and others, February of 1922 turned out to be perhaps the snowiest in Minnesota history. At least a dozen Minnesota communities reported 30 or more inches of snowfall during the month, while Cloquet reported an all-time statewide February total of 49.2 inches.

Words of the Week: nib-nebs

This is a Scottish term for Jack Frost, cold personified. It derives from nib meaning to poke or point, and neb meaning kiss. One possible connotation is that when kissed by Jack Frost you are poked by his cold nose. Nib-nebs has certainly been evident this winter, as most Minnesotans have grown tired of the windchill driven nib-nebs (cold kisses) on their faces.

Outlook:

A mild weekend most places with daytime highs perhaps similar to last weekend, 20s and 30s F. Increasing clouds later on Sunday and into Monday with a chance for snow, especially in southern sections. Some snow will last through Monday and into Tuesday morning. Temperatures will then drop for the balance of the week back to colder than normal values, but it will be dry most of next week as we approach the end of February with Leap Day on Friday.

Minnesota WeatherTalk for Friday, February 22, 2008

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minn Extension, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk for Friday, February 22, 2008

Headlines:

- Help with the Sesquicentennial
- Jet Streaming podcast this week
- A music contest continues
- More cold invades this week
- Weekly Weather Potpourri
- MPR listener question about wind
- Almanac for February 22nd
- Minnesota's snowiest February, 1922
- Nib-nebs
- Outlook

Topic: Fund Raiser for the Sesquicentennial

On Friday, February 29, 2008 the St Paul Hotel will host a storytelling event to help commemorate the state's Sesquicentennial. Stories about Abraham Lincoln's candidacy, the 1st Minnesota Regiment in the Civil War, the Dred Scott Decision, and how early settlers coped with fire, floods and droughts will be shared. Former Governor Al Quie, Supreme Court Justice Paul Anderson, Senate Majority Leader Larry Pogemiller, First Lady Mary Pawlenty, WCCO Anchor Don Shelby, and Mark Seeley will be on hand to share their stories about Minnesota. The event runs from 6-9 pm and will help raise funds for the state's Sesquicentennial Celebration. If you are interested in attending, please call 612-803-4029 or go to www.mn150year.org

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, includes a discussion about the lunar eclipse on February 20th and whether or not the current La Nina episode has contributed to our winter weather patterns. Dr. Terry Jones from the University of Minnesota Astronomy Department and Mike Halpert from the NOAA Climate

Prediction Center are guests on the program. In addition the web site of the week features the University of Minnesota Starwatch program.

You can listen at the following web sites.....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: Music contest continues....

If you are an MPR "Morning Edition" listener, you may have noticed that we've been trying out some new music to introduce our conversations about the weather on Friday mornings. For many years we played Mark O'Connor's fiddle tune, "Soppin' the Gravy," but we feel it's time for something new. We are experimenting with new tunes. If you like any of the new ones, or you prefer the old one, we'd like to know. You could even compose something yourself and play it into our answering machine if you're so inspired.

We are looking for a short musical introduction with a lively start and a strong finish. If you have any ideas, call the Morning Edition comment line at 651-290-1080. If your piece of music is selected as the new theme for Friday's WeatherTalk segment, Mark will send you a signed copy of his book "Minnesota Weather Almanac."

Topic: Cold continues and sets records in places

After a February thaw over the weekend, arctic air invaded the state again, causing temperatures to fall by 40 to 50 degrees F. Many communities reported record setting lows on Wednesday morning (February 20th) including, -33 degrees F at Grand Forks, -31 degrees F at Fargo, -33 degrees F at Embarrass, -32 degrees F at Perham, -26 degrees F at Alexandria, -21 degrees F at Lamberton, -22 degrees F at Worthington (tied record low), -28 degrees F at Morris (tied record low), and -19 degrees F at Sioux Falls. The cold air hung around long enough for Crookston to set a new record low as well on February 21st with a reading of -31 degrees F.

Minnesota has reported the lowest reading in the 48 contiguous states five times so far this month. The month has also brought at least four days with dangerous wind chill conditions ranging from -30 to -50 degrees F. If a dramatic and constant warm period does not surface before the end of the month, this may be the coldest February statewide since 1994.

Topic: Weekly Weather Potpourri

Another outbreak of tornadoes plagued the SE states on February 17th. The NOAA Storm Prediction Center received 49 reports of tornadoes from North Carolina, Georgia, Alabama, and Florida. Many homes were damaged or destroyed, with a number of injuries reported as well. Damage was especially widespread around Montgomery, Alabama. These areas continued to need rain as a result of ongoing drought, but they seem to be getting a high frequency of severe weather this winter season. Most of the 212 tornado reports in February have come from SE states.

In the southern hemisphere, Madagascar was hit on February 17th by Cyclone Ivan which developed in the Southern Indian Ocean during last week. It packed winds of 125 mph and produced a large storm surge, and heavy rains. At least 22 people died as a result of the storm and damages are still being assessed, particularly to agricultural areas. Though diminished in strength, the remains of Cyclone Ivan were headed for Mozambique next.

Strong shamal winds brought a dust storm to Kuwait on Tuesday, February 19th. Visibility was so poor that ports were closed and flights delayed from the airport. This was the second dust storm to hit Kuwait in the past week. They are far more common in the summer season than winter, but it has been a dry winter season over there.

Drought continues to plagued Spain and Portugal. Lack of winter precipitation and low reservoir water storage has caused government officials to formulate plans for water restrictions this spring and summer. Spain's Meteorological Service has forecasted that the country may see its driest October through March period in 60 years.

A study released by NOAA's National Climatic Data Center this week shows that the 1970s media hype about an impending ice age, came primarily from only a few research articles, most associated with the study of some of the severe winters of that decade. Much of the other scientific literature of the 1970s was about climate change in the context of increasing temperatures, but this research did not garner as many headlines.

MPR listener question: How can I estimate the wind speed from visual observations?

Answer: This is difficult to answer. There is no visual technique that is very precise. You can categorically estimate wind speed in some cases. For example, when you observe smoke or stack plumes maintaining a somewhat continuous vertical column as they rise through the air, the wind speed is typically less than 7-8 mph. Small branches on trees often move when wind speeds range from 13-18 mph, and small trees move when wind speeds exceed 25 mph. This is also the approximate threshold

for wind to start making a whistling or howling sound. Empty garbage cans blow about the yard when wind speeds exceed 30 mph. I don't know about full garbage cans! Twigs and branches are subject to breakage when wind exceeds 40 mph. So far this month some communities have reported wind gusts of 40 mph or greater on three days.

Twin Cities Almanac for February 22nd:

The average MSP high temperature for this date is 29 degrees F (plus or minus 12 degrees F standard deviation), while the average low is 11 degrees F (plus or minus 13 degrees F standard deviation).

MSP Local Records for February 22nd:

MSP weather records for this date include: highest daily maximum temperature of 57 degrees F in 1930; lowest daily maximum temperature of -2 degrees F in 1889; lowest daily minimum temperature of -22 degrees F in 1873; highest daily minimum temperature of 38 F in 1930. Record precipitation for this date is 1.13 inches in 1922. Record snowfall is 5.3 inches also in 1913. Snow depth on this date in 1967 was 27 inches.

Average dew point for February 22nd is 14 degrees F, with a maximum of 37 F in 1906 and a minimum of -21 degrees F in 1965.

All-time state records for February 22nd:

The state record high temperature for this date is 66 degrees F at Whitewater State Park (Winona County) in 1943. The state record low temperature for this date is -46 degrees F at Bemidji (Beltrami County) in 1939. The state record precipitation for this date is 3.00 inches at Willmar (Kandiyohi County) in 1922, the most single day precipitation ever in the month of February statewide. Record snowfall for this date is 13.1 inches at Chatfield (Fillmore County) in 1940.

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A mild weekend most places with daytime highs perhaps similar to last weekend, 20s and 30s F. Increasing clouds later on Sunday and into Monday with a chance for snow, especially in southern sections. Some snow will last through Monday and into Tuesday morning. Temperatures will then drop for the balance of the week back to colder than normal values, but it will be dry most of next week as we approach the end of February with Leap Day on Friday.

Minnesota WeatherTalk for Friday, February 29, 2008

To: MPR's Morning Edition and Minnesota WeatherTalk Subscribers
From: Mark Seeley, Univ. of Minn Extension, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, February 29, 2008

Headlines:

- Help with the Sesquicentennial
- Jet Streaming podcast this week
- A music contest continues
- Climate Statistics for Leap Day are Odd
- Preliminary Climate Summary for February 2008
- Weekly Weather Potpourri
- MPR listener question about frost depth
- Almanac for February 29th
- Coldest ever start to March....1897 and 1962
- NOAA vessels
- Outlook

Topic: Fund Raiser for the Sesquicentennial

On Friday, February 29, 2008 the St Paul Hotel will host a storytelling event to help commemorate the state's Sesquicentennial. Stories about early pioneers, weather events, sports legends, politics, and other topics will be shared by a number of speakers including, former Governor Al Quie, Supreme Court Justice Paul Anderson, Congressmen Tim Walz, Senate Majority Leader Larry Pogemiller, Viking great Carl Eller, and Mark Seeley. The event runs from 6-9 pm and will help raise funds for the state's Sesquicentennial Celebration. If you are interested in attending, please call 612-803-4029 or go to www.mn150year.org

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, includes a discussion about the coming spring snow melt flooding season and NOAA's ThreadEx data base that extends the climate records of several major cities deep into the 19th Century, resulting in some remarkable new extreme temperature values. Guests include Brian Hahn of the National Weather Service Forecast Office in Milwaukee and Pete Boulay,

with the Minnesota State Climatology Office. In addition the web site of the week features everything you want to know about snow cover from NOAA's National Operational Hydrologic Remote Sensing Center. Cathy Wurzer also shares some feedback from listeners.

You can listen at the following web sites.....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: Music contest continues....

If you are an MPR "Morning Edition" listener, you may have noticed that we've been trying out some new music to introduce our conversations about the weather on Friday mornings. For many years we played Mark O'Connor's fiddle tune, "Soppin' the Gravy," but we feel it's time for something new. We are experimenting with new tunes. If you like any of the new ones, or you prefer the old one, we'd like to know. You could even compose something yourself and play it into our answering machine if you're so inspired.

We are looking for a short musical introduction with a lively start and a strong finish. If you have any ideas, call the Morning Edition comment line at 651-290-1080. If your piece of music is selected as the new theme for Friday's WeatherTalk segment, Mark will send you a signed copy of his book "Minnesota Weather Almanac."

Topic: Leap Day Climatology

This year 2008 will mark only the 29th Leap Day in the modern climatological record (back to 1891). That's not much of a record to derive statistics from. Even if we extend the record back by using the U.S. Army Signal Corps data from the 1870s and 1880s we only add five more Leap Days for a total of 34. This is a small population of numbers to produce meaningful climate statistics. Most locations show very low record values for Leap Day precipitation, as well as snowfall. Here are some from selected Minnesota cities:

Location	Feb 29 Record Precipitation	Feb 29 Record Snowfall
MSP	0.09" in 2004	0.7" in 1948
Duluth	0.27" in 1940	3.6" in 1940
International Falls	0.60" in 1908	6.0" in 1908
Rochester	0.14" in 2004	0.1" in 1976
St Cloud	0.01" IN 1948	0.2" IN 1948

In addition, even some of the record maximum and minimum temperature values for Leap Day do not seem extreme when compared to the surrounding dates (February 28 and March 1). Such is the impact of having a low population of numbers.

Topic: Preliminary Climate Summary for February 2008

February mean temperatures ranged from 5 to 8 degrees F colder than normal around the state. Extremes for the month were -40 degrees F at International Falls and Embarrass on the 11th and a high of 52 degrees F at Canby on the 24th. Minnesota reported the coldest temperature in the 48 contiguous states 9 times during the month, more than any other state. It was the coldest February since that of 2001.

Most observers also reported a drier than normal month, with little snow. There were some exceptions as Worthington, La Crescent, Winona, and Caledonia reported above normal precipitation. Caledonia was also slightly above normal on monthly snowfall with 9.4 inches (normal is 9.3"), while Isle reported 7.9 inches of snowfall which corresponds to their average value for February. Though precipitation was lacking most places some strong low pressure systems crossed the state during the month, bringing wind gusts of 40 mph or greater to western Minnesota counties on four different dates. These all produced dangerous wind chill conditions.

Thanks to a colder than normal December and February, the winter season (Dec '07 through Feb '08) will also be noted as the coldest statewide since that of 2000-2001.

Topic: Weekly Weather Potpourri

Floods during the last week of February have been devastating in the Philippines. More than 300,000 citizens have been displaced and at least 45 have lost their lives. It has been the wettest two week period in a number years, washing out roads and creating landslides. Climate history of the Philippines shows that typhoons often lead to this type of flooding, but in this case it has been a series of stalled or slow moving low pressure systems that have produced persistent heavy rain showers.

The Chinese Meteorological Administration is blaming La Nina in part for the drought across the north and the severe winter across the south. Drought has persisted for a number of months in the northern provinces where water supplies are very low. Officials anticipate that fresh water supplies may be a problem in the Beijing area during the upcoming 2008 Summer Olympics.

Over 30 scientists will be aboard the NOAA vessel Ronald Brown this year, traveling the southern hemisphere oceans to measure carbon dioxide exchange between the atmosphere and the sea. The process of climate change in the Southern Hemisphere

has been given relatively little attention compared to its northern counterpart. Scientists hope to better quantify the carbon cycle and the interactions between the sea and atmosphere in order to understand how climate change may manifest itself there.

A paper recently published in *Natural Hazards Review* suggests that increased economic loss associated with landfall hurricanes in the USA is primarily due to greater population and infrastructure exposure rather than increased intensity of hurricanes. Bottom line conclusion is that our vulnerability is increased, it is not a signature of climate change. Two of the authors are Roger Pielke Jr. and Chris Landsea, both of whom have studied climate change for a number of years.

Though the winter season has been harsh for parts of North America and Asia, Swedish meteorologists report it may be the mildest winter for their country in 250 years. Temperatures have averaged remarkably warmer than normal for the December through February period. They expect that spring-like conditions will arrive in most areas weeks earlier than normal.

MPR listener question: Absence of snow and cold temperatures this month are conducive to deeper frost in our soils. How deeply are soils frozen in Minnesota at the present time?

Answer: Frost depths did increase during the month of February for the very reasons you mentioned. Current frost depths in bare soil under snow from selected locations around the state are:

Morris 33" Crookston 42" Lamberton 25" Waseca 24" St Paul 22"

Mn/DOT reports deeper frost depths under roads and highways around the state. Some examples:

MN Hwy 266 near Worthington 52" MN Cty Rd 4 SW of Marshall 42" US Hwy 2 Cass Lake 72"

MN Hwy 200 W of Ada 56" Cty Rd 23 near Orr 69" I94 near Monticello 48"

With colder than normal temperatures favored for the first half of March, soil frost depths may increase yet, before they begin the spring thaw process.

Twin Cities Almanac for February 29th:

The average MSP high temperature for this date is 34 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 16 degrees F (plus or minus 13 degrees F standard deviation).

MSP Local Records for February 29th:

MSP weather records for this date include: highest daily maximum temperature of 61 degrees F in 2000; lowest daily maximum temperature of 10 degrees F in 1912 and 1980; lowest daily minimum temperature of -10 degrees F in 1884; highest daily minimum temperature of 37 F in 2000. Record precipitation for this date is 0.09 inches in 2004. Record snowfall is just 0.7 inches in 1948. Snow depth on this date in 1972 was 14 inches.

Average dew point for February 29th is 10 degrees F, with a maximum of 36 F in 1992 and a minimum of -25 degrees F in 1980.

All-time state records for February 29th:

The state record high temperature for this date is 65 degrees F at Forest Lake (Washington County) in 2000. The state record low temperature for this date is -38 degrees F at Roseau (Roseau County) in 1916. The state record precipitation for this date is just 1.16 inches at Long Prairie (Todd County) in 1948, the smallest state record precipitation value in February. Record snowfall for this date is 10.5 inches at Lambert (Red Lake County) in 1896.

From "Minnesota Weather Almanac":(available in bookstores or write the author)

Probably the coldest March days in Minnesota history were those of March 2, 1897 and March 1, 1962. An arctic high pressure system had settled over the state in both cases. Fewer weather observer were around in 1897 to record the cold. The observer at Pokegama Dam reported a low of -50 degrees F on March 2nd, an all-time state record for March. Most of the extreme cold was confined to northern Minnesota where Tower reported -32 degrees F and Bemidji reported -22 degrees F. In southern counties the temperatures remained mostly in the single digits above zero. March 1, 1962 brought cold temperatures to the entire state, including the state record low of -47 degrees F at Bigfork. Over 80 Minnesota communities reported a morning low temperature of -30 degrees F or colder, and many of these were in southern Minnesota locations, including Rochester, Zumbrota, and Caledonia. As so often happens in March, the last week of the month in 1962 was exceptionally warm, the exact opposite how the month started.

Words of the Week: Albatross IV, Fairweather, Nancy Foster, Rainier, Thomas Jefferson, McArthur II, Oregon II, Delaware II, Ronald Brown, and Miller Freeman

What do all these words have in common? They are the names of National Oceanic and Atmospheric Administration (NOAA) ships. These vessels support the NOAA mission primarily in coastal and sea operations and marine research. Crews are made up of NOAA Corps Officers and salaried marine and civilian employees, as well as staff scientists and technicians. Oceanic data and observations collected by these vessels are supplemented by similar observations from ocean cargo ships and others that contract with NOAA to supply additional information. These ships and crews certainly add to our body of scientific knowledge when it comes to understanding Earth's oceans.

Outlook:

Warmer on the weekend with thawing temperatures in many places. Increasing clouds later on Saturday with a greater chance for mixed precipitation (including freezing rain, snow or sleet) on Sunday, and some carryover into Monday. Then cooler to start next week with another warming trend by Wednesday and increased chances for precipitation.

Minnesota WeatherTalk for Friday, April 4, 2008

To: MPR's Morning Edition and Minnesota WeatherTalk Subscribers
From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, April 4, 2008

Headlines:

- Jet Streaming podcast this week
- A music contest continues
- Taxing last day of March
- Warm, spring air arrives
- Weekly Weather Potpourri
- Question on April extreme temperatures
- Almanac for April 4th
- Weather History in April
- Fractus clouds
- Outlook

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, contains a discussion with Dr. Ernst Kiesling of the Wind Science and Engineering Research Center at Texas Tech University. He and his colleagues devote their time to the study of durable structural designs that can withstand tornadic and straight line wind storms. He tells us about some of his research findings. In addition Paul, Cathy, and Mark talk with Dr. Bob Weisman of St Cloud State University Meteorology Program. Dr. Weisman shares a few thoughts on the training of undergraduates in meteorology and trends in career opportunities in this field. Paul Huttner also highlights another web site of the week.

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Topic: A very taxing last day of March.....

A large mid-latitude cyclone encompassed much of the nation's midsection on Monday, March 31st, bringing severe weather and as many as 14 tornadoes to Missouri and Oklahoma. Minnesota was on the cold side of the system and recorded thunder, lightning, rain, and snow. The precipitation lasted all day and made the evening commute especially problematic. Many areas of southern and eastern Minnesota reported snowfall amounts ranging from 5 to 7 inches, with nearly 9.5 inches in New Hope (Hennepin County). This was the most snow for March 31st since the storm of 1985. The snow was very dense with snow to water ratios ranging from 3:1 to 8:1. Up north some significant snowfalls occurred but the snow was lighter and blew around more. Duluth recorded 2.3 inches, but Marquette, MI reported a storm total of nearly 25 inches, with a record setting 15.8 inches coming on April Fool's Day (1st). The storm intensified as it crossed the Great Lakes Region (984 mb low) and brought high winds and heavy rains to the Maritime Provinces in Canada. Most Minnesota farmers were happy to see the moisture after a relatively dry winter.

Topic: Warm, spring air arrives....

Thursday this week brought afternoon temperatures from the mid to upper 50s F to much of Minnesota. The warmest day since November 13, 2007. Get used to it. Daytime highs in the 50s F or greater become much more common in April. The average number of days in April with a daytime high of 50 degrees F or greater is 21 for the Twin Cities area. In 1895 all 30 days during the month brought highs of at least 50 degrees F to the area. Even though temperatures will retreat a little bit late in the weekend and early next week due to increasing cloud cover and chances for rainfall, the temperatures will rebound later in the week and bring highs of 50 F or greater by next Thursday.

In the meantime, the ground frost will dissipate both from the top and the bottom. While 50 degree F temperatures thaw the ground from the top, deeper ground

temperatures of 50 degrees F (below a 6 ft depth) will thaw the ground frost from the bottom up as well.

Topic: Weekly Weather Potpourri

NOAA meteorologists reported that northern Arkansas recorded its wettest month of March in history, with 14 to 16 inches of total precipitation common across that part of the state. Conversely, Phoenix, AZ reported zero precipitation for the month of March, tying the record value of 1933, 1956, 1959, and 1984.

Arkansas was in the weather headlines again this week when 7 tornado reports from the state emerged on Thursday, April 3rd. One of the worst hit areas was Little Rock, where a mobile home park sustained severe damage and small planes and hangars were damaged at the North Little Rock Airport. National Weather Service forecasters in Little Rock had to seek shelter from the tornado for a brief time as well.

Earlier this week the Weather Service in Peru reported near record setting high temperatures ranging from the high 70s to low 80s F. These conditions motivated a number of holidaymakers to head for the beaches.

Recent heavy rains and flooding in Eastern Kenya have caused at least 7 deaths and displaced thousands of people living along flood plains. The first rainy season of the year generally lasts until mid-June there.

An unusual April snowfall was reported in Greece this week on Thursday and Friday. Temperatures below the freezing mark coupled with a large slow moving low pressure system were producing significant inches of snow. At higher elevations in Macedonia many inches of snow were reported.

Research published this week from the University of Lancaster and Durham University in the United Kingdom shows no correlation between cosmic ray fluctuations and the formation of low cloud patterns in the Earth's atmosphere. Earlier research had proposed a causal relationship between the two and a possible link to global climate change. But this recent study casts doubt on that theory.

MPR listener question: I have heard you say that the temperature extremes in March across Minnesota are as large or larger than any month of the year: -50 degrees F at Pokegama Dam (March 2, 1897) to 88 degrees F at Montevideo (March 23, 1910), a spread of 138 degrees F. We can still have a lot of snow in April, but severe thunderstorms and tornadoes as well. So, are the temperature extremes for the month as amplified as those of March?

Answer: Not quite. The all-time extremes for April are -22 degrees F at Karstad on April 6, 1979 (3 inches of snow on the ground), and 101 degrees F at Hawley on April 22, 1980 (bone dry soils), a spread of 123 degrees F. The longer daylength generally prevents as much overnight cooling, plus the dewpoints (water vapor) get significantly higher in April and help prevent the overnight lows from plunging too much, even in the presence of snow cover. Changing air masses however can bring some dramatic daily swings in temperature across the state. This was the case on April 3, 1982 when following an afternoon high of 78 degrees F at Lambert (under the threat of severe weather), a cold front swept through overnight and lowered the temperature 71 degrees to just 7 F by morning!

Twin Cities Almanac for April 4th:

The average MSP high temperature for this date is 49 degrees F (plus or minus 12 degrees F standard deviation), while the average low is 31 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for April 4th:

MSP weather records for this date include: highest daily maximum temperature of 81 degrees F in 1921; lowest daily maximum temperature of 25 degrees F in 1874; lowest daily minimum temperature of 5 degrees F in 1995; highest daily minimum temperature of 62 F in 1921. Record precipitation for this date is 0.77 inches in 1932. Record snowfall is 7.2 inches in 1957. Snow depth on this date in 1975 was 9 inches.

Average dew point for April 4th is 26 degrees F, with a maximum of 65 F in 1929 and a minimum of -9 degrees F in 1995.

All-time state records for April 4th:

The state record high temperature for this date is 89 degrees F at Tracy (Lyon County) in 1929. The state record low temperature for this date is -17 degrees F at Tower (St Louis County) in 1975. The state record precipitation for this date is just 2.57 inches at Hokah (Houston County) in 1981. Record snowfall for this date is 18.0 inches at Meadowlands (St Louis County) in 1968.

From "Minnesota Weather Almanac":(available in bookstores or write the author)

April of 1874 was one of the coldest in Minnesota history. The mean temperature for the month in the Twin Cities areas was barely above freezing at 35.6 degrees F, fully 11 degrees F cooler than the current monthly normal temperature (1971-2000). Lows in the single digits and teens F were recorded that month, and 22 days brought

minimum values below the freezing mark. The following April of 1875 was nearly as cold with a mean monthly temperature of just 38.6 degrees F in the Twin Cities area. St Paul observers reported nearly 5 inches of snow and strong northerly winds of up to 50 mph that must have produced some serious windchill conditions during the month. Conversely, just two years ago, 2006 brought one of the warmest April months of all-time to the Twin Cities, when a average monthly temperature of 53.6 degrees F was recorded. That April 9 days topped the 70 degrees F mark, and there were only three frosts, the last one coming on April 9th, producing quite an extended growing season.

Words of the Week: fractus clouds

As we migrate deeper into the spring season this month, cumulus clouds will become more common. These are characterized mostly by their vertical extent and may form at mid levels of the atmosphere, then with growth extend into the upper atmosphere to great heights. Fractus is a term used to describe an accessory cloud form that often exists in the presence of cumulus clouds. Fractus clouds generally form below the base of cumulus and look as if they have broken off from the larger cloud and been shredded by strong wind shear. They are ragged in appearance, often darker, and sometimes appear as those they are floating pieces of shredded cotton candy. Sometimes fractus clouds associated with large cumulonimbus clouds (thunderstorms) are called scud clouds, and form along the leading edge of an approaching thunderstorm.

Outlook:

A warm start to the weekend with temperatures Saturday in the 50s F and possible 60s F in the southern and western sections of the state. Increasing clouds late Saturday and into Sunday with a chance for precipitation. Then cloudiness will prevail much of next week with frequent chances for precipitation. This will hold temperatures down to normal or cooler than normal values for much of the week. Some warm up for the end of next week, but a continuing wet pattern.

Minnesota WeatherTalk for Friday, March 7, 2008

To: MPR's Morning Edition and Minnesota WeatherTalk Subscribers
From: Mark Seeley, Univ. of Minn Extension, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, March 7, 2008

DON'T FORGET TO SET THE CLOCK AHEAD ONE HOUR BEFORE GOING TO BED SATURDAY NIGHT!

Headlines:

- Jet Streaming podcast this week
- A music contest continues
- Winter not done
- Final impacts of ThreadEx on Twin Cities climate records
- Weekly Weather Potpourri
- Question on Heating Degree Days
- Almanac for March 7th
- More on March cold
- sniffers
- Outlook

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, includes a discussion about air quality. Two experts from the Minnesota Pollution Control Agency, Mark Sulzbach and Rick Strassman, talk with us about the measurements and trends in air quality. Changing air quality standards appear to have some role in these trends as well as the weather. In addition we talk to Michelle Margraf, the Cooperative Observer Program Leader at the National Weather Service Office in Chanhassen, MN. She gives us some insights about women working in meteorology.

You can listen at the following web sites.....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: Music contest continues....

If you are an MPR "Morning Edition" listener, you may have noticed that we've been trying out some new music to introduce our conversations about the weather on Friday mornings. For many years we played Mark O'Connor's fiddle tune, "Soppin' the Gravy," but we feel it's time for something new. We are experimenting with new tunes. If you like any of the new ones, or you prefer the old one, we'd like to know. You could even compose something yourself and play it into our answering machine if you're so inspired.

We are looking for a short musical introduction with a lively start and a strong finish. If you have any ideas, call the Morning Edition comment line at 651-290-1080. If your piece of music is selected as the new theme for Friday's WeatherTalk segment, Mark will send you a signed copy of his book "Minnesota Weather Almanac."

Topic: Winter not done yet.....

March so far has carried on the pattern of February, with daily temperatures that are several degrees colder than normal. Morning lows in northern counties have ranged from -10 to -30 degrees F, then struggled to reach daytime highs in the teens F. Thanks to Hallock, Longville, Kelliher, and International Falls Minnesota has reported the coldest temperature in the 48 contiguous states four times already this month (most recently -32 F on Friday morning). Much of this is associated with persistent snow cover and upper air flow that is directly out of the north and from high latitude positions. Air masses in the polar regions of Canada where this air comes from remain in the -30 to -40 degrees F range. A shift in the jet stream next week will bring milder air to the state sufficient to lose some of the snow cover.

Topic: Final Impacts of the NOAA ThreadEx data set on Twin Cities climate extremes....

We have spoken about NOAA's ThreadEx project in the past. This effort brought about the inclusion of older US Army Signal Corps data sets in the climatological records of several USA cities, including the Twin Cities. Formerly, the official climate records for the Twin Cities dated back to the establishment of the Weather Service in 1891. They now extend back to 1871 to include the St Paul Signal Corps data.

As a result, numerous Twin Cities daily temperature and precipitation records have been tied or broken. The final tabulation on all daily data shows that the addition of the records from 1871 to 1890 changed or tied the following climate record extremes:

Daily precipitation records changed on 47 dates

Daily maximum temperature records change on 29 dates

Daily coldest maximum temperature records changed on 56 dates
Daily minimum temperature records changed on 98 dates
Daily warmest minimum temperature records changed on 26 dates

So in total 256 climate records in the Twin Cities were altered by the inclusion of the ThreadEx data sets.

Topic: Weekly Weather Potpourri

Several hours of sleet and snow on Thursday (March 6th) caused the cancellation of 200 flights at the Dallas/Ft Worth Airport in Texas. Crews were taxed to keep up with de-icing of the planes as well as clearing runways.

Flight delays and cancellations were also common in eastern sections of Canada this week thanks to a large low pressure system that brought freezing rain, snow, and ice pellets. Flight delays and cancellations were reported from Halifax Stanfield International Airport, Toronto's Pearson International Airport, and Montreal's Trudeau International Airport. Up to 8 inches of fresh snow fell around Ottawa. Montreal has reported over 9.5 feet of snow so far this winter, a huge amount, but still short of their winter record of 12.5 feet in 1970-71.

The world's tallest snowwoman was unveiled earlier this week in Bethel, Maine. She is said to measure 122 feet tall, ten feet taller than the previous tallest snowman. Her arms are made from pine trees, while her lips are composed of painted tires.

Temperatures in the mid 90s F with dewpoints of 70 degrees F or higher caused high Heat Index values in parts of South Africa this week. Forecasts and advisories from the South Africa Weather Service (SAWS) concerning the dangerous Heat Index Values caused the cancellation of a number of sporting events, and senior citizens were encourage to remain indoors until the hot spell was broken.

Parts of China, Japan, and South Korea were plagued by yellow dust storms this week as sands from the Gobi Desert were being carried on strong regional early spring winds. Meteorologists there were encouraging citizens to wash frequently and wear dust masks and headscarves. In some areas the dust picks up pollution from industrial areas and carries it to cities far away. Chinese meteorologists suggest that dust storms may be more frequent this spring as a result of persist drought.

A recent NSF funded study of arctic tundra revealed that as the landscape warms shrubs expand and the soils become dried out with greater frequency, leading to more fires. These fires in the polar latitudes can release a great deal of carbon into the atmosphere and amplify climate change even more.

MPR listener question: I have heard you say that most of our recent heating seasons (Nov-Mar) in Minnesota have been quite mild and as a result friendly towards our pocketbooks with fewer than normal Heating Degree Days. But what about this recent heating season? Aren't we recording above normal Heating Degree Days in most places?

Answer: Actually we are recording only slightly greater than normal Heating Degree Days (HDD) this winter so far (through February) across the state. The HDD is the accumulation of temperature below a base value of 65 degrees F and is based on daily mean temperature data. It does relate closely to our energy usage for heating our homes and buildings. We have been so used to fewer than normal HDD values in the most recent 10 winters (1997-1998 through 2006-2007), that this heating season seems quite severe. But in the long term historical context it is not. The table below summarizes HDD values for the November through February time frame and illustrates this point:

Location 30-yr normal (1971-2000) Recent 10-yr average 2007-2008 Heating Season
HDD for Nov-Feb HDD for Nov-Feb HDD values for Nov-Feb

Twin Cities	5295	4772 (down 10%)	5433 (up 3%)
Rochester	5448	4910 (down 10%)	5491 (up 1%)
St Cloud	5754	5201 (down 10%)	5938 (up 3%)
Duluth	5904	5409 (down 8%)	5945 (up 1%)
International Falls	6438	5885 (down 9%)	6515 (up 1%)

So in reality we are gaging our perception of this heating season based on recent memory and not the long term statistics.

Twin Cities Almanac for March 7th:

The average MSP high temperature for this date is 32 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 16 degrees F (plus or minus 12 degrees F standard deviation).

MSP Local Records for March 7th:

MSP weather records for this date include: highest daily maximum temperature of 73 degrees F in 1987 and 2000; lowest daily maximum temperature of 4 degrees F in 1932; lowest daily minimum temperature of -16 degrees F in 1960; highest daily minimum temperature of 45 F in 2000. Record precipitation for this date is 1.02 inches in 1874. Record snowfall is just 11.5 inches in 1917. Snow depth on this date in 1962 was 23 inches.

Average dew point for March 7th is 13 degrees F, with a maximum of 44 F in 1983 and a minimum of -25 degrees F in 1960.

All-time state records for March 7th:

The state record high temperature for this date is 80 degrees F at Winona (Winona County) in 2000. The state record low temperature for this date is -38 degrees F at Little Fork (Koochiching County) in 1913. The state record precipitation for this date is just 3.57 inches at Caledonia (Houston County) in 1959. Record snowfall for this date is 22.7 inches also at Caledonia (Houston County) in 1959.

From "Minnesota Weather Almanac":(available in bookstores or write the author)

Since March has started out cold this year, it might be appropriate to reconsider how cold March can be. The coldest temperature ever measured in Minnesota during March was -50 F at Pokegama Dam on March 2, 1897, mentioned in last week's WeatherTalk. The latest in the spring that a -40 F reading has been recorded is March 24, 1974 when Thorhult (Beltrami County) reported -41 F. The latest in the spring for a -30 F or colder temperature is March 31, 1975 when Tower reported -32 degrees F.

The coldest month of March in Minnesota history was that of 1843. Few climate records exist of that time except those at old Ft Snelling. There, observers recorded 27 days during the month when the temperature dipped below 0 degrees F, bottoming out at -22 degrees F on March 13th. It was as cold as -16 degrees F on March 26th, a date with an average low of 16 degrees F above. The mean monthly temperature of 3.9 degrees F is over 28 degrees F colder than the modern mean for March in the Twin Cities area of 32.1 degrees F.

Words of the Week: Field sniffers

Weather clearly plays an important role in the dispersion of odors across the landscape. In rural areas these odors are sometimes associated with livestock operations or manure applications to soils. In some situations these odors present an ongoing community nuisance at certain times of the year. In order to assess these odors and develop effective strategies to mitigate them, various measurements are made. Among these measurements you'll occasionally find the deployment of "field sniffers." These people are trained to measure odors in the field. They calibrate their nose using a standard odor intensity scale for n-butanol. Then, once deployed in the field the sniffer wears a charcoal filtered mask that allows them to breathe odor-free air. Periodically and from different locations a sniffer will remove the mask and breathe in the surrounding air, recording the odor intensity on some numeric or categorical scale. In this manner a team of field sniffers can assess the dispersion of an

odor from a field where manure has been applied, a barn or building hosting a concentration of livestock, or a manure lagoon. In some cases this detection and analysis of odors is used to prescribe a separation distance between the source of the odor and any facilities or neighbors.

Outlook:

After a chance for snow early in the weekend, perhaps Saturday into early Sunday, a warming trend will begin and carry on into next week. Highs will reach the 40s F next week with chances for precipitation returning by late Wednesday or Thursday. This will promote quite a rapid rate of loss in snow cover across the state.

Minnesota WeatherTalk for Friday, March 14, 2008

To: MPR's Morning Edition and Minnesota WeatherTalk Subscribers
From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, March 14, 2008

Headlines:

- Jet Streaming podcast this week
- A music contest continues
- Seasonal snowfall variations
- A Big Thaw
- Weekly Weather Potpourri
- Calms
- Almanac for March 14th
- Famous March storms
- Ventometer and ventose
- Outlook

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, includes a discussion about Space Weather with NOAA scientist Doug Biesecker. He shares some thoughts on the solar cycle (sunspot variation) and possible implications for Earth's climate. We also speak with Jill Hasling, President of the John C. Freeman Weather Museum and Research Center in Houston, Texas. To the best of our knowledge this is the first weather museum in the country and provides many educational programs and displays for children and their parents. Interestingly enough they also host programs for senior citizens.

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Topic: Music contest continues....

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Topic: Seasonal snowfall around the state.....

Much attention has been directed to the lack of seasonal snowfall around Minnesota. Indeed, with the exception of a snowy December, most months have brought less than normal amounts. Measurements in the Twin Cities show a seasonal total of just 26.7 inches, while St Cloud has reported just 24.2 inches. Areas of western Minnesota like Redwood Falls and Pipestone have recorded less than 20 inches so far.

There are some exceptions around the state where seasonal snowfall has been close to normal and even somewhat above normal. International Falls has recorded 65.6 inches (average to date about 58 inches), Babbitt 50.2 inches (average to date about 37 inches), and Grand Meadow 46.9 inches (average to date about 39 inches). As we all know March can bring abundant rains or abundant snow, so these seasonal amounts may grow significantly by the end of this month, unless most of the March precipitation comes as rain.

Topic: A Big Thaw

This week brought temperatures in the 40s F to most places in Minnesota. There were even some mid 50s F reported in western parts of the state, where many overnight lows remained above the freezing mark allowing 24 hour melting that began to thaw the top few inches of soil. This indeed is the muddy season and it looks like it will persist for several days, especially in southern and western sections of the state. Most of Minnesota will not have the high risk of spring snow melt flooding like southern Wisconsin, northern Illinois, and parts of Iowa.

Topic: Weekly Weather Potpourri

A National Research Council Report released earlier this week revealed that the USA transportation infrastructure may be faced with some formidable challenges with expected future climate change. The report highlighted the increasing threats of

coastal inundation due to sea level rise and to an increased frequency of heavy rainfall events that produce flash flooding that may wash out roads and highways. Not all of the expected consequences of climate change will be negative with respect to transportation. A longer ice-free season in the Arctic Ocean may allow cheaper shipping routes to be taken between the Pacific Ocean basin and the North Atlantic.

In another article released this week the U.S. Fish and Wildlife Service (FWS) is considering a proposal to list the polar bear as a threatened species under the Endangered Species Act, largely based on anticipated habitat loss forecasted by climate models. Some of these models project a loss of more than 40 percent of prime spring and summer polar bear habitat by the year 2050, based on current rates of polar latitude warming. Bear biologists believe these losses will lead to the demise of more than 60 percent of the current population within the next 50 years. So FWS actions may be taken based on these modeling exercises.

The U.S. Geological Survey and the Russian Academy of Science announced earlier this month that they have developed a model for tracking the thickness of arctic sea ice. The model uses satellite derived sea ice motion, along with solar radiation and temperature data. It fit the variations in arctic sea ice well during the 1982 to 2003 period, and will be used to estimate the continuing loss in sea ice thickness. Since 2003 it appears that both the areal extent of arctic sea ice as well as ice thickness have been declining at an accelerated rate.

A large and intense mid-latitude winter storm struck Western Europe earlier this week. The storm was especially unusual for intensity as its central low pressure fell below 960 mb (28.35 inches on the barometer) and winds gusted beyond hurricane force, up to 90 mph in North Wales. The British Met Office reported sea wave heights off southern Ireland and the southwestern UK of 50 to 60 feet. The storm sunk a trawler in the English Channel and grounded a large cargo vessel along the French coast. There was a good deal of wind and coastal sea erosion along portions of the southern coast of the United Kingdom.

USA Today reported earlier this week that NOAA's Climate Prediction Center did not score too highly in its winter season outlook for Minnesota. In October the CPC forecasted a warmer than normal winter with equal chances for above or below normal precipitation. On the temperature feature, it was the complete opposite, delivering a 2007-2008 winter season that was colder than normal in Minnesota. On the precipitation side, it was generally drier than normal for the winter season. Overall across the USA, the newspaper weather writers graded the CPC with a B- for their winter season outlook

In the Southern Hemisphere down under, Adelaide, Australia reported 11 days of a record-setting heat wave. The eleven consecutive days with 95 degrees F or above broke the old record duration for a heat wave in a major Australian city, which had been 10 days back in February 1988 at Perth. A stubborn and strong high pressure system is expected to bring more heat to the area and raise the risk of wildfires as well.

Officials in eastern Canada, notably Quebec City, are attributing a higher frequency of angry behavior from citizens to "snow rage." It has been a long and snowy winter there. Neighbors are complaining about fellow residents shoveling snow onto their properties, and snowplow drivers intentionally piling vast quantities of snow onto residential property, leaving the homeowner to deal with it. Police are noting an increase in complaint calls, while psychologists are up to their ears in angry patients. For parts of eastern Ontario and Quebec it has been one of the snowiest winters in years.

MPR listener question: How often are the winds calm in Minnesota?

Answer: First let me define calm. For decades the National Weather Service measured wind with anemometers (cups mounted on a vertical shaft that rotate with the wind) which have a start-up threshold of 1 mph. More recently the Weather Service has converted to ultrasonic wind sensors that measure wind speed more precisely by its effects on sound transmission. This instrument can detect wind movement down to 0.5 mph. When wind speed is less than 1 mph the observation is noted as "calm." In the absence of an anemometer, some observations of wind are recorded based on the Beaufort wind scale. On the Beaufort wind scale, when smoke is observed to rise vertically or the sea surface is mirrorlike, the wind is recorded as "calm."

The frequency of calm conditions varies significantly around the state. For the Twin Cities the local climate records from the MSP airport show that a calm wind condition is reported only about 1.5 percent of the time, or about 131 hours per year. The month of highest frequency is July, when nearly 2.5 percent of the time a calm wind condition is reported. The month with the lowest frequency is January with 0.8 percent occurrence of calms. In terms of the daily pattern of wind speed, calms are reported most frequently between 11 pm and 5 am, especially in the summer months of July and August.

Twin Cities Almanac for March 14th:

The average MSP high temperature for this date is 36 degrees F (plus or minus 12 degrees F standard deviation), while the average low is 20 degrees F (plus or minus 12 degrees F standard deviation).

MSP Local Records for March 14th:

MSP weather records for this date include: highest daily maximum temperature of 62 degrees F in 1973 and 1990; lowest daily maximum temperature of 8 degrees F in 1906; lowest daily minimum temperature of -10 degrees F in 1897; highest daily minimum temperature of 45 F in 1973. Record precipitation for this date is 0.81 inches in 1989. Record snowfall is 9.0 inches in 2002. Snow depth on this date in 1962 was 26 inches.

Average dew point for March 14th is 21 degrees F, with a maximum of 57 F in 1990 and a minimum of -16 degrees F in 1960.

All-time state records for March 14th:

The state record high temperature for this date is 73 degrees F at Pipestone (Pipestone County) in 1935. The state record low temperature for this date is -40 degrees F at Detroit Lakes (Becker County) in 1897. The state record precipitation for this date is just 2.20 inches at Fort Ripley (Crow Wing County) in 1852. Record snowfall for this date is 18.0 inches at Grand Marais (Cook County) in 1917.

From "Minnesota Weather Almanac":(available in bookstores or write the author)

March 14-15 are significant anniversary Dates in Minnesota Weather History. On March 14, 1870 the term "blizzard" was first used in a written account of a major storm. The storm struck Minnesota and Iowa, with high winds and reduced visibility. Snowfalls up to 16 inches were recorded in some places. The Vindicator newspaper in Esterville, IA described the storm as a "blizzard" a term previously used in the sport of boxing to describe a volley of punches. The Army Signal Corps weather service adopted the term "blizzard" in 1876 and the Weather Service later defined it precisely as a winter storm that brings winds of 35 mph or greater, reduces visibility to a quarter mile or less, with blowing snow and falling temperatures. Typically this makes both travel and outdoor exposure very risky.

Saturday, March 15, 1941 is still remembered by long-time residents of northern Minnesota as perhaps the state's worst blizzard. Over 70 fatalities occurred in North Dakota and Minnesota, most as a result of people caught traveling in motor vehicles on Saturday night, when as much as eight foot drifts of snow piled up in places. Winds gusted to 85 mph at Grand Forks, 74 mph at Fargo and 75 mph at Duluth. These winds were described as "terrifying and highly destructive" by northern Minnesota weather observers. Temperatures dropped by 40 to 50 degrees over a 12 hour period and windchill values reached -30 to -40 degrees F. Along the stretch of

Highway 2 between Crookston and East Grand Forks, a foot of fresh fallen snow turned into drifts several feet high. Many stranded motorists were rescued by farmers or railroad crews. Some people fishing on the ice in Lake Superior, were stranded on ice floes for a day or two and drifted several miles before being rescued. Governor Harold Stassen was critical of the Weather Bureau for "inadequate weather warnings", though they had predicted a cold wave and strong winds earlier on Saturday. As a result of this and other criticism, the Weather Bureau forecast districts were later broken down into smaller geographic regions, so that the Chicago district office no longer had responsibility for forecasting of Minnesota weather.

(The above was partially taken from reports of the Minneapolis Star Tribune, Mar. 16-18, 1941, from The History of the U.S. Weather Bureau by D.R. Whitnah, and from Minnesota Weather by R.A. Keen)

Words of the Week: Ventometer and Ventose

These are both old words. Before the use of the term anemometer to describe an instrument for measuring wind speed, several countries called this instrument a ventometer, from the Latin words "ventus" meaning wind and "meter" for measure. For example, military history shows that long ago a ventometer was used by the Italian and French military to measure wind velocity on artillery target ranges during practice sessions.

The term "Ventose" dates from the Revolutionary calendar devised by the First French Republic (1793) following the French Revolution. This calendar divided the year into 12 months, each 30 days long, with five additional days each year for festivals (six in every 4th year). Further, each month was divided into 3 ten day periods, with weeks being abolished. The year began on the autumnal equinox (Sept 22 or so). On the old 18th Century French calendar Ventose was the windiest period of the year, roughly mid-February to mid-March and hence the name derived from the Latin word for windy or flatulent (ventosus). To this day, the term ventosity refers to windiness, and is derogatory when describing a person who is too conceited or boastful.

Outlook:

Near seasonal temperatures with partly cloudy skies over the weekend. Increasing clouds later on Sunday with an increasing chance for precipitation, rain, snow, or mixed, mostly in southern sections. Precipitation for the most part will probably be light. Chance for precipitation returns later next week as well.

Minnesota WeatherTalk for Friday, March 21, 2008

To: MPR's Morning Edition and Minnesota WeatherTalk Subscribers
From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, March 21, 2008

Headlines:

- Jet Streaming podcast this week
- A music contest continues
- Slushy March snows
- Sap weather
- Weekly Weather Potpourri
- Question about April snows
- Almanac for March 21st
- March tornadoes
- Names for the March Full Moon
- Outlook

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, includes a discussion about tornadoes that strike in highly urbanized areas. We visit with Dennis McCarthy, former chief meteorologist for the National Weather Service in Oklahoma City. He relates his experience with the F-5 tornado that struck that city on May 3, 1999. Recall that downtown Atlanta, GA was hit by a tornado earlier this week. Paul, Cathy, and Mark also chat with Jim Forrester of Meteorologix/DTN, the company that provides the weather forecasts for the Professional Golfers Association (PGA). Safety is the number one concern of their forecasters. Mark Seeley has a web site suggestion for those golfers who want to understand how weather affects the game.

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http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

As we come up on the one year anniversary of producing this weekly podcast, please consider dropping us a line if you have a question or suggestion for "Jet Streaming." Thanks.

Topic: Music contest continues....

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Topic: Slushy snow in March....

St Patrick's Day (Monday, March 17) not only produced severe weather in Atlanta, GA, but it brought a dense snowfall to many parts of Minnesota, that lingered into early Tuesday as well. Total snowfall ranged from 1 to 5 inches in most areas. It was a heavy, dense snowfall with a snow to water ratio of less than 8 to 1, fairly typical for March snows, which can be very high in water content. It also signaled a change in precipitation pattern across the North American continent. It appears that Minnesota will be in the path of a number of low pressure systems as they migrate across the country over the next two weeks. This will bring much more frequent chances for precipitation to our area. A sloppy period is in store with mixed rainfall and snowfall amounts.

Topic: Sap weather

Adequate to surplus fall soil moisture recharge is always a welcome sign to those who harvest maple sap to make syrup. Most areas of Minnesota recorded good soil moisture recharge last fall. Another climate feature watched closely by those who make maple syrup is the daily temperature pattern. Ideally, nighttime lows below freezing are followed by daytime highs above freezing. But extreme warming needs to be avoided. Again this appears to be the case this winter. A third climatic ingredient needed for good sap flow is a run of days with sunny skies and calm winds. These we have yet to realize, but perhaps they will prevail before the end of the month. During

the sap runs, daytime temperatures of 50 degrees F or above are detrimental to sap quality because bacteria invade and multiply more rapidly producing a darker amber color. Higher temperatures also promote more rapid phenological development of the trees shortening the period to bud swelling, when maple sap goes off flavor or "buddy" and is no longer harvested. Lower temperatures in the 30s and 40s F during harvest help prevent sap fermentation. The outlook for continued cooler than normal temperatures into early April is generally favorable for a good sap run this year. It should certainly be better than last year.

Some old sayings about the maple sap season:

"If the trees go into winter with wet feet, there will be a good sap season."

"Sap runs better by day than by night." (certainly, temperature rises sharply during the day assisted by the sun)

"Sixty-three percent of the sap is said to drop before noon." (the sharpest temperature rise occurs in the morning hours and winds usually pick up in the afternoon which slows the sap run).

Topic: Weekly Weather Potpourri

The tornadoes and severe weather in Georgia certainly captured headlines this week, especially the EF-2 tornado (winds of 130 mph) in downtown Atlanta that caused a good deal of damage. An item that was overlooked was the South Carolina was struck by at least 15 tornadoes last weekend. Scores of homes were destroyed and hundreds were damaged. Overall estimated damages approach \$13 million. Following an unusually high number of tornadoes nationwide in February (232), the number of March tornadoes so far across the nation is approaching 100, and we have 10 days to go.

The National Weather Service reported widespread snow melt flooding in the midwest this week brought on by both warmer temperatures and rain falling on top of snow or saturated soils. Large areas along the Ohio River, the lower Missouri River, and Mississippi River were expected to flood and remain in flood stage for several days as the accumulation of winter snowfall on the landscape is shed, along with the heavy rain. It appears that a wetter weather pattern over these watersheds may be setting up toward the end of the month and keep the flood threat persistent.

San Antonio, TX and surrounding areas reported a dirty rain this week. Strong winds across the west Texas plains churned up the soil into dust clouds that were swept up into the storm system. The rain showers actually brought mud as cars in the San

Antonio area were covered with it and looked like they had been in off-road race competitions. The car washes were exceptionally busy on Wednesday of this week.

Winds were also exceptionally strong this week, and laden in Sahara dust in western Africa. Known as the harmattan, this wind can be unhealthy for those suffering from respiratory disorders. Many Nigerian cities reported reduced visibilities and poor air quality. Citizens were covering their noses and mouths were scarves.

Scientists from the British Antarctic Survey (BAS) reported the successful use of unmanned aerial vehicles (UAVs) for taking meteorological measurements over the Antarctic ice sheet. It appears that more use of such technology is in store for the future in an area where the collection of meteorological measurements has always been highly problematic.

Weatherwise magazine reported a total of 1092 tornadoes in the USA during 2007, with an estimated economic loss of \$1.3 billion. Texas with 196 and Kansas with 137 topped the list. Minnesota reported only 18, the fewest number since 12 in 1990. By far the strongest tornado was the EF-5 (winds over 200 mph) that wiped out Greensburg, KS on May 4th.

MPR listener question: My new neighbors moved here from Georgia last year and have been bemoaning the March snowfalls as they have been wanting winter weather to end for weeks. But I tell them we can still get significant snows in April. How often does it snow during April in the Twin Cities and what are some of the extremes?

Answer: For the Twin Cities area we get measurable April snowfall about 75 percent of all years. So it is indeed pretty common. We have measured as much as 13 inches from a single snowstorm in April. Please assure your neighbors that snowfall statistics really tail off in May with measurable amounts occurring in only about 15 percent of all years. The Twin Cities climate record shows total April snowfall of 10 inches or greater only 8 times since 1883. There have been two years when April brought over 20 inches: 20.2 inches in 2002 and 21.8 inches in 1983. Thankfully, late season snowfalls rarely last for more than a day or two as the strong spring sun melts them away.

Twin Cities Almanac for March 21st:

The average MSP high temperature for this date is 41 degrees F (plus or minus 12 degrees F standard deviation), while the average low is 24 degrees F (plus or minus 10 degrees F standard deviation).

MSP Local Records for March 21st:

MSP weather records for this date include: highest daily maximum temperature of 76 degrees F in 1938; lowest daily maximum temperature of 13 degrees F in 1965; lowest daily minimum temperature of -8 degrees F in 1965 (-16 F in pre-statehood days of 1855); highest daily minimum temperature of 47 F in 1938. Record precipitation for this date is 0.83 inches in 1904. Record snowfall is 3.2 inches in 1992. Snow depth on this date in 1951 was 23 inches.

Average dew point for March 21st is 22 degrees F, with a maximum of 51 F in 1946 and a minimum of -11 degrees F in 1965.

All-time state records for March 21st:

The state record high temperature for this date is 81 degrees F at Montevideo (Chippewa County) in 1910. The state record low temperature for this date is -33 degrees F at Cotton (St Louis County) in 1965. The state record precipitation for this date is just 2.00 inches at Ortonville (Big Stone County) in 1893. Record snowfall for this date is 10.0 inches at Worthington (Nobles County) in 1932.

From "Minnesota Weather Almanac":(available in bookstores or write the author)

Tornado anniversaries in March:

March 18, 1968 brought the calendar's earliest ever date for a tornado in Minnesota. Following an unusually warm and muggy afternoon (temperatures in the mid 60s F and dewpoints in the 50s F) about 5:30 pm a F-2 tornado (winds to 157 mph) traveled for 6 miles across Watonwan County near the town of Truman. It destroyed three farms but did little other damage.

March 20, 1991 brought the second earliest tornado to strike Minnesota. This F-1 tornado (winds to 112 mph) touched down in Faribault County 3 miles south of Bricelyn. It traveled northeast toward Wells for about 15 miles doing about \$200,000 in damages to some farmsteads, uprooting trees, and knocking down power lines. Temperatures were unusually warm with highs in the upper 50s to low 60s F when the storm struck at about 4:30 pm.

Finally, the third earliest tornado in Minnesota history was on March 21, 1953 when an F-2 (winds to 157 mph) traveled 11 miles across portions of Stearns and Benton Counties. This tornado destroyed a church, a lumberyard and a laundromat NW of St Cloud, unfortunately killing a young boy who was in the laundromat. Once again temperatures had climbed into the mid to upper 50s F that afternoon.

Next week we'll talk about the most famous March tornado outbreak in Minnesota history, that of March 29, 1998.

Words of the Week: Sap Moon, Crow Moon, Worm Moon, Good Friday Moon, or Lenten Moon

Today's full moon is called the Good Friday Moon, but the first full moon of March goes by many other names as well. There is a logic to each one. Sap moon ties in well with the maple sap run, which often occurs during the month of March. Crow moon indicates more numerous and active crows. Worm moon refers to the fact that the ground thaws in March and may become warm enough for worm activity. Lenten and Good Friday Moons are those associated with Easter, and this is the 28th time Easter Sunday has fallen in the month of March since 1891.

Outlook:

With fresh snow cover going into the weekend, temperatures will remain cooler than normal for Saturday and Easter Sunday, with most daytime highs in the 30s F. Some lingering and scattered snow flurries may occur in eastern sections over through the weekend. A warm up will begin on Monday and continue next week until late Wednesday or Thursday when another storm arrives in the area raising the chances for precipitation.

Minnesota WeatherTalk for Friday, March 28, 2008

To: MPR's Morning Edition and Minnesota WeatherTalk Subscribers
From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, March 28, 2008

Headlines:

- Jet Streaming podcast this week
- A music contest continues
- Precipitation records from 2007
- Preliminary March Climate Summary
- Weekly Weather Potpourri
- Question 50 F days in March
- Almanac for March 28th
- March past events
- Woolpack
- Outlook

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, is devoted entirely to one of the worst tornado episodes in Minnesota history, March 29, 1998. On that day 14 tornadoes struck the state, the most severe inflicting damage to Comfrey, St Peter, and Le Center. Paul, Mark, and Craig talk with Warren Michaels of St Peter whose dog Corky got caught in the storm and somehow survived, and is still alive and kicking today. We also talk with the former mayors of Comfrey, Linda Wallin, and St Peter, Jerry Hawbaker. They tell some interesting stories about the tornadoes and how the communities pulled together after the storms. Paul Huttner also highlights a web site where you can read a detailed account of the storms from March 29, 1998.

You can listen at the following web sites.....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: Music contest continues....

If you are an MPR "Morning Edition" listener, you may have noticed that we've been trying out some new music to introduce our conversations about the weather on Friday mornings. For many years we played Mark O'Connor's fiddle tune, "Soppin' the Gravy," but we feel it's time for something new. We are experimenting with new tunes. If you like any of the new ones, or you prefer the old one, we'd like to know. You could even compose something yourself and play it into our answering machine if you're so inspired.

We are looking for a short musical introduction with a lively start and a strong finish. If you have any ideas, call the Morning Edition comment line at 651-290-1080. If your piece of music is selected as the new theme for Friday's WeatherTalk segment, Mark will send you a signed copy of his book "Minnesota Weather Almanac."

Topic: New State Annual Precipitation Record is Possible from a Very Wet 2007

As the climate data from 2007 are entered into the state data base it appears that a number of SE locations in Minnesota set new annual precipitation records. This was mostly due to the flash flood producing thunderstorms that occurred in August, combined with the continued wet trend in September and October of last year. The following locations reported new annual precipitation records.....

Caledonia 52.85 inches
Lanesboro 49.54 inches
Spring Grove 48.05 inches
Zumbro Falls 47.38 inches.

In addition the state record for annual precipitation according to the Minnesota State Climatology Office is 53.52 inches at St Francis (Anoka County) in 1991. Preliminary data from Hokah (Houston County) indicate that annual precipitation there in 2007 was somewhere between 57.50 inches and 59.50 inches. Recall Hokah reported 15.10 inches of rainfall from the storm on August 19, 2007. In any event, when all is said and done, perhaps Hokah will claim the new state record for annual precipitation.

Topic: Preliminary March Climate Summary

Most observers report average March temperatures that are 3 to 6 degrees F colder than normal. Extreme temperature values from the month have ranged from 56 degrees F at Redwood Falls on the 14th to -33 degrees F at Embarrass on the 8th. Minnesota has reported the coldest temperature in the 48 contiguous states 6 times so far this month.

Despite some significant snowfalls, total precipitation for the month is below normal in most places around the state. Most areas have seen less than 10 inches of snowfall this month. Milan and Ortonville in western Minnesota reported over 20 inches.

At the end of the month soil frost depths range from 2 feet to over 4.5 feet in parts of northwestern Minnesota.

Topic: Weekly Weather Potpourri

Minnesotans were not the only ones to see snowfall over the Easter weekend. Parts of the United Kingdom saw snow on Easter morning, a very rare occurrence for them. Snowfall was reported in parts of Scotland, Yorkshire and Manchester. Easter sunrise services at Farnham Pinnacle in North Yorkshire took place in 2 inches of fresh snow. Up to 4 inches fell elsewhere as many tourist destinations reported low visitor numbers for the holiday weekend due to the wintry mix of weather. It was reported to be the snowiest Easter since that of 1983.

World Meteorological Day was celebrated (at least in the weather community) this week on March 25th. This commemorates the establishment of the World Meteorological Organization back on March 23, 1950. The WMO coordinates efforts among the world's weather services regarding observations, measurements and sharing of data.

The European Space Agency (ESA) announced that it is just completing a satellite based land use map for Earth that will provide users the best resolution ever to assess patterns in land use and effects on the regional environments. This map will be made public in July of this year and represents a cooperative effort between ESA and the United Nations FAO. The pixel resolution on this map is supposed to approximate 300 meters.

An American survey study released by the Truman School of Public Affairs at the University of Missouri this week highlights the top three environmental issues expressed by a broad sampling of citizens, non of which are tied to global scale climate change matters. Listed by priority they are:

1. protecting community drinking water supplies
2. reducing pollution of rivers and lakes
3. improving urban air quality and reducing smog

MPR listener question: Given the forecast it looks like March of 2008 in the Twin Cities will go into the books with only one 50 degrees F day. A 50 F reading is always a mark of spring and gives me hope. How common is it for March to have no 50 degrees F days in the Twin Cities?

Answer: In 117 years of climate records for the Twin Cities (back to 1891) I can find 13 years when the temperature never reached 50 degrees F in March, most recently 2001. The persistence of this winter can be found in the stretch of days below 50 degrees F. In the Twin Cities the last fall date in 2007 with a daytime maximum of 50 F or higher was November 14, 2007 with 50 F exactly. We did not see 50 degrees F again until March 13, 2008 when it reached 51 F, a period of 120 days. This is the longest stretch of days below the 50 F mark since the winter of 2000-2001 when it lasted 147 days (November 8, 2000 to April 3, 2001). The longest stretch all-time was in the winter of 1978-79 when it lasted 149 days. Now it took patience to endure that winter.

I might add that we have been somewhat spoiled with respect to recent March temperatures. Over the past two decades in the Twin Cities, March has produced an average of 7-8 days with highs of 50 degrees F or higher. Further, 7 of the last 10 months of March have brought highs in the 60s F, while 6 of the past 10 have produced 70 degrees F or higher.

Twin Cities Almanac for March 28th:

The average MSP high temperature for this date is 45 degrees F (plus or minus 12 degrees F standard deviation), while the average low is 28 degrees F (plus or minus 9 degrees F standard deviation).

MSP Local Records for March 28th:

MSP weather records for this date include: highest daily maximum temperature of 78 degrees F in 1946; lowest daily maximum temperature of 21 degrees F in 1899; lowest daily minimum temperature of -1 degrees F in 1923; highest daily minimum temperature of 51 F in 1946. Record precipitation for this date is 1.08 inches in 1896. Record snowfall is 6.5 inches in 1894. Snow depth on this date in 1965 was 22 inches.

Average dew point for March 28th is 28 degrees F, with a maximum of 55 F in 1981 and a minimum of -9 degrees F in 1923.

All-time state records for March 28th:

The state record high temperature for this date is 84 degrees F at Bemidji (Beltrami County) in 1946. The state record low temperature for this date is -30 degrees F at Roseau (Roseau County) in 1923. The state record precipitation for this date is just 2.60 inches at Canby (Yellow Medicine County) in 1924. Record snowfall for this date is 13.0 inches also at Canby in 1924.

From "Minnesota Weather Almanac":(available in bookstores or write the author)

March 28-29, 1924 brought a heavy snowfall to southern Minnesota communities. Because of a prolonged lack of snow that winter, the moisture was welcomed by most Minnesota farmers. Weather observers across southern counties reported 15 to 25 inches of snow from the storm. Roads were blocked by huge drifts. This storm ushered in a wet April that recharged the soils in most of the state.

Sunday, March 29, 1998 brought perhaps the most destructive outbreak of tornadoes since May of 1965. Spotters sighted 14 different tornadoes across southern Minnesota that day. Two deaths were reported and severe damaged inflicted on the towns of Comfrey, St Peter, and Le Center. The tornado that destroyed most of Comfrey was on the ground for 67 miles, one of the longest tornado paths in history. Only six other documented Minnesota tornadoes have been on the ground for 60 miles or longer. In addition, only five other years have ever brought a tornado to Minnesota during the month of March.

I will participate this Saturday, March 29, 2008 in the TREEmendous Twister Party at the St Peter Community Center, a fund raiser for building the TREEmendous playground in St Peter. During the event we will remember the tornado and I will talk about severe weather history in Minnesota. The event starts and noon and runs to 5:00 pm. It is open to the public if you are interested.

Words of the Week: Woolpack

This is the name given to describe cirrocumulus or altocumulus cloud forms that are often seen in the mid to late afternoon as a pattern of fleecy looking cotton balls. They resemble a flock of sheep or lambs to many observers. As we move into the month of April the cumulus forms of clouds will generally become more conspicuous and we may see some woolpacks.

Outlook:

Generally a cloudy weekend with a chance for rain or snow showers later on Saturday and into Sunday morning. Precipitation will become more common next week, as several disturbances move across the area. Chances for precipitation Tuesday through Thursday, with moderating temperatures. We may even see some 50s F in places.

Minnesota WeatherTalk for Friday, May 30, 2008

To: MPR's Morning Edition and Minnesota WeatherTalk Subscribers
From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, May 30, 2008

Headlines:

- Jet Streaming podcast this week
- Preliminary Climate Summary for May
- Weekly Weather Potpourri
- Question about Minnesota climate stations
- Almanac for May 30th
- Historical wet and dry Junes
- HP Supercells
- Outlook

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, includes a discussion about the recent tornadoes in Minnesota, Wisconsin, and Iowa among other states. Our first guest is Todd Krause, Warning Coordination Meteorologist with the National Weather Service Forecast Office in Chanhassen, MN. Todd is often required to do storm damage surveys and to rate the strength of tornadoes using the EF scale based on observed wind effects. Our second guest is Tim Marshall, a civil engineer who had a hand in developing the Enhanced Fujita Scale for assessing tornado strength. He talks about construction techniques to resist tornado forces. Clearly severe weather episodes have been more frequent across the country this year, with at least 110 deaths. We also highlight the web site of the NOAA Storm Prediction Center.

You can listen at the following web sites.....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: Preliminary Climate Summary for May

May brought a 4th consecutive month with below normal average temperatures. Most observers are reporting a monthly average that is 3 to 6 degrees colder than normal.

This temperature pattern of course delayed the normal signs of spring (lake ice out, leafing out of trees, planting of crops, mowing of grass, etc). Extremes for the month ranged from 89 degrees F at Waseca on May 25th to just 19 degrees F at Embarrass on May 5th. Even though it was a cold month climatologically, Minnesota reported the lowest temperature in the 48 contiguous states only twice during May. Frosts were reported on many mornings up north, including May 27th (Tue) this week when new record lows were established at a number of locations, including Hibbing with just 24 degrees F.

Despite a wet start to the month, May has been drier than normal in most places. Areas of the Red River Valley have had less than 1 inch of rainfall and consequently seen blowing soil. May 3-4 brought some heavy rains to southern Minnesota counties with many observers reporting over 1 inch. Heavier rainfalls were also occurring there on Thursday and Friday of this week. St Cloud reported a new daily record amount of 1.37 inches on May 29th.

May was a windy month. Many days wind gust exceeded 40 mph, and were over 50 mph on at least one day. May 25th brought the most severe weather. Water spouts were sighted over Leech Lake in northern Minnesota, and tornadoes caused damage in the Coon Rapids and Hugo areas of the Twin Cities Metro Area. These were the first Minnesota tornadoes of 2008. The one in Coon Rapids was rated an EF-1 (86-109 mph gusts), while the one in Hugo was rated EF-3 (138-167 mph gusts). The Warner Nature Center near Hugo reported many lost trees. Storm survey reports also showed that an EF-0 tornado (65-85 mph) damaged trees across the St Croix River in Wisconsin.

Topic: Weekly Weather Potpourri

A report released this week from Healing Our Waters-Great Lakes Coalition suggests that climate change will continue to have impacts on the Great Lakes region. Lake level fluctuations may be magnified and fall as much as 3 feet, while biological dead zones may emerge where fish and plant life have a difficult time surviving. They also call for repairing sewage treatment systems, restoring habitat and mitigating invasive species in the Great Lakes Region.

Last Friday, May 23rd, the Weather Service in Phoenix, AZ reported a new daily record rainfall of 0.12 inches. It was only the second time since 1896 that it has rained in Phoenix on May 23rd.

With nearly 1200 reports of tornadoes so far this year, the NOAA Storm Prediction Center suggests we may be heading for a record number of tornadoes. The record year was 1819 in 2003. Tornado deaths are up this year as well, with at least 110 reported

so far. Early in the year, tornadoes were more frequent in the southeastern states, but recent activity has moved to the southern and central plains states.

The first tropical storm of the Eastern Pacific season developed on Thursday this week. Tropical Storm Alma was bringing 65 mph winds and heavy rain bands to Honduras, Nicaragua, and Costa Rica. It was expected to develop into a hurricane before making landfall.

Meanwhile, south of Tokyo, Japan in the Western Pacific Typhoon Nakri was churning away with 165 mph winds and sea wave heights of 32 feet. Thankfully it was expected to track across the Pacific south and east of Japan, eventually dissipating on June 2nd.

As if the earth quakes in China were not enough, heavy rains, along with thunder and lightning were pounding parts of southern China on Wednesday this week. The flooding produced by the heavy rains were blamed for up to 28 deaths.

MPR listener question: What is the northern most weather reporting station in Minnesota and what is the southern most? How many miles apart are they?

Answer: At 49 degrees 32 minutes north latitude, Flag Island on Lake of the Woods is the most northerly climate station in Minnesota, and the most northerly in the contiguous 48 states. The most southerly station is Harmony in Fillmore County, at 43 degrees and 33 minutes north latitude. The distance between these two stations is about 435 miles. Obviously, Flag Island is a much colder place on average than Harmony. The average June daytime high temperature is near 80 degrees F at Harmony, while it is only about 72 degrees at Flag island. On occasions in the winter months, Flag Island reports the nation's coldest temperature, while Harmony never does. Flag Island is also a much drier place. Average annual precipitation in Harmony is 33.47 inches, while at Flag Island it is barely 22 inches.

Twin Cities Almanac for May 30th:

The average MSP high temperature for this date is 75 degrees F (plus or minus 9 degrees F standard deviation), while the average low is 53 degrees F (plus or minus 7 degrees F standard deviation).

MSP Local Records for May 30th:

MSP weather records for this date include: highest daily maximum temperature of 98 degrees F in 1934; lowest daily maximum temperature of 54 degrees F in 1922; lowest daily minimum temperature of 37 degrees F in 1947; highest daily minimum

temperature of 69 F in 1939, 1944, and 1988. Record precipitation for this date is 2.04 inches in 1877. There is no record of any snowfall on this date.

Average dew point for May 30th is 51 degrees F, with a maximum of 72 F in 1918 and a minimum of 24 degrees F in 1964.

All-time state records for May 30th:

The state record high temperature for this date is 108 degrees F at Pipestone (Pipestone County) in 1934. The state record low temperature for this date is 20 degrees F at Pokegama Dam (Itasca County) in 1889. The state record precipitation for this date is 5.63 inches at Preston (Fillmore County) in 1980. Record snowfall for this date is just 0.1 inches at Bemidji (Beltrami County) in 1897.

From "Minnesota Weather Almanac":(available in bookstores or write the author)

The wettest June for the Twin Cities Metro Area occurred in 1874. That particular month saw rainfall on 18 different days, and on four of those days it rained over 1 inch. June 15, 1874 brought thunderstorms that produced 2.80 inches of rainfall and a rapid rise in the Mississippi River. June 1874 brought a total of 11.67 inches of rainfall, nearly a third of the entire year's precipitation. That wet month was preceded by a dry May (only 1.65 inches of rain) and followed by a dry July (only 1.94 inches of rain).

Interestingly enough, the driest June in the Twin Cities Metro Area was not in the 1930s but also in the 19th Century, 1863. That particular June brought only a trace of rainfall to both Minneapolis and St Paul, according to the old Smithsonian observer records. July brought less than two-thirds of an inch of rainfall, so crops were significantly drought stressed and yields drastically reduced during that Civil War year. The year of 1863 ended up being one of the driest on record in the area with just 15.77 inches of precipitation.

Words of the Week: HP Supercell

An HP Supercell is a high-precipitation supercell thunderstorm where the intense precipitation and often times shafts of hail obscure the view of storm spotters who are looking for rotation to visually identify tornadoes. Unlike most classic supercells, the region of rotation in many HP storms develops in the front-flank region of the storm (i.e., usually in the eastern portion). HP storms more often produce extreme and prolonged straight-line wind events, serious flash flooding, and very large damaging hail events.

Outlook:

Continued partly cloudy over the weekend with a chance for scattered showers. Warmer on Sunday, with a few daytime highs of 80 degrees F or higher. Another chance for showers and thunderstorms later on Monday and continuing into Tuesday and Wednesday. Temperatures will remain near normal.

Minnesota WeatherTalk for Friday, April 11, 2008

To: MPR's Morning Edition and Minnesota WeatherTalk Subscribers
From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, April 11, 2008

Headlines:

- Jet Streaming podcast this week
- A music contest continues
- Winter hanging on
- Weekly Weather Potpourri
- Question about end of winter weather
- Almanac for April 11th
- Snow April of 1950
- Crosshair signature
- Outlook

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, contains a discussion with Kai Ryssdal, host of American Public Media's Marketplace program on National Public Radio. Weather impacts on economics provides the focus of conversation with Paul Huttner and Craig Edwards talking to Kai. Paul and Craig also speak to Kelly Savoy of the American Meteorological Society program to certify broadcast meteorologists. The AMS seal is an important feature in marketing the skills of a meteorologist. Paul Huttner also highlights another web site of the week called ScienceDaily.

You can listen at the following web sites.....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: Music contest continues....

If you are an MPR "Morning Edition" listener, you may have noticed that we've been trying out some new music to introduce our conversations about the weather on Friday mornings. For many years we played Mark O'Connor's fiddle tune, "Soppin' the Gravy," but we feel it's time for something new. We are experimenting with new

tunes. If you like any of the new ones, or you prefer the old one, we'd like to know. You could even compose something yourself and play it into our answering machine if you're so inspired.

We are looking for a short musical introduction with a lively start and a strong finish. If you have any ideas, call the Morning Edition comment line at 651-290-1080. If your piece of music is selected as the new theme for Friday's WeatherTalk segment, Mark will send you a signed copy of his book "Minnesota Weather Almanac."

Topic: Winter hanging on in Minnesota.....

April continued to deliver snow this week to the Minnesota landscape, having started out on April Fools Day with a heavy, wet deposition of white across parts of central Minnesota. April 5-6 brought record-setting amounts of snow to many northern communities. Some of the larger totals included: 32 inches just north of Virginia, 29 inches at Cass Lake, 26.5 inches at Chisholm, 26 inches at the Marcell Forestry Station, 23 inches at Grand Rapids, 22 inches at Embarrass, 20 inches at Orr, and 19 inches at Tower. The liquid water contained in the snow was very significant ranging from 1.5 to 2.0 inches in some spots, a very high amount for the month of April. The fresh snow cover reduced the air temperature considerably, as many observers reported overnight lows in the teens F, and some daytime highs that remained in the 20s F.

Thursday and Friday brought another winter storm, a very large one, across the area. New record daily precipitation amounts fell at Rochester (1.16 inches), Eau Claire, WI (1.01 inches), and La Crosse, WI (1.20 inches). Thunder and lightning were reported by a number of observers. Colder air brought snowfalls of 4 to 12 inches across central and northern portions of the state on Thursday as well. In addition blizzard conditions prevailed along the north shore, with wind gusts exceeding 50 mph at Duluth, and near shore wave heights of 12 feet or greater causing some coastal erosion. Some northern Minnesota locations may see April snowfall totals that match those of 1950 (see below).

Topic: Weekly Weather Potpourri

Heavy snow fell across portions of western Nebraska on Thursday morning this week, closing schools in the area. Ranchers were warned to move livestock to sheltered areas as blizzard conditions were possible with snowfall amounts ranging from 7-10 inches. As with most April snowfalls, the effect may be short-lived as temperatures will rebound into the 50s and 60s F later in the weekend.

Further to the south severe weather, including hail, thunderstorms and some tornadoes struck parts of Missouri, Texas, and Kansas on Thursday. Trees and powerlines were down in parts of these states and some buildings were damaged by winds. The number of tornadoes reported nationwide since April 1st now exceeds 40.

Dr. William Gray and the staff of atmospheric scientists at Colorado State University issued a North Atlantic Hurricane Season Forecast this week that indicates up to 15 named storms are expected, partially as a result of a lingering La Nina episode the Pacific Ocean Basin. Further they suggest that 8 of these storms will become hurricanes, and four of those may become major hurricanes. The North Atlantic Hurricane Season runs from June 1st to November 30th and on average produces about 10 named storms and six hurricanes. In this context the forecast implies a more active hurricane season for the North Atlantic in 2008.

Very heavy rains in the Rio de Janeiro region of Brazil caused widespread flash flooding and up to 34 deaths this week. In addition nearly 200,000 residents were displaced from their homes. Harvest season had not concluded, so some losses in crop production were anticipated as well. Rare April snow showers plagued the United Kingdom last weekend. Even London reported snow showers in enough quantity that outdoor work was disrupted and the carrying of the Olympic flame through the city was quite problematic with the cold and snow.

MPR listener question: How long is this !*^&%\$@! winter weather going to last? We are tired of it!

Answer: Though rare, winter conditions can certainly hang on for a long time....here are some historical facts....

Below zero minimum temperatures have come as late as April 28th to northern Minnesota. St Vincent (Kittson County) reported a low of -2 degrees F on April 28, 1892.

The Twin Cities thermometer was resting on just 2 degrees F on the morning of April 13, 1962.

Snow flurries were reported at Saint Paul's Holman Field on June 1, 1946.

The observer at Virginia, MN on the Iron Range reported a snow depth of 14 inches on May 4, 1954. In fact snowfalls of 10 to 12 inches were common across northern Minnesota the first few days of May, 1954 and school districts declared a "snow day", the only known school closure for snow during the month of May.

Virginia also reported a snow depth of 5 inches on Memorial Day of 1946.

There were ice floes on Lake Superior as late as June 9, 1972 and even later back in the 19th Century, July 3, 1876.

Though the history books document a handful of April blizzards in Minnesota history, I have yet to find one in the month of May! April of 2008 is setting up to be a cool, wet, and muddy month.

Twin Cities Almanac for April 11th:

The average MSP high temperature for this date is 53 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 34 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for April 11th:

MSP weather records for this date include: highest daily maximum temperature of 83 degrees F in 1968; lowest daily maximum temperature of 25 degrees F in 1940; lowest daily minimum temperature of 12 degrees F in 1940; highest daily minimum temperature of 59 F in 2006. Record precipitation for this date is 1.58 inches in 1887. Record snowfall is 5.7 inches in 1929. Snow depth on this date in 1980 was 4 inches.

Average dew point for April 11th is 29 degrees F, with a maximum of 59 F in 1945 and a minimum of -1 degrees F in 1940.

All-time state records for April 11th:

The state record high temperature for this date is 92 degrees F at Browns Valley (Traverse County) and Madison (Lac Qui Parle County) in 1977. The state record low temperature for this date is -4 degrees F at Baudette (Lake of the Woods County) in 1940. The state record precipitation for this date is just 3.75 inches at Rochester (Olmsted County) in 2001. Record snowfall for this date is 12.0 inches at Winnebago (Faribault County) in 1922 and at Minneota (Lyon County) in 1959.

From "Minnesota Weather Almanac":(available in bookstores or write the author)

Historically, it is hard to beat the snowy April of 1950. For much of Minnesota it was the snowiest April in history, with 26 communities reported monthly totals over 20 inches, and 7 communities reported totals over 30 inches. Observers reported measurable snowfall amounts during the month on as many as 13 different days, and snow depths of over 2 feet in the northern counties. At Itasca State Park 33 inches of

snowfall was reported and is still the monthly record at that location. Similarly the Duluth total of 31.6 inches and the Aitkin total of 35.8 inches are still April records even today. Pine River Dam accumulated 37 inches of snowfall which is the statewide record for April (tied with Tower's 37 inches in April of 1961).

Words of the Week: Crosshair Signature

This terminology is used by meteorologists to identify a spatial pattern signature in the data used to assess how much snow may fall from a storm. It refers to a vertical zone or area where atmospheric lift will be maximum right in an area of abundant moisture and dendritic ice crystal formation. Under such circumstances the crosshair signature implies that snowfall rates may range from 3 to 4 inches per hour, an extremely high snowfall rate and rare for the Western Great Lakes area.

Outlook:

Lingering showers and snow into Saturday for eastern sections, then partly cloudy with weekend highs in the 30s and 40s F. Slow warm up next week, but increasing chances for showers by late Tuesday and Wednesday. Some 50 degrees F temperatures will return.

Minnesota WeatherTalk for Friday, May 16, 2008

To: MPR's Morning Edition and Minnesota WeatherTalk Subscribers
From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, May 16, 2008

Headlines:

- Jet Streaming podcast this week
- Progress in planting slow...
- Weekly Weather Potpourri
- Question about Memorial Day weather
- Almanac for May 16th
- Historical May weather...hot and cold
- Vigil Basins
- Outlook

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, provides a continuation of the conversation held at the MPR Forum on May 1st about severe weather. Participants included Paul Huttner, Paul Douglas, Craig Edwards, Todd Krause from the National Weather Service, and storm spotters from the Skywarn System. Our conversation is moderated by MPR host Cathy Wurzer.

You can listen at the following web sites.....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: Finally some progress in planting....

Though only a third of the state's corn crop had been planted by last weekend (May 11), good progress has been made this week, with farmers working around wet spots. Unfortunately soil temperatures remain colder than normal, so corn seed is taking longer to germinate and emerge this year. Some farmers are also planting soybeans now, but wet spots in fields are still being worked around. Drier areas of northwestern Minnesota where small grains have been planted are in need of some rain. Portions of northwestern and west-central Minnesota still show up as dry on the U.S. Drought

Monitor. Alfalfa fields are beginning to grow more vigorously, but the first cutting of hay will be later than in most recent springs.

Soil temperatures at the 4 inch depth are now well into the 50s and 60s F, but partial ice cover still lingers on northern lakes like Gunflint, Devil Track, Rainy, Seagull, and Lake of the Woods. These will probably be ice free by the weekend. For some areas of the state temperatures have been colder than normal each day of the month so far, rivaling those cold Mays of 2004, 1997, and 1979.

Topic: New Seasonal Climate Outlook

NOAA's Climate Prediction Center released new monthly and seasonal climate outlooks on Thursday of this week. Continued wetter than normal conditions are expected to start June in SE Minnesota areas. But, elsewhere across the state summer precipitation has equal chances of being above or below normal through August. Likewise temperatures through August have equal chances of being above or below normal according to the CPC.

With the lateness in the planting season this year, warmer than normal temperatures during the summer may be needed to help crops catch up on growth and development so that they mature early enough in the fall to avoid any threat of frost.

Topic: Robert Louis Stevenson poetry....

This time of year I like to remember Stevenson's poem about the summer sun....

Great is the sun, and wide he goes,
Through empty heaven without repose;
And in the blue and glowing days
More thick than rain he showers his rays....
Above the hills, along the blue,
Round the bright air with footing true,
To please the child, to paint the rose,
The gardener of the World, he goes.

Topic: Weekly Weather Potpourri

The National Weather Service La Crosse, WI office web site....

<http://www.crh.noaa.gov/arx/>

offers an interesting remembrance of the famous tornado outbreak of May 15, 1968 in eastern Iowa. Up to five different tornadoes produced 18 fatalities and 619 injuries, with a good deal of destruction in the Charles City area. There are many photos and references to newspaper articles from that time.

The NOAA Storm Prediction Center notes that over 900 tornadoes have occurred throughout the USA so far this year. This is a frequency that may threaten the record year of 2004 when 1819 tornadoes were recorded in the USA. Many of these storms so far have been across the SE states.

A study release by NASA-Goddard and published in "Nature" reveals that more physical and biological systems are showing the consequences of climate change worldwide. Impacts on habitat, migration patterns, fresh water systems, and flowering habits of many plants are illustrated as climate change consequences.

Very strong thunderstorms near New Delhi India this week brought a massive dust storm that brought reduced visibility and poor air quality. The strong winds were followed by heavy rainfall and cooler air, dropping the daytime high from 113 degrees F to 99 degrees F. The heavy showers were expected to pass to the east over the Bay of Bengal and affect Myanmar over the next 4-5 days. This is unfortunate in that the stormy weather will compound the problems associated with recovery efforts in that country from the devastation of Cyclone Nargis.

MPR listener question: Given the cold temperatures and even snow that occurred last weekend up north for the Minnesota Fishing Opener, can you tell me if it has ever snowed on Memorial Day in Minnesota, which is only a little over a week away (May 25th)?

Answer: From my review of the Minnesota climate records I can find two cases when it snowed on Memorial Day. May 30, 1897 brought 0.1 inches of snow overnight to Bemidji, MN. It was cold and blustery with overnight temperatures in the low to mid 30s F. On May 25, 1992, between 11:00 am and 2:00 pm temperatures hovered in the mid to upper 30s F and New Ulm reported 1.3 inches of heavy, wet snow, a state record for Memorial Day. Of course the eruption of Mt Pinatubo in the Philippines during 1991 set up much of North America to have a very cold summer in 1992, with a frost on the Summer Solstice, June 20th that year.

Twin Cities Almanac for May 16th:

The average MSP high temperature for this date is 69 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 48 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for May 16th:

MSP weather records for this date include: highest daily maximum temperature of 94 degrees F in 1934; lowest daily maximum temperature of 48 degrees F in 1950 and 1968; lowest daily minimum temperature of 31 degrees F in 1890 and 1929; highest daily minimum temperature of 68 F in 1962. Record precipitation for this date is 1.10 inches in 1905 (Pioneer Era shows 1.15 inches in 1853). Record snowfall is 0.1 inches in 1929.

Average dew point for May 16th is 42 degrees F, with a maximum of 71 F in 1962 and a minimum of 16 degrees F in 1973.

All-time state records for May 16th:

The state record high temperature for this date is 100 degrees F at Milan, Beardsley, Wheaton, and Artichoke Lake in 1934. The state record low temperature for this date is 12 degrees F at Meadowlands (St Louis County) in 1929. The state record precipitation for this date is just 5.00 inches at St Cloud (Sherburne County) in 1894. Record snowfall for this date is 2.5 inches at Mahoning Mine (St Louis County) in 1932.

From "Minnesota Weather Almanac":(available in bookstores or write the author)

May of 1934 is remembered as one of the hottest in Minnesota history. Many communities had 14-15 days that month with highs of 90 degrees F or higher. Several reported temperatures over 100 degrees F, including an incredible 112 degrees F at Maple Plain on May 31st. Thirteen state record high temperatures still exist from May of 1934. Needless to say the combination of heat and drought produced one of the worst growing seasons in Minnesota history. Corn yields that year ranged from 7 to 15 bushel/acre in western Minnesota, and from 20 to 30 bushel/acre across southern counties.

Conversely, May of 1907 was probably the coldest in Minnesota history. Freezing temperatures occurred somewhere in the state on each day of the month, with all-time state lows of 13 degrees F at Hallock on the 7th and 10 degrees F at Pine River on the 8th. Widespread frost was reported as late as May 27th. In addition, 8 inches of snow fell at Mount Iron (St Louis County) on May 15, 1907. Ten communities reported 6 inches of snowfall or more. In the Twin Cities area five days never saw the temperature rise out of the 30s F.

Words of the Week: Vigil Basins

These are small drainage areas in which periodic measurements are conducted on a long-term basis. The observations are made on both geomorphological and hydrological characteristics, including channel changes, valley-floor features, hillslopes, reservoirs, precipitation, runoff, and vegetation mixtures. The purpose is to document changes in the landscape and its hydrologic features across time, especially over a period of decades, and to make the data available to present and future generations of scientists.

Outlook:

Partly cloudy with near seasonal temperatures over the weekend. Breezy with relatively low humidity. Chance of showers late Monday in northern areas, then increasing chances for showers statewide later next week. and Tuesday of next week. Temperatures will remain a few degrees either side of normal.

Minnesota WeatherTalk for Friday, April 18, 2008

To: MPR's Morning Edition and Minnesota WeatherTalk Subscribers
From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, April 18, 2008

Headlines:

- Jet Streaming podcast this week
- Our music contest continues
- Last winter storm?
- Signs of spring abound
- Weekly Weather Potpourri
- Question about radiosondes
- Almanac for April 18th
- 1896, the wettest April
- Abraham's tree
- Outlook

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, contains a very interesting conversation with well known storm photo journalist Warren Faidley. You have probably seen his storm photos in Life magazine, National Geographic or on the Weather Channel. Paul Huttner and Craig Edwards talk with Warren about the dangers and precautions associated with storm chasing and the growing tourism industry associated specifically with tornado chasing. In addition the Jet Streaming crew talks with National Weather Service Warning Coordination meteorologist Carol Christenson from the Duluth, MN office. She shares some insights on severe weather warning procedures and communications used by the National Weather Service. Craig Edwards also shares another interesting web site of the week (stormtrack.org).

You can listen at the following web sites.....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: Music contest continues....

If you are an MPR "Morning Edition" listener, you may have noticed that we've been trying out some new music to introduce our conversations about the weather on Friday mornings. For many years we played Mark O'Connor's fiddle tune, "Soppin' the Gravy," but we feel it's time for something new. We are experimenting with new tunes. If you like any of the new ones, or you prefer the old one, we'd like to know. You could even compose something yourself and play it into our answering machine if you're so inspired.

We are looking for a short musical introduction with a lively start and a strong finish. If you have any ideas, call the Morning Edition comment line at 651-290-1080. If your piece of music is selected as the new theme for Friday's WeatherTalk segment, Mark will send you a signed copy of his book "Minnesota Weather Almanac."

Topic: Last winter storm of the season?

Last Thursday through Saturday (April 10-12) brought perhaps the last winter storm of the season to our region. A deep low pressure system slowly migrated from the SW to NE across the area and brought abundant precipitation and high winds. Winds of over 50 mph brought 8-12 waves along the Lake Superior shoreline, and several areas nearby endured blizzard conditions. Many other areas reported winds over 40 mph as well. Snowfall amounts across central and northern Minnesota ranged from 6 to 14 inches. Madison in Lac Qui Parle County reported a storm total of 14.6 inches, while Little Falls accumulated 12 inches. Total precipitation amounts were impressive as well with Itasca State Park, Morris, Ortonville, Long Prairie, and Willmar all reporting over 1 inch of liquid water. Across southern locations where the storm brought mostly rainfall, the totals were near record-setting. Winnebago, Rushford, Lanesboro, Spring Valley, and Preston all reported over 2 inches.

Following the storm, a polar high pressure system brought very cold air to northern and central counties by Monday morning. Record low temperatures were reported on April 14th at Theilman with 18 degrees F, Hibbing and Babbitt with 7 degrees F, and St Cloud with 15 degrees F.

The storms of April so far have produced precipitation totals that exceed the monthly normals at many locations, including 2.90" at Itasca State Park, 3.23" at Pokegama Dam, 3.37" at Winnebago, 3.40" at Grand Rapids, 3.57" at La Crescent, 3.74" at Lanesboro, and 4.06" at Rushford. And for SE Minnesota locations it was raining again on Thursday and Friday.

Topic: Signs of spring abound.....

The last significant winter storm to affect the area was last Friday and Saturday, April 11-12. Since that time temperatures have become more spring-like with many daytime readings in the 60s and 70s F across western and southern counties and 50s F up north. Rochester, Preston, Winona, and Austin all reported highs of 73 degrees F on Wednesday (April 16) this week, their first readings above 70 F since October 20, 2007, a period of 179 days, nearly 6 months. Portions of South Dakota reported daytime highs in the 80s F on April 15th. In addition winds have been strong this month, fierce in some cases with gusts over 40 and 50 mph on some days. This should not be a surprise, as April is traditionally our windiest month across most of Minnesota. But the winds have helped dry out the landscape.

The spring-like conditions have promoted more rapid changes in the Minnesota landscape. Buds are swelling on trees and shrubs. Bulb plants are starting to emerge from the soil. Some lakes have lost their ice cover, including Sakatah Lake in Le Sueur County, Loon Lake in Waseca County, Lake Sarah in Murray County, and Budd Lake in Martin County. Lake Pepin was only showing partial ice cover this week according to the DNR State Climatology Office. In many southern Minnesota counties, frost has left the soil as well. University of Minnesota Research and Outreach Centers (ROCs) at Waseca and Lamberton report no soil frost, while the ROC at Morris reports a layer of soil frost remains between 26 and 34 inches below the soil surface. Further north at the Crookston, ROC a frost layer still exists between 14 inches and 46 inches. Where soils have thawed the shallow soil temperatures have climbed into the 40s F, enough to stimulate alfalfa regrowth. Most farmers are anxious to get started with spring field work, and may do so next week, though it appears they may have to work in the intervals between thunderstorms.

Topic: Latest CPC monthly climate outlook

The most notable feature of the new climate outlooks released this week by NOAA's Climate Prediction Center, is the forecast of continuing wetness across the region for the month of May. Just as their previous outlook favored a wetter than normal April, it also favors a wetter than normal May. As our region's farmers are about to begin the spring planting season, it appears they will have to take full advantage of every field working opportunity Mother Nature gives them. The rest of the CPC outlooks are suggesting temperature and precipitation have equal chances of being above or below normal values through July.

Topic: Weekly Weather Potpourri

Next Tuesday, April 22nd is Earth Day, a time to remember that we live on a planet of finite natural resources with abundant and varied biological organisms. Our misuse or abuse of them sets a poor example for future generations and simultaneously robs

them of a chance to enjoy the same quality of life which we have. There will be many events around the state to commemorate this day. On Sunday, April 20th there will be a huge gathering on the National Mall in Washington, D.C. with a theme of A Call to Action on Climate Change. On the same day a festival in Tokyo, Japan will call for action on energy and healthy foods, while organizers in Buenos Aires, Argentina will have an entertainment festival with educational themes about waste and garbage reduction. In Minnesota, there will be an Earth Day Wilderness Walk hosted at the University of Minnesota Landscape Arboretum on Saturday, April 19th, and an Earth Day Half Marathon at St Cloud on the same date, among many other activities. I will be doing Earth Day presentations on climate change at 3M on Tuesday (April 22), and at Anoka-Ramsey Community College on Wednesday (April 23).

Remarkably dry air infiltrated Colorado earlier this week, inflating the fire danger in many areas. Humidity was practically non-existent as Denver reported a high temperature of 82 degrees F with a dewpoint of -1 F, Pueblo was 86 degrees F with a dewpoint of -1 F, and Lamar was 91 degrees F with a dewpoint of -3 F. Smoke from wildfires was contaminating the air around Colorado Springs.

According to the Seattle Times newspaper the Washington State Department of Transportation's snow removal budget has been severely depleted this year. They are \$8 million over budget as a result of coping with seasonal snowfall amounts that are 150 percent of normal. Some of the states higher elevation highway passes have seen winter snowfall amounts exceed 500 inches.

A paper published by researchers from the University of North Carolina last week in Science magazine points out that rising water temperatures in inland lakes and streams are leading to a higher frequency of blue-green algae blooms and a degradation of water quality. The combined effects of increased nutrient runoff and warmer water temperatures provides more of an ideal environment for cyanobacteria growth (blue-green algae). After the algae dies off and sinks to the bottom of the lakes, their decomposition can lead to further oxygen depletion in the water. The authors see this as a problem linked to climate change.

Typhoon Neoguri formed this week off the SE coast of the Hainan Island of China. It intensified to a Category 2 storm with wind gusts from 115 to 120 mph on Thursday (April 17) and was tracking north at 8 mph well east of Vietnam. The winds were producing sea wave heights of 24 feet and ships were advised to avoid the storm.

A study by MIT scientists suggests that the deployment of hydrophones (underwater microphones) in the path of hurricanes can provide a cheaper method for forecasters to assess the strength of hurricane winds. It seems that the power of the wind generated noise is related to the true power of the wind in the storm. Tests of the

hydrophones suggest that they can predict the strength of hurricane winds within 5 percent of their actual value.

MPR listener question: Are weather balloons still used for forecasting? Seems with modern technology they would be "old hat?"

Answer: According to the World Meteorological Organization, at least 67 countries, including the USA, still use radiosondes (instrumented balloons) to measure the conditions of the upper atmosphere. These are launched every 12 hours (0Z and 12Z, GMT). Their data are used to initialize and run numerical forecast models by weather services in most of these countries. So, they still provide highly valued and needed data in operational meteorology. The local National Weather Service Forecast Office in Chanhassen, launches a radiosonde at 6:00 pm and 6:00 am daily.

Twin Cities Almanac for April 18th:

The average MSP high temperature for this date is 58 degrees F (plus or minus 12 degrees F standard deviation), while the average low is 38 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for April 18th:

MSP weather records for this date include: highest daily maximum temperature of 89 degrees F in 1985; lowest daily maximum temperature of 31 degrees F in 1953; lowest daily minimum temperature of 21 degrees F in 1953; highest daily minimum temperature of 61 F in 1915 and 2005. Record precipitation for this date is 1.04 inches in 2004. Record snowfall is 1.0 inches in 1898 and 1939. Snow depth on this date in 1983 was 4 inches.

Average dew point for April 18th is 33 degrees F, with a maximum of 63 F in 1908 and a minimum of 3 degrees F in 1988.

All-time state records for April 18th:

The state record high temperature for this date is 94 degrees F at Marshall (Lyon County) in 1985. The state record low temperature for this date is 2 degrees F at Gunflint Lake (Cook County) in 1983. The state record precipitation for this date is just 4.80 inches at Bingham Lake (Cottonwood County) in 1898. Record snowfall for this date is 13.0 inches at Beaver Bay (Lake County) in 1869.

From "Minnesota Weather Almanac":(available in bookstores or write the author)

The year 1896 brought the wettest April in history to Minnesota. Over half the days in the month brought precipitation, many times in the form of heavy showers. Soils were saturated and farmers hardly got any field work done. But back then Minnesota was mostly a small grain producer, rather than a corn and soybean producer. Record April precipitation totals from that year still stand for many Minnesota communities, including 9.06" at Dawson, 10.30" at New London, 8.12" at Morris, and 11.93" at Lynd. That April was a precursor to a very wet early growing season, as 1896 also produced the wettest ever April through June period. Many observers reported over 17 inches of precipitation during that 3 month interval, topped by 21.58 inches at Lynd in Lyon County.

Though we have started this April quite wet, we have a long way to go to rival April of 1896.

Words of the Week: Abraham's Tree

Yes, the first father of all Hebrews from the Old Testament (Genesis 17) resting at the base of the Hebrew family tree has a weather feature named after him.

This is the name given to a cloud form which consists of feather and plume like appendages of cirrus emanating from a point on the distant horizon. In mid latitudes this form is most often seen on the western or southern horizon with the approach of a warm front or as cirrus blowing out from the top of a distant thunderstorm cloud (cumulonimbus). Thus from the observer's perspective, rain is not very far away. In spring, as cloud ceilings rise and convective precipitation becomes more frequent we may see examples of Abraham's Tree in Minnesota. Some of the old forecast rules are "when Abraham's tree has its foot in the water" (emanates from a dark cloud base) it will soon rain, or "Abraham's tree is blooming; it is going to rain."

Outlook:

Generally partly cloudy through the weekend with a chance for showers along the north shore on Saturday, and a chance for showers later on Sunday in the south and west. Temperatures will warm into Sunday. Continuing chance for showers through Wednesday of next week. Temperatures will be a few degrees either side of normal for the period. The National Weather Service will be providing announcements and educational materials related to Severe Weather Awareness Week over April 21-25. This is a good time to review procedures for severe weather action plans in the work place or at home.

Minnesota WeatherTalk for Friday, April 25, 2008

To: MPR's Morning Edition and Minnesota WeatherTalk Subscribers
From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, April 25, 2008

THIS IS A SHORT VERSION OF MINNESOTA WEATHERTALK AS I AM OUT OF TOWN ON FRIDAY.

Headlines:

- Jet Streaming podcast this week
- Severe Weather Discussion at the MPR Forum
- Our music contest continues
- Threshold of the planting season
- Weekly Weather Potpourri
- Question about thunderstorm days
- Almanac for April 25th
- Snows of April 24-26, 1950
- Freshet and Coulee
- Outlook

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, contains two very interesting conversations. The first one is with Tim Turnbull, Director of Emergency Mangement for Hennepin County (Minneapolis) in Minnesota. Tim explains how the sirens are used for severe weather warnings, and more generally how they encourage citizens to be prepared for severe weather and have a plan of action.

Paul, Cathy, and Mark also chat with Dr. Louis Ucellini from NOAA's Climate Prediction Center. He tells us about the various models used in forecasting and some recent refinements to them. In addition Mark highlights the great features of the Climate Prediction Center's web site, and Cathy shares some listener feedback.

<http://www.cpc.ncep.noaa.gov/>

You can listen at the following web sites.....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: UBS Forum at MPR on Thursday, May 1, 2008 "Severe Weather"

I will team up with meteorologists Paul Huttner and Paul Douglas to join host Cathy Wurzer (MPR's "Morning Edition" host) in the UBS Forum at Minnesota Public Radio in downtown St. Paul to discuss everyone's favorite subject: the weather. We'll talk about the history of severe weather in our state and explain how storms are formed and how accurately they can be predicted. Weather spotters and survivors of severe weather will be in the audience to share their stories. Please come and join us that evening if you can.

May 1, 2008

7-8:30

Sign up at the Events page at minnesotapublicradio.org.

here's the link:

http://minnesota.publicradio.org/events/tickets/ticket_form.php?sale_id=111

Topic: Music contest continues....

If you are an MPR "Morning Edition" listener, you may have noticed that we've been trying out some new music to introduce our conversations about the weather on Friday mornings. For many years we played Mark O'Connor's fiddle tune, "Soppin' the Gravy," but we feel it's time for something new. We are experimenting with new tunes. If you like any of the new ones, or you prefer the old one, we'd like to know. You could even compose something yourself and play it into our answering machine if you're so inspired.

We are looking for a short musical introduction with a lively start and a strong finish. If you have any ideas, call the Morning Edition comment line at 651-290-1080. If your piece of music is selected as the new theme for Friday's WeatherTalk segment, Mark will send you a signed copy of his book "Minnesota Weather Almanac."

Topic: Getting ready for planting.....

Though winter has lingered somewhat with snow and cooler temperatures this month, soils are slowly getting into condition to be workable. Soil moisture storage appears to be adequate to surplus in most places, and soil temperatures have risen into the 40s F. In the context of recent spring seasons, this April has so far presented few opportunities to do field work. However most crop producers are geared up and ready to go with the first opportunity of weather. This should present itself next week, though it will be somewhat cooler with frequent chances for showers and thunderstorms.

Topic: Weekly Weather Potpourri

Northwestern Australia around Perth is recording its wettest April in history, with total precipitation ranging from 5 to 7 inches. Tropical Cyclone Rosie will bring even more rainfall to the area this weekend, and further amplify these record amounts.

It was reported this week that some economists think a delayed start to planting crops in the Midwest due to excessive wetness will further compound the recent upward trend in food costs. Many states are hoping for good field working opportunities over the next week to 10 days, as late planted crops tend to show reduced yield potential.

A University of Colorado study this week revealed that continuing improve in the ozone hole over the Southern Hemisphere may produce more amplified warming in Antarctica. This is based on the notion that large scale weather systems containing warmer air may circulate more deeply over the continent in coming years.

MPR listener question: With "Severe Weather Awareness Week" highlighted in recent days, it made me wonder how many thunderstorm days we have in the Twin Cities on a yearly basis?

Answer: Number of thunderstorm days has varied greatly and typically averages 35-40 per year in the Twin Cities area. Across the broader Minnesota landscape this number ranges from only about 25 in the far north to as many as 50 in southern Minnesota.

Twin Cities Almanac for April 25th:

The average MSP high temperature for this date is 61 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 41 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for April 25th:

MSP weather records for this date include: highest daily maximum temperature of 91 degrees F in 1962; lowest daily maximum temperature of 37 degrees F in 1950; lowest daily minimum temperature of 25 degrees F in 1907; highest daily minimum temperature of 65 F in 1990. Record precipitation for this date is 1.47 inches in 1902. Record snowfall is 3.2 inches in 1950.

Average dew point for April 25th is 36 degrees F, with a maximum of 63 F in 1990 and a minimum of 9 degrees F in 1933.

All-time state records for April 25th:

The state record high temperature for this date is 96 degrees F at Madison (Lac Qui Parle County) in 1962. The state record low temperature for this date is 5 degrees F at Leech Lake (Cass County) in 1909. The state record precipitation for this date is just 3,55 inches at Hokah (Houston County) in 1994. Record snowfall for this date is 16.0 inches at Two Harbors (Lake County) and Walker (Cass County) in 1950.

From "Minnesota Weather Almanac":(available in bookstores or write the author)

One of the heaviest late season snowfalls in Minnesota history occurred over April 24-26, 1950. Many northern Minnesota observers reported 12 to 18 inches of snowfall from this storm, the last of the winter storms from the challenging winter of 1949-1950. The weather observer at Pigeon River in Cook County reported a remarkable 72.5 inches of snow on the ground in mid-April. By the end of the month with snow melt discharge was causing widespread flooding on most Minnesota watersheds.

Words of the Week: Freshet and Coulee

These old, rarely used words have a more gentle connotation associated with the surplus flows of water across a landscape, and not quite the same impact as using the words flood or crest.

Freshet is derived from Scottish and Middle English terms and has three meanings: (1) a running stream of fresh water which empties into salt water (as in Shakespeare's "He shall drink naught but brine; for I'll not show him where the quick freshets are"); or (2) in cold climates the annual spring rise in stream beds which occurs with snowmelt runoff; or (3) a sudden great rise in a stream when it overflows its banks due to heavy rain or snowmelt runoff, causing a local scale flood.

Coulee is taken from the French word for flow and may refer to channeled flow or sheet flow off a landscape into a lowland area or basin. Coulee sometimes refers to a steep-sloped valley such as the Grand Coulee of the Columbia River basin in the

western U.S.. Coulees feed into Devils Lake, ND which has no natural outlet and therefore has been growing in size due to abnormally wet years recently.

Outlook:

Mostly a wet and cool weekend across the state. Drier by Monday and Tuesday, but remaining somewhat cool. Another chance for showers by mid-week.

Minnesota WeatherTalk for Friday, May 2, 2008

To: MPR's Morning Edition and Minnesota WeatherTalk Subscribers
From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, May 2, 2008

Headlines:

- Jet Streaming podcast this week
- Our music contest wraps up
- Preliminary Climate Summary for April
- Late Spring Signs
- Weekly Weather Potpourri
- Question about hard freezes
- Almanac for May 2nd
- Historical cold and snowy episodes from early May
- Lillipilli season
- Outlook

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, contains two very seasonally relevant topics. First, Cathy and Paul talk with Twin Cities allergist Dr. Richard Sveum about seasonal allergies and the battle to overcome them or live with them. Then Cathy hosts an interview with Skywarn storm spotter Nick Elms who tells us about chasing storms and the importance of getting the correct information out. Paul also shares another interesting web site that is associated with National Air Quality Awareness Week and is called www.airnow.gov

You can listen at the following web sites.....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: Music contest wraps up....

Thanks to all who submitted suggestions for music to play in association with our Friday morning weather chats. We had many wonderful pieces to choose from. The

producers of Morning Edition have selected a winner, which will be played on next week's program (May 9th). We are most grateful to our listeners.

Topic: Preliminary April Climate Summary

Cool and wet describes April of 2008 across the state. Mean monthly temperature values ranged from 2 to 5 degrees F colder than normal. Extreme values were 79 degrees F at Bruno on the 23rd to just 4 degrees F at Embarrass on the 15th. In a rare display of moderation, Minnesota reported the nation's lowest temperature only once during April, on the 28th when it was just 10 degrees F at International Falls.

With the exception of a few far northwestern communities, the month of April was significantly wetter than normal. Many observers reported monthly precipitation totals that were over 1 inch greater than average. Some monthly totals were record-setting, like 9.30 inches at Caledonia, 8.33 inches at La Crescent, 8.33 inches at Preston, and 5.59 inches at Grand Rapids. Up north, much of the monthly precipitation came in the form of snowfall, record-setting values in many locations. Grand Rapids reported a new record total for April of 32.7 inches, Pokegama Dam 32.2 inches, Leech Lake 37.5 inches, Babbitt 36 inches, Ottertail 34 inches, Detroit Lakes 32 inches, Bemidji 38.5 inches, Itasca State Park 43.5 inches, Blackduck 43 inches, and Zerkel an incredible 49 inches. Ole Anderson who teaches at Bagley High School in Clearwater County, but lives just north of Itasca State Park reports an April total of 45 inches. Many of these values break the state record for April snowfall of 37 inches at Tower in 1961.

Finally, living up to its reputation as the windiest month of the year, April brought winds of 40 mph or greater on a number of days during the month. Wind gusts even surpassed 50 mph at some locations.

Topic: Signs of a Late Spring Abound

With three consecutive months of below normal temperatures (Feb-Apr) and numerous late season snow storms (including that of April 25-26), the progress of the spring season has only made a snail's pace. Many northern Minnesota lakes are still ice covered and may even inhibit the Fishing Opener on May 10th. Vermilion, Gunflint, and Sturgeon are usually some of the last to report ice free conditions and have historically had ice as late as the third week of May.

In addition to being wet, soil temperatures have been averaging 8 to 15 degrees F cooler than normal and have slowed the regrowth of alfalfa and other perennial crops. Farmers report little field progress in tillage or planting and it appears that in the context of recent springs crop planting progress is running about two weeks behind,

and the slowest pace since spring of 1996.

Topic: Weekly Weather Potpourri

The central valley in California reported one of their driest Aprils in history. Both Fresno and Bakersfield reported only a trace of precipitation. This further amplified the dry season they have been having in that area. Further south in the San Bernadino National Forest dry conditions have produced a 700-acre wildfire and other fires.

The National Weather Service confirmed that up to eight tornadoes touched down in SE Virginia earlier this week destroying a number of homes. Most homeowners are reportedly insured, but the overall economic damages were not yet determined from these storms. According to NOAA's Storm Prediction Center 178 tornadoes occurred during the month of April nationwide, and nearly 700 so far this year.

Heavy snow melt runoff combined with recent rains produced flooding this week along the St John River in Maine. Many residents were evacuated. Canadian residents along the other side of the river in New Brunswick were also threatened and evacuating in some cases.

Tropical Cyclone Nargis was moving NE across the Bay of Bengal toward Myanmar with winds of 120-125 mph and heavy rain bands. Sea wave heights were ranging from 25-28 feet. It was expected to bring severe erosion and flooding to parts of that country by Friday of this week.

Researchers reported earlier this week that there is a significant upward trend in the water temperature on Lake Baikal in Russia, the world's largest lake. Not only has the water temperature risen, but so has the chlorophyll content with associated changes in the lakes food web and nutrient cycling. They argue this is evidence that climate change is affecting even the largest of inland lakes.

MPR listener question: Before we open our cabin, 15 miles west of Lake Mille Lacs, we like to be sure we are beyond the danger of a hard freeze so that the water pipes don't break. When is the typical last hard freeze there and the latest it has ever been?

Answer: The climate data for central Morrison County shows a mean date for the last 28 degrees F reading (hard freeze) of May 1st, and the latest it has occurred is May 17th. So if you want to be conservative with this cold spring season, you might wait another week or so.

Twin Cities Almanac for May 2nd:

The average MSP high temperature for this date is 63 degrees F (plus or minus 12 degrees F standard deviation), while the average low is 42 degrees F (plus or minus 9 degrees F standard deviation).

MSP Local Records for May 2nd:

MSP weather records for this date include: highest daily maximum temperature of 91 degrees F in 1959; lowest daily maximum temperature of 38 degrees F in 1909; lowest daily minimum temperature of 24 degrees F in 1875 and 1961; highest daily minimum temperature of 70 F in 1959. Record precipitation for this date is 1.49 inches in 1944. Record snowfall is 2.2 inches in 1954.

Average dew point for May 2nd is 38 degrees F, with a maximum of 64 F in 1959 and a minimum of 15 degrees F in 1940.

All-time state records for May 2nd:

The state record high temperature for this date is 99 degrees F at Wheaton (Traverse County) in 1959. The state record low temperature for this date is 4 degrees F at Pine River (Crow Wing County) in 1909. The state record precipitation for this date is just 3.05 inches at Trail (Polk County) in 1950. Record snowfall for this date is 10.0 inches at Wheaton (Traverse County) in 1935.

From "Minnesota Weather Almanac":(available in bookstores or write the author)

A temperature of just 4 degrees F was measured on this date (May 2nd) in 1909 at Pine River Dam in Crow Wing County. This is the all-time coldest Minnesota temperature for the month of May. Less than 36 hours later it was a remarkable 76 degrees F at Pine River Dam, quite a turn around from a winter-like start to May.

One of the snowiest starts in May occurred in 1954 when a winter storm brought widespread snowfall to the state over the 1st through the 4th. Some northern rural schools had to close and there were numerous power outages and traffic delays. Park Rapids reported 10 inches of snow, Walker 11.5 inches, Babbitt 11.8 inches, Tower 15 inches, and Virginia 15.5 inches. The observer at Virginia reported an incredible 17.8 inches of snowfall for the month of May, an all-time state record total.

Words of the Week: Lillipilli Season

The Australian natives divide the year into six seasons. March through May (fall in the Southern Hemisphere) is considered the Lillipilli season since the sour fruits on

the Lillipilli tree ripen. This signals the start of cooler and wetter weather in the seasonal migration towards winter continues.

Outlook:

The weekend will start wet and cool but improve by Sunday. Rain showers and snow showers may linger from Friday night into early Saturday, with some snowfall accumulation in places. Temperatures will warm on Sunday, then remain near normal for several days. It will be dry Sunday and Monday, then a chance for showers again by Tuesday through Thursday. Cloudiness and showers will be the theme during the first half of May.

Minnesota WeatherTalk for Friday, May 9, 2008

To: MPR's Morning Edition and Minnesota WeatherTalk Subscribers
From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, May 9, 2008

Headlines:

- Jet Streaming podcast this week
- Winner of Our Music Contest
- Cold hangs on
- May starts wet..
- Weekly Weather Potpourri
- Question about summer heat
- Almanac for May 9th
- Historical May events
- Romeo, etc.....
- Outlook

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, contains a discussion about severe weather that took place at the MPR Forum on May 1st. Participants included Paul Huttner, Paul Douglas, Craig Edwards, Todd Krause from the National Weather Service, and storm spotters from the Skywarn System. Our conversation is moderated by MPR host Cathy Wurzer.

You can listen at the following web sites.....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: Music contest winner....

Thanks to all those who submitted pieces of music for our contest. There were many great choices. The Morning Edition staff selected "The Cat Came Back The Very Next Day" by Norman Blake. This was submitted by listener Bill Sims who will receive a signed copy of my book "Minnesota Weather Almanac." Congratulations to Bill. This lively piece of music will be introducing our Friday weather chats.

Topic: Cold hangs on.....

Rochester airport reported a trace of snow on May 3rd. International Falls reported a morning low of 21 degrees F on Thursday, May 8th, the coldest reading in the 48 contiguous states. Many other observers reported lows in the 20s F as well. Temperatures in May are averaging colder than normal at most locations. Should this trend hold for the month, it would be a 4th consecutive month with colder than normal temperatures. Immediate consequence can be found in the delayed ice out dates on some northern Minnesota lakes. Some in north-central and northeastern counties will not be free of ice for the Fishing Opener this weekend. In addition planting progress for the 2008 crop season has been the slowest since 1996.

Topic: May starts wet.....

Continuing the trend of April, precipitation has been abundant through the first eight days of May. Many observers have reported over 1.5 inches of rainfall already, while reports from Fairmont, Winnebago, New Ulm, St James, and Hastings show over 2 inches so far. To its credit, the National Weather Service told us last month that May would be wetter than normal across the region. Indeed, the coming weekend will be wet in most areas.

Topic: Weekly Weather Potpourri

The Olympic symbol reached the top of Mt Everest this week on its journey to Beijing, China. On May 8th climbers reached the summit with the Olympic pennant and flag, amidst very strong winds and temperatures as cold as -22 degrees F. Surprisingly, those are considered mild conditions for the summit of Mt Everest (29,029 ft).

NOAA researchers reported earlier this month that loss of sea ice is strongly evident at the North Pole where temperatures have warmed as much as 4 degrees F, but the amount and stability of sea ice at the South Pole is not unusual, except on the Antarctic Peninsula which extends up toward the tip of South America. Along that region warmer temperatures and exposure to ocean waves is causing the collapse of ice observed along the Wilkins Ice Shelf.

The 130 mph winds, 12 foot storm surge, and torrential rainfall rates brought by Cyclone Nargis to Myanmar (Burma) last Saturday were apparently quite destructive and lethal. Likely, the worst natural disaster to hit that country, NASA satellite imagery suggests that the storm surge transformed miles of the coastal delta region, an area that will likely never look the same.

More tornadoes were reported across Mississippi and Alabama on May 8th. This raised the number for the month of May so far to over 110, and for the year to date well over 800 nationwide. This pace of tornado activity could threaten the record year of 2004 when 1819 tornadoes were reported across the USA.

The opening of Grand Teton National Park in Wyoming has been pushed back to the third week of May as late winter snowfall has been so abundant it is blocking access to some of the park's facilities. Places in the park still have snow depths of 50 inches or greater.

MPR listener question: As summer nears I have a bet with my neighbor that we will not see a 100 degrees F temperature in the Twin Cities area this year. You have commented that minimum temperatures are getting warmer, but maximum temperatures are not. Do you think I have a safe bet?

Answer: In such a bet I would side with you. Maximum temperature values of 100 degrees F or greater are rare in the Twin Cities anyway. They occur historically only once every 3-4 years in the Twin Cities. The last occurrence we had was July 31, 2006 (101 degrees F at MSP), and the last summer with multiple occurrences was 1988. The frequency of days with 90 degrees F or higher in the Twin Cities is trending downward. In the early and middle part of the 20th Century it was about 20 days per year. In the most recent 30 years of record it is only about 13 days per year.

Twin Cities Almanac for May 9th:

The average MSP high temperature for this date is 65 degrees F (plus or minus 12 degrees F standard deviation), while the average low is 45 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for May 9th:

MSP weather records for this date include: highest daily maximum temperature of 91 degrees F in 1987 and 1887; lowest daily maximum temperature of 40 degrees F in 1924; lowest daily minimum temperature of 27 degrees F in 1966; highest daily minimum temperature of 69 F in 1896. Record precipitation for this date is 1.14 inches in 1918. Record snowfall is 0.4 inches in 1924.

Average dew point for May 9th is 39 degrees F, with a maximum of 66 F in 1985 and a minimum of 10 degrees F in 1966.

All-time state records for May 9th:

The state record high temperature for this date is 99 degrees F at Milan (Chippewa County) in 1928. The state record low temperature for this date is 9 degrees F at Isabella (Lake County) in 1966. The state record precipitation for this date is just 3.22 inches at St Cloud (Sherburne County) in 1979. Record snowfall for this date is 4.0 inches at Leech Lake in 1902, at Farmington in 1924, and at Maple Plain and New Ulm in 1938.

From "Minnesota Weather Almanac":(available in bookstores or write the author)

May 6, 7, and 8 of 1885 brought three consecutive days with snow and overnight lows in the 20s F. It was a slow start to the growing season. But it warmed up dramatically with many days in the low to mid 80s F during the second half of the month.

May 10, 1953 brought four destructive tornadoes to Minnesota. Beginning around 4:00 pm a tornado was sighted along a 20 mile path length near Cyrus and Starbuck in western Pope County. It damaged some farm buildings and killed some livestock. Later that day between 5:00 and 8:00 pm three more tornadoes occurred across SE Minnesota in parts of Fillmore, Winona, Olmsted, and Freeborn Counties. Many trees were snapped by the winds in Whitewater State Park and a rural school was leveled near Chatfield. Fortunately it was well after school had ended for the day. In all there were 8 deaths and 19 injured from these tornadoes.

Words of the Week: Romeo, Sierra, Tango, and Uniform

No, those aren't the names of Cathy Wurzer's horses. They are the names of the primary time zones across the USA. The military and Nato organizations need to refer to time zones as they run from pole to pole and cross the landscapes of many countries. In order to do so, they give them names. Romeo corresponds to the USA Eastern Time Zone, Sierra is the USA Central Time Zone, Tango is the USA Mountain Time Zone, and Uniform is the Pacific Time Zone. Interestingly, the time zone that transects Hawaii and Tahiti is called Whiskey.

Outlook:

Cloudy in the north, chance of showers and thunderstorms elsewhere to start the weekend and the Fishing Opener. Temperatures will be cooler than normal as well. Clearing later on Sunday for Mother's Day, but with cooler than normal temperatures. Warmer and drier on Monday, but another chance for showers on Tuesday and Wednesday, including the possibility for thunderstorms.

Minnesota WeatherTalk for Friday, June 13, 2008

To: MPR's Morning Edition and Minnesota WeatherTalk Subscribers
From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, June 13, 2008

Headlines:

- Jet Streaming podcast this week
- Another stormy week
- Passing of Dr. Reid Bryson
- Weekly Weather Potpourri
- Question about current flooding and that of 1993
- Almanac for June 13th
- Past significant weather events
- Debris dams
- Outlook

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, includes conversations about all of the spring flooding around the Midwest. Cathy, Paul, and I visit with Glenn Lussky, Meteorologist in Charge at the La Crosse, WI National Weather Service Forecast Office and Steve Buan, NOAA hydrologist at the North-Central River Forecast Center in Chanhassen, MN. We chat about what data and models are used to forecast flash floods and how the public needs to react to this severe weather threat. We also speak with Dr. Skip Messenger of Hamline University about the role of climate change in the demise of the ancient Mayan civilization. And Cathy Wurzer has an interesting web site of the week.

You can listen to the whole podcast at the following web sites.....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: Another stormy week.....

Wednesday, June 11 brought severe weather across the region and ample rainfall amounts to some who needed it, especially the agricultural soils of the Red River

Valley. The Storm Prediction Center logged 58 tornado reports on Wednesday, 11 from Minnesota. Though there were damage reports and some deaths (4) reported at a scout camp in Iowa, most of the tornado reports from Minnesota were short-lived and did not result in widespread damage. Across portions of southern Minnesota thunderstorms delivered flash flood producing rainfall amounts.

Rainfall amounts overnight on June 11-12 exceeded two inches in several communities, including Milaca, Hinckley, Litchfield, Albert Lea, Zumbrota, and Lake City. Some other southern Minnesota communities reported over 3 inches, including Rochester, as well as Austin and Lansing in Mower County. Several observers report that the first 13 days of June have produced rainfall totals that exceed the historical averages for the entire month. Among these are Itasca State Park 4.82", Moorhead 4.49", Park Rapids 4.57", Grand Portage 5.82", Wolf Ridge 6.38", Browns Valley 5.29", Wadena 4.64", Milaca 5.66", Albert Lea 5.23", Caledonia 6.48", Grand Meadow 7.19", La Cresecent 6.46", Lake City 5.51", Lanesboro 8.16", Preston 9.64", Rochester 6.63", Spring Grove 8.85", Spring Valley 6.47", Winona 5.30", and Zumbrota 5.17". The total rainfall value at Preston (Fillmore County) already ranks as the 4th wettest June historically at that station. Many flash flood warnings were issued by the Weather Service.

Topic: Passing of Dr. Reid Bryson

Dr. Reid Bryson, one of the most significant climatologists of his generation, passed away on Wednesday of this week. He had a long and distinguished career at the University of Wisconsin-Madison. He was founder of the Center for Climate Research and its program in Climate, People, and the Environment. He taught many top notch students and made significant contributions to the fields of atmospheric science, climatology, ecology, and even history. He will be missed by many.

Topic: Weekly Weather Potpourri

Widespread heavy thunderstorms have caused flooding problems in many states this week, most significantly eastern Iowa and southern Wisconsin. The breaching of the shoreline around Lake Delton and drainage of the lake will have significant impacts on tourism in the Wisconsin Dells area this summer. Cedar Falls, IA was recording one of its worst all-time floods. Other states reporting flooding included Illinois, Missouri, Michigan, and SE South Dakota.

Flash flooding was also a problem this week in the central and southern states of Mexico. Officials there reported persistent thunderstorms over the past week have saturated the soils and left standing water in fields and many rivers running above flood stage.

The drought in California has contributed to a number of wildfires. Some of the worst this week were in the Santa Cruz mountains where fire units were still trying to gain control over fires that were threatening homes there.

Tuesday, June 10th brought snow advisories and heavy snow warnings from National Weather Service Offices in the northwest region of the country. Eastern Washington (Spokane), Idaho, western Wyoming, and Montana offices issued snow advisories and heavy snow warnings for higher elevations. A strong low pressure system coupled with a northern jet stream that brought colder air from high latitudes produced a March-like disturbed weather system for that area. Those visiting Glacier and Yellowstone National Parks were greeted by snow, and several inches fell at higher elevations in the mountains, where some hikers had to be rescued. In contrast to these conditions residents in the Mid-Atlantic states experienced real mid-summer conditions with the Weather Service issuing a heat advisory on Tuesday. Residents in MD, VA, NC, NY, PA, DE, and NJ had to put up with air temperatures in the 90s F, dewpoints in the 70s F, and Heat Index values ranging from 100 to 115 degrees F. Whew! Local health authorities reported up to 30 heated-related deaths in some of the major cities there.

The NOAA Storm Prediction Center (SPC) has logged nearly 300 tornado reports so far in June, following an unusually high number in May (595). The total USA tornado reports for the year to date is approaching 1600, a pace that would be record-setting if it keeps us.

Research from the University of Maryland released this week shows that droplet size and distribution varies considerably among tropical storms that form over the oceans and extra-tropical storms that commonly form over land. The tropical storms tend to have a larger fraction of smaller droplets and rain harder (more intensely) than the extra-tropical storms. Some of this research may assist meteorologists in adjusting radar data to better represent rainfall intensity.

MPR listener question: With so many reports of flooding along the upper Mississippi River and the watersheds that feed into it, some are comparing this spring weather pattern to that of 1993, another great flood year. Is this a good comparison?

Answer: Not in all respects. In my view it is premature to compare the two years since flooding in 1993 intensified in July and carried on through August in many areas. We are only at mid-June this year. However many watersheds that flooded in June 1993 are also flooding this year, especially along the upper Mississippi River. In 1993 May through July rainfall totals across southern Minnesota were 150 to 300 percent of normal. So far this year, those values mostly apply to SE Minnesota, but not other sections of the state. This year's excess precipitation is displaced further east than in

1993. In addition the Missouri River Basin provided a good deal of the volume for the 1993 flood and that has not been the case this year. Lastly, the 1993 flood was the result of more widespread and longer lasting heavy rains across the region. This year, the rainfalls have certainly been extreme in places, but they have also been more spatially variable than those of 1993.

Since 1993 a good deal of flood risk mitigation work has been done by the Association of Flood Plain Managers. As a consequence of this many watersheds in flood stage are less destructive than they were back in that time. It remains to be seen how persistent the floods will be as we approach the first day of summer next week (June 20).

NOAA announced this week the establishment of two more Cooperative Climate Research Programs at universities. The Cooperative Institute for Arctic Research (CIFAR) will be located at the University of Alaska-Fairbanks, while the new Cooperative Institute for Climate Research (CICS_ will be located at Princeton University. These research programs will focus on changes and patterns in Arctic sea ice, greenhouse gases, and climate change measures and mechanisms.

Twin Cities Almanac for June 13th:

The average MSP high temperature for this date is 79 degrees F (plus or minus 9 degrees F standard deviation), while the average low is 58 degrees F (plus or minus 7 degrees F standard deviation).

MSP Local Records for June 13th:

MSP weather records for this date include: highest daily maximum temperature of 100 degrees F in 1956; lowest daily maximum temperature of 49 degrees F in 1947; lowest daily minimum temperature of 37 degrees F in 1969; highest daily minimum temperature of 77 F in 1956. Record precipitation for this date is 2.37 inches in 2001. There is no record of any snowfall on this date.

Average dew point for June 13th is 55 degrees F, with a maximum of 73 F in 1905 and a minimum of 29 degrees F in 1933.

All-time state records for June 13th:

The state record high temperature for this date is 104 degrees F at Redwood Falls (Redwood County) in 1956. The state record low temperature for this date is 25 degrees F at Cotton (St Louis County) in 1969. The state record precipitation for this

date is 6.08 inches at Red Wing (Goodhue County) in 1950. No snowfall has been measured on this date.

From "Minnesota Weather Almanac":(available in bookstores or write the author)

June 10, 11, and 12 of 1903 brought late frosts that damaged corn and potato crops in Minnesota. Fortunately crop planting was late that year and crops had not developed at their normal growth rates, so the young plants recovered from the frost and did well in the warmer weather of late June.

Severe thunderstorms brought 4-6 inches of rainfall across southeastern Minnesota on June 12-13, 1950. This produced flash flooding along the Root, Zumbro, and Whitewater Rivers of that region, flooding farm fields.

On this date in 1991, lightning struck a tree on the 16th hole at Hazeltine Golf Club in Chaska where the first round of the U.S. Open Golf Championship was being played. Five people were injured and one person killed by the lightning. Since that time the PGA has employed meteorologists to provide hour by hour forecasts during their tournaments.

Words of the Week: Debris Dam

This term is used in hydrology to refer to a temporary dam on a watershed that results from accumulated trash or materials from destroyed structures (buildings) and vegetation (trees) that have been swept away by flooding upstream. This material may get caught in a narrow channel or where a river channel turns and then block the normal flow of water, creating more widespread flooding in the nearby landscape. Often times the debris dams will last for hours, then give way and result in a flash flood proceeding further down the channel.

Outlook:

Warmer over the weekend with a chance for showers and thunderstorms later on Saturday and early Sunday as another strong low pressure system passes over the area. 80 degrees F will return to some parts of the state. A bit cooler and drier next week early, then becoming warmer with a chance for showers toward the end of the week.

Minnesota WeatherTalk for Friday, May 23, 2008

To: MPR's Morning Edition and Minnesota WeatherTalk Subscribers
From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, May 23, 2008

Headlines:

- Jet Streaming podcast this week
- Persistent cold up north
- Planting progress accelerates
- Weekly Weather Potpourri
- Question about July weather probabilities
- Almanac for May 23rd
- 1998 May derecho storms
- What's a wind sentry?
- Outlook

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, provides a discussion about the active tornado season (over 1000 so far this year in the USA) and an update on severe weather research with mobile Doppler radar systems. Our guest Dr. Howie Bluestein from the University of Oklahoma shares his thoughts and experience on this topic. In addition we talk with farmer Kevin Papp and landscape designer Karen Filloon about the problems presented by the cool, wet spring across the region. Participants in the conversation are Paul Huttner, Craig Edwards, Cathy Wurzer, and myself. We also highlight a web site where you can get site specific agricultural and gardening forecasts.

You can listen at the following web sites.....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: Cold, dry air up north....

Northern areas of the state have been reporting some cold temperatures for this time of the year. Embarrass, MN reported the lowest temperature in the 48 contiguous

states on May 19th with 21 degrees F and on May 22nd with 25 degrees F. In addition near record lows were reported on May 21st this week at Floodwood with 29 F, Crookston with 28 F, and Hallock with 30 degrees F. Grand Forks, ND reported a new record low of 27 degrees F on the 21st.

Greenwood Lake in Cook County (north shore) finally lost its ice cover on May 17th, last of the Minnesota lakes to be ice free this spring.

Topic: Planting progress accelerates....

More favorable weather and warmer soil temperatures have helped to pick up the pace in planting the state's crops this week. Corn planting, well passed 75 percent done, may be near completion by the end of this week. Soybean planting is making rapid progress as well. Soil temperatures have risen into the 60s and 70s F during the day this week and ample sunshine has helped stimulate more rapid emergence and growth of crops that were already planted. Some alfalfa fields will not be ready for the first cutting of hay until early June because of the prolonged cool spring season. So far it has been the coldest May statewide since 1997, and the coldest March through May so far statewide since 1996.

Topic: Weekly Weather Potpourri

On Thursday this week NOAA forecasters released an outlook for the 2008 North Atlantic Hurricane Season. They suggested 12-16 named storms may form (historical average is 11), and that 6-9 of these tropical storms would become hurricanes. Thus tropical storm activity in the North Atlantic is expected to be a bit greater than normal. The first two storm names on the NOAA list this year are Arthur and Berta, so watch for those in the weather headlines after the Atlantic hurricane season begins in June.

Persistent drought in some parts of Florida have produced abundant wildfires this spring. This week alone over 90 wildfires were reported in the state, many in and near Everglades National Park. Fortunately some rains were bringing relief to some parts of central Florida this week, as some 1 to 2 inch amounts were reported across the northern edge of Everglades Park.

Up to 46 tornado reports were filed with the Storm Prediction Center on Thursday this week. Many of these storms occurred in Colorado, Wyoming, and Kansas. Cars and buildings were damaged in the Windsor and Greeley areas, where a tornado nearly a mile in diameter was filmed as it crossed a highway. Further to the north in eastern Wyoming, 3-4 inch thunderstorm rains were reported. The Storm Prediction Center now reports well over 300 tornadoes nationwide this month so far.

Hot air balloonists are helping tornado researchers. In Alabama balloonists and National Weather Service personnel are collaborating to study the radar signature of various airborne debris. Balloonists ascend to various heights and then drop debris consisting of shingles, shutters, twigs, leaves, even pine needles. As they fall, Doppler radar is used to detect them and develop methods for discriminating debris from the normal rain and hail signatures. Hopefully this will aide Weather Service personnel in detecting where a tornado has hit, just based on its Doppler signature.

MPR listener question: I host a garden party each July, but wonder if the probabilities for rainfall vary during the month based on historical climatology. Also, do the probabilities for temperatures of 90 degrees F or higher vary during the month as well?

Answer: For the Twin Cities area, the historical climate records for 1891-2007 show the following distributions for rainfall and temperatures of 90 degrees F or higher during the first four weeks of July.....

July 1-7 33 percent chance for rain, 15 percent chance for temp of 90 F or higher
July 8-14 33 percent chance for rain, 20 percent chance for temp of 90 F or higher
July 15-21 29 percent chance for rain, 23 percent chance for temp of 90 F or higher
July 22-28 27 percent chance for rain, 25 percent chance for temp of 90 F or higher

Thus marginally lowest risk of getting rainfall occurs during the 4th week, but that is also the marginally highest probability for a 90 F day. So it is a trade-off.

Twin Cities Almanac for May 23rd:

The average MSP high temperature for this date is 71 degrees F (plus or minus 8 degrees F standard deviation), while the average low is 50 degrees F (plus or minus 7 degrees F standard deviation).

MSP Local Records for May 23rd:

MSP weather records for this date include: highest daily maximum temperature of 88 degrees F in 1874; lowest daily maximum temperature of 52 degrees F in 2001 and 2004; lowest daily minimum temperature of 28 degrees F in 1963; highest daily minimum temperature of 67 F in 1975 and 1991. Record precipitation for this date is 1.56 inches in 1975. There is no record of any snowfall on this date.

Average dew point for May 23rd is 47 degrees F, with a maximum of 69 F in 1991 and a minimum of 22 degrees F in 1930.

All-time state records for May 23rd:

The state record high temperature for this date is 97 degrees F at Tracy (Lyon County) in 1926 and at Fergus Falls (Otter Tail County) in 1928. The state record low temperature for this date is 18 degrees F at Sawbill Camp (Cook County) in 1935. The state record precipitation for this date is 4.54 inches at Park Rapids (Hubbard County) in 1935. Record snowfall for this date is just 0.7 inches at Fergus Falls (Otter Tail County) in 1924.

From "Minnesota Weather Almanac":(available in bookstores or write the author)

Ten years ago this month, two derecho storms (straight-line wind storms accompanied by heavy rain and hail) wreaked havoc across the southern and central counties of Minnesota. On the afternoon of May 15th between 2:00 pm and 4:00 pm a derecho storm passed through southern Minnesota counties and up through the Twin Cities Metro area. It brought destructive winds of 55 to 65 mph and widespread hail, ranging from 0.75 inches to 2 inches in diameter. Carried by the winds the hail stones inflicted damage to cars as well as houses, and damaged many crop fields which had to be replanted. Total economic loss was estimated to be over \$5 million. Then 15 days later on May 30, 1998 between 6:00 pm and 9:00 pm one of the strongest and largest derecho storms to ever hit the region plowed over central and southeastern Minnesota counties with winds of 60 to 85 mph cutting a wide damage swath. Damage from this storm was estimated to be \$35 million in Dakota County alone. The Highland Park area of St Paul lost over 3000 old trees and numerous homes. This storm maintained its continuity and carved a destructive path across Wisconsin, Michigan, Ontario, and New York state before finally exhausting itself. 1998 was a turbulent year for severe storms in Minnesota as 57 tornadoes were reported statewide.

Words of the Week: Wind Sentry

We know that an anemometer is used to measure wind speed, while a wind vane is used to measure the direction it blows from. An instrument that combines both an anemometer and a wind vane is called a wind sentry. There are several types and manufacturers. Commonly you might find a vane and cup anemometer mounted on a single vertical shaft, one above the other. Another mounting will be a horizontal shaft with a cup anemometer on one end and a wind vane on the other. Costs for such an instrument can range from \$500 to \$1000.00.

Outlook:

Pleasant to start the Memorial Weekend. Increasing clouds later on Saturday and into Sunday with a chance for showers and thunderstorms, especially in the southern

counties. Some of the thunderstorms may be strong. Lingered chance for showers in the eastern sections on Monday. Then drier with seasonal temperatures for the middle part of next week.

Minnesota WeatherTalk for Friday, June 27, 2008

To: MPR's Morning Edition and Minnesota WeatherTalk Subscribers
From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, June 27, 2008

Headlines:

- Jet Streaming podcast this week
- Perspective on weather and climate extremes
- Better week for Minnesota agriculture
- Weekly Weather Potpourri
- Question dust devils and gustnadoes
- Almanac for June 27th
- Past significant weather events on June 27-28
- Staubosphere and Konisphere
- Outlook

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, includes a "best of version" compiled from the past year, with outstanding guests telling us about their research and weather observations and analysis. Segments include discussions about the use of sirens to warn of severe weather, perspectives on storm chasing from a well-known weather photographer, and forecasting for the Professional Golfers Association events. You can listen to the whole podcast at the following web sites.....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: Perspective on new NOAA report about weather and climate extremes

A new NOAA report released last week reported on how climate change may impact the frequency and amplitude of weather and climate extremes. You can read about this or even download the report at....

http://www.noaanews.noaa.gov/stories2008/20080619_climatereport.html

Among the findings for North America landscapes, scientists suggest that:

- abnormally hot days and nights, along with heat waves will become more common, with fewer cold nights.
- sea ice extent will continue to decrease in the Arctic.
- precipitation may be less frequent but more intense.
- droughts are likely to be more frequent and intense for some regions.
- hurricanes will likely bring increased precipitation and wind.

There is a second dimension to dealing with weather and climate extremes that is equally important. Aside from any frequency or amplitude changes, each event and episode is costing us more dearly, especially in infrastructure loss, insurance loss, and numbers of people affected. This is all about increasing societal vulnerability, a problem we must eventually deal with. The image below from NOAA-NCDC depicts the temporal pattern in billion dollar weather disasters since 1980 nationwide and shows a disturbing trend even when considered in the context of 2007 dollars.

Though highly variable, the number of events per year leading to such sizable loss is increasing, and has already been seen in 2008 with over a billion dollars in loss due to flooding in Iowa, Illinois, Missouri, and Indiana. Given the state of the economy and priorities for allocating precious resources, communities need to discuss vulnerability issues that are most important to them and build an agenda to deal with this from the local scale upward. This is a process that has worked in the past, but needs to be reinvigorated. Infrastructure, mitigation, adaptation are certainly terms that need more community attention.

Topic: Weather more favorable for agriculture....

The weather last week provided the best spell for getting fieldwork done all month. Many were out applying a side dressing of fertilizer, cultivating or spraying weeds, or simply field scouting for pests and other problems. Soil moisture is adequate to surplus in most places, but growing degree days have been lacking and crop growth and development has been slow. The pace picked up this week as some areas reported a string of days with temperatures above normal, many daytime highs in the mid 80s F. Crops that were showing nutrient deficiency symptoms now have sufficient root system growth to tap deeper sources and are greening up. Over two-thirds of the states first cutting of alfalfa is complete. According to USDA Agricultural Statistics Service over 60 percent of the corn/soybean crops are rated good to excellent, while 75-80 percent of the small grain crops are rated good to excellent. In relative terms

Minnesota's crops are as good or better than any in the region at this point in the growing season.

Topic: Weekly Weather Potpourri

Earlier this month, Jason Burnett, an associate deputy administrator in the EPA resigned his post. He was a principle advisor to the EPA chief concerning climate change issues and helped develop the EPA's response to the 2007 Supreme Court ruling that allowed regulation of carbon dioxide and other greenhouse gases. Mr. Burnett resigned after deciding there was no progress to be made on this issue under the Bush Administration, as further action on regulating these gases has stagnated within the agency.

NASA teaming up with the French Space Agency announced that the recently launched OSTM-Jason-2 satellite system is operating well and sending back very useful data. This satellite monitors sea level fluctuations and the strength of ocean currents. In addition scientists will be able to assess how much of the solar energy is stored by the oceans.

Firefighters from Oregon and Nevada arrived in California this week to help with wildfires that have plagued the state for days. As many as 700 wildfires, many ignited by lightning strikes, were burning across that state. One of the worst areas was Los Padres National Forest where up to 92 square miles has burned.

SE Iowa and NE Missouri recovering from recent flooding, were hit by strong thunderstorms on Wednesday and Thursday this week. Two to four inch rainfall amounts were reported along the Mississippi River and its tributaries, magnifying the above normal flows in the watersheds there. Further rains were expected on Friday, before the weather pattern settled down for a few days.

After recording some unusual heavy snows two weeks ago, parts of the northwestern states, WA, OR, ID, MT were expecting the onset of a heat wave this weekend. Temperatures in many areas are expected to reach the low to mid 90s F.

MPR listener question: I have heard that gustnadoes and dust devils can be dangerous and cause the equivalent of EF-1 tornado damages. Is this true?

Answer: Indeed, though rare this can happen. Dust devils are well developed whirlwinds originating from the land surface and visible as a result of the dust, sand, and debris they carry. Their diameters can range from a few feet up to nearly 100 feet, and they may extend up to a 1000 feet in elevation. Intense surface heating causes a

steep temperature gradient on hot, calm afternoons when these systems often form. Though brief in duration winds from dust devils can reach 60 to 80 mph.

Technically gustnadoes are a short-lived, ground-based, shallow, vortices that develops on a gust front associated with either thunderstorms or showers. They may only extend up to a few hundred feet above the ground and show no apparent connection to any cloud above. They are usually wispy in appearance, or only visible as a debris cloud or dust whirl. Wind speeds can reach 60 to 80 mph, resulting in significant damage, similar to that of a F0 or F1 tornado. However, gustnadoes are not considered to be a tornado, and some cases, it may be difficult to distinguish a gustnado from a tornado. Gustnadoes are not associated with storm-scale rotation.

Back on June 14th a number of gustnadoes were reported from southern and western counties in Minnesota. On June 18th a woman jogger was killed in Casper, WY when a strong dust devil struck and destroyed a shed where she was seeking shelter. According to Jeff Boyne of the NWS-La Crosse, WI office, back in 1990 during the World Solar Challenge across the Australian Outback, a solar powered car was picked up by a dust devil carried aloft and then dropped, destroying the car.

Twin Cities Almanac for June 27th:

The average MSP high temperature for this date is 81 degrees F (plus or minus 8 degrees F standard deviation), while the average low is 61 degrees F (plus or minus 7 degrees F standard deviation).

MSP Local Records for June 27th:

MSP weather records for this date include: highest daily maximum temperature of 104 degrees F in 1934; lowest daily maximum temperature of 61 degrees F in 1888 and 1911; lowest daily minimum temperature of 44 degrees F in 1925; highest daily minimum temperature of 79 F in 1933. Record precipitation for this date is 2.00 inches in 1953.

Average dew point for June 27th is 59 degrees F, with a maximum of 76 F in 1959 and a minimum of 36 degrees F in 1925.

All-time state records for June 27th:

The state record high temperature for this date is 108 degrees F at New London (Kandiyohi County) in 1934. The state record low temperature for this date is 20 degrees F at Baudette (Lake of the Woods County) in 1970. The state record precipitation for this date is 6.46 inches at Zumbrota (Goodhue County) in 1998.

From "Minnesota Weather Almanac":(available in bookstores or write the author)

June 28, 1876 marks the latest day ever for the break-up of ice in Duluth Harbor. Ship navigation in and out of the harbor was impeded much of June that year by ice that had been driven to the SW end of the big lake by strong NE winds. Ice was present in the Duluth waters as late as July 11, 1876. On July 3rd of 1876 residents of Duluth used ice harvested from the harbor waters to make homemade ice cream.

Conversely June 27-28, 1934 marked the end of a six day heat wave across southern Minnesota counties. Many observers reported consecutive days with maximum temperatures over 100 degrees F and young crops baked in the fields as their root systems could not supply enough moisture. Heat waves killed nearly 1400 people across the region in the summer of 1934.

Also on June 27-28, 1947 a derecho straight-line wind storm passed across central Minnesota between 9:00 pm the evening of the 27th and 4:00 am the morning of the 28th. Wind gusts were estimated to exceed 70 mph in places as the storm started over Yellow Medicine County and ended over Dakota County, cutting a 10 to 20 mile wide path of destruction along the way. Many farm buildings and silos were damaged and planes and hangars were destroyed at Southport Airfield near Rosemount. Total damages from the strong winds were estimated at \$700,000.

Words of the Week: Staubosphere or Konisphere

Staubosphere was a termed coined by S. Cyril Blacktin during the dustbowl years of the 1930s. It refers to the dust content of the atmosphere. A more common term is konisphere, which refers to the dust content in the lower atmosphere as measured by a koniscope or konimeter. A koniscope measures the optical properties of the atmosphere then estimates the dust content, while a konimeter actually samples the air and collects microscopic dust particles on a sticky film surface. Today, there are a variety of aerosol photometers that measure particles of different size in the air.

In the central plains states, dust content is clearly higher during prolonged drought periods and even briefly higher during spring tillage and planting when soils are disturbed by tractors and associated implements like plows, chisels, disks and cultivators.

Outlook:

Cooler over the weekend with chances for showers and thunderstorms through Saturday night. Sunday and Monday look mostly dry with temperatures at or a few degrees cooler than normal. It will be warming up again by mid-week with a chance

for showers and thunderstorms returning late Tuesday and Wednesday through Thursday.

Minnesota WeatherTalk for Friday, June 6, 2008

To: MPR's Morning Edition and Minnesota WeatherTalk Subscribers
From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, June 6, 2008

Headlines:

- Jet Streaming podcast this week
- Wet first half of June
- Salute to Bill Togstad
- Weekly Weather Potpourri
- Question about sirens
- Almanac for June 6th
- June 6th weather of the past
- Greenlash
- Outlook

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, includes a conversation with Greg Carbin, Warning Coordination Meteorologist for NOAA's Storm Prediction Center. He tells us what weather features are implied when the SPC issues a PDS watch (Particularly Dangerous Situation). He also reports on the high frequency of tornadoes across the USA so far this year. In addition we talk with Paul Gross, meteorologist with WDIV-TV in Detroit. He has studied the weather associated with the D-Day invasion of WWII and produced a documentary about it for the Eisenhower Center. We learn from Paul much about the behind the scenes work that produced the D-Day forecast for the Allied forces to invade France on June 6, 1944. We also highlight a web site from the European Center for Medium Range Forecasting, where you can read about a meteorological reconstruction of that fateful day.

www.ecmwf.int/research/era/dday

You can listen to the whole podcast at the following web sites.....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: Wet first half of June expected

Most of the forecast models indicate a frequency and magnitude of storminess across our region that will bring us a very wet first half of the month. Some northern areas of the state will welcome this scenario as they have been dry so far this spring. On average it rains about every third day in June, but the track of low pressure systems is very near Minnesota and expected to remain that way for some time, so a higher frequency of rainfall chances is expected. Some Minnesota observers have already reported 2 to 4 inches of rainfall over just the first six days of the month.

Most farmers would welcome a little more heat. Growing Degree Days (accumulation of air temperatures above 50 degrees F) have been relatively scarce so far. As a result crop development is slow and running behind normal. The first cutting of alfalfa for the hay crop will be one of the latest in recent springs. Farmers in southern Minnesota counties needing to do some weed control (spraying or cultivating) and those wishing to cut hay are hoping for some dry days to do so.

Topic: A Salute to Bill Togstad in His Retirement....and a comment about loss of experience

Bill Togstad retired earlier this week from the National Weather Service. It was my privilege to work with Bill for many years, mostly when he was at the MSP International Airport Office, and later at Chanhassen. He was an outstanding forecaster, one of the few in the NWS organization to receive the Isaac Cline Award, and he was also an expert on severe weather. Bill's expertise and attention to detail will be missed by Minnesotans. With his retirement comes the loss of nearly 36 years of experience.

Bill's retirement adds to the cumulative loss in experiential knowledge and expertise at the Chanhassen National Weather Service Office. Since October of 2006 Craig Edwards (former Meteorologist in Charge), Rich Naistat, Mike Anderson (NOAA hydrologist for nearly 36 years), and Bill Togstad have all retired after outstanding careers in science and public service - a cumulative loss organizationally of over 145 years of experience. These are big shoes to fill, but the NWS has done well in replacing them with excellent young meteorologists who know how to use the latest technologies in forecasting. I am hopeful that the outstanding track record of the NWS-Chanhassen office will continue.

Topic: Weekly Weather Potpourri

Researchers from the University of Alberta announced this week a new wireless system to monitor the environment in remote areas and have the data transmitted to

any global research center. They are experimenting with new sensor technology to monitor temperature and light in rain forests with tiny devices that can collect and transmit large quantities of data.

NOAA declared this week Rip Current Awareness Week and put out a number of announcements warning beachgoers about the threat of rip currents. Many coastal National Weather Service Forecast Offices issue daily "Surf Zone Forecasts." Educational resources are also available on this topic at

www.ripcurrents.noaa.gov

Tuesday and Wednesday of this week brought heavy rains to parts of central England, with up to 2 inch amounts reported. This produced some flash flooding along various watersheds that closed many roads.

The Indian Monsoon Season was underway this week as well, with very heavy rains over Sri Lanka that produced flooding and displaced up to 150,000 people.

In Central America citizens of Belize experienced a double dose of tropical storm rains over the past week. First Tropical Storm Alma came in from the Eastern Pacific Ocean and brought very heavy rains that produced flooding and displaced thousands of people. Then Tropical Storm Arthur moved in off the Caribbean Sea and brought high winds and heavy rains across some of the same landscape.

The Western Regional Climate Center reported this week that the state of California had its driest ever spring (March, April, May) with an aggregate 3-month total of less than 1.25 inches of precipitation. The USDA Drought Monitor has placed much of California in the moderate to severe drought categories and Governor Schwarzenegger on Wednesday officially declared a drought condition prompting water conservation measures and water restrictions in many areas.

NOAA's Storm Prediction Center continues to report a high frequency of tornadoes for this spring. Following nearly 600 reports of tornadoes nationwide in May, the first 4 days of June have produced over 70 tornado reports, including several in Iowa and Nebraska. Tornado and flash flooding damages were reported in Indiana on Wednesday this week.

MPR listener question: How long do the sirens sound for a tornado warning in Minnesota?

Answer: To the best of my knowledge sirens have been a significant feature for severe weather warnings in Minnesota since the 1980s. However, the policy for use of the sirens, including the duration they blare, is determined by the local emergency

management office of Homeland Security. As a consequence, I believe that the number of minutes that sirens sound for a tornado warning varies somewhat by county. There is no use of sirens for sounding an all clear after a storm. When they sound, it is best to take appropriate protective action and use radio or television to access information regarding the passage of the threat. In some instances the severe weather threat (tornado or otherwise) can be very brief, just a few minutes, while in other cases it can be a half hour or longer.

Twin Cities Almanac for June 6th:

The average MSP high temperature for this date is 75 degrees F (plus or minus 10 degrees F standard deviation), while the average low is 55 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for June 6th:

MSP weather records for this date include: highest daily maximum temperature of 95 degrees F in 1979 and 1987; lowest daily maximum temperature of 54 degrees F in 1901 and 1937; lowest daily minimum temperature of 36 degrees F in 1897 (35 degrees F at old Ft Snelling in 1843); highest daily minimum temperature of 74 F in 1925. Record precipitation for this date is 1.59 inches in 1974. There is no record of any snowfall on this date.

Average dew point for June 6th is 53 degrees F, with a maximum of 73 F in 1925 and a minimum of 26 degrees F in 1926.

All-time state records for June 6th:

The state record high temperature for this date is 106 degrees F at Pipestone (Pipestone County) in 1933. The state record low temperature for this date is 20 degrees F at Warroad (Roseau County) in 1952 and at Remer (Cass County) in 1985. The state record precipitation for this date is 6.51 inches at Luverne (Rock County) in 1896. No snowfall has been measured on this date.

From "Minnesota Weather Almanac":(available in bookstores or write the author)

Frost was reported around St Paul over June 6-7, 1864. According to newspaper accounts the frost was damaging to some local gardens and regional crops. This was one of several late spring frost events during the 1860s in Minnesota.

A tornado outbreak between 4:45 pm and 5:45 pm on June 6, 1906 killed 5 people and injured 40 others in parts of eastern Minnesota. Farm buildings and homes were

destroyed by tornadoes in Houston, Anoka, and Chisago Counties. The most destructive of these was an F-4 tornado that was on the ground for 33 miles from Caledonia to La Crosse in SE Minnesota.

Another June 6th tornado struck in Carlton County at 7:00 pm in 1946. It was on the ground for 15 miles and destroyed a number of farm buildings and homes near Moose Lake. Farmers reported hundreds of animals killed by this storm. Historically speaking tornadoes are extremely rare in Carlton County.

Word of the Week: Greenlash

Probably a take-off on the word backlash, this term is used by ecologists to refer to the interconnectedness of ecosystem disturbance across large geographic regions. For example the clearing of a forest, drainage of a wetland, or construction of a dam can lead to changes in local ecosystems that have consequences on vegetation, minerals, atmospheric gases (including water vapor), transport of organisms and other features all of which can impact distant ecosystems across the landscape from where the disturbance has occurred. Many scientists argue that more study of greenlash effects on needed to better evaluate the potential consequences of climate change.

Outlook:

Continued warm and humid over the weekend and into next week with chances for scattered showers and thunderstorms, especially in SE sections of the state. Somewhat cooler temperatures on Monday and Tuesday. The La Nina episode in the equatorial Pacific Ocean has all be ended. It appears as though a very wet June may be in order across the region.

Minnesota WeatherTalk for Friday, June 20, 2008

To: MPR's Morning Edition and Minnesota WeatherTalk Subscribers
From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, June 20, 2008

Headlines:

- Jet Streaming podcast this week
- Perspective on flooding
- New climate outlooks
- Weekly Weather Potpourri
- Question about summer solstice daylength
- Almanac for June 20th
- Past significant weather events
- Wing dams
- Outlook

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, includes several interesting conversations. Paul, Cathy, and Mark start by visiting with Dan Luna of the National Weather Service (NWS-Chanassen, MN) about the recent flooding across the Midwest. He says the NWS has done a good job in forecasting the flood crests, but they have been so record-breaking in places that protection and mitigation efforts by communities have had limited effect. Next we visit with Vic Luspinos from the Chicago Mercantile Exchange about the impact the flooding has had on major crop prices. He notes that there has been a 24 percent run-up in corn prices this month due mostly to bad weather, and that the market will remain quite volatile for the balance of the 2008 growing season. Lastly, we visit with Dr. Sally Mason, President of the University of Iowa in Iowa City, IA. She tells us about the heroic efforts made by faculty and staff at the university to protect the campus from the flooding on the Iowa River which crested several feet above the all-time historic flood crest from 1993. And Paul Huttner highlights the web site of the week from NOAA's Advanced Hydrologic Prediction System.

You can listen to the whole podcast at the following web sites.....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: Perspective on Flooding

The damages from flooding continue to pile up in Iowa, Illinois, and Missouri this week. SE sections of Minnesota are recovering from floods along the Cedar and Root River watersheds, where precipitation since April 1st has been 150 to 200 percent of normal. Fortunately the weather pattern for the balance of June appears to be quieter, dominated by mostly warm and dry air.

Flood impacts though are far reaching and may linger throughout the summer. Commodity price fluctuations are likely to be amplified by weather conditions throughout the balance of the growing season. Some fields have been lost to flooding, as analysts have estimated that between 7 and 20 percent of the nation's corn acreage has been affected by high water. However, some of these fields will recover to varying degrees. Soybean processing plants in Iowa were closed due to flooding, as were some meat processing plants. Transportation has been affected with road and bridge closures, as well as closures to river navigation along the Mississippi River. The insurance industry is taking a bit hit this year, not just because of flooding, but also associated with higher frequencies of hail and tornado damage. Lastly, clean-up and recovery efforts for many communities will be substantial and further stress their local economies. Resources earmarked for other purposes will likely be deployed to help in these recovery efforts, though hopefully federal assistance (FEMA) will buffer the stress on local economies.

Topic: New Monthly and Seasonal Climate Outlooks.....

NOAA's Climate Prediction Center released new seasonal climate outlooks this week. For Minnesota the outlooks favor cooler than normal temperatures for July, with above normal rainfall in SE sections of the state. This is primarily based on lingering cold air intrusion from high latitudes and abundant soil moisture across the region contributing to evaporative cooling. For the balance of the growing season, August and September included there are equal chances for warmer or colder than normal temperatures, and equal chances for above or below normal rainfall. Much of the growing season remains and crop yields may still be quite good with more favorable weather and a good harvesting season.

Topic: Weekly Weather Potpourri

The American Meteorological Society will host the 36th Conference on Broadcast Meteorology next week in Denver, CO. Two of the program sessions will be discussions on climate change, including the scientific evidence and uncertainties, and how to communicate the research findings. Several outstanding climate scientists are on the program.

FEMA personnel were scattered across Iowa, Illinois, and Missouri this week assessing damages from flooding and promising federal assistance. Officials were concerned about more levees being breached by the waters and about the long term effects of polluted waters invading residential areas. Following their 3rd wettest April-May in state history, many Iowa communities have seen June rainfall amounts that are 200 to 400 percent of normal.

Torrential rains have also caused flooding along the Pearl River Delta in southern China. Thousands of people have been displaced from their homes. In addition roads have been washed away and agricultural fields are under water. This is only the beginning of the monsoon season for them.

Typhoon Fengshen was tracking southeast to northwest through the Philippine Islands late this week and packing winds of 100-110 mph. Luzon, and specifically the city of Manila were expected to see heavy rainfall from this storm on the summer solstice weekend. Damages over the highly populated region may be significant.

NOAA announced the release of a new report this week on how a climate change may impact the frequency and amplitude of weather and climate extremes. You can read about this or even download the report at...

http://www.noaanews.noaa.gov/stories2008/20080619_climatereport.html

Among the findings for North America landscapes, scientists suggest that:

- abnormally hot days and nights, along with heat waves will become more common, with fewer cold nights.
- sea ice extent will continue to decrease in the Arctic.
- precipitation may be less frequent but more intense.
- droughts are likely to be more frequent and intense for some regions.
- hurricanes will likely bring increased precipitation and wind.

Following last week's brief heat wave in the mid-Atlantic states, the western states took a turn this week. California reported near record or record-breaking heat for Wednesday and Thursday with many daytime highs of 100 degrees F or greater. Observers reported 115 degrees F at Palm Springs, 113 degrees F at Blythe, 112

degrees F at El Centro, and 113 degrees F at Needles. Van Nuys in the LA basin also hit 100 degrees F. Many people were assisted for heat related ailments.

MPR listener question: On the summer solstice (longest day of the year) what is the difference in daylength across Minnesota from south to north? Is it several minutes?

Answer: Indeed, it is several minutes, almost an hour. Along the northern most shore of Lake of the Woods daylength on the summer solstice can be about 16 hours and 20 minutes, while along the Iowa border it will be around 15 hours and 25 minutes, a difference of 55 minutes.

Twin Cities Almanac for June 20th:

The average MSP high temperature for this date is 78 degrees F (plus or minus 9 degrees F standard deviation), while the average low is 59 degrees F (plus or minus 7 degrees F standard deviation).

MSP Local Records for June 20th:

MSP weather records for this date include: highest daily maximum temperature of 98 degrees F in 1933; lowest daily maximum temperature of 54 degrees F in 1946; lowest daily minimum temperature of 41 degrees F in 1992; highest daily minimum temperature of 75 F in 1943. Record precipitation for this date is 1.92 inches in 1927.

Average dew point for June 20th is 55 degrees F, with a maximum of 78 F in 1909 and a minimum of 31 degrees F in 1992.

All-time state records for June 20th:

The state record high temperature for this date is 104 degrees F at Olivia (Renville County) and Stewart (McLeod County) in 1988. The state record low temperature for this date is 23 degrees F at Remer (Cass County) in 1985. The state record precipitation for this date is 5.93 inches at Georgetown (Clay County) in 2000.

From "Minnesota Weather Almanac":(available in bookstores or write the author)

June 16, 1992 brought the last F-5 tornado (winds over 260 mph) to the Minnesota landscape. It started about 4:00 pm in the afternoon near Leota in NW Nobles County and traveled for 16 miles NNE to Chandler in Murray County. There it destroyed 40 homes and damaged another 47. There was one death and 40 injuries. At times the tornado was 300 yards wide while traveling across the landscape of SW Minnesota.

June 20, 1992 brought the only known instance of frost in southern Minnesota counties on the summer solstice (longest day of the year). Many reported temperatures in the 30s F, even some of the suburban areas of the Twin Cities Metro Area. Temperatures from the mid to upper 20s F were reported in the NE regions. Widespread frost damage to crops caused some farmers to harvest their corn for silage, though most who waited out the growing season were able to harvest corn for grain, albeit a lower yield. The growing season of 1992 was one of the coolest of the 20th Century, much of it blamed on the consequences of the Mt Pinatubo eruption in 1991.

Words of the Week: Wing dams

Wing dams are man-made rock piles that are strategically placed along rivers to trap sediment and force current flow to the main navigational channel, helping to keep sufficient depth for boats and barges to travel unhindered. They also prevent current from causing shorelines to erode. These are common along the Upper Mississippi River, though occasionally they are overtopped by flood flows. Many river fish use the still waters on the downstream of wing dams as places to feed and rest. I am told these are good spots for catching catfish.

Outlook:

Looks like a great weekend for the 35th Annual "Back to the 50s Auto Show" hosted by the Minnesota Street Rod Association at the State Fairgrounds. Summer-like temperatures under partly cloudy skies will be in order, though there is a small chance for widely scattered thunderstorms later on Saturday. Warmer next week with a chance for showers and thunderstorms in the west late Monday and across the state on Tuesday. Highs may approach 85-90 degrees F late next week in some areas, as a summertime high pressure ridge approaches the state.

Minnesota WeatherTalk for Friday, July 11, 2008

To: MPR's Morning Edition and Minnesota WeatherTalk Subscribers
From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, July 11, 2008

Headlines:

- Jet Streaming podcast this week
- Welcome relief for some
- Weekly Weather Potpourri
- A question about dewpoint variation
- Almanac for July 11th
- Past significant weather
- What is gunge?
- Outlook

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, includes a discussion about the history of the Weather Channel, its sale to NBC Television, and what the future might bring for broadcast meteorology. In addition, Craig Edwards, Paul Huttner and Mark Seeley talk to Dr. Jose Fuentes of the University of Virginia about his research on insect behavior associated with air pollutant effects. We learn that honey bees and other pollinators can be negatively affected by pollutants such as ozone. Craig Edwards also offers another interesting web site of the week. You can listen to the whole podcast at the following web sites.....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: Welcome relief for some.....

Just when the USDA/NOAA Drought Monitor places central Minnesota counties in a D0 category (abnormally dry) this week, a large system of thunderstorms aligned along a warm frontal boundary brought some significant rainfall on Thursday this week to most of that area. The largest storm system formed as a derecho (straight line wind storm) at times and moved from the eastern Dakotas across Minnesota and all the way to the Chicago area. There were at least 30 reports of large hail, including a report near Lake City of 2.25 inch diameter hail stones. In addition there were over 30 reports of wind damage caused by 50 to 70 mph gusts. Two EF0 (winds of 65-85 mph) tornadoes were reported, one in Dakota County near Hampton, and one in Goodhue County near Vasa.

Many observers reported 0.5 inches to over 1 inch of rainfall in a short period of time from Thursday's storms. Rosemount reported 1.90 inches of rainfall in a half hour period, a level of intensity that equates somewhere between a once in 50 to once in 100 year recurrence. Just prior to the thunderstorms dewpoints spiked from the mid 60s to low 70s F indicating an abundance of water vapor in the atmosphere. Some of the more significant rainfall amounts included 1.53 inches at Fergus Falls, 1.18 inches at Gull Lake, 1.80 inches at Alexandria, 1.02 inches at Long Prairie, and 1.53 inches at Wabasha.

Topic: Cold at Embarrass

On July 3rd, Embarrass, MN reported the coldest temperature in the nation with just 34 degrees F. This was the first time Minnesota has held that distinction since Embarrass reported the nation's low of just 21 degrees F on May 19, 2008.

Weekly Weather Potpourri:

NOAA reports that the sports fishing industry is using satellite imagery to forecast fishing prospects for their customers. It seems that Kingfish prefer sea temperatures of 68 to 73 degrees F, while Sailfish prefer a range of 61 to 75 degrees F. NOAA infrared satellite imagery can be used to discriminate this range in water temperature so boat captains know where to find these different type of fish.

New South Wales Australia was reporting snow this week along with gale force winds. Temperatures dipped into the 30s F as a strong cold front approached from the south. Farmers were glad to see the snowfall and the rain as parts of Australia are still recovering from drought.

The United Kingdom Meteorological Office reports on some symptoms of climate change evident in their countryside. Growing seasons are longer by as much as six days over the past decade. Because spring is coming earlier and autumn is sticking around longer, they also report lawn cutting season is longer and in the north farmers raising livestock are seeing benefits from a longer grazing season.

The National Hurricane Center was still tracking Hurricane Bertha this week as it was an uncertain threat to the island of Bermuda. The storm formed in the eastern North Atlantic last week and has varied between a class I and class III hurricane this week. At the very least it is likely to produce some rainfall and large sea waves over the weekend around Bermuda. Residents are being put on alert there.

Drought has had detrimental affects on Iraq's agriculture and water supply systems so far this year. The dry spell has hurt wheat and barley yields, as well as the orange groves. Water used for irrigation is much diminished and many river flows are quite low. Compounded the problem are damages inflicted by frequent sandstorms.

MPR listener question: Earlier this month, July 6 and 7, I noticed quite a large range in dewpoints around the Twin Cities area. Some were in the high 50s F and some were as high as 70 degrees F. Is this range in dewpoints common?

Answer: Under certain conditions, especially with stalled frontal boundaries between weather systems, there can be quite a substantial geographic range in dewpoints. Air on the southern side of the warm front boundary may have dewpoints well into the 70s F, while air to the north having migrated typically out of Canada will have relatively low dewpoints, perhaps in the 50s F. For example on Sunday afternoon, July 6th a warm front was draped across the state separating warm, moist air from cool, dry air. The dewpoint at 4:00 pm in the afternoon was 58 degrees F near Buffalo in Wright County, NW of the Twin Cities, while the dewpoint was 72 degrees F near Eagan in Dakota County, SE of the Twin Cities. Similarly on July 31, 1999 with another warm front across the state, the dewpoint was 59 degrees F in Anoka and 70 degrees F in Red Wing.

In addition to air mass differences, sometimes local landscapes can produce differences in dewpoints, especially under conditions with little or no wind. Ponds, lakes, and growing vegetation can add to the water vapor content of the air. For example earlier this week on Monday, July 7th MSP International Airport reported an afternoon temperature of 81 degrees F with a dewpoint of 68 degrees F from instruments located just off the runway, while the University of Minnesota St Paul Campus Observatory located amidst small grain plots reported the same 81 degrees F air temperature, but with a dewpoint of 73 degrees F.

Almanac for July 11th:

The average MSP high temperature for this date is 84 degrees F (plus or minus 8 degrees F standard deviation), while the average low is 64 degrees F (plus or minus 6 degrees F standard deviation).

MSP Local Records for July 11th:

MSP weather records for this date include: highest daily maximum temperature of 106 degrees F in 1936; lowest daily maximum temperature of 66 degrees F in 1941; lowest daily minimum temperature of 49 degrees F in 1945; highest daily minimum temperature of 82 F in 1936. Record precipitation for this date is 3.75 inches in 1909.

Average dew point for July 11th is 60 degrees F, with a maximum of 78F in 1966 and a minimum of 42 degrees F in 1985.

All-time state records for July 11th:

The state record high temperature for this date is 111 degrees F at Ada (Norman County) in 1936. The state record low temperature for this date is 30 degrees F at Meadowlands (St Louis County) in 1985. The state record precipitation for this date is 7.47 inches at Rochester (Olmsted County) in 1981.

From "Minnesota Weather Almanac":(available in bookstores or write the author)

One of the driest summers of the 19th Century was that of 1863. Smithsonian records for St Paul indicate only a trace to 0.02 inches of rainfall during June, and just 0.63 inches during July. This

was followed by 3.19 inches of rain in August, giving a three month total (June through August) of only 3.84 inches. The modern average rainfall for the June-August period in the Twin Cities is nearly 12.5 inches, so 1863 delivered less than one-third of that. Naturally the fire danger that summer was extreme as Reverend A.B. Paterson of St Paul noted that the air was filled with "suffocating smoke" over July 10-11. There were also numerous July frosts that damaged gardens and vegetation over July 11-15.

In the Twin Cities climate records only the summer of 1894 (1.73 inches of rain for June through August), and 1910 with 3.49 inches were drier than 1863. Interestingly, both of those years were terrible fire seasons as well.

Word of the Week: Gunge

According to the Storm Spotter's Guide, this term is used to describe anything that impedes the ability of a storm spotter in observing the development and onset of a storm. This can be dust, haze, smoke, low clouds, shafts of rain, or fog. Under conditions of extreme gunge, forecasters must rely on satellite imagery and radar, rather than storm spotters.

Outlook:

Chance of showers and thunderstorms east and north early in the weekend perhaps through early Saturday morning, then becoming significantly cooler on Sunday and Monday. Temperatures will start to warm again Tuesday and Wednesday with an increasing chance for showers and thunderstorms.

Minnesota WeatherTalk for Friday, July 18, 2008

To: MPR's Morning Edition and Minnesota WeatherTalk Subscribers
From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, July 18, 2008

Headlines:

- Jet Streaming podcast this week
- Crazy day starts cold and turns severe
- More tornadoes on July 11th
- Weekly Weather Potpourri
- A question about peak wind speeds
- Almanac for July 18th
- Past significant severe thunderstorms
- What is agglomeration?
- Outlook

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, includes a discussion about fire weather and the tasks before an incident meteorologist who provides forecasts to firefighters battling forest and wildfires around the country. Our guest Steve Marien of the National Park Service has years of experience in this field. Another guest, Jason Dunion from NOAA's Hurricane Research Division in Miami, FL describes the effects of African dust storms on hurricane suppression over the North Atlantic. The Jet Streaming crew also offers another interesting web site of the week related to NASA's MODIS sensor aboard both the Terra and Aqua satellites. You can listen to the whole podcast at the following web sites.....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: First a cold start to July 14th, then severe weather up north...

Monday morning of this week, July 14th was a bit startling for those camping in northeastern Minnesota. Morning low temperatures included 39 degrees F at Cook, 38 degrees F at Orr, 37 degrees F at Hibbing, and 34 degrees F at Embarrass. The values at Orr and Embarrass were new record lows for July 14th.

From those morning lows temperatures rose over 40 degrees throughout the day into the 80s F by Monday afternoon. Severe thunderstorms passed across the area, bringing 2-3 inches of rainfall

to parts of Beltrami, Itasca, and St Louis Counties. There were 13 reports of large hail and 4 reports of tornadoes.

Topic: July 11th storms in Minnesota

Dewpoints rose late last week to the highest levels of the summer, reaching 75 to 81 degrees F in places. This came just ahead of severe thunderstorms on July 11th that resulted in 11 tornado reports around the state, bringing the statewide number of reports this year to over 30. The most damaging of the tornadoes was an EF-3 (winds 136-165) that traveled for 8 miles south of Willmar in Kandiyohi County. This was the 3rd EF-3 tornado of the season in Minnesota, the others being the Hugo tornado of May 25th and the tornado in Emmaville (near Park Rapids) on June 6th. So far July has brought numerous tornadoes, strong thunderstorms, hail, and straight line winds to the state. NOAA's Climate Prediction Center and Storm Prediction Center forecast more turbulent weather across the region for over the coming weekend.

Weekly Weather Potpourri:

Scientists from NASA's Jet Propulsion Laboratory suggest that continued use of the QuikSCAT satellite data on wind speeds over the oceans may lead to better deployment of wind turbines for generating energy. New technologies have made the deployment of floating wind farms across the oceans a more feasible possibility. Using the QuikSCAT data base, this technology can be more strategically used to place such systems where they will be most productive.

Bermuda was pounded by heavy rain, high surf, and strong winds up to 70 mph brought by Tropical Storm Bertha earlier this week. Roads were flooded and power poles knocked down, but no deaths were reported from the 2nd named storm of the North Atlantic Hurricane Season. Bertha was indeed a hurricane for a time in its passage across the North Atlantic. Still of tropical storm strength, Bertha was moving NE across the North Atlantic as late as Thursday this week and had become the longest lived July tropical storm in history, surpassing 12 days.

An article in the recent Proceedings of the National Academy of Sciences presents data that associated increased frequency of warm temperatures with increased cases of kidney stones. In this context, climate change is expected to bring an increase in the occurrence of kidney stones brought on by dehydration. Such an increase in frequency may cause a 25 percent rise in the cost of treating kidney stones according to the authors.

President Bush was visiting California this week to inspect the damages from what's called California's worst ever fire event. Over 2000 fires have burned nearly 900,000 acres (1400 square miles) and caused the evacuation of thousands. Fortunately firefighters were gaining control this week over many of the fires.

Typhoon Kalmaegi was ravaging the island nation of Taiwan on Thursday this week. It is the 7th typhoon of the Western Pacific season. Wind gusts to 120 mph, with sea waves of 25 feet were affecting coastal areas of the country. Later in the weekend the storm was expected to bring heavy rains to Shanghai, China.

Atmospheric chemists from the University of Rhode Island commented on ScienceDaily this week that the threat of foul air for the Beijing Olympics next month is not just about local sources of pollution but regional ones as well. Even though officials are attempting to curb the pollution from local sources during the Olympic Games to keep air quality acceptable, the regional sources of air pollution (transportation, industry and coal-fired power plants) may affect the air quality of the Olympic Games if a stagnant weather pattern prevails.

MPR listener question: It seems to me that it is getting windier where I live in Mahtowa, MN (40 miles SW of Duluth) or I am getting less tolerant of the wind. The wind seems to blow more and stronger when it does. Does the Weather Service have a method to measure the cumulative wind over a week, month or year to determine this change? And if there is a way to measure, what is it called and does it actually show a change over time?

Answer: The history of wind speed and direction data in our state is not as long or as detailed as that of temperature and precipitation. Much of it has been measured by mechanical cup anemometers, but more recently is measured by precise sonic anemometers (related the wind speed to the attenuation of sound waves). The National Weather Service does compute some means and extremes for wind data for selected locations, but the length of the climate record is generally short. Among these are Duluth, International Falls, Rochester, Saint Cloud, and the Twin Cities. Comparing the mean monthly wind speeds this year to the historical averages does not show much deviation. Depending on locations, the average monthly wind speeds have ranged from 8 mph to 13 mph so far this year, with peak values in April.

Though the mean values do not show any sharp trends this year, the frequency of high wind speeds is much higher this year (2008) for most locations. Typically peak wind speeds of 40 mph or greater might occur on only 5-10 days per year depending on location around the state. But the following table shows these historical average frequencies for 40 mph winds have already been exceeded this year at all locations except International Falls.

Location	Number of days with peak wind speed > 40 mph	Peak value for 2008
International Falls	7	59 mph in May
Saint Cloud	17	56 mph in July
Duluth	14	62 mph in April
Rochester	19	53 mph in June
Twin Cities	14	62 mph in July

Your observation of windiness in your area is likely tied to the memory of these frequent days with speeds over 40 mph. Obviously the mean monthly wind speeds are dampened off by a frequency of calms and low wind speed days.

Almanac for July 18th:

The average MSP high temperature for this date is 84 degrees F (plus or minus 7 degrees F standard deviation), while the average low is 64 degrees F (plus or minus 6 degrees F standard deviation).

MSP Local Records for July 18th:

MSP weather records for this date include: highest daily maximum temperature of 101 degrees F in 1940; lowest daily maximum temperature of 60 degrees F in 2000; lowest daily minimum temperature of 49 degrees F in 1873; highest daily minimum temperature of 78 F in 1986. Record precipitation for this date is 2.94 inches in 1895.

Average dew point for July 18th is 62 degrees F, with a maximum of 79 degrees F in 1957 and a minimum of 18 degrees F in 1910.

All-time state records for July 18th:

The state record high temperature for this date is 109 degrees F at Beardsley (Big Stone County) and Morris (Stevens County) in 1940. The state record low temperature for this date is 30 degrees F at Kelliher (Koochiching County) in 2003. The state record precipitation for this date is 7.50 inches at Ft Ripley (Crow Wing County) in 1867.

From "Minnesota Weather Almanac":(available in bookstores or write the author)

Anniversary Week for some of Minnesota's most intense rain storms....

(1) Today (July 18) is the anniversary of perhaps the most prolonged intense rainfall ever recorded in the state. This thunderstorm complex occurred in 1867 over western and central Minnesota, but was especially heavy in parts of Douglas, Pope and Stearns Counties, affecting the pioneer communities of Osakis, Sauk Centre, and St Cloud. Beginning late on Wednesday, July 17th, lasting all day July 18th, and into the early morning of Friday July 19th, heavy thunderstorms drenched the landscape with 30 to 36 inches of rainfall. Unfortunately measurements of the storm were not made by official rain gages in those days, but several people did record measurements via buckets and barrels which filled up. George B. Wright, a pioneer land surveyor in the area, documented the event and reported on it in some detail to the Minnesota Academy of Natural Sciences years later (1876). In his account, the Pomme de Terre, Chippewa, and Sauk Rivers, normally creeks at that time of year, became lakes several miles wide. The storm generated runoff caused the Mississippi to rise 12 feet in 24-hours, washing out bridges and logging booms right through the Twin Cities area. The total number of logs washed away was estimated to exceed 35 million. The mosquito population was reported as the worst ever for the balance of that 1867 summer.

(2) July 21-22, 1972 brought perhaps the most widespread destructive flash flooding event, closing every major highway from Alexandria east to the Wisconsin border (except I35 north to Duluth) for a period of 3 to 16 days. The storm covered an area of approximately 1500 square miles, with the heaviest rainfall occurring over a stretch from Douglas and Otter Tail Counties east to Mille Lacs County. Greater than 13 inches of rainfall was recorded in the Fort Ripley area north of Little Falls. Damage estimates exceeded \$20 million. Timely advisories and forecasts, as well as actions by local law enforcement limited casualties of this storm. One person drowned driving into a washed out road.

(3) July 23, 1987 is a date most residents of the Twin Cities remember well. Ten inches of rainfall came in one storm, most of which occurred from 7 pm to 1 am. Rainfall intensity was 2.25 to 2.75 inches per hour for a period of three hours. The area covered by ten or more inches of rainfall was estimated to be 93 square miles. The storm damages were exacerbated by saturated ground as a result of earlier 2 to 6 inch rains on July 20-21. Damages were estimated to exceed \$25 million as over 8500 homes, over 250 commercial properties, dozens of public parks, and several waste water treatment plants experienced flooding. Many vehicles (including a Red Cross Blood Mobile with a day's worth of blood donations) were submerged when Nine Mile Creek flooded I494 to a depth of 9 feet.

It should not be surprising that many of the state's most intense rain storms have occurred in July. Examining the historical statistics on rainfall shows that although May and June show the highest frequencies of measurable rainfall, July and August show by far the highest frequencies of intense rainfall (greater than 2.50 inches). In part this is due to the fact that the atmosphere over Minnesota is more heavily laden with water vapor (called precipitable water) during these months.

Word of the Week: Agglomeration

Contrary to some popular opinion, this is not what they served in the Ft Snelling Commissary to the frontier soldiers!

This is a term used in cloud physics to describe a precipitation process whereby water droplets or ice crystals grow in size by collision and assimilation with other precipitation particles. When two colliding water droplets form a new larger droplet this agglomeration process is called coalescence. When an ice crystal collides with a supercooled water droplet which is assimilated and freezes, this agglomeration process is called accretion which may eventually lead to formation of hail. Snowflakes are agglomerations of various ice crystals as well.

Outlook:

A warm front across the state will bring the chance for showers and thunderstorms over the weekend. Temperatures will be near seasonal normals. Drier on Monday and Tuesday, with a chance for showers and thunderstorms returning by mid week, along with warmer temperatures.

Minnesota WeatherTalk for Friday, July 25, 2008

To: MPR's Morning Edition and Minnesota WeatherTalk Subscribers
From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, July 25, 2008

Headlines:

- Jet Streaming podcast this week
- Drought threatening?
- Archaeology meets climatology
- Weekly Weather Potpourri
- Dewpoints and wind
- Almanac for July 25th
- Past significant severe thunderstorms
- Dvorak scale
- Outlook

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, includes a discussion with Ron Holle of Vaisala, Inc in Tucson, AZ, home to the National Lightning Detection Network. Everything you want to know about lightning and more. The other guest this week is Troy Hirdler of the Twin Cities. He survived a close encounter with lightning 23 years ago and he talks about. Craig Edwards also talks about another exciting web site....NOAA's Operational Significant Event Site. You can listen to this discussion at the following web sites.....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: On the cusp of drought?

Much of central and northwestern Minnesota is now designated by the USDA Drought Monitor as a D-0 category, implying significantly drier than normal conditions. This is not categorically a drought designation, but it is worrisome for crop conditions. Some counties show rainfall deficits of 2 to 4 inches since June 1st and this is a time for maximum water usage by Minnesota's corn and soybean crops. Landscapes to the west of Minnesota, notably much of North Dakota and eastern South Dakota are showing dryness as well. Fortunately temperatures this month have been near normal or even slightly cooler than normal and not placed crops under any severe temperature stress. Many crop producers in these Minnesota counties are hoping for a wet spell of weather yet this month and it looks like Mother Nature may provide it, according to some of the recent forecast models for next week.

Topic: Archaeology Confirms Climatology

Excavations along the Nile Delta in Egypt have revealed a number of prehistoric villages, dating back to around 4000 BC, the Egyptian Neolithic period when tools and wares were made of stone. A series of oval or horseshoe-shaped structures were found somewhat randomly spaced and without common orientation. These roofless huts had walls made of wattle (woven twigs), and were likely used for storage of grain and as pens for small animals. They were also probably used for shelter from the wind. Climatologists have found that the common orientation of the doorless entrance on the southeast facing side conforms to the wind direction of least frequency and is diametrically opposite to the direction of the strongest windstorms in the region which come out of the northwest. Thus, the choice of direction for the opening of these huts was clearly based on a perception of the wind climatology in the Nile Delta region, assuming that the frequency distribution of the wind has changed little over the centuries.

Weekly Weather Potpourri:

Hurricane Dolly reached category 2 status (96-110 mph winds, and 6-8 ft storm surge) just before making landfall across southern Texas and northern Mexico this week. Wind speeds reached 100 mph. Up to five tornadoes were associated with Dolly, and strong winds caused some damage to several homes in the San Antonio area. Much of the other damage inflicted by Dolly was due to flooding. Radar estimated rainfall amounts between Brownsville and McAllen Texas ranged from 16 to 20 inches. Many other others reported at least six inches of rainfall. The path and strength of Dolly was generally well forecasted by the National Hurricane Center, giving citizens plenty of time to prepare.

New England states were hammered with severe thunderstorms on Thursday of this week as winds gusted to over 40 mph in many places and rainfall amounts ranged from 3 to 6 inches. The Mt Washington Observatory in New Hampshire reported winds of 54 mph, temperatures in the 40s F, and windchill conditions in the upper 30s F. At least 100 homes were damage by strong winds in New Hampshire alone.

With the help of several European environmental agencies the Chinese Meteorological Service will be monitoring air quality in Beijing during the Olympics next month and issuing 3-day air quality forecasts for the competitions. This is a collaborative effort that may set the ground work for future routine monitoring of air quality at Olympic Games because of concern about air pollution effects on both athletes and spectators. The meteorological community will have a very important role to play in the coming Olympic Games not only in providing forecasts for the various competitive venues but also in evaluating the effectiveness of the air quality mitigation measures taken by the Chinese government in preparation for the Games.

This week, the United Kingdom Meteorological Office announced the appointment of Dr. Julia Slingo, Professor of Meteorology at the University of Reading, as its new Chief Scientist. In this position, Dr. Slingo will direct weather and climate change research for the Met Office. She is the founding Director of the Walker Institute and a contributor to the Intergovernmental Panel of Climate Change (IPCC). She is also an expert on tropical weather systems. I believe Dr. Slingo is the first woman scientist to hold this very prestigious science position.

Researchers from Ohio State University reported this week that a single Typhoon in the western Pacific Ocean can bury as many tons of carbon in the ocean as all the other rain storms that occur in a year. This causes major variability in the year to year amounts of carbon that is stored (sequestered) in the oceans and is a feature of the Earth climate system that needs more study according to these researchers. The average number of tropical storms each year in the western and northern Pacific Ocean is about 30.

MPR listener question: I was asked recently at a University of Minnesota Curiosity Camp to explain the impact wind has on dewpoint. This is an important relationship.

Answer: The wind directly affects the mixing depth and mixing volume of the atmosphere around us. When the wind is blowing hard, the mixing volume of air is larger, water vapor molecules have ample room, and both relative humidity and dewpoint tend to be lower. When the wind is light or it is calm the atmosphere tends to stratify into layers that don't readily mix, and thus the mixing volume of the air is less. In this condition water vapor molecules are confined in space, and relative humidity and dewpoint tend to be higher. Note that after sunset, the wind usually dies off and dewpoints spike to their highest levels of the day. This is often evident in the summertime when early evening dewpoints can spike in the 70s F, as they have done several times this month.

Almanac for July 25th:

The average MSP high temperature for this date is 84 degrees F (plus or minus 7 degrees F standard deviation), while the average low is 64 degrees F (plus or minus 5 degrees F standard deviation).

MSP Local Records for July 25th:

MSP weather records for this date include: highest daily maximum temperature of 99 degrees F in 1941 and 1999; lowest daily maximum temperature of 69 degrees F in 1915 and 1962; lowest daily minimum temperature of 50 degrees F in 1891; highest daily minimum temperature of 78 F in 1941. Record precipitation for this date is 2.07 inches in 1878.

Average dew point for July 25h is 60 degrees F, with a maximum of 77 degrees F in 1953 and a minimum of 18 degrees F in 1915.

All-time state records for July 25th:

The state record high temperature for this date is 109 degrees F at Wheaton (Traverse County) in 1931. The state record low temperature for this date is 30 degrees F at Cloquet (Carleton County) in 1915. The state record precipitation for this date is 5.20 inches at Tamarac Refuge (Becker County) in 1993.

From "Minnesota Weather Almanac":(available in bookstores or write the author)

A July frost occurred in parts of Roseau, Itasca, Koochiching, St Louis, and Carleton Counties on this date in 1915. In fact July 1915, the coldest in Minnesota until July of 1992, brought 4 to 5 morning frosts to northern Minnesota counties. Some of the small grain crop was damaged by these frosts.

On this date in 1889 near 4:00 pm in the afternoon two tornadoes touched down across southern Minnesota. One, an F-2 tornado (wind speeds 113-157 mph) sped across the landscape in Scott County near New Prague. It struck a train load of wheat and derailed five of the rail cars. The other tornado, an F-3 (wind speeds 158-206 mph) passed across Blue Earth and Le Sueur Counties ripping up orchard trees and flattened crops. As a waterspout it picked up fish out of Lake Jefferson and deposited them on the ground. Some farm buildings were destroyed and one person was injured.

On this date just 8 years ago (2000) an F-4 tornado (winds over 207 mph) was on the ground for 9 miles across Chippewa and Yellow Medicine Counties in western Minnesota. About 6:15 pm it carved a 500 yard wide swath of damage through a residential section of Granite Falls. One person was killed and 15 were injured, as this tornado destroyed scores of homes and caused an estimated \$20 million in damages.

Word of the Week: The Dvorak Technique

In 1975, Vern Dvorak, a meteorologist with the National Environmental Satellite Services, derived a method to analyze and predict tropical storm intensity based on real-time satellite imagery. Though over 20 years old, his technique is still used to assess the strength and project the future intensity of hurricanes, tropical cyclones and typhoons. His technique is based on pattern recognition of the storm size and shape using satellite imagery, especially the infrared. Some of the more important specific storm features used in his technique include an examination of the curvature and size of the outer band cloud circulation, the vertical depth of the clouds which compose these bands and the difference in temperature between the warm eye of the storm and the surrounding cloud tops. Though aircraft reconnaissance provides some of the most important data to assess storm intensity, the Dvorak technique is still used to examine the storm between aircraft flights or in tropical areas where instrumented aircraft are not available for storm studies, such as parts of the Pacific Basin.

Outlook:

Continued seasonally mild temperatures for this time of year over the weekend and early next week. Slight chance of showers across southern counties over the weekend associated with an oscillating frontal boundary. Chance for showers and thunderstorm again by Wednesday and Thursday next week. Some may be heavy.

Minnesota WeatherTalk for Friday, July 4, 2008

To: MPR's Morning Edition and Minnesota WeatherTalk Subscribers
From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, July 4, 2008

Headlines:

- Jet Streaming podcast this week
- June Summary and Comments
- Crop Condition Comments
- Weekly Weather Potpourri
- A tornado on July 4th?
- Almanac for July 4th
- Past significant weather
- Slopover and Breakout
- Outlook

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, includes a detailed discussion about television and radio meteorology with Paul Douglas, former chief meteorologist at WCCO-TV in the Twin Cities. He is now developing enhanced Internet delivery of weather information through a system called "Weather Nation." Cathy Wurzer, Paul Huttner and Mark Seeley also share comments on recent weather news and agricultural impacts. You can listen to the whole podcast at the following web sites.....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: June Climate Summary and Comment on the Year So Far....

For the recent month of June most observers reported mostly average temperatures that were 2 to 3 degrees F colder than normal, though some eastern locations within the state where cloud cover was more dominant reported mean monthly temperatures that were 1 to 2 degrees F warmer than normal. Overall on a statewide basis it was a cooler than normal June ranking 35th coldest since 1895. Temperature extremes ranged from 29 degrees F at Embarrass on the 19th to 91 degrees F at Theilman (Wabasha County) on the 25th. Minnesota did not report the nation's lowest temperature for any day during the month.

Rainfall reports for June were mixed as well, though most observers reported total values that were above normal. Most of the rainfall occurred in the first half of the month and brought some

flash flooding to various watersheds, especially SE and NE counties. Thunderstorms on June 11th brought heavy rain with hail to many southern and central Minnesota counties, and 12 tornado reports were filed. Some observers reporting excessive June rainfall included Spring Grove with 9.14", Lanseboro with 8.70", Austin with 8.51", Grand Portage with 7.63", and Littlefork with 7.41".

Strong winds prevailed during June on at least four different days with wind gusts over 40 mph, and up to 60 mph in some places.

On a statewide basis June was the 5th consecutive month with cooler than normal temperatures, the first time this has happened since 1979. Overall the year 2008 through the first six months ranks as the 29th coldest since 1895. Yearly precipitation to date is in the mid-range historically and many areas of the state could use a good rain during early July.

Topic: Crop Condition in Relative Terms....looking good

Despite a cool and sometimes wet spring season, along with some delayed planting, Minnesota agriculture is in relatively good shape according to recent USDA National Agricultural Statistics Reports. As of the end of June the percent of the corn and soybean crops rated to be in good to excellent condition across the region is as follows:

State Percent of Acreage Rated Good to Excellent Condition

Corn Soybean

IA 53 56

IL 60 52

IN 59 54

WI 60 60

OH 59 55

NE 70 69

MN 71 68

The condition of Minnesota's corn and soybean crops rivals that of Nebraska and is clearly better than all other states, many of which have been hit harder by flooding.

Weekly Weather Potpourri:

Researchers writing in the recent edition of Chemical and Engineering News report on new eco-friendly pyrotechnic formulas for fireworks that use less heavy metals to generate the bright colors, and also produce less smoke. Some of these lower polluting new fireworks have already been used at rock concerts and may be used for next year's 4th of July celebrations.

The tropical weather activity was gearing up this week as the National Hurricane Center (NHC) in Miami was issuing advisories on three storms. The second named storm of the North Atlantic season, Tropical Storm Bertha in the far eastern Atlantic was packing winds of 45 mph with gusts over 50 mph. It was expected to reach the mid-Atlantic by Sunday. Tropical Storm Boris in the Eastern Pacific Ocean was about 1300 miles SW of the tip of Baja California and was

packing winds of 45 mph. This storm was expected to weaken. Tropical Depression Douglas is also in the Eastern Pacific about 200 miles west of Cabo San Lucas Mexico. It was expected to remain a tropical depression and weaken through the weekend. No Tropical Storm activity was being reported from the Western Pacific or Indian Ocean Basins.

Because of above normal snowfall this past winter, it is said to be a great rafting season in Colorado this summer as most watershed flows are high. The downside is that the mountain hiking season has been delayed due to lingering snowpack at high elevations.

The Hong Kong Observatory reported this week that June 2008 was their wettest month ever, going all the way back to 1884. The total rainfall for June was 53 inches breaking the previous record of 49 inches from May of 1889. A new one hour rainfall rate was reported for the Hong Kong Observatory as well with 5.73 inches in one hour on June 7th. Much of the rainfall was attributed to Tropical Storm Fengshen which had flooded the Philippines earlier in the month.

Though the Wimbledon All-England Tennis Championships were blessed by favorable weather early on, the semi-final and final matches this weekend are expected to be disrupted by rain as the weather across the London area will be quite unsettled.

At least 850 residents of Big Sur in California were evacuated this week due to raging wildfires in the area. Unfortunately with temperatures in the 80s F, low humidity and gusty winds in the forecast for this weekend, firefighters were not optimistic about gaining the upper hand.

MPR listener question: Has there ever been a significant tornado in Minnesota on July 4th?

Answer: Yes. But I can find only one. July 4, 1913 about 5:30 pm an F-2 (113-157 mph winds) tornado traveled about 10 miles across Pipestone County between Ihlen and Hatfield. Farm buildings were destroyed and a number of livestock killed, but only four people were injured. This tornado was observed by hundreds of people and it was said that the storm produced ample "natural fireworks" for the occasion.

Twin Cities Almanac for July 4th:

The average MSP high temperature for this date is 82 degrees F (plus or minus 7 degrees F standard deviation), while the average low is 62 degrees F (plus or minus 6 degrees F standard deviation).

MSP Local Records for July 4th:

MSP weather records for this date include: highest daily maximum temperature of 100 degrees F in 1949; lowest daily maximum temperature of 58 degrees F in 1967; lowest daily minimum temperature of 43 degrees F in 1972; highest daily minimum temperature of 80 F in 1999. Record precipitation for this date is 2.27 inches in 1900.

Average dew point for July 4th is 59 degrees F, with a maximum of 77 F in 1977 and a minimum of 40 degrees F in 1972.

All-time state records for July 4th:

The state record high temperature for this date is 107 degrees F at Pipestone (Pipestone County) and Worthington (Nobles County) in 1936. The state record low temperature for this date is 27 degrees F at Tower (St Louis County) in 1972. The state record precipitation for this date is 9.78 inches at Milan (Chippewa County) in 1995.

From "Minnesota Weather Almanac":(available in bookstores or write the author)

One of the wettest July 4ths in state history occurred in 1995. Many western and central Minnesota weather observers reported thunderstorms with rainfall total exceeding 2 inches, and in some cases 4 inches. The biggest rainfall came to Chippewa County where the observer at Milan reported 9.78 inches of rainfall. The consequence of this storm was a 9 foot rise in the Chippewa River.

The most uncomfortable July 4th was in 1949. With dewpoints in the 70s F and afternoon temperatures in the upper 90s F to as much as 105 degrees F at Wheaton, the Heat Index around the state ranged from 110 to 115 degrees F. In many locations even after sunset the temperature fell no lower than 80 degrees F. Fireworks audiences consumed cold beverages in great quantities just to stay hydrated.

July 4, 1999 brought one of the most destructive derecho storms (straight line winds) ever, blowing down millions of trees in the Boundary Waters Canoe Area of northeastern Minnesota. Winds over 80 mph were reported and at least 20 people were injured by the storm.

Words of the Week: Slopover or Breakout

These are fire weather terms used to define a situation where a wildfire crosses over a barrier or control line intended to confine it. Often induced by windborne debris or simply strong gusts of wind, slopovers can seriously complicate fire fighting efforts.

Outlook:

A beautiful early start to the weekend, then warming up significantly through next week. It should become cloudier on Sunday with a chance for scattered showers and thunderstorms into the evening, then another chance of showers late Monday in eastern sections. Temperatures will approach the upper 80s to low 90s F for much of next week, feeling more like mid-summer.

Minnesota WeatherTalk for Friday, August 1, 2008

To: MPR's Morning Edition and Minnesota WeatherTalk Subscribers
From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, August 1, 2008

Headlines:

- Jet Streaming podcast this week
- Late July storms mostly welcome
- July climate summary
- Weekly Weather Potpourri
- Weather during the I-35W bridge collapse
- Almanac for August 1st
- Past significant heat waves
- Toggy tool
- Outlook

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, includes a discussion with Tom Fahey, chief meteorologist for Northwest Airlines. He talks about the improvements in aviation weather forecasting over the years and the logistics of working with pilots and flight control operators. You're likely to learn something about what goes on behind the scenes when you step onto that airplane. Our second guest is Cassie MacMahon from the Minnesota Pollution Control Agency. She talks about air quality monitoring and the alert system used to warn citizens of foul air. Believe it or not air quality forecasting now extends out to 5-days. Paul Huttner has another interesting web site of the week, this time from the University of Utah. You can listen to this discussion at the following web sites.....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: Storms on July 28th and July 31st mostly welcome....

Strong thunderstorms brought hail, gusty winds, and heavy rains to parts of western Minnesota between Wheaton and East Grand Forks on July 28th. Wheaton reported wind gusts to 63 mph. The rainfall was welcome in most areas and ranged from 0.50 to 1.50 inches in some counties. Grand Forks, ND reported 2.17 inches, Detroit Lakes 1.85 inches, Morris 1.46 inches, Park Rapids 1.36 inches, Georgetown 3.10 inches, and Bemidji 1.62 inches. Small grains are nearing maturity, while soybeans and sugarbeet crops are likely to benefit from the rain.

Then on evening of July 30th and morning of July 31st strong thunderstorms that had migrated across the Dakotas brought heavy rains to parts of Swift, Lac Qui Parle, Chippewa, and Big Stone Counties in western Minnesota. There were over 35 reports of strong winds associated with these storms. Storm winds damaged trees, tents and fences around the Vikings training camp in Mankato. Up to 2.71 inches of rainfall occurred in Big Stone County, while Willmar reported 2.80 inches of rain, their biggest rain storm of the year so far. Several other areas reported rainfall between 0.5 and 1.0 inches.

Topic: July Climate Summary

Despite some warm days at the end of the month, July of 2008 brought monthly average temperatures that ranged from 1 to 3 degrees cooler than normal (mostly in the north) to 1 to 2 degrees F warmer than normal (mostly in the south). Embarrass reported the coldest temperatures in July, and the nation's lowest temperature on both July 3rd and 15th with an overnight low of 34 degrees F. Though morning lows fell into the 30s F at Embarrass on six dates during the month, no frosts were reported there. Redwood Falls reported the highest temperature in July with 95 degrees F on the 11th. In fact they reported highs in the 90s F on six different days.

Total monthly rainfall was generally less than normal for most observers. There were some exceptions like Bemidji with 4.44", Duluth with 4.58", Milan with 5.26", Waseca with 5.25", Winona with 4.88", and La Crescent with a whopping 9.55 inches. Most observers fell 1 to 2 inches shy of their historical average for July. Central Minnesota counties were especially dry during the month. For example Wheaton and St Cloud reported less than 1.50 inches of rainfall.

An EF-3 tornado (winds 136-150 mph) struck near Willmar on July 11th and inflicted some damages in rural areas. It was on the ground for a total of 8 miles. Tornadoes and severe thunderstorms were also reported in Dakota and Goodhue Counties on the 10th and 11th. Storm damage to crops there greatly diminished the supply of fresh produce to the St Paul Farmer's Market. Tornadoes were also reported across Minnesota on July 14th, 16th, 17th, 19th, and 25th. In all there were 18 reports of tornadoes during the month. In addition to the tornado reports, July brought numerous reports of gusty winds and hail. There were several reports of wind gusts over 40 mph during the month, and some even exceeded 80 mph.

Weekly Weather Potpourri:

It appears that a rapid increase in the soybean aphid population is causing some growers in Minnesota to spray for this pest. In some areas, the thunderstorm rainfall diminished their threat to the crop, but those missed by the rains saw a real jump in populations this week.

Hurricane Dolly brought drought relief to parts of Texas and New Mexico earlier this week, especially along the Rio Grande watershed. Though pasture and grasslands will benefit from these rains (over 6 inches in many places), the cotton and sorghum crops were near harvest time and knocked down by the intense storms, so some yield losses will likely occur.

Researchers reported that a large chunk of ice from the Ward Hunt Ice Shelf along Ellesmere Island in Arctic Canada broke off this week. The ice chunk is 7 square miles in size and one of the largest to separate from the ice shelf in recent years. Canadian researchers note that the Ward Hunt Ice Shelf has been shrinking in recent decades and may be related to climate change in the polar regions.

One of many wildfires burning in California destroyed 21 homes near Yosemite National Park this week. Over 46 square miles have been burned by this fire. The smoke plumes from the California fires are still visible in the NASA-MODIS satellite imagery.

<http://modis.gsfc.nasa.gov/gallery/showall.php>

A recent research paper from the University of Southern Oregon reports that the California wine industry has been enjoying improved wind quality as a result of few frosts, longer growing seasons, and higher spring temperatures. Researchers don't suggest these trends are entirely related to climate change, since oscillations in the temperature behavior of the Pacific Ocean (a feature called the Pacific Decadal Oscillation) have something to say about the California climate.

Typhoon Fung Wong brought intense rainfall, winds, and storm surge to Taiwan and the coast of China this week. The 8th Tropical Storm of the season, Fung Wong caused the evacuation of over 750,000 people in SE China and was expected to spread its rain to more northern provinces. On the brighter side the Typhoon brought an end to the heat wave that had been plaguing southern China.

MPR listener question: What was the weather like at the time of the I-35 bridge collapse in Minneapolis on this date last year?

Answer: August 1, 2007 was kind of a typical summer day. The high had been 93 degrees F in Minneapolis under partly cloudy skies. At 6:00 pm near the time of the bridge collapse the temperature was still 89 degrees F, with a dewpoint of 66 degrees F. So it was pretty sultry and I suspect most drivers had their windows rolled up and air conditioners working. Winds were from the SW at 14 mph and gusting into low 20s mph under partly cloudy skies. The debris cloud from the bridge collapse shortly after 6:05 pm hung over the river and slowly drifted to the north. By 7:30 pm during rescue operations a thunderstorm brought light rain and wind helping to clean up the air and the rescue operations went on throughout the night.

Almanac for August 1st:

The average MSP high temperature for this date is 83 degrees F (plus or minus 7 degrees F standard deviation), while the average low is 62 degrees F (plus or minus 6 degrees F standard deviation).

MSP Local Records for August 1st:

MSP weather records for this date include: highest daily maximum temperature of 101 degrees F in 1988; lowest daily maximum temperature of 61 degrees F in 1903; lowest daily minimum temperature of 49 degrees F in 1962 (just 46 degrees F at Ft Snelling in 1842); highest daily minimum temperature of 78 F in 1964. Record precipitation for this date is 2.03 inches in 1975.

Average dew point for August 1st is 61 degrees F, with a maximum of 79 degrees F in 1955 and a minimum of 33 degrees F in 1927.

All-time state records for August 1st:

The state record high temperature for this date is 110 degrees F at Madison (Lac Qui Parle County) and at Montevideo (Chippewa County) in 1988. The state record low temperature for this date is 31 degrees F at Cloquet (Carleton County) in 1920. The state record precipitation for this date is 6.75 inches at Park Rapids (Hubbard County) in 1906.

From "Minnesota Weather Almanac":(available in bookstores or write the author)

Beardsley, MN in Big Stone County is arguably the hottest spot in Minnesota. Among all Minnesota cities, Beardsley holds the most state records for daytime high temperatures. This week in 1917 Beardsley recorded one of the hottest strings of days ever measured. The high temperatures for that week were:

July 24 104 F July 25 105 F July 26 104 F July 27 104 F July 28 113 F July 29 114 F July 30 101 F

The heat wave of July 1917 killed a number of Minnesota citizens, but that was only one of three significant aberrations in the weather that month. Adding to the lore about July of 1917 is the fact that Beardsley reported light frost on July 2nd and 3rd with overnight lows of 39 degrees F and 38 degrees F, respectively. These cold temperatures caused minor damages to some crops and gardens. Then on July 11th between 6:30 and 7:00 pm a tornado raced across the Big Stone landscape, fortunately doing little damage. The combination of frost, heat wave, and tornado in the month of July 1917 at Beardsley is extremely rare in Minnesota history.

Another heat wave occurred in western Minnesota during late July and early August of 1988, the drought year. Many observers recorded consecutive 100 degrees F days, including Montevideo. Their data show daily highs as follows:

July 27 104 F July 28 100 F July 29 104 F July 30 93 F July 31 110 F Aug 1 110 F Aug 2 110 F

Because the summer of 1988 had been so hot and citizens had adjusted to it, this heat wave caused discomfort, but no deaths.

Words of the Week: Toggy tool

It is not often that a National Weather Service employee has a tool named after him. Bill Togstad who recently retired from the National Weather Service Office in Chanhassen, MN studied

severe weather for many years. He developed a numerical algorithm to evaluate the risk of EF-2 (winds of 111 mph or greater) or greater tornadoes. This tool, called the Toggy Tool is still used by the National Weather Service, and especially the NOAA Storm Prediction Center in Oklahoma. Threats of severe weather are evaluated using a number of tools, but I suspect that Bill still derives a measure of satisfaction to see his being used operationally after his retirement.

Outlook:

Warmest weekend of the summer coming up as temperatures will reach into the upper 80s and 90s F both Saturday and Sunday. Increasing cloudiness later on Saturday with slight chances for showers and thunderstorms mostly in the north. Chances for showers and thunderstorms on Sunday, and again Monday through Wednesday next week as temperatures will cool down.

Minnesota WeatherTalk for Friday, August 8, 2008

To: MPR's Morning Edition and Minnesota WeatherTalk Subscribers
From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, August 8, 2008

Headlines:

- Jet Streaming podcast this week
- Warming Lake Superior
- Cool August start up north
- Dryness continues
- Weekly Weather Potpourri
- Question about sunshine
- Almanac for August 8th
- Past significant weather
- von Karman vortices
- Outlook

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, includes a conversation about urban climates with Dr. Tony Brazel from Arizona State University in Phoenix, AZ. He shares some of his research findings related to urban landscape effects on temperature, dewpoint, precipitation, wind, and air quality. We also talk with Scott Henley, Executive Director of the Mt Washington Observatory in New Hampshire, home to some of the most extreme weather conditions ever measured in the USA. He shares his thoughts on what it is like to work there, as well as describing some of the incredible weather extremes they have measured, including a 231 mph wind. Cathy Wurzer also shares some listener feedback and Paul Huttner offers another interesting web site of the week (www.thestormtrack.com). You can listen to this discussion at the following web sites.....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: Summer warming of Lake Superior

According to the SEA GRANT Coastwatch web site (<http://www.coastwatch.msu.edu/twosuperiors.html>) the Lake Superior shoreline from Schroeder to Grand Marais has warmed over 20 degrees F in the last month. On July 7th water temperatures ranged from 34 to 41 degrees F, but by August 7th they were reported to be ranging from 52 to

61 degrees F. It is common for the warmest water temperatures to occur in August, then begin a seasonal decline in September.

Topic: Cool start to August up north....

Through the first week of August most northern Minnesota weather observers have been reporting mostly below normal temperatures so far. Daytime highs in the 70s F and nighttime lows in the 40s F have been common. Embarrass reported a morning low of just 37 degrees F on August 7th, the lowest temperature reading in the USA outside of Alaska. The Climate Prediction Center medium range forecasts continue to favor cooler than normal conditions through the first half of the month.

Topic: Continued dryness in places.....

According to the latest Drought Monitor and the Minnesota DNR-State Climatology Office persistent dryness over the past 7 weeks has brought a designation of moderate drought to parts of central Minnesota (most notably in Kandiyohi, Meeker, Wright, and Hennepin Counties) and abnormal dryness to wider areas of central and northern Minnesota (http://climate.umn.edu/doc/journal/dry_mid-summer_2008.htm). Many of these areas have seen rainfall shortages of 3-5 inches over this period. In addition according to the USDA surveys 29 percent of the agricultural soils are short to very short in stored soil moisture. Obviously August rains would be welcome in all of these areas.

Weekly Weather Potpourri:

The 5th named storm of the North Atlantic Hurricane Season, Tropical Storm Edouard brought heavy rain to Texas and Louisiana earlier this week. Parts of east-central and central Texas caught in extreme to exceptional drought conditions saw relief come in the form of 2-3 inch rains.

Earlier this week, Dr. William Gray and his staff at Colorado State University in Ft Collins, CO revised the North Atlantic seasonal tropical storm forecast. They now forecast up to 17 named tropical storms for this season, with nine reaching hurricane status, and five becoming major hurricanes (category 3 or greater). NOAA forecasters at the Climate Prediction Center in Camp Springs, MD also revised their forecast and now call for 14-18 named tropical storms, 7-10 named hurricanes, and 3-6 major hurricanes. So it appears that both sets of forecasters expect a quite active August through October period in the North Atlantic.

A rare strong tornado ravaged parts of northern France on Sunday night August 3rd. One of the hardest hit areas was the town of Hautmont not far from the border with Belgium, where many homes were destroyed. Four people died as a result of the tornado which struck just before midnight Sunday night and was on the ground for about seven miles. France reports about 100 tornadoes each year, but most are relatively weak.

A recent study published in Natural Hazards Review found that the increase in economic loss from hurricanes is not the result of increased frequency of such storms, but is related to larger

exposed populations, heavier infrastructure, and greater wealth along the USA coastlines. According to Chris Landsea and other authors the damages from hurricanes are doubling about every 10 to 15 years.

According to a recent NASA study there is a link between Indian Ocean temperatures and drought over eastern and southern Africa. According to Dr. Chris Funk of UC-Santa Barbara and his co-authors increased Indian Ocean surface temperatures induce higher rainfall rates over the ocean itself but less rainfall over the eastern and southern portions of the African continent. Being able to predict fluctuations in Indian Ocean temperatures may help governments in Africa anticipate rainfall deficits.

MPR listener question: I read recently that many Florida locations report an average percent possible sunshine of 60 to 70 percent, while many Arizona locations report 80 to 90 percent. What is the average percent possible sunshine in the Twin Cities area on an annual basis? My neighbor and I are outdoor photographers and it seems to us that this year has been cloudier than normal. Is our percent possible sunshine lower than normal this year?

Answer: The long-term average for percent possible sunshine in the Twin Cities area is 58 percent. That is of the possible daytime minutes of sunshine each year, 58 percent are sunny. You are right about this year being cloudy. The following table shows the percent possible sunshine for each month so far this year compared to the long-term average values, along with the frequency of days with no sunshine. These data come from the National Weather Service in Chanhassen.....

2008 mean monthly percent possible sunshine at Chanhassen compared to average, and days with no sunshine....

MONTH PCT POSSIBLE SUNSHINE HISTORICAL AVE DEVIATION FROM AVERAGE
DAYS WITH ZERO SUNSHINE

JAN	49	53	-4	4
FEB	54.5	59	-4.5	0
MAR	43	57	-14	5
APR	33	58	-25	11
MAY	47	61	-14	3
JUN	55	66	-11	3
JUL	66.5	72	-5.5	0

From the standpoint of outdoor photography, April was really a lousy month.

Almanac for August 8th:

The average MSP high temperature for this date is 83 degrees F (plus or minus 7 degrees F standard deviation), while the average low is 63 degrees F (plus or minus 6 degrees F standard deviation).

MSP Local Records for August 8th:

MSP weather records for this date include: highest daily maximum temperature of 96 degrees F in 1894 and 1914; lowest daily maximum temperature of 62 degrees F in 1888; lowest daily minimum temperature of 47 degrees F in 1888; highest daily minimum temperature of 77 F in 2001. Record precipitation for this date is 2.22 inches in 1987.

Average dew point for August 8th is 59 degrees F, with a maximum of 75 degrees F in 1995 and a minimum of 37 degrees F in 1927.

All-time state records for August 8th:

The all-time state record high temperature for this date is 105 degrees F at Beardsley (Big Stone County) and Wheaton (Traverse County) in 1936. The all-time state record low temperature for this date is 33 degrees F at Tower (St Louis County) in 1898 and at Thorhult (Beltrami County) in 1964. The all-time state record precipitation for this date is 5.30 inches at Waseca in 1991.

Past Weather Features:

This is one of only two dates on the calendar (the other being July 21st) when Minnesota has never recorded a frost. The coldest temperature ever measured on August 8th is 33 degrees F at Thorhult (Beltrami County) in 1964 and the lowest temperature ever measured on July 21st is 34 degrees F at Angus (Polk County) in 1947.

August 6, 1969 brought a tornado outbreak to NE Minnesota. Between 3:30 and 6:00 pm at least 8 different tornadoes were reported across parts of Crow Wing Cass, Aitkin, St Louis and Lake Counties. Perhaps the worst of the tornadoes was an F-4 (winds of 207-260 mph) that was on the ground for 33 miles and caused a great deal of destruction to cabins, farms and other buildings in the Hill City area. The last tornado of the day, about 6:00 pm was sighted near Two Harbors in Lake County, one of the very few to every be reported near that Lake Superior community. In all the tornadoes killed 15 people, injured over 100 and did millions of dollars in damage.

On August 6, 1907 a pair of tornadoes along the Iowa border south of Kiester, MN (Faribault County) were said to look like swinging elephant trunks. They destroyed a number of farm buildings between 4:00 pm and 5:00 pm. In addition farmers reported many dead livestock.

Words of the Week: von Karman vortices

Named for the Founder of the NASA Jet Propulsion Laboratory, Dr. Theodore von Karman, this feature of the atmosphere is very recognizable in satellite images and photos of cloud forms taken from aircraft. When the air flow across the ocean is disturbed by an island, the downstream effect produces two oppositely rotating eddies of air. When cloud forms are present you can see the rotating motions in the form of cloud streets. There is more information about von Karman vortices at the following NASA web site....

http://disc.gsfc.nasa.gov/oceancolor/scifocus/oceanColor/vonKarman_vortices.shtml

In addition, there is a wonderful recent cloud image of a von Karman vortex over the coast of Alaska on the Cloud Appreciation Society web page....

<http://www.cloudappreciationsociety.org/august-08/>

Outlook:

Near seasonal temperatures over the weekend with a chance for showers and thunderstorms in southern sections early Saturday. Chance for more widely scattered showers late Sunday through Tuesday morning, with cooler temperatures. Much of next week looks to be cooler than normal, with more showers later in the week.

Minnesota WeatherTalk for Friday, August 15, 2008

To: MPR's Morning Edition and Minnesota WeatherTalk Subscribers
From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, August 15, 2008

Headlines:

- Jet Streaming podcast this week
- Rains bring flooding and relief
- State Fair Weather Quiz Coming Up
- Weekly Weather Potpourri
- Question about precipitation in Duluth
- Almanac for August 15th
- Past significant weather
- Fog Fences
- Outlook

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, includes an interview conducted by MPR's Tom Crann with Dr. James Hansen from NASA. Dr. Hansen reports on his latest research on climate change and his initiative with explorer Will Steger to educate the public and get political leadership to take more action on this issue. Dr. Hansen was in Saint Paul to speak to a group of science teachers about climate change. We also talk with sailor Marlin Bree who survived the July 4th 1999 derecho (wind storm) while on board his boat out on Lake Superior. It is an interesting tale of survival. You can listen to this discussion at the following web sites.....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: Rains of August 11-12 bring flooding to some and relief to others....

Widely scattered but intense thunderstorms rumbled across northwestern and central parts of the state on August 11 and 12. The storms brought record-setting amounts to some areas on the 11th, including Fargo, ND with 3.33 inches, Grand Forks, ND with 1.79 inches, Moorhead, MN with 1.80 inches, and 4.30 inches in the Wapeton (ND)/Breckinbridge (MN) area. On the 12th record setting amounts of rainfall fell in Traverse County where Wheaton reported 2.70 inches and White Rock Dam reported 2.63 inches. Portions of the lower Red River flooded along with associated watersheds like the Buffalo River rose above flood stage. In addition some streets and basements in the Wapeton/Breckinridge area flooded.

But the rains were welcomed by most farmers as rainfall totals from 0.50 to 3.00 inches over the Sunday through Tuesday period came just in time to help corn and soybean crops during their reproductive phase of growth. Morris reported 1.20 inches, while Willmar reported nearly an inch. That was the most rain for Willmar since June 12th. In addition Rothsay received 0.90 inches, Campbell 2.62 inches, Ada 1.40 inches, Hallock 2.19 inches, and Roseau 1.03 inches. This moisture was especially beneficial in these areas which were reporting soil moisture levels that were short or very short of normal.

Topic: The Annual Minnesota Weather Quiz on Midday from the State Fair August 21st, 11:00 am

We have names for various groups of animals.....a pride of lions.....a murder of crows...a gaggle of geese. But what do you call a group of meteorologists? (a shame, a guess, an embarrassment)

Where was the coldest temperature measured in Minnesota last winter? (Fosston, International Falls, Embarrass)

Where was the greatest snowfall in Minnesota during the winter of 2007-2008? (Ely, Tower, International Falls)

What was the most notable weather feature of Easter weekend (March 21-23) in 2008? (windy, warm, snowy)

If these questions tweak your interest, be sure to listen to MPR on Thursday, August 21st from 11:00 am to noon during the Midday broadcast from the State Fair. Host Gary Eichten and I will be conducting the 12th Annual Minnesota Weather Quiz. Or better yet, if you are visiting the Fair that day, come over to the MPR booth at the corner of Judson and Nelson and watch the program live. We'll have prizes for those who participate.

Weekly Weather Potpourri:

Weather reports during the first week of the Olympics indicated a variety of impacts. Cycling competition was affected by the heat and humidity, which also kept attendance down at some of the other outdoor events. Rainfall of several inches cleared the air and improved the air quality. The rain also delayed or postponed some events. It was reported that the skeet shooting competition just ignored the rain and was conducted without incident or protest. Lightning strikes associated with the rainfall struck near the Great Wall and injured some Olympic visitors. The good news is that the weather is supposed to stabilize and improve for the weekend coming up, with highs in the 80s under mostly sunny skies and lower humidity.

Governor Schwarzenegger of California has asked for more federal disaster aid for the state as a result of escalating costs to fight wildfires there. Since May approximately 3000 fires have burned more than 1.3 million acres, destroyed over 300 homes, and costs the state nearly \$300 million in fire fighting expense. The Governor is considering imposing a disaster surcharge on homeowners who live in the most fire prone areas to help cover the added expenses. In the past, other states like Florida, Indiana, and Maine have imposed surcharges to help cover disaster

response expenses. California still faces at least two more months in the fire season before the fall rains arrive.

A new study from the United Kingdom Meteorological Office finds that small scale wind turbine deployment in the rural landscape shows greater potential than the urban landscape to economically benefit energy production and reduce carbon emission. The study found many areas of the English countryside where wind generated electricity on a small scale could be successful given modern technology.

Researchers from Worcester Polytechnic Institute are studying ways to utilize the heat absorbed by the asphalt in roads and parking lots to heat water and store it as energy. Asphalt is an effective absorber of solar energy and if retrofitted with piping it might one day provide a hot water energy system that could be used by local community or industry according to the Worcester researchers.

MPR listener question: In changing weather situations we frequently see green blots on the radar screen (on the Weather Channel) coming from the NW directly toward Duluth. And then -- they fizzle out as they get near the lake??? Not always, but it is frequently the case. Is this the result of the NE surface winds running into the wet clouds and somehow disintegrating them? Or could it be a regularly occurring coincidence?

Answer: Weather systems are so diverse in nature that it is difficult to give you a universal answer to this question. I visited with Dan Miller of the Duluth Weather Service Office about this to gather some local expertise. There are two features associated with the north shore environment that commonly mitigate shower activity coming from the NW. Firstly, the depth of the mixing layer over land tends to be greater than over Lake Superior. As a result, convection is suppressed (instability is weakened) as the showers approach the north shore. Secondly the terrain topography causes air to subside (sink) off upland areas as it reaches the north shore. The subsidence process warms the air and it becomes less saturated, so evaporation takes place and the clouds dissipate. A third and perhaps only occasional factor in your observation may be differences in the strength of an inversion layer across the NE landscape, particularly in the morning hours. In this case the inversion layer over Duluth may be stronger than it is over the western, upland landscape.

Almanac for August 15th:

The average MSP high temperature for this date is 82 degrees F (plus or minus 7 degrees F standard deviation), while the average low is 62 degrees F (plus or minus 6 degrees F standard deviation).

MSP Local Records for August 15th:

MSP weather records for this date include: highest daily maximum temperature of 103 degrees F in 1936; lowest daily maximum temperature of 63 degrees F in 1897; lowest daily minimum

temperature of 47 degrees F in 1960; highest daily minimum temperature of 76 F in 1937. Record precipitation for this date is 1.23 inches in 1966.

Average dew point for August 15th is 59 degrees F, with a maximum of 75 degrees F in 1987 and a minimum of 41 degrees F in 1976.

All-time state records for August 15th:

The all-time state record high temperature for this date is 108 degrees F at Beardsley (Big Stone County) in 1937 and at Madison (Lac Qui Parle County) in 1988. The all-time state record low temperature for this date is 26 degrees F at Tower (St Louis County) in 1976. The all-time state record precipitation for this date is 5.40 inches at St Peter (Nicollet County) in 1993.

Past Weather Features:

This date (Aug 15) in 1993 brought flash flooding to many areas of southern Minnesota as 4-5 inch rainfall amounts were common. Harmony, Waseca, Albert Lea, and St Peter all reported over 4 inches. Roads were washed out and basements were flooded. August of 1993 was one of the wettest in state history, with some observers reporting measurable rainfall on 15 days. In fact for the summer months of June through August it was the wettest in state history averaging over 17 inches.

August of 1993 was also quite cool. Many observers reported zero days with 90 degrees F or higher, while several others reported overnight lows in the 30s F. Understandably crops were late coming out of the field during fall harvest.

Words of the Week: Fog Fences

Capturing the water out of fog has been attempted for centuries. Since the 1980s a number of fog fences have been constructed throughout the world to capture and store the fresh water from fog. They are usually located in arid or semi-arid coastal regions that have a significant frequency of fog, particularly along upland areas. The fog fences are constructed out of mesh with a significant vertical extent positioned at right angles to the prevailing wind. Wind driven fog passing through the fence where the micro-scale droplets are captured on the mesh and coalesce into larger droplets that fall into PVC pipe at the bottom of the nets then flow to a storage container. Successful fog fences have been deployed in countries like Chile, Yemen, Guatemala, Haiti, Nepal, Ethiopia, and Oman. Depending on the density and persistence of fog in the local environment, fog fences have been known to yield from 1 to 10 gallons of fresh water per day from one square meter of fence.

A Canadian non-profit called FogQuest specializes in the deployment of fog fences and fog collectors in areas of the world that have a significant frequency of fog, but lack other non-polluted fresh water sources for their citizens. They have constructed successful facilities in Peru, Namibia, Dominican Republic, and Ecuador among other places. You can read more about their work at.....

www.fogquest.org

Outlook:

Beautiful weekend with near seasonal temperatures. Increasing clouds by Monday with a chance for showers and thunderstorms in the northeast. Continued near normal temperatures next week with another chance for showers by Wednesday and Thursday.

Minnesota WeatherTalk for Friday, August 22, 2008

To: MPR's Morning Edition and Minnesota WeatherTalk Subscribers
From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, August 22, 2008
Headlines:

- Jet Streaming podcast this week
- State Fair Weather Quiz online
- New fall season climate outlooks
- Weekly Weather Potpourri
- Question about September frosts
- Almanac for August 22nd
- Past significant weather
- kettle and boil
- Outlook

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, includes an interview with Dr. Marc Lloyd Levitan from Louisiana State University concerning the recovery from Hurricane Katrina and the amplified preparedness measures that coastal communities are taking to mitigate the threats of future hurricanes. We also revisit the scene of last year's devastating flash floods in southeastern Minnesota communities like Rushford, Stockton, and Hokah, and get an update on recovery there. In addition Cathy, Paul, Craig, and Mark offer another interesting web site of the week, the Institute of Global Environment and Society which can be found at...<http://www.iges.org/home.html>

You can listen to the entire podcast at the following web sites.....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

If you are going to the State Fair next week, don't miss the Jet Streaming gang (Cathy Wurzer, Paul Huttner, Craig Edwards, and special guest Belinda Jensen) at the MPR booth at 11:00 am on Thursday, August 28th, where they will be doing a live recording of the weekly podcast.

Topic: The Annual Minnesota Weather Quiz on Midday from the State Fair August 21st, 11:00 am

This week brought the broadcast of the 12th Annual Minnesota Weather Quiz on MPR's Midday program from the State Fair (11:00 am on Thursday, August 21st). For those present at the fair

who participated in the quiz we gave out prizes of Minnesota Weatherguide Environment Calendars, children's weather books from Bellwether Media, and colorful NOAA/NASA cloud identification posters. If you did not get a chance to listen, you can still take the quiz, go to....

<http://minnesota.publicradio.org/collections/special/columns/updraft/>

It will interactively score your responses. Give it a try. I think you'll surprise yourself with how much you know.

Topic: Fall Season Climate Outlooks

Both the NOAA Climate Prediction Center (CPC) and the European Weather Center (Hadley) came out with their fall season climate outlooks for the western Great Lakes region, including Minnesota. The CPC outlook goes out through November, while the Hadley Center outlook extends only through October. The CPC outlook sees equal chances for above or below normal fall precipitation, and equal chances for above or below normal fall temperatures. This despite the fact that most models show a warmer than normal start to the month of September coming up. The Hadley models suggest the fall season will be warmer and drier than normal across the region. This particular outlook is not good news for northern and central region of the state which have seen a dry summer.

Weekly Weather Potpourri:

Tropical Storm Fay passed over Cuba, crossed the Florida Keys and meandered across the Florida peninsula from SW to NE this week, then paid return visits as well. It brought mostly very heavy rains, ranging from 10 to 20 inches in some areas. It was a slow moving tropical storm that actually intensified briefly after making landfall, something unheard of in hurricane history. Then it kept migrating west and east as it slowly moved north. Some preliminary rainfall totals from Fay included 6.80" at Marathon, 4.37" at Ft Meyers, 4.07" at Naples, 4.50" at Miami, 7.27" at West Palm Beach, 10.04" at Vero Beach, 11.46" at Ft Pierce, 13.88" at Melbourne, and 21 inches near the Kennedy Space Center.

After pounding the Philippines with strong winds, storm surge and heavy rainfall Typhoon Nuri was threatening Hong Kong with heavy rains this weekend, just as the Olympic Equestrian competition was ending. Nuri is the 13th named tropical storm of the Northwest Pacific season. No longer packing winds of 80 to 100 mph, the typhoon was bordering on tropical storm status as it slowly approached Hong Kong. Nevertheless because of its size it was generating sea waves of over 20 feet.

Parts of Northern Ireland, Scotland and Wales were flooding earlier this week as a result of torrential rains over the weekend. Many areas reported 2-3 inches of rainfall in less than 24-hours (a month's worth in some cases). Some houses were flooded and some rivers reached flood stage for a brief time early this week before the waters receded. More rain was expected across these areas this weekend.

Recent research on emissions from sea going vessels shows that much of the poor air quality in coastal cities and harbors can be blamed on the smoke from ships. Scientists from UC-San Diego found that on occasion ships burning high-sulfur content fuel as they cruise near shore or anchor in harbors can account for nearly half of the fine particulate matter measured in the air. As a result of this and other research California is considering a law to mandate the use of cleaner fuels on ships when they are near shore or in harbors.

MPR listener question: I am an avid Twin Cities gardener, but with the cool, wet spring I got off to a late start this year. I am hoping for an extended growing season into September and early October. How often historically do we see a September frost in the Twin Cities area?

Answer: Based on the frequency of low temperatures of 32 degrees F or colder, the median first frost date for the Twin Cities since 1891 is October 10th. Over this time period, frost has come in September in 23 years, about one year in five. Often times when frost arrives in September it occurs on multiple nights. For example in 1991 there were three September nights that brought frost, and in 1942 there were five. The last year that brought a September frost was 2000 (September 24th). The earliest ever frost was September 3, 1974.

Interestingly enough, if you live in a Twin Cities suburb (Rosemount, Anoka, Maple Plain) your odds for a September frost jump to about two years in five. The outlooks from both the NOAA Climate Prediction Center and the Hadley Center in Europe suggest that the western Great Lakes region will be warmer than normal this fall, and especially start the month of September with warm temperatures. So that should help your garden to keep going.

Almanac for August 22nd:

The average MSP high temperature for this date is 79 degrees F (plus or minus 8 degrees F standard deviation), while the average low is 60 degrees F (plus or minus 6 degrees F standard deviation).

MSP Local Records for August 22nd:

MSP weather records for this date include: highest daily maximum temperature of 97 degrees F in 1898 and again in 1971; lowest daily maximum temperature of 60 degrees F in 1891; lowest daily minimum temperature of 43 degrees F in 1875 and again in 1890; highest daily minimum temperature of 80 degrees F in 1968. Record precipitation for this date is 3.32 inches in 1914.

Average dew point for August 22nd is 58 degrees F, with a maximum of 75 degrees F in 1968 and a minimum of 38 degrees F in 1934.

All-time state records for August 22nd:

The all-time state record high temperature for this date is 104 degrees F at Redwood Falls (Redwood County) in 1971. The all-time state record low temperature for this date is 26 degrees F at Cotton (St Louis County) in 1967. The all-time state record precipitation for this date is 4.58 inches at Buffalo (Wright County) in 1999.

Past Weather Features:

About 8:30 pm in the evening on August 22, 1938 (70 years ago) an F-2 tornado (113-157 mph) traveled 12 miles across Stearns County near the towns of Paynesville and Richmond. It was 150 yards in diameter and seriously damaged eight farms in the area. It was the 4th tornado sighted that month in Minnesota.

On August 25, 1875 one of the earliest documented tornadoes struck in Minnesota. This F-2 tornado (113-157 mph winds) was spawned by a complex of severe thunderstorms that delivered over 4 inches of rainfall to central Minnesota. The tornado itself destroyed a number of homes, barns and farm buildings just south of Hutchinson. It carried bundles of harvested small grains for over mile.

The 4th driest August in state history occurred in 1976. On a statewide basis average rainfall that August was barely 1.5 inches and many areas received less than 1 inch. This set up a very difficult fall fire season and September was riddled with wildfires that kept firefighters busy through October. In fact over 3400 wildfires were reported in Minnesota during 1976.

Words of the Week: kettle or boil

When a group of migrating hawks are seen circling and riding the updrafts of thermals to higher altitudes, this is called a kettle or boil. Fall season is often the best for bird watching, especially migratory birds. Along the north shores of Lake Superior, and along the Mississippi River bluff country of SE Minnesota during the fall season is the best place to view a kettle or boil of hawks. (Footnote: see the Minnesota Weather Quiz at the MPR web site).

Outlook:

Cooler and less humid this weekend with a chance for isolated showers in SE counties on Saturday. Otherwise pleasant weather with another chance for rainfall by Wednesday of next week.

Minnesota WeatherTalk for Friday, August 29, 2008

To: MPR's Morning Edition and Minnesota WeatherTalk Subscribers
From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, August 29, 2008

Headlines:

- Jet Streaming podcast this week
- Preliminary August Climate Summary
- Weekly Weather Potpourri
- Question about 90 F days
- Almanac for August 29th
- Past significant weather (State Fair)
- Solar Decathlon
- Outlook

Topic: On this week's "Jet Streaming" podcast

This week's podcast, available at the MPR web site, is a recording of the 12th Annual Minnesota Weather Quiz presented live from the Minnesota State Fair on August 21, 2008 as part of the Midday program. Listen to the tricky questions and fun responses as Gary Eichten and Mark Seeley awarded prizes to the contestants who participated at the MPR booth. You can also take the quiz online at <http://www.mpr.org/statefair>

You can listen to this entire podcast at the following web sites.....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: Preliminary August Climate Summary....

Mean August temperatures were generally plus or minus 2 degrees F off normal. Some areas of northern Minnesota saw mostly cooler than normal temperatures, while some areas in the south saw warmer than normal temperatures. Extremes for the month ranged from 93 degrees F at Worthington on the 5th to just 27 degrees F at Embarrass on the 25th. In fact Embarrass reported the lowest temperature in the 28 contiguous states on both the 25th and the 8th (37 degrees F). Virginia, Isabella, Littlefork, and Hibbing also reported frosts during August.

Though a few observers reported monthly total precipitation of 4 to 5 inches, rainfall in August was generally below normal in most places with several observers reporting less than 9 days with precipitation. The two largest rainfall came on the 11th and 12th (mostly west-central counties),

followed two weeks later on the 26th, 27th, and 28th. These storms brought amounts ranging from 2 to 4 inches. The rains were beneficial to corn, soybean and alfalfa crops around the state.

Weekly Weather Potpourri:

Tropical Storms Gustav and Hanna were churning away this week, with Gustav expected to become a hurricane again and threaten western Cuba, then areas along the Gulf Coast late on Labor Day. Gustav holds the potential to grow in size and intensify in strength to a category 3 or 4 system. Communities along the Gulf, and notably in Louisiana are preparing for a strong storm. Further to the east, TS Hanna is expected to migrate west-northwest toward the Bahamas and pose a threat there by next Wednesday. Hanna too is expected to evolve into a Hurricane, though probably not as strong as Gustav. Two other areas of disturbed tropical weather in the eastern North Atlantic may evolve into tropical storm systems as well. So it looks like the next two or three weeks will be quite active.

Last week Tropical Storm Fay brought some much needed rainfall to drought-stricken Alabama. In fact weather observers in that state report August total rainfall amounts that range upwards to 15 inches in places. August rainfall totals exceed historical averages across much of the state by 5 to 8 inches, bringing the most drought relief to that state in over a year.

The National Ice Center acknowledged this week that satellite data confirm the 2nd lowest amount of polar ice in the northern hemisphere since 1979. Based on the areal extent of ice cover, the current year is only surpassed by last year's diminished ice cover (September of 2007). This suggests that the strong trend in loss of polar ice will continue at least in the northern hemisphere for sometime to come. Satellite data suggest that the Northwest Passage linking the North Pacific to the North Atlantic Ocean across the polar reaches of Canada is almost ice free.

The Meteorological Office in the United Kingdom reports that Northern Ireland has seen their wettest summer since 1958. Country-wide rainfall since June 1st has averaged nearly 15.5 inches, just shy of the record wettest summer when it was 15.91 inches (1958). Other areas of the United Kingdom have also seen a wet summer, ranking among the top ten historically in both Wales and Scotland.

MPR listener question: How many Minnesota communities have not recorded a 90 degrees F temperature this summer? I heard that was the case for both Duluth and International Falls.

Answer: Indeed, neither Duluth nor International Falls have registered a 90 F temperature this summer. The last time that happened was in 2000. But several other Minnesota communities have not seen the mercury hit 90 degrees F this year, including Warroad, Itasca State Park, Hibbing, Aitkin, Red Lake Falls, Leech Lake, Floodwood, Wadena, Long Prairie, and Zumbrota. The last time Zumbrota went an entire year without a 90 F reading was 1993, while Long Prairie has only seen two years in the past 60 not bring a 90 F day (2006 and 2008).

Almanac for August 29th:

The average MSP high temperature for this date is 79 degrees F (plus or minus 8 degrees F standard deviation), while the average low is 59 degrees F (plus or minus 7 degrees F standard deviation).

MSP Local Records for August 29th:

MSP weather records for this date include: highest daily maximum temperature of 96 degrees F in 1969; lowest daily maximum temperature of 60 degrees F in 1915; lowest daily minimum temperature of 45 degrees F in 1911 and 1946; highest daily minimum temperature of 74 F in 1881, 1899, and 1969. Record precipitation for this date is 2.05 inches in 1964.

Average dew point for August 29th is 58 degrees F, with a maximum of 76 degrees F in 1945 and a minimum of 22 degrees F in 1976.

All-time state records for August 29th:

The all-time state record high temperature for this date is 103 degrees F at Beardsley (Big Stone County) in 1921. The all-time state record low temperature for this date is 22 degrees F at Tower (St Louis County) in 1976. The all-time state record precipitation for this date is 5.32 inches at Thorhult (Beltrami County) in 1980.

Past Weather Features:

The evening of August 30, 1977 brought the biggest rainfall ever during the State Fair. The Twin Cities International Airport reported 7.28 inches of rain in just 4.5 hours. Nearly 5 inches fell at the State Fair coincident with the Grandstand Show which was washed out. In fact, 1977 was the wettest State Fair in history with a total of nearly 10 inches of rainfall during the 12 day run of the Fair. The driest State Fair run occurred in 1968 with just 0.08 inches of rainfall.

Five years ago on August 24 the temperature reached 97 degrees F at the State Fair, tying the record high for the Fair from September 1, 1913. So far this year, the State Fair high temperature has been 87 degrees F on the 22nd. But this may be topped by the high temperature forecast for this Sunday and Monday as it may approach 90 F.

Labor Day closes the Minnesota State Fair and in both 1935 and 1974 it brought killing frost. Crops across the state were hurt by these frosts which occurred 10-14 days earlier than they ever had previously.

Words of the Week: Solar Decathlon

This annual competitive event is sponsored by the U.S. Department of Energy. In 2009, it will take place on the Capitol Mall in Washington, D.C. during October. Teams of college and university students compete to design, build, and operate the most attractive and energy-efficient solar powered house. Students from the University of Minnesota Institute of Technology, College of Design, Carlson School of Management, College of Liberal Arts, and College of Continuing Education are among the 20 teams competing in 2009. To read more about it go to...

<http://www.solardecathlon.org/>

Outlook:

Pleasant start to the Labor Day weekend with seasonal temperatures. Getting warmer and windy on Sunday and Monday, with a chance for widely scattered showers and an increase in humidity. A better chance for rainfall by next Tuesday and Wednesday, followed by cooler temperatures.

Minnesota WeatherTalk for Friday, September 5, 2008

To: MPR's Morning Edition

From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk for Friday, September 5, 2008

Headlines:

- Jet Streaming podcast this week
- Records fall on first two days of September
- August temperature trivia
- Minnesota photographer wins weather photo contest
- Weekly Weather Potpourri
- Question on fall frost
- Almanac for September 5th
- Past significant weather
- Monsoon ailments?
- Outlook

Topic: On this week's "Jet Streaming" podcast

On this week's podcast, available at the MPR web site, Cathy Wurzer speaks to reporter Fred Kasten in New Orleans about the aftermath and clean-up efforts following tropical storm Gustav. She also speaks with Dennis Feltgen from the National Hurricane Center in Miami about the current array of tropical storms lined up in the North Atlantic that may threaten parts of the USA over the next days and weeks. Ft Lauderdale's Sun-Sentinel Hurricane Headquarters is highlighted as the web site of the week.... www.sun-sentinel.com

You can listen to this entire podcast at the following web sites.....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: First days of September record-setting for some....

September began in summer-like fashion across Minnesota with many communities reporting daytime highs in the upper 80s to low 90s F. International Falls tied their record high on September 1st with 87 degrees F. Itasca State Park reported a new daily record high of 92 degrees F on September 2nd. In addition the warm air mass promoted some new record high overnight minimum temperatures as well. On September 1st Browns Valley reported a new record warm minimum temperature with 72 degrees F, Thief River Falls a record 72 degrees F, Red Lake Falls a record 72 degrees F, and Park Rapids a record 71 degrees F. On September 2nd

Warroad reported a record warm minimum temperature of 72 degrees F and Preston a record 73 degrees F.

In addition, strong thunderstorms brought 1.50 to 3.0 inches of rainfall over September 1st and 2nd in northwestern Minnesota. Portions of Wilkin, Clay, Polk, and Roseau Counties reported one of their largest rainfall events of the year. Moorhead had a record 2.50 inches on September 2nd, Red Lake Falls a record 2.57 inches, Grand Forks, ND a record 1.67 inches on the 1st, Crookston a near-record 2.28 inches, and Warroad a near-record 1.46 inches.

A strong cold front brought much cooler and drier air to the state on September 3rd as temperatures and dewpoints fell by 20 to 30 degrees F. Many daytime highs on the 3rd were only in the 60s F and cooler than normal weather was expected to dominate the state through the first half of the month. Some observers in NE counties reported three consecutive mornings with temperatures in the 30s F this week.

Topic: August Temperature Trivia

Following our chat about August weather last week, a listener pointed out that this was the 4th time in the last 10 years that August produced no days with a high of 90 degrees F or higher in the Twin Cities area. In addition, Greg Spoden of the Minnesota State Climatology Office noted that the statewide high temperature last month of 93 degrees F at Worthington is extraordinarily low for the month of August. In fact since 1891, only 1977 (92 degrees F) and 2004 (93 degrees F) produced an August high temperature value so low.

Topic: Weatherwise Magazine Photo Contest Winner

Congratulations to Trudy Ryks of Raymond, MN (Kandiyohi County) who won the Grand Prize in the 2008 Weatherwise Magazine Photo Contest. Trudy submitted a wonderful shot of lightning imbedded in a thunder cloud over a lake near Willmar. You can find it in the current edition of the magazine.

Weekly Weather Potpourri:

During the first week of September Hurricane Gustav made landfall in Louisiana and slowly moved northeast. Up to 30 tornado reports were associated with Gustav. It eventually merged with a mid-latitude cold front and brought a great deal of rainfall to many places. Portions of Louisiana, Mississippi, and Arkansas received from 10 to 19 inches of rainfall this week. By Thursday this system was bringing rain to Kentucky, Indiana and Illinois.

The tropical storm activity appears to be peaking in early September with TS Hanna bringing some thunderstorms to eastern Florida and expected to saturate NC and VA later in the weekend as it slowly migrates north. It may turn into a hurricane for a brief period as well. Meanwhile Hurricane Ike with 135 mph winds is a category 4 system migrating towards the Bahamas where it may strike later in the weekend. It is expected to maintain hurricane status for several days, but its track is still rather uncertain. Further east yet is TS Josephine, a relatively weak and disorganized storm, it is expected to remain well out to sea traveling west-northwest throughout

the weekend. There is also a tropical wave (disturbance) between Josephine and Ike, but it remains uncertain whether it will develop into a storm. Finally, remnants of TS Karina in the Eastern Pacific Ocean were circulating off Baja California, but not expected to intensify. Back in late August and early September of 1995 there were as many as 5 named tropical storms being tracked at the same time.

And speaking of hurricanes, a study released this week in the Journal of Clinical Nursing reported that half of the residents of New Orleans were still suffering from poor physical and mental health a full year after Hurricane Katrina struck in 2005. More than a quarter of those surveyed had no health insurance and lived below the poverty line in unsafe housing. Depression was a common post-traumatic symptom.

Thunderstorms brought flash flooding to parts of central and southern England this past Sunday and Monday. Roads were closed and many homes and businesses were water damaged by the heavy rains and runoff. More heavy rains were expected for this coming weekend there.

A scientist from Trent University in Ontario reported this week that a large chunk of the Markham Ice Shelf separated from Ellesmere Island in the Canadian arctic last month. The 19 square mile piece of ice is adrift on the Arctic Sea. Total ice shelf loss in the Arctic this summer is now over 82 square miles of ice.

MPR listener question: Several NE Minnesota observers reported lows in the 30s F on Thursday morning this week (Sept 4) and all of the National Weather Service Climate Prediction Center guidance points towards a colder than normal September across the state. Do you think we'll have an early frost?

Answer: Though the forecast guidance clearly favors cooler than normal temperatures in September, it appears to favor cooler days more than cooler nights. This is because of persistent cloud cover. Temperatures are expected to average 3 to 7 degrees cooler than normal during the first half of the month, which will mean more overnight lows in the 30s F up north, but I don't think that the major agricultural areas of the state will necessarily see an early frost as a result of this. Most corn and soybean crops would benefit from a normal or later than normal frost date this year as their maturation rates are running a bit slower than usual.

Almanac for September 5th:

The average MSP high temperature for this date is 77 degrees F (plus or minus 10 degrees F standard deviation), while the average low is 57 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for September 5th:

MSP weather records for this date include: highest daily maximum temperature of 98 degrees F in 1922; lowest daily maximum temperature of 57 degrees F in 1873; lowest daily minimum temperature of 36 degrees F in 1885 and 1962; highest daily minimum temperature of 77 F in 1912. Record precipitation for this date is 2.57 inches in 1946.

Average dew point for September 5th is 55 degrees F, with a maximum of 78 degrees F in 1990 and a minimum of 31 degrees F in 1924.

All-time state records for September 5th:

The all-time state record high temperature for this date is 103 degrees F at Tracy (Lyon County) in 1922. The all-time state record low temperature for this date is 23 degrees F at Park Rapids (Hubbard County) in 1885. The all-time state record precipitation for this date is 3.72 inches at Austin (Mower County) in 1946.

Past Weather Features:

About noon on September 4, 1941 an F-2 tornado (113-157 mph winds) was sighted in Hennepin County moving to the NE. It stayed on the ground for 30 miles, crossing both Ramsey and Washington Counties, and at times the funnel was 70 yards wide. It destroyed a number of buildings in all three counties, and more than 20 cottages on White Bear Lake. The tornado resulted in 4 deaths and 50 injuries to Twin Cities residents.

Two years later, on September 5, 1943 about 2:30 pm in the afternoon another F-2 tornado raced across Cottonwood County, passing directly over Lake Augusta and just southwest of the town of Jeffers. It was on the ground for 8 miles and destroyed many barns and farm buildings, but killed no one.

Both 1868 and 1885 brought cold Septembers to the Twin Cities area. Multiple early ground frosts occurred in both of those years. In fact in 1885, there were 5 consecutive days of ground frost reported from the 2nd to the 6th. On September 23, 1868 a rare snowfall of 0.2 inches fell in the Twin Cities area.

Words of the Week: Monsoon Ailments

In the subtropical climates subject to a distinct monsoon (rainy) season, the medical profession routinely gears up for increased patient loads due to cold, fever, and cough. The onset of this season can come suddenly and may tax the body's ability to acclimate. In addition, the higher humidity and persistent wet landscape favors the development of certain disease carrying insects and organisms. Fresh water supplies are sometimes contaminated by monsoon floods and the high humidity causes stored foods to spoil more rapidly. Under such environmental conditions it is no wonder that humans are exposed to a variety of ailments.

Outlook:

Cloudy and cool conditions will persist into the weekend with a chance for showers later on Saturday and into Sunday morning. Temperatures will average several degrees below normal then start to warm up on Tuesday next week. By Wednesday there will be another chance for showers.

Minnesota WeatherTalk for Friday, September 12, 2008

To: MPR's Morning Edition

From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk for Friday, September 12, 2008

Headlines:

- Jet Streaming podcast this week
- Cooler than normal trend in September
- Welcome rains on September 11th
- Weekly Weather/Climate Related Potpourri
- Question on hurricanes
- Almanac for September 12th
- Past weather features
- SnoMotes?
- Outlook

Topic: On this week's "Jet Streaming" podcast

On this week's podcast, available at the MPR web site, Cathy Wurzer hosts a weather show recorded at the recent Minnesota State Fair. Guests included MPR meteorologist and former chief at the NWS Chanhassen Office Craig Edwards, and Belinda Jensen, chief meteorologist at KARE-11, the NBC affiliate in the Twin Cities. All things about Minnesota weather were fair game on this show, and Cathy gave away prizes to members of the audience that participated with questions for Craig and Belinda.

You can listen to this entire podcast at the following web sites.....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: Consistently Cooler Than Normal....

Since September 2nd, most Minnesota weather observers reported 7-8 consecutive days with cooler than normal temperatures, the longest such streak since mid-April. The morning of September 9th brought some of the coldest temperatures in many months and set some daily records in places. A 27 degrees F reading at Pine River that morning was the lowest in the 48 contiguous states. With 37 degrees F Mankato tied their record low for September 9th. Similarly Austin tied the record low for the date with 35 degrees F. New record lows for September 9th were reported at Browns Valley with 36 degrees F, at Albert Lea with 35 degrees F, and at Waseca with 35 degrees F. Fortunately a widespread frost was not reported across the corn and

soybean growing areas of Minnesota where crops would benefit from at least 10 more days of frost free conditions.

Topic: Welcome rains on September 11th....

Widespread showers and thunderstorms occurred across all areas of the state overnight from September 10 throughout most of the day on the 11th. These were the most widespread rains in quite some time and very welcome, especially in areas of the state that had been designated as being in moderate drought (some central, northeastern and southeastern counties). Generally most observers reported at least 0.25 to 0.50 inches, but many received more substantial amounts. Some of the larger totals included:

2.53" Northome (Koochiching County) 2.38" Waskish (Beltrami County) 1.90" Bemidji 2.01" Itasca State Park

1.48" Little Fork 1.75" Kabetogama 1.58" Crane Lake 1.20" Detroit Lakes 1.66" Big Fork 1.60" Moorhead 1.25" Baudette 1.22' Red lake Falls 1.65 International Falls 1.74" Hinckley

These amounts represent new daily records at International Falls, Crane Lake, Waskish, Bemidji, Itasca State Park, and Moorhead. In fact, for Waskish and Northome they are the largest 24-hr rainfall total observed in September historically.

These rains will help restore soil moisture values and return stream flows to near normal in some places, but many observers would welcome more fall rains as well.

Weekly Weather/Climate Related Potpourri:

Hurricane Ike caused severe damage in Cuba and headed out into the open Gulf of Mexico this week where it strengthened in intensity and expanded in size. Ike is expected to be close to a Category 3 (111-130 mph winds) hurricane as it approaches the Texas coastline on Saturday. Based on its size there will be widespread coastal flooding, erosion, and a large swath of wind damage around the Houston area. The size of Ike also means the possibilities for tornadoes and flash floods out through 72 hours after landfall.

After drenching Manila in the Philippines as a Tropical Storm early in the week, Typhoon Sinlaku migrated north over open ocean east of Taiwan and strengthened into a powerful Category 4 system (winds 131-155 mph) producing 30-40 foot wave heights. It was expected to remain over the ocean in category 3-4 status through Sunday, then weaken in cooler waters before approaching southern Japan.

A new study by scientists from University of Montana, University of Colorado, and UC-San Diego suggests that the most plausible rise in sea level during the 21st Century may be around 0.8 meters (about 2.6 ft). This is primarily due to ocean thermal expansion and melting of ice. Published in Science magazine, this research suggests that the dynamics of glaciological behaviors of the past and modeling of the pace of change in future climate constrain the magnitude of sea level rise that will occur this century. Nevertheless a projected 2.6 foot rise in sea level is very problematic for many coastal environments.

An international team of scientists (lead author Daniel Rosenfeld) reported in Science magazine last week that atmospheric aerosols (particles) have contrasting effects on the precipitation process depending on their concentration in the atmosphere. Up to a point they amplify the precipitation process by providing condensation nuclei for water droplets to form. But beyond a certain concentration, they diminish the sun's energy reaching the Earth's surface and they provide too many surfaces for condensation to occur, not allowing droplet size to reach a critical mass that can lead to precipitation. In this latter context they diminish the chance for the precipitation process to occur. They argue that this has implications for climate models that are trying to account for human effects on future precipitation.

MPR listener question: Nowadays, it seems that any hurricane of category 3 (111-130 mph winds, 9-12 ft storm surge) or greater which makes landfall in the United States surely causes at least \$1 billion in damages. When was the first time that hurricane losses exceeded \$1 billion?

Answer: According to the National Hurricane Center, Hurricane Betsy, a category 3 storm which struck the Louisiana coast on September 10, 1965, produced over \$1.4 billion in losses. This was the first time that loss estimates exceeded a billion dollars. Betsy has since faded into memory as many hurricanes have since surpassed the \$1 billion mark in economic losses. In fact since 1980 over 20 hurricanes have inflicted losses exceeding \$1 billion, and in 2005 Katrina alone accounted for over \$130 billion in losses.

Almanac for September 12th:

The average MSP high temperature for this date is 72 degrees F (plus or minus 10 degrees F standard deviation), while the average low is 53 degrees F (plus or minus 7 degrees F standard deviation).

MSP Local Records for September 12th:

MSP weather records for this date include: highest daily maximum temperature of 94 degrees F in 1908 and 1948; lowest daily maximum temperature of 55 degrees F in 1886, 1923, and 1974; lowest daily minimum temperature of 36 degrees F in 1878 and 1940; highest daily minimum temperature of 73 F in 1931. Record precipitation for this date is 4.96 inches in 1903.

Average dew point for September 12th is 52 degrees F, with a maximum of 72 degrees F in 1909 and a minimum of 26 degrees F in 1923.

All-time state records for September 12th:

The all-time state record high temperature for this date is 102 degrees F at Beardsley (Big Stone County) in 1931. The all-time state record low temperature for this date is 17 degrees F at Kelliher (Beltrami County) in 2000. The all-time state record precipitation for this date is 6.50 inches at Komiska (McLeod County) in 1869. There was a trace of snow at Roseau, Warroad, and Virginia on this date in 1923.

Past Weather Features:

September of 1869 was the wettest in history for the Twin Cities area with 10.61 inches of rainfall recorded in St Paul. September 12-14 was extremely stormy and wet across southern Minnesota. Rainfall of 6.50 inches at Komiska in McLeod County on the 12th is one of the greatest single day totals ever in the month of September. Large hail broke windows and damaged vegetable crops in Madelia (Watonwan County) on the same date. Nearly five inches of rain fell in St Paul and at Ft Snelling over the 12th to the 14th. The widespread heavy rains caused the Minnesota River near Mankato to rise nearly 16 feet by the 17th of September, and the Mississippi River in St Paul crested 2 feet above flood stage, its highest rise during the month of September. The flooding destroyed log booms on the Rum River and Upper Mississippi River, send millions of logs over St Anthony Falls and suspending work on the local mills there.

On September 11, 1942 one of the worst derechos (straight-line wind storms) in state history left a swath of damage from Granite Falls in the west to North Branch in the east. Winds of 65 to 70 mph flattened groves of trees, and damaged many farms, homes and office buildings. More than 650 barns were destroyed and 1700 homes claimed damage. Willmar, Canby, Bird Island, and Montevideo all reported over 2 inches of rain from this storm.

On September 16, 1962 an unusual and very dangerous F-4 tornado (winds 207-260 mph) touched down in Olmsted County southeast of Rochester. It was unusual because it occurred between 4:00 and 4:30 am, while everyone was asleep, and was only on the ground for one mile. The tornado destroyed eleven homes and injured 34 people. Fortunately there were no deaths. The storm system that gave birth to this tornado brought little rainfall, as Rochester recorded only 0.19 inches while to the NE Elgin reported 0.48 inches.

Word of the Week: SnoMotes

This miniature snowmobile-type rover was designed by Dr. Ayanna Howard of Georgia Tech University. It can be equipped with sensors, gauges, and cameras for surveying and collecting data in harsh environments. NASA, who funded Dr. Howards research hopes that a fleet of robotic SnoMotes may investigate the environment of Antarctica in a manner that will give them better spatial resolution about its variability in climate.

Outlook:

Increasing cloudiness on Saturday with a chance for widespread showers Saturday night into early Sunday. Then drier and much cooler weather for Monday and Tuesday, before a warm-up starts by mid-week. Overnight lows early next week may drop into the 20s and 30s F up north, then a rebound in temperatures by mid-week may return high temperatures into the 70s and 80s F. Generally a dry pattern for much of next week.

Minnesota WeatherTalk for Friday, September 19, 2008

To: MPR's Morning Edition

From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk for Friday, September 19, 2008

Headlines:

- No Jet Streaming podcast this week
- Sunglasses for fall color viewing
- Large temperature range
- Weekly Weather/Climate Related Potpourri
- Question on hurricanes
- Almanac for September 19th
- Past weather features
- Leaching and denitrification
- Outlook

Topic: The Jet Streaming crew are taking the week off..we'll return next week

To listen to any of our older podcasts, please go to....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

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Topic: : Discriminating Fall Foliage

As Minnesotans begin to spend their weekends browsing the state for fall color displays, some may choose to wear sunglasses to enhance the view. Foresters, botanists and ecologists who carefully observe and study forest and vegetation types have for years used amber, yellow, or brown tinted sunglasses to enhance their eyesight. These colored lenses, sometimes referred to as "blue blockers", screen out the blue and haze that come from the scattering of blue light, especially under the lower sun angles of fall. This allows the human eye to better discriminate among the hues and subtle shades of pigment changes in the landscape foliage. The enhanced vision helps observers to better differentiate among mixed hardwoods, conifers, and understory. It is also helpful in detecting vegetation that has suffered from drought, nutrient deficiencies, or plant disease. Very slight deficiencies in chlorophyll (green) show up as lighter colors through these glasses. These glasses can be purchased for anywhere from \$10 to \$75. However, many Minnesotans will probably still prefer to view the natural, unfiltered fall colors with their naked eye.

Topic: Drier Canadian air this week means larger daily temperature range

September commonly brings a daily temperature range of about 20 degrees to most Minnesota communities. That is an expression of the difference between the morning low and the afternoon high. But the cooler and dry air that descended out of Canada earlier this week certainly brought some wider swings in temperature. Between Monday, September 15th and Tuesday, September 16th many observers reported a temperature rise of 35 to 45 degrees F in less than a 24-hour period. Swings in temperature of this magnitude in September and early October are rare, but have certainly occurred historically. Similar conditions existed in mid-September of 1962 and 1974. As we move towards the cloudiest month of the year, November, the average daily temperature range will decline.

Weekly Weather/Climate Related Potpourri:

Forecasters who work for the United Kingdom Meteorological Office were assigned to work side by side with the Chinese Meteorological Service during last month's Olympic Games providing forecasts for all the competitive venues. In addition, some stayed on and forecasted for the recently concluded Paralympic Games in Beijing. As a result, the forecasters report that many lessons were learned and they expect to do an even better job in forecasting for the 2012 Olympics which will be held in London.

Typhoon Sinlaku, which I mentioned last Friday, struck Taiwan last weekend with damaging winds and up to 47 inches of rainfall. At least a dozen deaths were blamed on the storm. Diminished in strength, but still a tropical storm, Sinlaku is expected to bring heavy rain and strong winds to Tokyo, Japan this weekend.

Hurricane Ike inflicted a great deal of damage to SE Texas last week, but then remnants of the storm continued to inflict damage across eastern sections of the midwest this week. Portions of Missouri, Illinois, Indiana, and Michigan reported flash flooding as a result of 4 to 8 inch rainfalls. In addition there were many reports of damage from 60 to 80 mph winds. The low pressure center associated with Ike hung together as it crossed over into Canada, bringing localized flooding to parts of Ontario and Quebec. On Thursday of this week, remnants of Ike were bringing heavy rain, large waves, and strong winds to southern Iceland in the North Atlantic.

Some of the damage inflicted by Ike to the Texas coastline and interior is depicted in aerial photos on the NOAA-National Weather Service web site....

<http://ngs.woc.noaa.gov/ike/IKE0000.HTM>

In addition, the Center for Severe Weather Research in Boulder, CO deployed a Doppler on Wheels (DOW) to measure the forces of IKE as it made landfall hour by hour. These data may prove to be very useful in dissecting the details of Ike's structure and why it hung together for so long.

MPR listener question: If we can put people on the moon....why can't we use that technology or develop new technology to blow up hurricanes before they hit the coast and cause all of their damage and suffering and related expense? Unlike tornadoes that often form on the spot, we

know hurricanes are coming for days or weeks..... and much of the time they are over open water.

Answer: There are two perspectives to share on this question: one is ethical in nature, the other is scale. If we attempted to modify or dissipate hurricanes we might affect tropical weather in a manner we could not predict. Such tampering might lead to drought in some places, intense thunderstorms, disruption of ocean or terrestrial ecosystems, etc. In addition we would incur great expense in our efforts and deprive financial resources from being allocated to other purposes that might be more predictable and beneficial. Secondly, hurricanes represent energy systems that are enormous. According to Chris Landsea of the NOAA National Hurricane Center, a modest hurricane generates the heat energy equivalent of a 10 megaton nuclear bomb every 20 minutes. The energy needed to modify a heat engine of this size would be enormous, even if the effort was concentrated to affect the birth phase of a hurricane's development when it is still relatively weak.

In the end hurricanes and tropical storms are part of planet Earth's metabolism. They function to dissipate inequalities in the surface and atmospheric distribution of heat and moisture.

Almanac for September 19th:

The average MSP high temperature for this date is 71 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 51 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for September 19th:

MSP weather records for this date include: highest daily maximum temperature of 94 degrees F in 1895; lowest daily maximum temperature of 48 degrees F in 1901 and 1918; lowest daily minimum temperature of 33 degrees F in 1873 and 1991; highest daily minimum temperature of 72 F in 1891 and 1940. Record precipitation for this date is 2.98 inches in 1907. Record snowfall on this date is a trace in 1927.

Average dew point for September 19th is 51 degrees F, with a maximum of 72 degrees F in 1907 and a minimum of 25 degrees F in 1937.

All-time state records for September 19th:

The all-time state record high temperature for this date is 104 degrees F at Beardsley (Big Stone County) in 1895. The all-time state record low temperature for this date is 16 degrees F at Alborn (St Louis County) in 1929. The all-time state record precipitation for this date is 6.08 inches at Red Wing (Goodhue County) in 1907. State record snowfall for this date is 0.7 inches at Moorhead (Clay County) in 1946.

Past Weather Features:

On September 21, 1894 between 8:00 and 10:00 pm numerous tornadoes struck across southeastern Minnesota. Counties affected included Faribault, Mower, Fillmore, Winona, and Olmsted. The strongest of these was an F-5 (winds greater than 260 mph) that struck near Kiester, and an F-4 (winds 207-260 mph) that struck near Leroy and Spring Valley. Nine people were killed and dozens injured in these storms. Scores of farms were damaged and a railroad depot at Eyota was destroyed. These were the last of many tornadoes in Minnesota during 1894.

On September 19, 1906 an F-2 tornado (winds 113-157 mph) touched down about 11:00 am near Springfield in Brown County. It was on the ground for 5 miles and damaged or destroyed 11 farms in its path. Fortunately there were no injuries or deaths with this storm.

A rainfall oddity occurred in September of 1907. Red Wing reported 25 dry days and only 5 days with rainfall during the month. But the 5 days with rainfall were consecutive (15th-19th) and totaled 8.30 inches, making Red Wing the wettest spot in the state that year.

On September 18, 1991 Duluth reported 2.4 inches of snowfall at the airport, the most snowfall ever measured so early in September in the state of Minnesota.

Word of the Week: Leaching and Denitrification

These terms are only sometimes used by climatologists. They are used much more commonly by soil scientists and farmers when they are discussing fertilizer options. Leaching refers to the movement or washing out of soluble constituents within the soil by percolation of water. Moisture moves through successive soil layers by gravity, saturating all the pore spaces and moving deeper. In many agricultural soils the moisture is stored there until it is removed by plant roots during the growing season. But in some soils, deeper percolation occurs, depositing these soluble materials into aquifers which may be sources of drinking water or water for irrigation. Potential leaching losses are governed by soil moisture, soil texture as well as rainfall frequency and intensity.

Denitrification is the biological process in the soil where nitrate nitrogen is converted into a gas and lost as vapor through the soil surface to the atmosphere. This process occurs more rapidly under warm and moist conditions and in fine textured soils. Unlike leaching which represents an environmental concern with respect to ground water quality, denitrification losses are not generally an environmental threat but nevertheless can represent an economic loss with respect to a farmers fertilizer costs. This is why attention is given to soil temperatures this time of year. Farmers do not want to apply nitrogen to the soil, especially as anhydrous ammonia, until the soil temperatures cool down below 50 degrees F.

Outlook:

Typical fall weather this weekend, with an increasing chance for showers in southern sections by Monday. Generally warmer than normal next week, with a chance for showers later on Wednesday and into Thursday.

Minnesota WeatherTalk for Friday, September 26, 2008

To: MPR's Morning Edition

From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk for Friday, September 26, 2008

Headlines:

- Jet Streaming podcast this week
- Preliminary Tornado Report for MN in 2008
- Climate literacy
- Welcomed rainfall this week
- Weekly Weather/Climate Related Potpourri
- Question on Pacific and Atlantic Tropical Storms
- Almanac for September 26th
- Past weather features
- Percent possible sunshine
- Outlook

Topic: Our guests on the Jet Streaming podcast this week include Carroll Henderson, a non-game wildlife biologist with the Minnesota Department of Natural Resources and one of the regions leading bird experts. He tells us about good places to watch bird migrations this time of year, and also about his latest book "Birds in Flight" by Voyageur Press. He shares one of his favorite web sites...

www.wildlifeviewingareas.com

In addition we talk with Dr. Roger Pielke Jr of the University of Colorado, a national expert on societal impacts of weather and climate events and episodes. Dr. Pielke offers his insights on both the financial and human costs of landfall hurricanes and other weather-related disasters and his views on how scientists can assist with the community engagement need to adapt to and better manage risk associated with such events.

To listen to this podcast, please go to....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: MN tornado summary for 2008

Todd Krause of the National Weather Service Office in Chanhassen was kind enough to provide a preliminary look at tornado reports in Minnesota for 2008. The earliest date was May 25th,

when 5 tornadoes were reported, including the EF-3 storm that hit Hugo, MN. July 24th was the last report of a tornado, and that was in Mahnommen County. In all there were 43 tornadoes in Minnesota this year. There were 3 reports of EF-3 storms (136-165 mph winds). These occurred at Hugo, another between Dorset and Park Rapids, and one near Kandiyohi. There were 2 reports of EF-2 tornadoes (111-135 mph), 15 reports of EF-1 storms (86-110 mph), and 23 reports of EF-0 twisters (65-85 mph winds). In all these 43 tornadoes resulted in 1 death and 24 injuries.

Topic: Climate Literacy

The NOAA Climate Program Office launched a program last year to provide resources for teaching climate science in the K-12 grades. Many areas of the school science curriculum can be enhanced by incorporating an understanding of the Earth's climate system. NOAA hopes that school science teachers will adopt these 7 Essential Principles of Climate Science:

1. Life on Earth has been shaped by, depends on, and affects climate
2. We increase our understanding of the climate system through observation (measurement) and modeling
3. The sun is the primary source of energy for the climate system
4. Earth's weather and climate system are the result of complex interactions (physical, chemical, and biological)
5. Earth's weather and climate vary over time and space
6. Evidence indicates that human activities are impacting the climate system
7. Earth's climate system is influenced by complex human decisions involving economic costs and social values

Teachers, and others can learn more about NOAA's effort at climate science literacy by going to....

www.climate.noaa.gov/education

Topic: A needed rain this week

September 22-23 brought some much needed rain to parts of northern and central Minnesota. Many observers reported between 0.5 and 1 inch of rainfall. A record amount of 0.56 inches fell on the 23rd at International Falls, while a record 1.08 inches fell at Cook. In addition Kabetogama reported a record amount of 1.13 inches as did Bruno with 1.82 inches. These amounts helped to improved stream flow on watersheds in those areas, but the effect will be rather short-lived without additional rains.

Much of central and southern Minnesota remains in a moderate drought category according to the U.S. Drought Monitor, so abundant rainfall before harvest time would be welcome, as it would help replenish soil reserves.

Weekly Weather/Climate Related Potpourri:

For a change, both the NOAA Climate Prediction Center and the Hadley Center in the United Kingdom have predicted similar conditions across the western Great Lakes Region for late fall

and early winter. Both organizations forecast above normal temperatures through December. In turn, both organizations show no preferred trend in precipitation. It could be wetter or drier than normal. Nevertheless, the message may be not to put away the golf clubs too early this fall.

A large, slow moving tropical weather disturbance brought very heavy rains to Puerto Rico this week. Many areas reported 5 consecutive days of rain, with total amounts ranging from 15-20 inches. One observer reported 20 inches in less than 24 hours.

Tropical Storm Kyle, the 11th of the season formed in the North Atlantic this week. It is expected to strengthen perhaps to hurricane status and bring some rainfall to the New England states late in the weekend and next week.

Chinese officials in Beijing lifted the restrictions on car and factory emissions this week, following the cities hosting of both the Summer Olympic Games and Paralympic Games. The added restrictions on traffic and industrial emissions certainly brought cleaner air to the region since July 20th. Measurements of air pollution values in August were the lowest in a decade. Air quality is expected to deteriorate in the coming weeks with the lifting of the restrictions.

MPR listener question: I have heard that tropical storm activity in the Western North Pacific generally exceeds that of the North Atlantic. But with the formation of Tropical Storm Kyle in the Atlantic, that makes for 11 named storms so far this year. How many have occurred in the Western Pacific Ocean this year?

Answer: 14 named tropical storms have occurred in the Western North Pacific Ocean so far in 2008 (the latest named Jangmi). In most years the number of named tropical storms in the Western North Pacific Ocean will exceed the number in the North Atlantic, and that looks to be the case again. Tropical Storm Kyle currently in the North Atlantic is the 11th named storm there this year. In many cases the intensity of the Tropical Storms (central low pressure and wind speed) in the Pacific Ocean exceed those of the North Atlantic Ocean as well, and that has been the case again this year. Incidentally, to round out the geography of tropical storms in 2008, the Eastern North Pacific has reported 12 named storms, the Central North Pacific one named storm, and the Indian Ocean one named storm.

Almanac for September 26th:

The average MSP high temperature for this date is 66 degrees F (plus or minus 10 degrees F standard deviation), while the average low is 45 degrees F (plus or minus 7 degrees F standard deviation).

MSP local Records for September 26th:

MSP weather records for this date include: highest daily maximum temperature of 87 degrees F in 1923; lowest daily maximum temperature of 41 degrees F in 1942; lowest daily minimum temperature of 27 degrees F in 1965; highest daily minimum temperature of 64 F in 1998. Record precipitation for this date is 1.81 inches in 1930. Record snowfall on this date is 1.7 Inches in 1942.

Average dew point for September 26th is 46 degrees F, with a maximum of 70 degrees F in 1986 and a minimum of 20 degrees F in 1965.

All-time state records for September 26th:

The all-time state record high temperature for this date is 93 degrees F at Madison (Lac Qui Parle County) and Redwood Falls (Redwood County) in 1974. The all-time state record low temperature for this date is 11 degrees F at Crookston (Polk County) in 1893. The all-time state record precipitation for this date is 3.45 inches at Albert Lea (Freeborn County) in 1973. State record snowfall for this date is 7.5 inches at Long Prairie (Todd County) in 1942.

Past Weather Features:

Anybody remember 1942?

No, this is not a follow up to the movie, "The Summer of '42." September 26, 1942 is a climatic benchmark of sorts in that it marks the earliest fall occurrence of a significant snowfall in Minnesota. Though MSP officially recorded 1.7 inches (most of which fell from 8 pm on the 25th to 8 am on the 26th), many of the city parks reported 2 or more inches. Much of this melted during the day on the 26th, but the heavy wet snow damaged trees and shrubs which had not lost their leaves. Elsewhere around the state the snow was heavier yet and required some shoveling. Several areas of central Minnesota reported 6 inches or more, including Willmar.

Anybody remember 1892?

October 1, 1892 brought a very rare heavy hail storm to St Paul, perhaps the worst ever recorded in the month of October. Minnesota weather historian Tom St Martin has written about this storm. Hailstones actually piled up in the streets, some being half of the size of hen's eggs. The lightning and thunder which accompanied the storm caused many horses to bolt. An Anheuser-Busch driver was thrown from his wagon by an unmanageable team of horses, while another driver of a grocery wagon was knocked to the street by a bolt of lightning which killed his horse. In contrast, the city of Minneapolis reported little or no rainfall from the storm.

Subsequently, the climatological record for the Twin Cities shows that October hail storms only occur about once every 50 years. So they are indeed a rare October weather event.

Word of the Week: Percent Possible Sunshine

This is a standard climate measurement made at National Weather Service Offices, but it is often misunderstood as a indicator of solar energy. It is the ratio of the actual duration of bright sunshine (unobstructed sunlight measured by a sunshine recorder) in hours and minutes compared to the astronomically possible duration of sunshine in hours and minutes taken from sunrise and sunset times for the local station (latitude specific). Thus, in the winter when only 8 hours of sunshine is possible for the Twin Cities, 7 hours of actual sunshine would equal 87.5

percent possible sunshine, while in summer when 15 hours of sunshine is possible, 7 hours of actual sunshine would only equal about 47 percent possible sunshine.

Incidentally, long term climate averages show that it is this time of year that we see the maximum percent possible sunshine in Minnesota (typically the last few days of September and first few days of October). My former colleague and mentor Dr. Don Baker wrote about this topic decades ago, but his findings are still valid today.

Outlook:

Temperatures across the region are expected to cool down this weekend, with a chance for showers in eastern sections on Saturday. Brighter on Sunday early, but increasing cloudiness late in the day, with a widespread chance for showers by Sunday night and on Monday. Then warm and dry for much of next week.

Minnesota WeatherTalk for Friday, October 3, 2008

To: MPR's Morning Edition

From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk for Friday, October 3, 2008

Headlines:

- Jet Streaming podcast this week
- Climate Summary for September 2008
- October starts cold
- Weekly Weather/Climate Related Potpourri
- Question on October snows in the Twin Cities
- Almanac for October 3rd
- Past weather features
- Smart buoys
- Outlook

Topic: Jet Streaming Podcast this week.....

Our guests on the Jet Streaming podcast this week include forecaster John Hammond with the BBC Weather Centre in London, England. He tells us about forecasting weather in the United Kingdom and the media operations of the United Kingdom Meteorological Office. Then, we visit with Janice Stillman, editor of the Old Farmer's Almanac. She describes how the oldest publication in North America goes about making their annual weather forecasts. By the way, they are calling for a warmer than normal winter in our region. Craig Edwards also shares an interesting web site of the week that relates to climate and our energy use.

To listen to this podcast, please go to....

http://minnesota.publicradio.org/radio/programs/morning_edition/

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http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: September Climate Summary for Minnesota

Most Minnesota weather observers reported a mean September temperature that was 1 to 3 degrees F warmer than normal. A few reported mean temperatures that were 1 to 2 degrees cooler than normal, especially areas where cloud cover dominated. Extremes for the month ranged from 92 degrees F at several locations on the 1st to just 24 degrees F at Embarrass on the 16th. Minnesota reported the coldest temperature in the 48 contiguous states on two dates, the 16th at Embarrass and the 9th at Pine River Dam (27 degrees F). Frosts occurred in several

northern counties, but much of the west and south escaped the month of September frost-free, a factor that helped crops reach maturity.

Rainfall reports for September were mixed. Many observers from southern counties reported less than normal rainfall, especially in the southeast. Winona reported their driest September since 1998 with just 1.15 inches. To the north, most observers reported above normal rainfall. This was most welcome, especially in counties that had seen moderate drought conditions develop this summer. Some of the larger monthly total rainfall values included....

Moorhead 5.40" Red Lake Falls 5.27" Bemidji 4.78" Two Harbors 4.96" Hinckley 6.82"
Bruno 5.49" Cloquet 4.71" Fargo 5.08" Babbitt 4.87" Milaca 4.79"

For many of these locations, September brought the wettest month of the year. The drier soils in southern Minnesota counties could use much more moisture recharge before they freeze up later this fall.

Topic: Cold start to October

Wednesday, October 1st started cold for many observers in Minnesota. Pine River in Cass County reported the coldest temperature in the 48 contiguous states on October 1st with just 28 degrees F. Elsewhere many observers reported lows in the 30s F, including Byron and Preston in SE Minnesota where the temperature dropped to 34 degrees F. Thursday, October 2nd brought even more readings in the 30s F, including just 31 degrees F at Preston and Theilman, and 32 degrees F to both Jackson and Waseca in southern Minnesota, ending the growing seasons there.

Weekly Weather/Climate Related Potpourri:

Tropical Storm Kyle brought high seas, rain, and strong winds to the Maritime Provinces of Canada late last weekend, but apparently little damage was done. Once a category 1 hurricane Kyle brought a glancing blow to Maine with some heavy rains reported (up to 7 inches). But by the time it reached eastern Canada it was delivering just one to two inch rainfall amounts and winds were gusting to 50-60 mph. The storm did knock out the power to many residential customers in New Brunswick.

Laura, the 12th named storm of the North Atlantic season, fluctuated between subtropical storm and tropical storm status after it formed off the northeast coast earlier this week. For a time it produced wind speeds of 40-60 mph, but it remained primarily over open water.

Portions of eastern and central Argentina have been experiencing drought this year. Rainfall has only been 40 to 50 percent of normal in some areas, meaning just 8-10 inches of rainfall for the year so far. As they enter their crop season producers are hoping for additional soil moisture recharge so that they can expect near normal yields, especially in the Pampas region. Fortunately, the outlook calls for a wet October which may help to make up for some of their moisture deficiency before the crop season gets too far along.

Researchers from the Oak Ridge National Laboratory report this week that annual carbon dioxide emissions have continued to rise by 38 percent since 1992, and that the source of these emissions has shifted dramatically to other countries, most notably China and India. China became the largest emitter of carbon dioxide in 2006 and India is expected to surpass Russia as the 3rd largest emitter. Chief among the sources for carbon dioxide emissions in these countries are burning fossil fuels, the manufacturing of cement, and deforestation.

MPR listener question: With this cold start to October, do I dare ask about snow? My wife and I were wondering how many times the Twin Cities has seen a measurable October snowfall?

Answer: Since 1884, 40 Octobers have brought a measurable snowfall to the Twin Cities area. The last time was October 20-21, 2002. The highest incidence of October snows occurred in the decade from 1911 to 1920 when five years brought measurable snowfalls, and another four brought traces of snow. Nearly all October snowfalls have been short-lived, and melted in a day or two.

Almanac for October 3rd:

The average MSP high temperature for this date is 66 degrees F (plus or minus 10 degrees F standard deviation), while the average low is 46 degrees F (plus or minus 8 degrees F standard deviation).

MSP local Records for October 3rd:

MSP weather records for this date include: highest daily maximum temperature of 90 degrees F in 1997; lowest daily maximum temperature of 41 degrees F in 1935; lowest daily minimum temperature of 26 degrees F in 1996; highest daily minimum temperature of 72 F in 2005. Record precipitation for this date is 2.62 inches in 1903. There was a trace of snowfall on this date in 1935.

Average dew point for October 3rd is 42 degrees F, with a maximum of 64 degrees F in 1926 and a minimum of 18 degrees F in 1989.

All-time state records for October 3rd:

The all-time state record high temperature for this date is 95 degrees F at Ada (Norman County) in 1922 and at Milan (Chippewa County) in 1938. The all-time state record low temperature for this date is 9 degrees F at Embarrass (St Louis County) in 1999. The all-time state record precipitation for this date is 4.50 inches at Pine River Dam (Crow Wing County) in 1903. State record snowfall for this date is 0.3 inches at Virginia (St Louis County) in 1935 and at Marshall (Lyon County) in 1950.

Past Weather Features:

An extremely rare F-4 tornado (winds 207-260 mph) passed across SE Minnesota between 1:30 and 2:00 pm on the afternoon of October 3, 1903. This tornado was on the ground for 55 miles as

it passed through Olmsted and Winona Counties and dissipated over Wisconsin. Just before this storm developed temperatures soared to near the 80 degrees F mark with dewpoints in the 50s F. The tornado devastated the town of St Charles, MN, killing 7 people, and injuring another 30. Over 50 homes and businesses were damaged or destroyed by this funnel, which at one time was nearly a quarter of a mile wide.

October 4-5, 2005 brought an extremely rare flash flood event to east-central Minnesota counties. Storm totals that exceeded six inches were reported from observers in Dakota, Benton, Mille Lacs, Isanti, Chisago, Kanebec, Pine, and Washington Counties. The single day rainfall at Wild River State Park of 6.61 inches on October 5th is an all-time daily record in Minnesota for the month of October. Rush City airport reported a storm total of 9.59 inches. This storm closed portions of Interstate 35E and I-494, as well as flooding numerous basements.

Word of the Week: Smart Buoys

These instrumented buoys are used by NOAA to monitor the aquatic environments of important ecosystems, including bays and river systems. The smart buoy collects weather, oceanographic, and water-quality observations, then transmit these data wirelessly in near-real time to scientists and researchers. New sensors also allow for tracking levels of nitrogen in the water. High levels of nutrients, including nitrogen, have a strong connection to deterioration of water quality, and contribute to low dissolved oxygen levels in waters that may create areas known as "dead zones" where biological systems cannot survive.

Outlook:

Cool and dry to start the weekend. Some overnight lows in the 20s F up north. Increasing cloudiness on Sunday with a chance for showers later in the day. Chance for showers Monday and early Tuesday as well with temperatures warming up. Next week will bring generally warmer temperatures but chances for showers as well.

Minnesota WeatherTalk for Friday, October 10, 2008

To: MPR's Morning Edition

From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk for Friday, October 10, 2008

Headlines:

- Jet Streaming podcast this week
- October starts cold, then turns wet
- Weekly Weather/Climate Related Potpourri
- Question on snowfalls when it's above freezing
- Almanac for October 10th
- Past weather features
- What's a dray?
- Outlook

Topic: Jet Streaming Podcast this week.....

The podcast this week is a composite of some "best of" segments recorded over the past year. Our guests include David Phillips, Senior Climatologist with Environment Canada. He talks about weather folklore, and validates some of those old sayings. Our second guest is Gavin Pretor-Pinney, the British founder of the Cloud Appreciation Society. Mr. Pinney has published two books on clouds and shares his fascination with them.

To listen to this podcast, please go to....

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Topic: Cold Start to October Gives Way to Moderation and Moisture

October began last week with numerous frosty mornings. International Falls reported a new record low on the 3rd with 20 degrees F, while Hibbing reported a near record 22 degrees F. Embarrass reported the lowest temperature in the contiguous 48 states on both October 3rd (18 degrees F) and October 5th (19 degrees F). Following the cold start to the month, temperatures moderated and a series of low pressure systems brought some much needed rainfall to the state. Over the 5th and 6th Moorhead reported 1.11", Park Rapids 1.85", Alexandria 1.32", Milan 1.12", Ottertail 2.12", Aitkin 1.14", Hinckley 1.48", Mora 1.49", Redwood Falls 1.08", and Marshall 1.79 inches. Then over the 7th and 8th even more widespread heavy amounts of rainfall were reported, including:

Cass Lake 1.47" Grand Portage 1.44" Glenwood 1.74" Milan 1.70" Madison 2.00" Morris 1.39"

Wadena 2.18" Willmar 1.50" Redwood Falls 1.66" Worthington 1.76" Vesta 1.54" Grand Meadow 1.86"
Rochester 1.62" Lake City 1.38" Theilman 1.85" Zumbrota 1.24" Austin 1.32" Lakefield 1.23"

Since many of these locations had recorded a dry September, these rainfall amounts were needed and welcomed. The amount of 1.62 inches at Rochester was a record for October 7th, as was the case at Wadena, Madison, and Grand Meadow. Total rainfall through the first 10 days of October exceeds 2 inches in many locations. Some observers have already exceeded the average rainfall for the entire month, most notably Milan with 2.82 inches, Ottertail with 2.89 inches and Wadena with 2.99 inches. The wetter than normal weather pattern is expected to persist through mid month, thus the harvest of corn and soybeans may be slowed for a time.

Weekly Weather/Climate Related Potpourri:

Researchers from the University of Georgia have developed a new model to forecast Clear Air Turbulence (CAT) for pilots. Their method involves a better fix on gravity waves in the atmosphere that are generated spontaneously at jet stream levels. Testing of this method by airline meteorologists will likely be the next step in implementing a new CAT forecast.

A strong storm system brought high winds and heavy rainfall to New Zealand this week. Winds up to 80 mph were reported in Wellington, damaging some homes and bringing down power lines and trees. On the South Island snowfalls up to 8 inches were reported in the higher topography.

Hurricane Norbert spinning in the eastern Pacific Ocean off the coast of Mexico may bring rainfall to southern California and the desert southwest this weekend. Norbert is the 14th named storm of the season in the Eastern Pacific.

Researchers at the University of Alaska this week reported finding larger concentrations of soil organic matter within permafrost layers than was previously thought. Their samples indicate that in a warming climate, as permafrost thaws and the carbon stored in those soils may be released as carbon dioxide, methane and other greenhouse gases. The release of this carbon into the atmosphere may further exacerbate the pace of climate change in the arctic regions.

MPR listener question: What is the highest air temperature that has still produced a snowfall? Can it be in the 40s F?

Answer: Depending on the height of the freezing level, the depth of the cloud layer, and a number of other features snowfall has been observed many times when the air temperature near the ground is above freezing in Minnesota. I have found reports of snowfall when the air temperature was as high as 47 degrees F. Even in the Twin Cities area with the urban heat island snowfall has been observed with temperatures in the 40s F. More often than not, these observations come at the beginning of the snow season (Sept, Oct) or near the end of the snow season (Apr, May).

Almanac for October 10th:

The average MSP high temperature for this date is 62 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 42 degrees F (plus or minus 9 degrees F standard deviation).

MSP local Records for October 10th:

MSP weather records for this date include: highest daily maximum temperature of 90 degrees F in 1928; lowest daily maximum temperature of 38 degrees F in 1906; lowest daily minimum temperature of 25 degrees F in 1964 and 1987; highest daily minimum temperature of 63 F in 1930. Record precipitation for this date is 1.89 inches in 1898. Record snowfall is 2.5 inches in 1977.

Average dew point for October 10th is 41 degrees F, with a maximum of 67 degrees F in 1949 and a minimum of 16 degrees F in 1932.

All-time state records for October 10th:

The all-time state record high temperature for this date is 93 degrees F at Tracy (Lyon County) in 1928. The all-time state record low temperature for this date is 6 degrees F at Big Falls (Koochiching County) in 1932. The all-time state record precipitation for this date is 6.13 inches at Vesta (Redwood County) in 1973. State record snowfall for this date is 10.0 inches at Oklee (Red Lake County) in 1970.

Past Weather Features:

October 12, 1918 brought one of the worst fire episodes in Minnesota history to the Cloquet area. Portions of northeastern Minnesota had suffered through drought during the summer months and September brought little relief. By October 1st many small fires started and continued to smolder across the landscape. On October 12th a strong low pressure system tracked across southern Canada and brought winds of 25 to 40 mph. These winds fanned the small fires into raging infernos that burned more than 2000 square miles of forest. In today's jargon this would be called "an explosive fire day." Between 500-600 people lost their lives and thousands were left homeless.

October 10, 1949 brought one of the worst wind storms to Minnesota. Most of the southern and northeastern areas of the state saw a great deal of damage to farm buildings, water towers, airport hangars, power lines, and trees. Even some drive-in movie theatre screens were blown down. Four people were killed and 81 injured by this storm. Winds gusted to 89 mph in the Twin Cities, 76 mph at Duluth Airport, and 100 mph at Rochester. Fortunately the storm brought modest amounts of rainfall to most areas, although both Argyle and Crookston in NW Minnesota reported 2.50 inches of rain from this storm.

October 8-10, 1970 brought heavy snowfall to portions of western and northern Minnesota. Oklee reported a total of 14 inches, Kelliher 10 inches, Fosston 9 inches, Itasca State Park 8 inches, Ottertail 8 inches, Thorhult 8 inches, Wadena 7.9 inches, and Slayton 7.5 inches, all record amounts for so early in the season.

Word of the Week: Dray

This is an old English term that was used in the logging industry to refer to a low, sideless sled or skid that would be used to haul harvested timber across frozen lakes or snow covered trails and roads in Minnesota. The horses used to pull these loads were called dray horses. Minnesota's 18th and 19th Century logging industry was very much built on harvested in the winter season when the ground was frozen and covered with snow. Heavy loads could more easily be supported and dragged across the landscape. The logs were either transported by booms along Minnesota's waterways or by railroad to get to the lumber mills.

Outlook:

Partly to mostly cloudy skies over the weekend with chances for rain in the west and north Saturday, spreading to much of the rest of the state for Sunday and Monday. Temperatures will be warmer than normal, especially in southern sections. It will be cooling down sharply by next Tuesday. There will be a drier period by mid-week.

Minnesota WeatherTalk for Friday, October 17, 2008

To: MPR's Morning Edition

From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk for Friday, October 17, 2008

Headlines:

- Jet Streaming podcast this week
- Wet October Continues
- Dramatic Temperature Swings
- New CPC seasonal outlook
- Lego League Climate Connections
- Weekly Weather/Climate Related Potpourri
- Question on elevation effects on frost
- Almanac for October 17th
- Past weather features
- Omega High
- Outlook

Topic: Jet Streaming Podcast this week.....

The podcast this week includes two very interesting guests. First we speak with Jean Bergerson of the Minnesota Interagency Fire Center. She tells us about the fire season so far, weather impacts, and some recent developments in fire fighting. Our second guest is Karen Filloon, meteorologist and gardening expert. Karen highlights the many things we should be paying attention to during the fall season, including lawn care, watering, and composting. And don't forget it is a good time of year to update yourself on yard and garden care at the Extension Gardening Information web site....

<http://www.extension.umn.edu/gardeninfo/>

Cathy Wurzer, Craig Edwards and I also discuss current weather happenings around the USA and highlight a fire weather web site.....To listen to this podcast, please go to....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: Wet October Continues....

Additional rainfall since last Friday has helped recharge soil moisture. University of Minnesota Research and Outreach Centers at both Lamberton and Waseca had reported earlier this month

significantly depleted soil moisture values. They showed that stored soil moisture was less than 4 inches to the 5 foot depth in the root zone, much below normal for this time of year. Thankfully much of the October rainfall so far has gone into soil storage.

Some locations have already reported October rainfall totals that rank in the top five historically. These include the following locations:

Itasca State Park 5.06 inches

Staples 5.45 inches

Crookston 4.44 inches

Fergus Falls 4.55 inches

Tamarac Wildlife Refuge 4.42 inches

Park Rapids 5.08 inches

Wadena 4.16 inches

Such high rainfall totals across the state follow a trend in October weather that has been in place for a number of years. Since 1990 October rainfall has been significantly above normal in 12 of 18 years on a statewide basis. In addition, the fall season (Sep-Nov) has shown the same trend in wetness, with 16 of the last 18 years showing normal or above normal precipitation statewide. In this context the state's crop producers have seen stored soil moisture conditions work to their benefit the majority of the time.

Topic: Dramatic Temperature Swings Over October 12-14

Sunday afternoon (October 12) brought strong south winds, warm temperatures and high dewpoints to the state. Dewpoints reached near record levels into the low 60s F all the way up to the Canadian border. Combined with temperatures in the high 70s to low 80s F it felt more like August than October. The high dewpoints and cloud cover kept overnight minimum temperatures high and several locations set records for the warmest minimum temperature. On the 12th these communities included New Ulm with 62 degrees F and Rochester with 61 degrees F (tying their record). On the 13th even more communities reported record high minimum temperature values, including Mankato with 65 degrees F, Albert Lea with 63 degrees F, and Waseca with 64 degrees F. A cold front swept across the state and dramatically reduced the temperatures by Monday night as most observers reported nighttime values close to freezing (32 degrees F). At MSP airport on Monday the temperature dropped from 69 degrees F at 7:00 am in the morning to 48 degrees F by 1:30 pm in the afternoon, running counter to the daily heating cycle.

Topic: New Seasonal Outlook Released

The NOAA Climate Prediction Center released a new seasonal climate outlook on Thursday, October 16th. This outlook covers the period from November through January. For the Great Lake region, including Minnesota, the temperature outlook favors above normal temperatures for this period. This pattern has been a strong trend over the past two decades in our region. Their outlook for precipitation calls for equal chances of above or below normal values.

Topic: Lego League-Climate Connections

I mentioned the NOAA program on Climate Literacy some weeks ago on Morning Edition. This is a national program to educate adults on climate science and the impacts of climate change. For young students the Lego League has taken on this issue through Climate Connections. I had the chance to meet with many young students this week, including several from Groveland School in St Paul, as well as groups of students visiting the University of Minnesota. Fundamentally, why should adults and students invest time to learn about climate change? The simplest answer I can think of

Climate change affects things that we care about including forests, lakes, rivers, water, food, people, and animals. Climate change is real and at least partially caused by humans. We can take steps to adapt to climate change or mitigate it. The more we discuss the topic the closer we will come to taking these actions.

Weekly Weather/Climate Related Potpourri:

Researchers from James Cook University in Australia estimate that the geographic range of kangaroos may be shrunk by as much as 48 percent if their continent warms by as much as degrees C this century. Like the recent studies on polar bears, this research substantiates the hypothesis that climate change will pose a risk to these mammals as well. The study is published in an issue of Physiological and Biochemical Zoology.

Omar, the 15th named storm of the North Atlantic hurricane season formed this week. It strengthened enough on Tuesday and Wednesday to become the 7th hurricane of the season. Fortunately forecasts project a path that will keep it well out to sea throughout its life cycle.

NOAA announced this week the activation of its 1000th NOAA Weather Radio transmitter nationwide. This one is located in Nenana, in central Alaska and was done using a partnership grant from USDA. NOAA Weather Radio now reaches close to 95 percent of the US population thanks to a large expansion in the network that has occurred since the 1990s. There are dozens of NOAA Weather Radio transmitters in Minnesota that cover most of the state, and you can even listen to NOAA Weather Radio on the internet now at.....

<http://www.nws.noaa.gov/nwr/streamaudio.htm>

MPR listener question: At least three listeners have written to me in recent weeks about the effect of elevation on frost in Minnesota. Many locations have observed a frost this fall, while several others have not yet seen one. Does elevation have anything to do with this?

Answer: Elevation may play a part in this, but it is not the only factor that results in frost for one community and not another. Thanks to Greg Spoden, a series of maps showing the lowest temperatures observed this fall around the state is available at the State Climatology web site...

<http://climate.umn.edu/doc/irrigation/mintemp.htm>

The extent of overnight cloud cover has been important in discriminating who has had frost this fall. In addition some areas have seen more wind (mixing of air) than others. There is also an

influence of soil heat storage (depending on soil type) and other factors such as urban heat islands.

Frost pockets, low spots in the landscape usually see frost last in the spring and first in the fall, as the still nighttime air settles there. Temperatures can vary by several degrees in the settled overnight air as the layers do not mix. But in some areas of the state higher elevation probably has an effect on overnight low temperatures as well. For example in southwestern Minnesota Pipestone sits at 1705 feet mean elevation while Redwood Falls sits at 1025 feet, about a 700 foot difference in elevation. The standard dry adiabatic lapse rate (temperature drop with elevation) is about 5.5 degrees F per thousand feet. So with this difference in elevation we might expect to see some effect. Indeed, the average last freeze (28 degrees F) date at Pipestone in the spring is about two weeks later than Redwood Falls, and the average first freeze in the fall is about a week earlier. So far this fall, Pipestone has recorded a low of 30 degrees F, while Redwood Falls has recorded a low of 37 degrees F. At least some of this disparity in low temperature is likely due to elevation.

Almanac for October 17th:

The average MSP high temperature for this date is 60 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 41 degrees F (plus or minus 9 degrees F standard deviation).

MSP local Records for October 17th:

MSP weather records for this date include: highest daily maximum temperature of 84 degrees F in 1910; lowest daily maximum temperature of 33 degrees F in 1880 and 1930; lowest daily minimum temperature of 22 degrees F in 1948 and 1952; highest daily minimum temperature of 62 F in 1910 and 1953. Record precipitation for this date is 1.24 inches in 1879. Record snowfall is a trace in 1990.

Average dew point for October 17th is 38 degrees F, with a maximum of 66 degrees F in 1994 and a minimum of 8 degrees F in 1948.

All-time state records for October 17th:

The all-time state record high temperature for this date is 90 degrees F at Beardsley, Campbell, Long Prairie, and Moorhead in 1910. The all-time state record low temperature for this date is 2 degrees F at Bemidji (Beltrami County) and Cass Lake (Cass County) in 1952. The all-time state record precipitation for this date is 4.02 inches at Georgetown (Clay County) in 1971. State record snowfall for this date is 7.0 inches at Cook (St Louis County) and Gunflint Lake (Cook County) in 1990.

Past Weather Features:

October 15-17, 1880, brought one of Minnesota's most famous winter storms and earliest blizzards. Thus began "The Long Winter" that Laura Ingalls Wilder wrote about (1880-1881).

Southwestern Minnesota, northwestern Iowa, and southeastern South Dakota were severely impacted by this blizzard. It started out as a heavy rain, with hail, about 5:00 pm in the evening on October 15th. Overnight the rain turned to snow and began to blow into enormous drifts. It snowed all day on the 16th and ended on the morning of the 17th. In the New Ulm area about 15 inches of snow fell, but the strong NW winds blew this into 15 to 20 foot drifts, closing down the railroads. This was just the first of several winter storms that isolated many pioneer families on their farms until the next April. St Paul reported 35 inches of snowfall by Christmas, and the first three months of 1881 brought another 75 inches of snowfall. There was little respite from snow until mid-April of 1881, when all the snow melted and it flooded the Minnesota landscape.

Following a fresh snowfall of a few inches over the 15th and 16th of October 1952, the temperatures in northern Minnesota fell to as low as 2 degrees F at both Bemidji and Cass Lake. But Mother Nature was just fooling around. She put the brakes on winter and within a day the temperatures warmed into the 40s and 50s F, with many daytime readings in the 60s F during the rest of October 1952.

October of 1999 brought some unusually dry weather to Minnesota. Many observers reported less than 1 inch of rainfall for the month and during some afternoons the humidity fell to desert-like values. For example on October 25, 1999 the afternoon relative humidity was very close to that of Tucson, AZ, as evidenced by the following afternoon readings:

MSP temperature 65 F dewpoint 11 F Relative Humidity 12 percent

Rosemount temperature 64 F dewpoint 4 F Relative Humidity 9 percent

Faribault temperature 64 F dewpoint 9 F Relative Humidity 7 percent

Princeton temperature 63 F dewpoint -6 F Relative Humidity 6 percent

Litchfield temperature 62 F dewpoint 0 F Relative Humidity 8 percent

Tucson, AZ temperature 88 F dewpoint 16 F Relative Humidity 6 percent

Word of the Week: Omega High

An omega high is a ridge of high pressure which disrupts the normal westerly flow pattern across North America. On a surface or upper air map of the pressure pattern it shows up as a feature which looks like the Greek letter omega. Persistent dry, fair weather under the high pressure ridge is often the case, lingering for days or sometimes week on end. This feature is also called a blocking high, because it prevents the normal progression of weather systems and fronts from west to east. Omega highs are more prevalent in the spring, summer, and fall than they are during the winter months.

Outlook:

Warmer on Saturday and Sunday with increasing cloudiness and a chance for showers late on Sunday. Continued chance for showers Sunday night and Monday, mostly central and north. Cooler with another chance for showers by Wednesday and Thursday next week.

Minnesota WeatherTalk for Friday, October 24, 2008

To: MPR's Morning Edition

From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk for Friday, October 24, 2008

Headlines:

- Jet Streaming podcast this week
- Rain and snow this week
- New Weather Service newsletter available
- Weekly Weather/Climate Related Potpourri
- Question on 2008 tornadoes
- Almanac for October 24th
- Past weather features
- Stormdefender
- Outlook

Topic: Jet Streaming Podcast this week.....

The podcast this week is a repeat of an earlier episode hosted by Cathy Wurzer. First is a conversation about getting ready for winter, including winterizing the cabin up north. The second part of the program is an interview with NASA scientist Dr. James Hansen of the Goddard Institute for Space Studies. Dr. Hansen talks about trends in arctic climates and what some of the climate models project for the future. The web site of the week is about winter preparedness. To listen to this podcast, please go to....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: Rain and snow on October 22-23.....

A low pressure system tracking through Nebraska brought snow to that state this week, and a combination of rain and snow to Minnesota. Cold air aloft behind the storm front on Wednesday brought up to an inch of snowfall to Ivanhoe (Lincoln County) and Appleton (Swift County). The Milan observer reported 0.5 inches while snow was also reported at Canby, Alexandria, and Ortonville. Soil temperatures were still in the 40s F so the snow melted within hours.

The rainfall on October 22 and 23 was heaviest in western and southwestern counties of the state. New record daily record rainfall amounts were reported by a number of observers, including the following.....

Worthington 2.17" Pipestone 1.65" Springfield 1.40" Sioux Falls, SD 1.63" Milan 1.06" Ottertail 1.04"

St James 1.50" Madison 1.00" Lamberton 1.65" Marshall 1.40" Windom 1.63" Luverne 1.14"
Jackson 1.42" Lakefield 1.98" Olivia 1.04" Redwood Falls 1.25" on Oct 22 and 1.28" on Oct 23

The rainfall pattern so far this month has produced one of the wettest Octobers on record for some locations. The historical ranking of total October rainfall to date and associated ranking historically for selected observers includes:

5.67" at Park Rapids, 3rd wettest October

4.40" at Redwood Falls, 5th wettest October

4.54" at Worthington, 6th wettest October

4.46" at Ottertail, 6th wettest October

4.82" at Wadena, 7th wettest October

Topic: Twin Cities Forecaster Newsletter Arrives

The NOAA National Weather Service Forecast Office in Chanhassen, MN partnered with the NOAA North-Central River Forecast Office has initiated a brand new newsletter to be published seasonally. This first issue highlights some recent weather and flooding in the region, how winter precipitation is measured, and reviews of last winter, along with the Willmar tornado on July 11th this year. The inaugural fall issue is also packed with other great information and can be found on line at....

<http://www.crh.noaa.gov/images/mpx/Newsletter/Fall08.pdf>

Weekly Weather/Climate Related Potpourri:

In addition to western Minnesota, a number of other places recorded early snowfalls this week including Colorado, Nebraska, upstate New York, Pennsylvania, and parts of Ontario, Canada. Heavy wet snow and high winds combined to cause tree damage in O'Neill, NE.

Over the past 7-10 days parts of Central America have been inundated with intense tropical rainfall. Last week very heavy rainfalls, roughly the equivalent to the entire month of October, fell across parts of Costa Rica. These heavy rains caused flooding and landslides to occur, and rivers to burst their banks. The Meteorological Institute of Costa Rica reported that the city of San Jose had not seen rainfall that intense since 1944. Similarly intense rainfall over several days brought flooding to Honduras and widespread crop damage. Upwards of 12,000 people had to be evacuated from their homes and 13 deaths were blamed on the heavy rains.

The High Plains Climate Center in Nebraska announced last week that Lake McConaughy, the largest lake in the state appears to be consistently recovering from its low water mark of 2006 when it was only at 27.5 percent capacity. Recent data on the water level of the lake suggest that it has risen to 35.5 percent of capacity, a rise of 8.6 feet over the past 12 months. This is good news for those who use the lake for recreation.

NOAA scientists and researchers from the University of North Carolina will use the new Aquarius Reef Base off the Florida Keys to study the effect of ocean acidification on coral reef ecosystems. This working laboratory lies 60 feet below the ocean surface and allows researchers to remain submerged on the sea floor to study the water chemistry. More information is available at the NOAA web site....

http://beta.w1.noaanews.noaa.gov/stories2008/20081014_aquarius.html

A Russian cargo ship (the Mekahnik Semakov) broke down in the Minch of Skye off the northwest of Scotland on Wednesday this week and was being battered by strong winds and high seas. After sending out an SOS, it was intercepted by the Coastguard Agency's Anglian Prince and towed to safety in the Hebrides. The ship was carrying a load of timber.

MPR listener question: Earlier in the year you reported that the frequency of tornadoes was on a record setting pace nationwide. Is this still the case?

Answer: It has quieted down considerably since September. In fact there have been only 24 preliminary reports of tornadoes nationwide so far in October. The total number for the year so far is over 1600, but the final verified numbers reported by the NOAA Storm Prediction Center are likely to be lower. If the number of nationwide tornadoes in November and December is close to the historical average, we will likely not break the record of 1817 tornadoes reported in 2004. I might add that the number reported in Minnesota this year was close to average, with 35 reports.

Almanac for October 24th:

The average MSP high temperature for this date is 55 degrees F (plus or minus 10 degrees F standard deviation), while the average low is 36 degrees F (plus or minus 8 degrees F standard deviation).

MSP local Records for October 24th:

MSP weather records for this date include: highest daily maximum temperature of 80 degrees F in 1989; lowest daily maximum temperature of 33 degrees F in 1887; lowest daily minimum temperature of 15 degrees F in 1887; highest daily minimum temperature of 59 F in 2000. Record precipitation for this date is 1.00 inches in 1899. Record snowfall is 0.9 inches in 1981.

Average dew point for October 24th is 35 degrees F, with a maximum of 62 degrees F in 2000 and a minimum of 11 degrees F in 1960.

All-time state records for October 24th:

The all-time state record high temperature for this date is 88 degrees F at Fairmont (Martin County) in 1891. The all-time state record low temperature for this date is -5 degrees F at Isabella (Lake County) in 1976. The all-time state record precipitation for this date is 2.65 inches

at Faribault (Rice County) in 1899. State record snowfall for this date is 12.0 inches at Itasca State Park (Clearwater County) in 1919.

Past Weather Features:

One of the warmest spells of October weather was observed at Ft Snelling back in 1830. The average daily high temperature that month was nearly 64 degrees, and during the last week of the month the daytime highs were in the 80s F. The lowest temperatures reported from the Fort on October 25 and 26 were 62 and 64 degrees F, respectively, still to this day all-time warm minimum temperatures for those dates.

October of 1919 was one of the snowiest in history. Many observers reported heavy snow over October 24 and 25. Monthly totals for snowfall exceeded 10 inches at a number of locations, including Itasca State Park with 14.5", Leech Lake with 15.4", Meadowlands with 10.0", Pokegama Lake and Winnibigoshish Lake with 12.0", and Park Rapids with 10.0 inches. This was a precursor to a very snowy November in 1919 as well.

The worst October tornado outbreak in Minnesota history was on the 26th in 1996, when 14 tornadoes were reported across western and central counties between 3:00 pm and 7:00 pm. Dewpoints spiked in the upper 50s to low 60s F during the afternoon just ahead of these storms, indicating a large quantity of latent energy in the atmosphere. The first tornado struck in Big Stone County about 3:00 pm and was on the ground for 1 mile. The last tornado struck near Brainerd (Crow Wind County) about 7:00 pm and was on the ground for less than one mile. Five of the tornadoes were F-2 intensity (winds 113-157 mph). These tornadoes and some lesser ones caused some structural damages to homes, cottages, and farms in Swift, Stearns, Isanti, and Douglas Counties. October tornadoes are very rare in Minnesota, with a total of only 28 documented storms historically. The last October tornado was on the 29th, back in 2004 near Buckman in southern Morrison County.

Words of the Week: Storm Defender Cape

We discussed this garment for dogs back in 2003, but it might be worth mentioning again. An electrical engineer invented a garment that will ease the anxiety experienced by dogs when a thunderstorm approaches. Called the stormdefender, this garment is a cape that can be placed on the animal to remove the static charge from its fur, a charge that builds up with the approach of a storm and creates their anxiety in the first place. Apparently tests have been conducted on a variety of dogs with mixed results. Some dog behaviorists report pretty good success with it. The cape comes in various colors and sizes. More information can be found at the web site...

<http://www.stormdefender.com/>

Outlook:

Partly sunny and milder on Saturday, with a chance for showers in the north. Increasing cloudiness Saturday night into Sunday with strong winds and a chance for snow and rain showers. Winds will remain strong through early Monday with a continuing chance for widely

scattered snow showers. Much colder temperatures for Monday and Tuesday, then moderating temperatures with drier weather by mid-week.

Minnesota WeatherTalk for Friday, October 31, 2008

To: MPR's Morning Edition

From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk for Friday, October 31, 2008

Headlines:

- Jet Streaming podcast this week
- Climate Summary for October
- Annual Kuehnast Lecture
- 100 year anniversary of the Itasca Biology Station
- Weekly Weather/Climate Related Potpourri
- Question on biting wind
- Almanac for October 31st
- Past weather features
- Saltation
- Outlook

REMINDER: DON'T FORGET TO TURN BACK YOUR CLOCK 1 HOUR ON SATURDAY NIGHT...WE CAN ALL USE THE EXTRA SLEEP!

Topic: Jet Streaming Podcast this week.....

The podcast this week includes a conversation with Professor Larry Jacobs from the Humphrey Institute of Public Affairs at the University of Minnesota. Dr. Jacobs shares his thoughts on elections and Election Day weather impacts. In addition we talk to Tim Carter from AskTheBuilder.com about weatherizing the home for winter...what's important and how much cost savings might be realized. We also highlight another web site which helps prepare you for winter (www.weather.gov/om/winter). To listen to this podcast, please go to....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: Climate Summary for October, 2008

Most Minnesota observers reported an average October temperature that was close to normal (30-yr ave), perhaps 1 or 2 degrees F either side of it. The state high was 80 degrees F at Rochester and Winona on the 12th, while the state low was 14 degrees F at Embarrass on the 30th. In fact Embarrass reported the lowest temperature in the 48 contiguous states on four dates: October 3rd 18 degrees F, October 5th 19 degrees F, October 21st 15 degrees F, and October 30th 14 degrees F.

It was a wetter than normal month for most observers, especially in western and northern sections of the state where some reported monthly total of 3 to 5 inches. Most of the rainfall came in the first 3 weeks. The first snowfall of the season was reported by a number of observers. In the western counties Rothsay reported 2.5 inches of snow while Otter Tail reported 2.0 inches.

A strong wind storm occurred on the 26th with gusts reported from 50 to 60 mph and some scattered reports of wind damage.

Topic: 16th Annual Kuehnast Lecture on November 5, 2008

Next Wednesday, November 5th, 2008 we will host the 16th Annual Kuehnast Endowment Lecture on the St Paul Campus of the University of Minnesota. It will take place from 3:00 to 5:00 pm in Room 335 Borlaug Hall. This is a public lecture and all interested individuals are invited to attend. The lecture will be presented by Dr. Susan Solomon, atmospheric chemist at the National Oceanic and Atmospheric Administration's Earth System Research Laboratory (NOAA-ESRL) in Boulder, CO. In 2004 she received the prestigious Blue Planet Prize for "pioneering research identifying the causative mechanisms producing the Antarctic ozone hole." She also served as co-chair of Working Group 1 for the Intergovernmental Panel on Climate Change (IPCC) in 2007 and, consequently with her colleagues was awarded the Nobel Peace Prize (shared with Al Gore). Most recently she received NOAA's 2008 Distinguished Presidential Rank Award.

Dr. Solomon's presentation title and abstract are:

A World of Change: Climate Yesterday, Today, and Tomorrow.

Key evidence from the 2007 IPCC report points to causes of Earth's climate change. Changing attributes of climate and their relationship with greenhouse gases will be discussed, along with their associated time scales. There are numerous impacts of climate change that are anticipated and worthy of public discussion, as they pose a challenge for current societies as well as multiple generations of future citizens.

Topic: Centennial of the University of Minnesota Itasca Biology Station

A summer training program for forestry students was established at Lake Itasca in 1909. Boasting a diversity of vegetation, soils, and wildlife it was an ideal setting. Hundreds of students and many outstanding research scientists took their training at the Itasca Biology station. During 2009 there will be a centennial celebration of this valuable research and training facility. Since its establishment in 1909 Itasca has built one of the best long-term daily climate records in northern Minnesota, and certainly the best in Clearwater County. All-time records there include: 105 degrees F on July 28, 1917 and July 12, 1936; -50 degrees F or colder in 1922, 1933, 1936, and 1996 (-52 F on Feb 1st); Thunderstorm rainfall of 5 inches or greater in 1957 and 2002; snowfall of 110 inches in 1965-1966; and a snow depth of nearly 4 feet in March of 1966. The station lives on today as a living laboratory with new investments by the university to upgrade and add facilities for students and faculty researchers.

Topic: Weekly Weather/Climate Related Potpourri:

Todd Krause of the National Weather Service Office in Chanhassen, MN has provided a summary of tornado activity in Minnesota during 2008. In the absence of any further tornado activity in November and December (highly unlikely), these will probably be the final numbers for 2008. He reports 43 tornadoes in Minnesota during the year, including 3 EF-3 (winds 136-165) storms: one struck Hugo on May 25; one struck Emmaville, between Dorset and Park Rapids on June 6; and one struck near Kandiyohi on July 11. The majority of Minnesota tornadoes (23) were EF-0 (winds less than 86 mph). In all 23 injuries and one death were attributed to these tornadoes.

For the second time this month Morocco was hit by devastating flash floods, inundating roads, villages, and killing 28 people. These rain storms were the worst in years for many parts of the country, with hundreds of displaced from their homes. Rains were expected to continue there into the weekend.

An early winter storm hit the northeastern states earlier this week, with snow, rain, and high winds. Thousands were without power in NJ and NY, and portions of PA. Higher elevations received significant snow, and some schools were dismissed early. This storm disrupted the World Series as well, causing a nearly 48 hr postponement of game 5.

For those who like to keep the pulse of the Earth's climate system on a weekly basis, there is a valuable web site that highlights the major events of each week. You can find this by a google search using the keyword "Earthweek" or go to

<http://www.earthweek.com/Earthweek.pdf>

Recent research from the Hadley Centre and Walker Institute for Climate System Research reveals that increasing salinity of the sub-tropical Atlantic Ocean basin is likely the result of decreased precipitation and runoff from the land surface and increased evaporation, both at least partially affected by human activity in the sub-tropical latitudes. More on this topic can be found at...

<http://www.metoffice.gov.uk/corporate/pressoffice/2008/pr20081024a.html>

MPR listener question: This one comes from a listener to the podcast "Jet Streaming." What gives wind a bite? As when we say the wind has a real bite to it today....

Answer: It can be a number of things, but chiefly humidity or the lack of moisture in the air. When the dewpoint is low, both moisture and heat are taken away from the human body at a faster rate. So the wind has a penetrating effect as you lose heat more rapidly.

Almanac for October 31st:

The average MSP high temperature for this date is 53 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 35 degrees F (plus or minus 8 degrees F standard deviation).

MSP local Records for October 31st:

MSP weather records for this date include: highest daily maximum temperature of 83 degrees F in 1950; lowest daily maximum temperature of 26 degrees F in 1873; lowest daily minimum temperature of 15 degrees F in 1878; highest daily minimum temperature of 57 F in 1933. Record precipitation for this date is 0.85 inches in 1991. Record snowfall is 8.2 inches in 1991 (Halloween Blizzard).

Average dew point for October 31st is 34 degrees F, with a maximum of 60 degrees F in 1974 and a minimum of 4 degrees F in 1996.

All-time state records for October 31st:

The all-time state record high temperature for this date is 86 degrees F at Worthington (Nobles County) in 1950. The all-time state record low temperature for this date is -4 degrees F at Hallock (Kittson County) in 1913. The all-time state record precipitation for this date is 4.12 inches at Luverne (Rock County) in 1979. State record snowfall for this date is 8.5 inches at New Hope (Hennepin County) in 1991.

Past Weather Features:

Summer revisited Minnesota for Halloween of 1950. Temperatures reached the mid-80s F with Worthington reporting a high of 86 degrees F, while Winona, Pipestone, and Farmington reached 85 degrees F. In all over 20 Minnesota communities reached the 80 F mark or higher. Even far northern cities, like Warroad broke the 70 degrees F mark. The last few days of the month were all exceptionally warm and dry which increased the fire danger and many grass fires were reported around the state. Canby reached 90 degrees F on the 30th the latest in the fall season that a temperature reading that high has ever been observed.

For many Minnesotans the most memorable Halloween was that of 1991 when a blizzard started and began to paralyze the state well into the first two days of November. At least 30 communities reported a snowfall of 20 inches or more from this storm, including a record 28.4 inches in the Twin Cities, and 36.9 inches at Duluth. A 180-mile stretch of Interstate 90 was closed as winds up to 60 mph produced snow drifts of 10 feet or higher. Snowfall intensity at times was equivalent to 2 inches per hour during the storm.

Word of the Week: Saltation

Wind causes various visible types of motion. Two of the most conspicuous in the rural landscape are soil erosion (in extreme cases dust storms and sandstorms) and the drifting of snow. The movement of soil particles or snow across the landscape is often described as rolling, tumbling, drifting, or even creeping, especially when it is continually in motion by a constant wind.

Occasionally, this motion is observed to be a series of leaps or jumps which only occur with strong gusts of wind. This type of motion is called saltation, taken from the Latin "saltare", meaning to dance. So in essence when we use this term we are describing dancing soil or dancing snow.

Outlook:

Nice fall weekend coming up...generally dry with relatively mild temperatures. Increasing cloudiness on Monday with a chance for rain later in the day. Cooler on Election Day and a chance for rain, even thunderstorms through Wednesday. Then cooling down for Thursday and Friday next week.

Minnesota WeatherTalk for Friday, November 7, 2008

To: MPR's Morning Edition

From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk for Friday, November 7, 2008

Headlines:

- Jet Streaming podcast this week
- Lecture at Dodge Nature Center next week
- Warm start to November, then taste of winter
- Weekly Weather/Climate Related Potpourri
- Question on analogies to early November weather
- Almanac for November 7th
- Past weather features
- Buys-Ballot law
- Outlook

Topic: Jet Streaming Podcast this week.....

The podcast this week includes a conversation with Dr. Susan Solomon of the NOAA Earth Systems Research Laboratory in Boulder, CO. She was a co-chair of the Working Group I for the Intergovernmental Panel on Climate Change from 2002-2008 and along with her colleagues on the IPCC and Al Gore was awarded the 2007 Nobel Peace Prize. Dr. Solomon shares her research perspectives on climate change in the context of the sea change in political leadership, and recent research findings. Cathy, Craig and Mark also share some listener feedback, along with the web site of the week, the local Twin Cities chapter of the American Meteorological Society. To listen to this podcast, please go to....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: Dodge Nature Center Program on November 11th....

For those interested in weather and climate matters I will be giving a free lecture on Minnesota's Changing Climate at the Dodge Nature Center in Saint Paul on Tuesday evening (7:00 pm), November 11th. This event is open to the public, but registration is encouraged. For more information go to...

<http://www.dodgenaturecenter.org/Activities/?activityId=49>

Topic: Warm start to November gives way to a taste of winter....

The first 5 days of November were extraordinarily warm, averaging 15 to 20 degrees F above normal in many locations. Numerous record high temperatures were reported around the state, including.....

on the 2nd: 72 degrees F at Cambridge (tied record from 1978), a near record 72 degrees F at Rochester and a near record 66 degrees F at Milaca and Aitkin

on the 3rd: 69 degrees F at Park Rapids (tied record from 1978), 66 degrees at International Falls (tied record from 1978), a record 73 degrees F at Gaylord, a record tying 74 degrees F at MSP, a record 78 degrees F at Redwood Falls, 75 F at La Crosse, WI (tied record from 1978, a record high of 75 degrees F at Rochester, and a record high of 77 degrees F at Winona.

on the 4th: a record 69 degrees F at Warroad, 74 degrees F at Jordan (tied record from 1978), 74 degrees F at Willmar (tied record of 1978), a new record high of 74 degrees F at Rochester, a new record high of 75 degrees F at La Crosse, WI, a new record high of 75 degrees F at Worthington, a new record 77 degrees F at Winnebago, and a new record 75 degrees F at Preston.

on the 5th: a record 74 degrees F at Mankato, a record 74 degrees F at Winnebago, a record 74 degrees F at Red Wing, and a record 74 degrees F at Zumbrota.

In addition over the course of the week, humidity increased across the state and moderated overnight low temperatures to the point that many observers also reported record warm overnight lows. For example, the Twin Cities reported a new record high minimum temperature for November 5th of 57 degrees F. Dewpoints rose throughout the week as well. The Twin Cities tied the record high dewpoint values for November 5th (55 degrees F) and November 6th (56 degrees F).

The influx of warm, moist air from the south during the first week of November was arguably the strongest since 1978. The latent moisture helped fuel thunderstorm development across portions of the state on Wednesday. Hail was reported in Kanabec and Renville Counties. In addition some record rainfall amounts occurred in places. Grand Forks, ND reported a record rainfall of 0.93 inches on November 5th. Also, International Falls reported a record 1.37 inches, LITTLEFORK a record 0.81 inches, Embarrass a record 0.76 inches, Mankato a record 0.87 inches, and a near record 1.05 inches at Albert Lea.

A strong low pressure system associated with this precipitation brought high winds to parts of Minnesota on Thursday, November 6th. Wind gusts from 50 to 63 mph caused some damages to buildings, downed or broken trees and broken telephone polls in some east-central counties. This system also brought snow to many sections of the state just in time for the deer hunting season slated to begin this weekend. By Friday morning 1 to 3 inches of snow had fallen across portions of southwestern and central Minnesota, with Marshall reporting over 4 inches.

Topic: Weekly Weather/Climate Related Potpourri:

Hurricane Paloma, the 16th named storm of the North Atlantic Hurricane season, formed this week off the east coast of Honduras and southwest of Jamaica. The storm was designated a class I hurricane on Friday morning with the potential to strengthen to class II before crossing Cuba over the weekend. It appears that it will track northeast away from the US coast after that time period.

The National Weather Service Office in Grand Forks reported this week that both Fargo, and University of North Dakota in Grand Forks report their wettest fall season (Sep-Nov) in history, and we still have over 3 weeks to go in November. UND has received 11.60 inches of rainfall since September 1, 2008, while Fargo (Hector Field) has received 10.57 inches. On the Minnesota side of the Red River, Moorhead reports their 2nd wettest fall season ever with 10.79 inches, but with 3 weeks to go, they may break the record of 11.23 inches set in 2000. No wonder farmers in the Red River Valley have been late in harvesting the soybean crop. Their soils have been saturated. Further to the north and east, Kabetogama has reported 11.65 inches of precipitation so far this fall, 2nd wettest historically.

Across South Dakota and North Dakota significant snowfalls were observed on Thursday and Friday of this week. Deadwood, located in the Black Hills of SD reported an incredible 45.7 inches, and the Pine Ridge Indian Reservation reported snow drifts up to 20 feet. Across ND snowfall reports ranged from 5 to 12 inches in many places.

Vietnam was hit with heavy rains and flooding over the past week. Since last Friday, Hanoi reports over 20 inches of rainfall. Tens of thousands of homes have been flooded, along with over 600,000 acres of cropland. Officials report over 80 deaths due to the flooding, the worst seen in 25 years.

A recent study by Northern Illinois University researchers reveals that nocturnal tornadoes (midnight to dawn) account for a much higher percentage of deaths across the country. Among all tornadoes studied from 1950 to 2005, only 27 percent occurred at night, but these accounted for 39 percent of all tornado fatalities. Nighttime tornadoes are most common in the states of the mid-south and pose real challenges for severe weather warning procedures. The best protection is likely to be a NOAA Weather Radio with a warning alarm system.

USDA ARS scientists reported this week that they will soon release advanced soybean breeding lines that carry low-wilting, or drought hardy traits. Under variable soil moisture conditions these new soybean lines show yield advantages that average 4 to 8 bushels/acre more than traditional genetic lines. This is good news for crop producers who have seen greater variability in growing season rainfall amounts in recent years.

MPR listener question: This week in the Twin Cities has reminded me of the first week of November in 1978. We were exceptionally warm and humid with temperatures in the 70s F, then the other shoe dropped and we saw cold and snowy weather dominate the rest of the month and for the balance of winter. Do you think that may happen again this year?

Answer: Weather people often look for historical patterns that are analogies to the current situation. I think you have found one for the first week of November, though there are others as

well. The high temperatures and elevated dewpoints we have experienced this week are giving way to colder temperatures, with mixed precipitation (rain and snow) for the weekend. But of equal importance the NWS models suggest a pattern of cooler and wetter conditions prevailing well past mid-month. Historical analogies to this pattern include 1978 (16.5 inches of snow for the month, and 68.4 inches for the season), 1975 (16.2 inches of snow for the month and 55 inches for the season), 1990 (5.0 inches of snow for the month and 44 inches for the season), and 2000 (10 inches of snow for the month and 75.8 inches for the season). So perhaps taking a cue from these historical analogies, snow lovers should be optimistic!

Almanac for November 7th:

The average MSP high temperature for this date is 46 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 30 degrees F (plus or minus 9 degrees F standard deviation).

MSP local Records for November 7th:

MSP weather records for this date include: highest daily maximum temperature of 72 degrees F in 1874; lowest daily maximum temperature of 15 degrees F in 1991; lowest daily minimum temperature of -6 degrees F in 1991; highest daily minimum temperature of 51 F in 1874. Record precipitation for this date is 1.67 inches in 1915. Record snowfall is 4.2 inches in 1947, and a record snow depth of 16 inches in 1991.

Average dew point for November 7th is 30 degrees F, with a maximum of 62 degrees F in 1915 and a minimum of -10 degrees F in 1991.

All-time state records for November 7th:

The all-time state record high temperature for this date is 78 degrees F at Montevideo (Chippewa County) in 1931. The all-time state record low temperature for this date is -20 degrees F at Redby (Beltrami County) in 1936. The all-time state record precipitation for this date is 2.30 inches at Garrison (Crow Wing County) in 1991. State record snowfall for this date is 14.0 inches at Marshall (Lyon County) in 1943 and at Virginia (St Louis County) in 1947.

Past Weather Features:

On November 7, 1874 summer conditions made a brief visit to the Twin Cities. After a very warm overnight low of 59 degrees F, the temperature rose to 72 degrees F and thunderstorms with strong winds (50 mph or greater) brought nearly 2/3 of an inch of rain to the area. It was short-lived, as one week later, temperatures were in the 20s F with 2 inches of snowfall.

November 7-11, 1913 brought a terrible storm to the Great Lakes. The Duluth Weather Office reported wind speeds up to 62 mph, but further east wind speeds were even higher, up to 74 mph, hurricane strength. Many ships on the Great Lakes were reported in peril, and two ships on Lake Superior were sunk by this storm, the Leaffield, with a loss of 18 crew members, and the Henry B. Smith, with the loss of 23 crew members.

On November 7, 1931 over 15 communities reported a daytime high of 70 degrees F or higher. This began a trend of above normal values that made that November one of the warmest in history.

Word of the Week: Buys-Ballot's Law

This empirical law in meteorology, sometimes called the baric wind law, relates the horizontal wind field to the atmospheric pressure pattern. It was formulated in 1857 by Christoph H.D. Buys Ballot (pronounced Bowis-Ball-ott), then head of the Dutch Meteorological Services. Basically the law states that with your back to the wind, the pressure to your left is lower than the pressure to your right. This law is based on the known wind fields which circulate around low pressure and high pressure systems in the northern hemisphere. It is exactly reversed in the southern hemisphere. In the absence of any weather forecast, you can at least ascertain the direction of low pressure, where frontal activity such as precipitation may be occurring. If you place your back to the wind and are facing north, then low pressure and frontal activity is to the west and likely to be passing your way in the future. Conversely, if you find that you are facing south with your back to the wind, then low pressure is to the east and active weather systems are probably already heading away from you.

Outlook:

Cold with chances for scattered snow showers on Saturday. Then drier Sunday and Monday (Veterans Day). Cold and dry should prevail until Thursday of next week when there will be another chance for snow.

Minnesota WeatherTalk for Friday, November 14, 2008

To: MPR's Morning Edition

From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk for Friday, November 14, 2008

Headlines:

- Jet Streaming podcast this week
- Snow and freezing rain
- Update on soil temperatures
- Weekly Weather/Climate Related Potpourri
- Question on earliest weather observations
- Almanac for November 14th
- Past weather features
- Robin Hood's wind
- Outlook

Topic: Jet Streaming Podcast this week.....

It is Winter Hazard's Awareness Week in Minnesota so appropriately our podcast guest this week is Kristine Chapin from the Minnesota Department of Public Safety. She shares her thoughts on the psychological shift to wintertime and the safety measures we should remember to protect ourselves and our families as we work, travel, and play in the winter environment. Their web site hosts a great deal of useful information on winter weather at.....<http://www.winterweather.state.mn.us/>

In addition, kids can find more reading and illustrative materials on winter weather at....<http://www.theweatherchannelkids.com/>

Cathy Wurzer, Craig Edwards and I also talk about recent weather headlines and expected Minnesota trends. To listen to the entire podcast online, please go to....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: Snow and freezing rain this week....

Following a very warm start to November, it has been much more winter-like over the past week. A number of observers reported freezing rain and snow. Freezing rain on Tuesday, November 11th produced a number of accidents across southern Minnesota counties. Some of the larger snowfall amounts over the past week included 6.2 inches at Redwood Falls, 5 inches at Mankato

and Winnebago, 4.4 inches at Madison, and 4 inches at Milan. No record setting cold temperatures around the state this week, although overnight lows have been mitigated by cloud cover.

Topic: Update on fall soil temperatures.....

With the recent run of cooler than normal days across Minnesota, absence of sunshine, and freezing rain and snow, soil temperatures have significantly declined this week. At the 4 inch depth the mean soil temperatures are mostly in the mid 30s F range. Though rare in history, soils can freeze up in mid-November. However it appears that the cooler than normal temperature pattern across the state may reverse itself by the 20th, so I suspect some continued moderation in soil temperatures ranging through the 30s F but not below the freezing mark. For historical reference, listed below are the current 4 inch depth soil temperatures at selected locations, along with the mean date of soil freeze up, and the earliest historical date of soil freeze up since 1971.

Location of up	Ave 4" soil temp as of 11/13/08	Mean date of soil freeze up	Earliest date of soil freeze up
Becker	36 F	11/27	11/11
Morris	34 F	11/24	11/7
Staples	35 F	11/24	11/6
Crookston	36 F	11/28	11/10
Lamberton	37 F	12/4	11/10
Waseca	35 F	12/2	11/11
Rosemount	39 F	12/6	11/9
St Paul	35 F	12/6	11/7

Topic: Weekly Weather/Climate Related Potpourri:

A study conducted by researchers at the University of Georgia and Emory University found a 3 percent rise in patients with asthma problems on the day after a thunderstorm. This study was conducted in the Atlanta, GA area over a 12 year period from 1993 to 2004 and included 20 counties and over 10 million emergency room visits. Researchers concluded that asthma related hospitalizations increase after thunderstorms because pollen grains rupture when they take in rainwater and then release allergens that are scattered by the winds the usually follow. This was reported in the online medical journal Thorax.

A study release out of Iowa State University recently shows that a number of turtle species are nesting earlier in the year as a result of a warming temperature trend. Dr Fred Janzen at ISU reports that turtle nesting is occurring from 10 days to 3 weeks earlier in species that included mud turtles, sliders, snapping turtles, and painted turtles from South Carolina, Nebraska, and along the Mississippi River.

Hurricane Paloma, briefly a Category 4 storm (winds 131-155 mph), struck Cuba last weekend producing enormous damage and displacing hundreds of thousands of residents from their homes. It was the 16th named storm and 8th hurricane of the North Atlantic Hurricane Season. In addition, 2008 is the only year that has featured a major hurricane in every month from July

through November in the North Atlantic (Bertha, Gustav, Ike, Omar, and Paloma). Recent revisions of the damage estimates from Hurricane Ike now exceed \$25 billion.

Drought in southern California has become so prolonged and severe that the city of San Diego is considering very serious water restrictions on businesses and residents. These restrictions include bans on car washing, ornamental fountains, and strict outdoor watering schedules. There is also consideration of a property to property water budget model that imposes higher water rates on those who go over their limits. San Diego Weather Service Office reports only about 57 percent of normal rainfall so far this year.

MPR listener question: I read that the birth of the National Weather Service dates to 1870 when it was administrated through the U.S. Army Signal Corps. But, weren't there weather observational networks in place around the country before this date?

Answer: There were weather observations made in this country prior to 1870, but not many as part of standardized networks. From the work of weather historian David Ludlum and others the earliest weather records in the United States are from individual diaries. The earliest known weather diary dates back to 1644 and was kept by the Chaplain (John Campanius Holm) of a Swedish colony in what is now Wilmington, Delaware. Among other early American weather observers who kept diaries, one finds the names of Benjamin Franklin, George Washington, and Thomas Jefferson, the last of whom kept a continuous record from 1776 to his death on July 4, 1826. The first attempt at an organized network was in 1814 when the government issued an order for the U.S. Army medical corps to collect weather data at forts and barracks around the country. In 1847 the Smithsonian Institution began a limited network of weather observations as well. But an attempt at a coordinated national network, including all of the states, was not tried until 1870 when the U.S. Army Signal Corps began a program which evolved into the National Weather Service.

Almanac for November 14th:

The average MSP high temperature for this date is 41 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 26 degrees F (plus or minus 10 degrees F standard deviation).

MSP local Records for November 14th:

MSP weather records for this date include: highest daily maximum temperature of 71 degrees F in 1990; lowest daily maximum temperature of 12 degrees F in 1940; lowest daily minimum temperature of 0 degrees F in 1919; highest daily minimum temperature of 52 F in 2001. Record precipitation for this date is 0.80 inches in 1926. Record snowfall is 2.5 inches in 1951, and a record snow depth of 8 inches in 1991.

Average dew point for November 14th is 26 degrees F, with a maximum of 58 degrees F in 2001 and a minimum of -2 degrees F in 1959.

All-time state records for November 14th:

The all-time state record high temperature for this date is 81 degrees F at St James (Watonwan County) in 1999. The all-time state record low temperature for this date is -23 degrees F at Warroad (Roseau County) in 1911. The all-time state record precipitation for this date is 2.05 inches at Mankato (Blue Earth County) in 1951. State record snowfall for this date is 14.0 inches at Moorhead (Clay County) in 1909.

Past Weather Features:

About 9:35 pm, well after dark, on November 16, 1931 an F-2 tornado (113-157 mph) passed 5 miles across Hennepin County near Maple Plain. The storm destroyed a number of farm buildings in the area, but did not inflict any injuries. This is the latest date on the fall calendar that a tornado has ever been documented in Minnesota. The day was very warm with temperatures from 65 to 70 degrees F and dewpoints in the 50s F. As a result many observers reported unusual November thunderstorms that evening, some with heavy rain.

November 13-14, 1999 brought a record-setting warm spell to Minnesota. At least six communities hit the 80 degrees F mark across southern Minnesota, and many local golf courses were opened to hackers who had already put away their clubs for the winter. Two years later, 2001, the same thing happened as daytime temperatures ranged into the 60s and 70s F, allowing many Minnesota golfers to play a final round late in the fall season. In fact 2001 brought the warmest statewide November temperatures in history.

Word of the Week: Robin Hood's wind

This is a term used to describe a raw and penetrating wind which usually occurs in saturated air with temperatures at or below freezing. Derivation of the term comes from the fact that this wind robs the heat from even the best dressed (rich) people, much like the legendary Robin Hood robbed from the rich to give to the poor. Western Minnesota residents will feel Robin Hood's wind this weekend.

Outlook:

Generally cold weekend coming up with chances for snow early Saturday in eastern sections, then again in the northeastern sections later on Sunday. Winds will be brisk in western sections. Dry and cool early next week with a chance for snow showers by Wednesday and Thursday, along with milder temperatures.

Minnesota WeatherTalk for Friday, November 21, 2008

To: MPR's Morning Edition

From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk for Friday, November 21, 2008

Headlines:

- Jet Streaming podcast this week
- Coldest temperatures of the season
- Freezing soils
- Winter season outlook update
- Thought provoking art exhibit
- Weekly Weather/Climate Related Potpourri
- Question on Thanksgiving snow in the Twin Cities
- Almanac for November 21st
- Past weather features
- Hythergraph
- Outlook

Topic: Jet Streaming Podcast this week.....

This week we talk with Bill Murtagh of the NOAA Space Weather Prediction Center in Boulder, CO. He tells us about the impacts of space weather on navigation systems, radio broadcasting, and other communications systems. He also describes some of the forecasts and products released by his NOAA office and what's available on their web site. In addition we speak to Pete Frits of Park Service in St Paul about winter season auto care. He provides us some tips to cope with winter and keep our car running smoothly. Cathy, Craig, and Mark also share another web site of the week that provides a rich background on the earth sciences. To listen to the entire podcast online, please go to....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: Coldest of the season so far....

Monday and Tuesday mornings, November 17-18 brought the coldest temperatures of the fall season so far in Minnesota. Many observers reported overnight lows in the teens F, while some reported their first single digit readings since last March. Minnesota reported the coldest temperatures in the 48 contiguous states on Monday morning. Some of the coldest spots in the state included.....

Wadena 9 degrees F Long Prairie 8 degrees F Wolf Ridge 9 degrees F Park Rapids 6 degrees F

Littlefork 7 degrees F International Falls 5 degrees F Warroad 9 degrees F Kabetogama 5 degrees F and Flag Island with 9 degrees F.

Friday morning, November 21st brought even colder temperatures with single digit readings reported as far south as the Iowa border communities (Jackson was just 3 degrees F). The first below zero temperature readings of the fall were reported from some locations. It was -2 degrees F at Wadena and -8 degrees F at Embarrass, one of the coldest readings in the nation for Friday morning. Further to the north in Thompson, Manitoba a morning low of -13 degrees F was reported.

As a result of the many mornings with very cold temperature readings ice is starting to form on some inland lakes, along shorelines and in bays. But it will be a long time before safe ice cover exists.

Topic: Soils freezing up....

After reporting a dramatic decline in soil temperatures last week, it appears that some locations are reporting frozen soils this week. At Morris and Staples soils are frozen to a depth of 4-5 inches, deep enough to prohibit fall tillage. Even in the Twin Cities area bare soils are starting to freeze up, although those that still have vegetation, mulch or plant residues are holding in the mid 30s F. The forecast shows no dramatic warm up strong enough to thaw these soils, so they are likely to remain frozen for some time.

Topic: Winter season outlook....

The NOAA Climate Prediction Center seasonal outlook for the months of December through February continues to favor warmer than normal temperatures, but restricted to the southern half of Minnesota. Certainly the models currently favor a warm start to December. On the precipitation side, the outlook models do not favor either above or below normal conditions, so there is still great uncertainty regarding seasonal snowfall amounts.

Topic: Thought Provoking Art Exhibit....

Though I seldom go to art galleries, I had the privilege of visiting the Water and Oil Gallery in St Paul, MN this week. It is located at 506 Kinney Road and is open Tue-Sat from 11 am to 5 pm. Among selected original paintings from Iceland and Europe you will find a special touring exhibit of photographs called "Irreplaceable Wild." These are photos of threatened species, including moose, lynx, sugar maples, polar bears, whooping cranes and others that are already feeling the effects of climate change. It is a very moving exhibit sponsored by Earth Justice, International League of Conservation Photographers, and others. It will only be showing through November 30th, so I encourage you to attend. Might be a nice outing for the upcoming 4-day Thanksgiving break. A web site showcasing some of the photos can be found at....

www.ireplaceablewild.org

Topic: Weekly Weather/Climate Related Potpourri:

A recent study from researchers at LSU reveals that most ice-nucleating bacteria responsible for ice formation in clouds are derived from vegetation and soils. They can travel great distances and metabolize and grow new cells even within cloud systems. Many of these ice-nucleating bacteria are also plant pathogens, so that understanding their dispersal within the atmosphere may be useful in predicting the outbreak of plant diseases as well.

A preliminary summary of the North Atlantic Hurricane Season for 2008 shows 16 named storms, 8 hurricanes, and 5 major hurricanes. These numbers were very close to those predicted by the Colorado State University atmospheric scientists last spring. The hurricane season officially ends on November 30th. The two most destructive hurricanes were Gustav and Ike. Damage estimates from Gustav ranged from \$3-\$5 billion, while those for the longer-lived Ike ranged above \$20 billion.

Tropical Storm Noul (meaning Red Sky) passed over Vietnam this week bringing wind and flooding damages to many areas, especially in South Vietnam. Over 100 boats were sunk, crops were damaged, and schools were closed. Fortunately relatively few deaths were reported.

The cold polar air passing over the Great Lakes this week brought lake-effect snows to many areas. Marquette, MI reported a record 14.7 inches of snowfall on November 20th, bringing their monthly total to 39.3 inches. Manistique, MI reported 13 inches on Thursday, November 20th as well, while further south along the shores of Lake Erie Astabula, OH reported 10.9 inches of lake-effect snow this week and other areas of Ohio had up to 16 inches. To the east Ellicottville, NY reported 30 inches of snowfall during the week.

MPR listener question: Over the 4-day Thanksgiving Holiday how often does snowfall occur or is there snow on the ground in the Twin Cities area.

Answer: Examining over 100 years of Thanksgiving weather in the Twin Cities area shows that there is snow cover about 50 percent of the time. In terms of snowfall over the 4-day weekend, this usually occurs 57 percent of the time, so a little higher probability than snow cover. From 1944 to 1958 it snowed on every Thanksgiving Holiday weekend. Daytime high temperatures on Thanksgiving Day have ranged from 62 degrees F (1914) to just 4 degrees F (1930).

Almanac for November 21st:

The average MSP high temperature for this date is 37 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 24 degrees F (plus or minus 10 degrees F standard deviation).

MSP local Records for November 21st:

MSP weather records for this date include: highest daily maximum temperature of 67 degrees F in 1990; lowest daily maximum temperature of 5 degrees F in 1880; lowest daily minimum temperature of -11 degrees F in 1880; highest daily minimum temperature of 42 F in 1963.

Record precipitation for this date is 0.54 inches in 1994. Record snowfall is 4.8 inches in 1989, and a record snow depth of 8 inches in 1957 and 1981.

Average dew point for November 21st is 20 degrees F, with a maximum of 58 degrees F in 1990 and a minimum of -9 degrees F in 1978.

All-time state records for November 21st:

The all-time state record high temperature for this date is 72 degrees F at Tracy (Lyon County) in 1962. The all-time state record low temperature for this date is -25 degrees F at Tower (St Louis County) in 1978. The all-time state record precipitation for this date is 3.04 inches at Lake City (Wabasha County) in 1996. State record snowfall for this date is 16.0 inches at Montevideo (Chippewa County) in 1975.

Past Weather Features:

For this date, November 21st, there have been only two years that brought temperatures of 70 degrees F or higher to the state. In 1962 six western and southern communities reported daytime highs of 70 F or higher, while in 1990 another six southeastern Minnesota communities reported daytime highs of 70 degrees F or higher.

Thanksgiving week of 1983 is remembered in Minnesota for its traumatic weather. A major winter storm crossed the state from Tuesday, November 22nd through Thanksgiving Day, November 24th. It brought freezing rain to southern and western counties making travel very hazardous and there were numerous accidents. Ice accumulations on wires and tree limbs was substantial in portions of southern Minnesota, resulting in a number of power outages. In central and northern counties this winter storm produced mostly heavy snow. Forest Lake and Stillwater reported over a foot of snow, while Cloquet had nearly 17 inches. Litchfield and St Cloud reported 10-11 inches, and further north Tower and Cotton reported 18 inches, Duluth reported nearly 21 inches, and Babbitt reported 23 inches. Many schools closed down the day before Thanksgiving during the storm, not just because of heavy snow, but also because of high winds and near zero visibility. Many travelers were stranded for Thanksgiving Day, and some were rescued from Minnesota highways by law enforcement officials in four-wheel drive vehicles.

Word of the Week: Hythergraph

Rarely used anymore, but in the old glossary of meteorology this term referred to a climate diagram which showed temperature along one axis and some form of moisture, such as humidity or precipitation along the other axis. Certain climate zones could be characterized by the shape of a hythergraph using mean monthly values for example. Another form of hythergraph is the comfort chart which shows values of temperature vs values of humidity. For indoor environments in the winter our comfort zone is most tolerable from 68 to 70 degrees, if the indoor humidity remains between 35 and 60 percent. If humidity is lower than this range we tend to feel too cool, if higher than this range, we tend to feel too warm.

Outlook:

Near normal to slightly above normal temperatures over the weekend with increasing cloudiness by Sunday and a chance for snow or rain showers in eastern sections, some of which may carry over into Monday. Generally drier on Tuesday and Wednesday. An Alberta Clipper weather system may bring a chance for snow late in the day on Thanksgiving or into Friday.

Minnesota WeatherTalk for Friday, November 28, 2008

To: MPR's Morning Edition

From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk for Friday, November 28, 2008

Headlines:

- Jet Streaming podcast this week
- Preliminary Climate Summary for November
- Weekly Weather/Climate Related Potpourri
- Question on hoarfrost
- Almanac for November 28th
- Past weather features
- Pole of Cold (brrr..)
- Outlook

Topic: Jet Streaming Podcast this week.....

This week we talk with Greg Holland, Director of the Mesoscale and Microscale Meteorology Division at the National Center for Atmospheric Research in Boulder, CO. He reviews the recent 2008 North Atlantic Hurricane Season and offers an analysis of trends in tropical storm frequencies and intensities. We also talk with Shannon Swanson from AAA about Thanksgiving Holiday travel conditions and what is anticipated on both a regional and national level this year. She notes that weather often modifies travel plans for Thanksgiving, but rarely prevents travel. Craig Edwards highlights a DNR web site that promotes ice safety for the coming winter (<http://www.dnr.state.mn.us/safety/ice/index.html>)

This is Cathy Wurzer's last "Jet Streaming" podcast as host. She is moving on to do other radio projects, but we are most grateful for her outstanding work in getting this podcast off the ground and building an audience for it. Best wishes and good luck to Cathy on her new projects.

To listen to the entire Jet Streaming podcast online, please go to....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: Wrap up to November....

As we near the end of the month we can assess what the final climate statistics might look like. Most observers reported a warmer than normal November, with mean monthly temperatures that were 1 to 4 degrees F above average. Extremes in the state ranged from 78 degrees F at

Redwood Falls on the 2nd to -8 degrees F at Embarrass on the 21st. In fact Embarrass reported five mornings with below zero F during the month, and four of those readings were the lowest in the 48 contiguous states. Grand Marais and Hallock reported the lowest temperature in the lower 48 states on the 17th with just 12 degrees F.

Precipitation for November was mixed with most observers in western Minnesota reporting above normal amounts, while many in the east reported less than normal. On the upper end Waseca, Winona, Albert Lea, and Rochester all received over 2 inches, while Bemidji in the north received over 4 inches, one of their all-time wettest Novembers. Most observers also reported some snow, albeit small amounts, much of which did not last very long. International Falls, Redwood Falls, Winnebago, and Milan all reported more than 6 inches of snowfall. And more snow, from 1 to 4 inches, was reported on Thanksgiving Day in parts of Koochiching and St Louis Counties.

International Falls had a monthly total near 11 inches of snow.

Over the last ten days of November, soils and lakes began to freeze up in Minnesota. As is often the case, winds were strong during the month, gusting to over 30 mph on 10 or more days many places. Some reported gusts of over 40 mph.

Topic: Weekly Weather/Climate Related Potpourri:

NOAA scientists announced this week that the combined land and ocean mean temperatures for the month of October were the 2nd warmest since records began in 1880. Northern hemisphere snow cover was below normal during the month, and arctic sea ice extent was at its 3rd lowest level for the month of October since 1979.

England and Scotland noticed a taste of winter this week, with some widespread snowfall. November 23rd brought freezing rain and snowfall to many central and northern areas. Aberdeen reported 5.5 inches of snowfall. Parts of France, the Netherlands, and Spain also reported snowfalls this week.

Prolonged heavy rains brought damaging floods to Santa Catarina in Brazil this week. Over 100 people were killed and over 50,000 displaced from their homes. The port of Itajai, a significant container terminal for agricultural products, was expected to be closed for 10 days due to flood damages. The agricultural season in parts of Brazil was off to its wettest start in decades.

MPR listener question: This actually comes from a listener to the "Jet Streaming" podcast. She lives in Willmar, MN and writes, "what is the origin of the term hoarfrost, and why do we not hear it very often?"

Answer: Hoarfrost is probably one of the oldest terms used in weather, dating back centuries. It is derived from the Anglo-Saxon and Middle English term hoar, meaning white in appearance. Hoarfrost essentially refers to the beautiful white appearance of terrestrial objects as a result of sublimation of water in the form of ice crystals. The temperature of the object, a telephone wire, a tree, or a shrub for example may be at or below the freezing mark (32 F) so that water vapor in the air around it will sublimate and form tiny ice crystals on its surface. Sometimes in winter we

get this overnight when fog forms, and as it lifts in the morning, we see a beautiful whitened landscape. We don't have a high frequency of hoarfrost, so we rarely hear the meteorologists refer to it. December is perhaps the best month for observing hoarfrost in Minnesota. So perhaps we'll see it before Christmas.

Almanac for November 28th:

The average MSP high temperature for this date is 31 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 17 degrees F (plus or minus 10 degrees F standard deviation).

MSP local Records for November 28th:

MSP weather records for this date include: highest daily maximum temperature of 58 degrees F in 1941; lowest daily maximum temperature of -1 degrees F in 1872; lowest daily minimum temperature of -21 degrees F in 1887; highest daily minimum temperature of 43 F in 1913. Record precipitation for this date is 1.08 inches in 1987. Record snowfall is 7.3 inches in 1983, and a record snow depth of 15 inches in 1983.

Average dew point for November 28th is 16 degrees F, with a maximum of 51 degrees F in 1998 and a minimum of -13 degrees F in 1985.

All-time state records for November 28th:

The all-time state record high temperature for this date is 72 degrees F at Amboy (Blue Earth County) in 1998. The all-time state record low temperature for this date is -37 degrees F at Rush City (Chisago County) in 1887. The all-time state record precipitation for this date is 2.24 inches at Duluth (St Louis County) in 1960. State record snowfall for this date is 16.0 inches at Campbell (Wilkin County) and Lutsen (Cook County) in 1993.

Past Weather Features:

On this date in 1872 the Twin Cities was in the grip of arctic cold. Five consecutive days produced overnight lows below zero degrees F, bottoming out at -21 degrees F on the 27th. Four inches of fresh snowfall on the 24th had amplified the arctic cold. On Thanksgiving Day, November 28th the morning low was -17 degrees F with an even worse windchill.

On this date in 1905 (Nov 28) a strong storm produced 20-30 foot waves on Lake Superior as winds gusted to 68 mph near Duluth. Outside Duluth Harbor the steel bulk freighter Mataafa took a pounding from the winds and the waves and eventually was grounded, eventually breaking up. Nine of the 15 crewmen were killed, but the others were rescued. In all this storm damaged 29 ships on Lake Superior.

On this date in 1939 the driest November in state history was wrapping up with above normal temperatures. Daytime highs ranged from the mid 40s into the 60s F. Precipitation had been recorded on only two days during the month, and then only very little. The statewide average for

the month was just 0.07 inches, with most observers only reporting a trace of snow. The Twin Cities reported a record dry November with just 0.02 inches.

Just over 7 years ago, November 27, 2001 a strong winter storm struck the Duluth Harbor and Lakewalk area with 10-15 ft waves causing over \$1.5 million in damage. Winds reached 50-55 mph, and crowds of people gathered along the Canal Park area to watch the storm. You can still see some of the photos taken at:

<http://www.glerl.noaa.gov/seagrant/glw/photos/Seiche/26November2001/26November2001.html>

Word of the Week: Pole of Cold

Coldest temperatures in the northern hemisphere have not been measured at the North Pole, but about 100-200 miles south of there in northeastern Siberia. Colder air held near the land surface under a strong "Siberian High Pressure" system in winter contributes to this feature. Earlier this week, locations in eastern Siberia reported overnight lows from the -45 F to the -50 F.

This town, Tomtor, located in the Oymyakon district of Siberia, has acquired the name "Pole of Cold" because it truly represents the coldest pool of air in the northern hemisphere. It was -96 F there in 1926. The tourism industry has acknowledged the uniqueness of this area and each winter between late November and March, there are package vacation deals offered to tour the Pole of Cold region. Air and rail systems can get you to the region, then you will travel to Tomtor via 4WD Jeep, each equipped with up to three extra heaters for comfort and safety. In the town of Tomtor, you are greeted by the mayor, visit the Pole of Cold Monument, and are given a certificate for framing that verifies your wintertime presence there.

Outlook:

The weekend should start warmer than normal with a chance for snow showers late on Saturday and into Sunday. Cooler temperatures will follow with another chance for snow late Tuesday and into Wednesday of next week. Somewhat milder weather may surface for next weekend.

Minnesota WeatherTalk for Friday, December 5, 2008

To: MPR's Morning Edition

From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk for Friday, December 5, 2008

Headlines:

- Jet Streaming podcast this week
- Winter weather settles in
- Weekly Weather/Climate Related Potpourri
- Question on comparing Alaska stations to the Twin Cities
- Almanac for December 5th
- Past weather features
- K-feet
- Outlook

Topic: Jet Streaming Podcast this week.....

This week representatives from 190 nations have gathered in Poznan, Poland for the United Nations Climate Change Conference. Delegates will review progress to work out a sweeping new UN Climate Treaty. We talk with Dr. Renate Christ of the Intergovernmental Panel on Climate Change. She is attending the conference and shares some of her insights. With host Steven John, we also visit with Curt Brown, author of a new book "So Terrible a Storm" about the famous November 27, 1905 storm over the Great Lakes that damaged or sank 31 ships, including the Mataafa, which broke apart just outside the Duluth Harbor entrance.

The web site of the week is the UN Framework Convention on Climate Change, which offers an array of resources and updates concerning climate change research and actions taken to adapt to consequences, or mitigate outcomes. <http://unfccc.int/2860.php>

To listen to the entire Jet Streaming podcast online, please go to....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: Winter settles in....

Certainly the weather pattern the first week of December has been distinctly winterlike. Many observers have reported at least a trace of snow each day of the month so far. Early Wednesday morning (Dec 3) several southern Minnesota locations reported 2-3 inches of snow, while Spring Valley reported 3.8 inches, St Peter 4 inches, and Vermillion 6 inches. Then on Thursday

morning another shot of snow brought 2 inches to Faribault and 1-2 inches across portions of west central counties. For the first 4 days of the month, some observers have already reported 4-6 inches in total. In fact, Lanesboro has reported over six inches. Further, the forecast models all suggest that southern Minnesota counties may have more frequent chances for snow during the first half of this month, so it looks like a snowy December for them.

Temperatures have also averaged cooler than normal for the first several days of the month. Many observers have reported overnight lows in the single digits. Some such as International Falls, Embarrass, Brimson, Tower, Park Rapids, Orr, Cook, Hibbing, Theilman, and Preston have seen below zero F readings. The low of -7 degrees F at Embarrass on Tuesday (Dec 2) was the coldest in the 48 contiguous states. Further to the north in Manitoba, Canada weather observers were reporting lows from -5 to -20 degrees F this week. The cold period has promoted deeper penetration of frost into the soil, as some observers now report frost depths of 10 to 12 inches.

Topic: Weekly Weather/Climate Related Potpourri:

The North American Ice Service, a partnership of Canada and the USA, provided their winter seasonal outlook for ice across the Great Lakes this winter. For Lake Superior, the first week of December has brought the build-up of thin ice on northern sections of Thunder Bay, in Black Bay, and in the St Marys River. Duluth Harbor ice build up is predicted for the last week of December, while shoreline ice north of Grand Marais is projected to be present by mid-January.

A paper recently published in Nature magazine concerning a study of geologic evidence from Australia suggests that life forms may have existed on Earth as long ago as 4.2 billion years, much longer ago than earlier thought. The evidence further points to an earlier existence of plate tectonics, and relative movement among the land masses and oceans, providing perhaps more environmental niches where life could exist.

Noting six consecutive years of drought in SE Australia, particularly New South Wales and Victoria, officials there are taking actions to insure future fresh water supplies. In Sydney and Melbourne they are investing in new desalinization plants to convert sea water to make up perhaps 33 percent of their fresh water supply. In Brisbane, they are investing in recycling technologies to convert sewage water into potable water.

The city of Venice, Italy flooded earlier this week, not because of storms but because of the 4th highest tide since 1872. The tide in the city rose to 61 inches, well beyond the flood stage of 40 inches. City workers were unable to respond fast enough to raise city walkways. Water taxis (gondolas) were halted for a time as the loading platforms for passengers were underwater.

A tropical weather system over the Bay of Bengal brought very heavy rain to Sri Lanka earlier this week. Strong thunderstorms with winds from 50-60 mph brought very heavy rains, especially to the northern parts of the country near the city of Jaffna. Flooded streets and waterways displaced over 350,000 residents. This comes outside the normal monsoon season, during a time of year that the climate is drier over there (December through February typically). This storm was expected to strike parts of southern India this weekend.

MPR listener question: How do the average temperatures and snowfall amounts in Alaska compare to those of the Twin Cities?

Answer: The answer depends on which part of Alaska you compare. See the table below to compare Fairbanks, Anchorage and the Twin Cities average monthly temperatures.

The Alaska interior, as represented by Fairbanks is consistently much colder, ranging from 30 degrees F cooler in November to 9 degrees F cooler in May. Anchorage, located on the top of the Cook Inlet off the Gulf of Alaska is a coastal climate. It is generally colder than the Twin Cities, except for the middle of winter, when snow cover and dry high pressure systems keep Minnesota temperatures somewhat colder, while the Gulf of Alaska and Cook Inlet waters moderate the temperature of Anchorage. Note the difference in January mean temperature, where Anchorage is 3 degrees F warmer than the Twin Cities. Minnesota also experiences higher temperature variability during winter than Anchorage does. In terms of annual snowfall, the snow season is clearly longer in Alaska, mostly skewed to an earlier start with substantially more snowfall in the months of September and October. The Twin Cities actually reports more average snowfall in January and March (our snowiest months) when compared to Anchorage and Fairbanks.

Average Monthly Temperatures (F)												
Anchorage, AK												
JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
15	19	23	36	47	53	58	56	48	35	21	17	
Fairbanks, AK												
-9	-4	9	31	50	59	62	57	45	25	3	-6	
Minneapolis-St Paul, MN												
12	18	31	46	59	68	74	71	61	49	33	18	
Average Monthly Snowfall (in)												
Anchorage, AK												
9.2	10.9	10.2	4.1	0.1	0	0	0	0.2	8.3	11.6	14.9	
Fairbanks, AK												
10.3	7.3	5.2	2.4	0.6	0	0	0	2.2	12.3	13.6	14.1	
Minneapolis-St Paul, MN												
13.7	8.2	10.5	3.1	0.1	0	0	0	0	0.6	10.0	10.1	

Almanac for December 5th:

The average MSP high temperature for this date is 30 degrees F (plus or minus 10 degrees F standard deviation), while the average low is 16 degrees F (plus or minus 10 degrees F standard deviation).

MSP local Records for December 5th:

MSP weather records for this date include: highest daily maximum temperature of 63 degrees F in 2001; lowest daily maximum temperature of 2 degrees F in 1873; lowest daily minimum temperature of -14 degrees F in 1873; highest daily minimum temperature of 40 F in 1875. Record precipitation for this date is 0.81 inches in 1909. Record snowfall is 7.0 inches also in 1909, and a record snow depth of 20 inches in 1991.

Average dew point for December 5h is 17 degrees F, with a maximum of 57 degrees F in 2001 and a minimum of -19 degrees F in 1977.

All-time state records for December 5th:

The all-time state record high temperature for this date is 65 degrees F at Winona (Winona County) in 1998 and again in 2001. The all-time state record low temperature for this date is -38 degrees F at Fort Ripley (Crow Wing County) in 1873. The all-time state record precipitation for this date is 2.23 inches at Milaca (Mille Lacs County) in 1985. State record snowfall for this date is 12.0 inches at Little Falls (Morrison County) in 1909.

Past Weather Features:

December 4-6, 1909 brought a strong winter storm to Minnesota that abruptly halted the late corn harvest. Snow and rain fell in heavy amounts. On the 5th Little Falls reported 12", Baudette 10.5" Red Lake 10", Pine River Dam 10", Kelliher 11", and Floodwood 8 inches. Two Harbors reported all rain as temperatures remained in the 30s to low 40s F, but their measurement of 1.85 inches on the 5th is the 2nd highest one day total precipitation for December in their entire climate history. With consistent snow cover, temperatures for the balance of December 1909 were very cold, with many mornings below -30 degrees F in northern counties. Much of the state corn crop was left in the field for that winter and not harvested until spring of 1910.

December 5, 1998 was the 5th consecutive day with temperatures that were 20 to 30 degrees F above normal across southern and central Minnesota counties. Afternoon highs were consistently in the 50s and 60s F, and with the absence of snow cover, many golf courses opened for a round of golf, by those who could take time off work while the sun was still up. Many golfers remarked how difficult it was to visually track the flight of the ball with such a low sun angle.

December 5, 2001 was perhaps the warmest, most humid in history (for that date). The Twin Cities, Preston, Rushford, Winona and others reported daytime highs in the 60s F, with dewpoints in the 50s F. In fact the dewpoint in the Twin Cities hit 57 degrees F, the highest dewpoint ever measured in December. The high water vapor content of the air combined with atmospheric instability produced some thunderstorms over SE Minnesota. Rochester reported .81 inches of rainfall, Austin reported 0.62 inches, and Eyota reported small hail from a thunderstorm.

Word of the Week: K-feet

This expression is used in a number of science disciplines and also in sport. It is simply an abbreviated form of kilo-feet (kilo is of French derivation meaning thousand)...thousand foot increments. In meteorology sometimes it is used to refer to layers in the atmosphere where instability exists, to describe cloud layers, or where moisture or heat advection is taking place. In skydiving, gliding, or high altitude skiing sometimes participants will refer to K-feet to reference their elevation.

Outlook:

Chance of snow with much colder temperatures this weekend, both early Saturday and late Sunday as two weather systems cross the state. Below zero readings in the north and single digit readings in the south will prevail for overnight lows, especially on Saturday night. Some moderation in temperature by Monday, but with continued chances for snow. Generally drier on Tuesday, but another chance for snow Wednesday and Thursday next week.

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Minnesota WeatherTalk for Friday, December 12, 2008

To: MPR's Morning Edition

From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk for Friday, December 12, 2008

"Winter gives the bone and sinew to literature, [while] summer the tissues and blood. The simplicity of winter has a deep moral."
(from "The Snow-Walkers" by John Burroughs)

Headlines:

- Jet Streaming podcast this week
- Let it snow....
- Temperature index for residential energy demand
- Weekly Weather/Climate Related Potpourri
- Question on frequency of snowfall in the Twin Cities
- Almanac for December 12th
- Past weather features
- Snowy
- Outlook

Topic: Jet Streaming Podcast this week.....

We welcome back MPR chief meteorologist Paul Huttner this week and have two interesting conversations on the podcast: Our first guest is Dr. Stephen Schneider of Stanford University, one of the world's leading climate scientist and policy advisors. He shares his thoughts about how the climate change issue may be addressed differently under the new Obama administration and how the role of NOAA might change. In addition we visit with Karen Nelson Hoyle, curator of children's literature at the Kerlan Collection in the Elmer L. Andersen Library at the University of Minnesota. She shares some stories and some children's books about weather that are very fitting for the coming holiday season. A good story, fiction or non-fiction, involving the weather and with striking illustrations can be very engaging with young children. And finally Craig Edwards shares another interesting web site of the week.

To listen to the entire Jet Streaming podcast online, please go to....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: "Let it snow, let it snow, let it snow"

For many the weather outside is delightful, not frightful. To those who remember putting up with a snow drought last winter, the repeated snowfalls of this month are a welcome sight. Some locations like International Falls have reported at least a trace of snowfall everyday this month. Skiing, snowmobiling, snowshoeing, and winter photography enthusiasts are already taking advantage of these conditions.

Snowfall totals for December are mounting up. A winter storm over the 8th and 9th deposited 1 to 4 inches across much of central Minnesota, and 3 to 8 inches across southeastern counties. Rushford reported 9 inches from this storm. Then on the 10th another storm deposited 1 to 4 inches in northeastern counties, with Grand Marais reporting a six inch total snowfall. December has thus far brought over a foot of snow to Preston, Grand Meadow, Lanseboro, and Winona in southeastern Minnesota, and nearly a foot to Kabetogama, International Falls, and Wolf Ridge Environmental Learning Center in northern Minnesota. Snow depths across northern counties range from 6-10 inches, with more snow on the way. The National Weather Service medium range forecast models favor continued colder than normal temperatures with frequent changes for snow through December 24th.

The snow cover has helped contribute to some very cold overnight minimum temperatures this month. Minnesota has reported the coldest temperature in the 48 contiguous states on seven of the first twelve days of December. The Twin Cities reported the first below zero F reading of the season (-1 degrees F) on Friday the 12th. Places like International Falls, Embarrass, Crane Lake, Orr, Cook, Cotton, Ely, Hibbing, Eveleth, Big Fork, Waskish, Warroad, Flag Island, Baudette, Roseau, Park Rapids, Thief River Falls, Pine River, Isabella, Kabetogama, Babbitt, Tower, Brimson, Camp Norris, and Littlefork have all reported -20 degrees F or colder. Brimson recorded -26 degrees F on the morning of the 8th, while on the morning of the 12th Cook reported -29 degrees F, Orr -30 degrees F, and Embarrass -32 degrees F.....all of which were the coldest temperatures in Minnesota for the month so far. Embarrass has reported below zero minimum temperatures on 10 of the first 12 mornings this month so far.

Topic: REDTI

This of course is another government acronym, but perhaps one we'll hear more about this winter. It stands for Residential Energy Demand Temperature Index and it was created by scientists at the National Climatic Data Center. It is based on a nationwide view of the population weighted heating and cooling degree days that relate so closely to residential energy use. Constructing this index allows those in the energy industry to examine long term climatic fluctuations and their impact on energy use in the United States. The REDTI values can be viewed for the most recent 3-month period, or for any other historical period by going to the National Climatic Data Center web site at...

<http://lwf.ncdc.noaa.gov/oa/climate/research/cie/redti.html#desc>

This index might be interesting to track and compare with your home heating bills this winter.....

Topic: Weekly Weather/Climate Related Potpourri:

With temperatures in the mid 30s F on Thursday morning (Dec 11) New Orleans and Slidell, LA were reporting snow. This was their first reported snow since Christmas Day of 2004. Previous to that date, it had not snowed in New Orleans since 1989. With relatively warm soils the snow was generally melting, but accumulating in some grassy areas up to 2 inches. Several schools were closed Thursday morning in Louisiana, while children were enjoying a rare snow experience in the Cajun state.

In contrast to the Western Great Lakes Region which has seen cold weather dominate this month, parts of Russia have been experiencing record warmth in December. On Saturday, December 6th, Moscow reported a temperature of 49 degrees F at 3:00 am! This is the highest December temperature in the history of observations there. Temperatures in the region have averaged 15 to 20 degrees F above normal so far this month, but are expected to decline to near normal values next week.

Delegates to the U.N. Climate Conference in Poznan, Poland are discussing deforestation trends this week. It is alarming to think that climate change may accelerate deforestation and combined with periodic drought inflate the fire risk to many areas. Strategies to mitigate deforestation may get more attention during the next phase of IPCC work.

A new paleoclimate study based on geologic chemical signatures from the University of Wisconsin-Madison suggests that the decline of the Roman and Byzantine Empires between 100 and 700 A.D. may have been partially the result of climate trends that favored droughts during that time. Researchers are going to apply their technique to longer periods of record and try to determine drought sequences back as far as 19,000 years ago.

MPR listener question: I noticed the posting by the NWS Office in Chanhasen that there have been 12 days so far (since October 1st) when at least 0.1 inches of snowfall was measured in the Twin Cities. Is this a relatively high frequency for measurable snowfalls? What is the record frequency of measurable snowfalls for a winter season?

Answer: The average number of days that bring at least 0.1 inches of snowfall to the Twin Cities between October 1st and December 31st is 13. So given that we have already seen 12 days so far and it is only the 12th of December, we are clearly on a pace to significantly exceed the historical average. In December of 1969 there were 19 days that brought at least 0.1 inches of snowfall to the Twin Cities, and by December 31st the monthly total was 33.2 inches, a record for the month. By then end of December 1969 measurable snow had occurred on 27 days and the first four months of 1970 (Jan-Apr) would bring another 27 days with measurable snow, bringing the winter total to 54 days. As far as I can determine that is a record frequency of snow for a Twin Cities winter. By the way the total snowfall that winter was 63.4 inches, above normal but not a record. Record snowfall years are characterized by several big snow storms and not necessarily a high frequency of snow storms.

Almanac for December 12th:

The average MSP high temperature for this date is 28 degrees F (plus or minus 12 degrees F standard deviation), while the average low is 12 degrees F (plus or minus 13 degrees F standard deviation).

MSP local Records for December 12th:

MSP weather records for this date include: highest daily maximum temperature of 53 degrees F in 1883 and 1968; lowest daily maximum temperature of -1 degrees F in 20003; lowest daily minimum temperature of -15 degrees F in 1879; highest daily minimum temperature of 37 F in 1928. Record precipitation for this date is 0.61 inches in 1886. Record snowfall is 12.0 inches in 1865, and a record snow depth of 16 inches in 1950.

Average dew point for December 12th is 9 degrees F, with a maximum of 49 degrees F in 1968 and a minimum of -19 degrees F in 1962.

All-time state records for December 12th:

The all-time state record high temperature for this date is 64 degrees F at Tracy (Lyon County) in 1913. The all-time state record low temperature for this date is -39 degrees F at International Falls (Koochiching County) in 1995. The all-time state record precipitation for this date is 3.66 inches at Caledonia (Houston County) in 1899. State record snowfall for this date is 12.0 inches at Milan (Chippewa County) in 1926 and in the Twin Cities in 1865.

Past Weather Features:

December 11-12, 1865 brought a memorable blizzard to Minnesota. The St Paul area received about 18 inches of snowfall from the storm, while Red Wing received about 15 inches. The heavy snow shut down the railroad system out of the Twin Cities for days. Temperatures following the storm fell into the -20s F and winter's sting lasted through the end of the month with over 26 inches of snow piling up in the Twin Cities area.

After starting out to be a mild month with temperatures of 40 degrees F, December of 1879 began an abrupt transition to winter on the 11th when temperatures plummeted below zero F for the first time that season. Eleven of the remaining December days brought snowfall to St Paul, and 14 of them brought below zero F temperature readings, with a -19 degrees F on Christmas Eve, and a reading of -39 degrees F on Christmas morning.

Conversely in 1913 December 11-12 brought very mild temperatures to the Gopher State, with 11 different communities reporting daytime highs in the 60s F. It turned out to be one of the warmest Decembers in Minnesota history and the warmest ever in the Twin Cities area where not a single nighttime temperature fell below 10 degrees F.

Word of the Week: Swody1 and Swody2 (swoe-dee)

These are terms used by the meteorologists at NOAA's Storm Prediction Center in Norman, OK. They stand for the Convective Weather Outlook Day One and Day Two products, often used to

assess the threat of severe weather and whether or not to issue a watch. These products have been in use for many years nationwide, but more often apply to the western Great Lakes region during the May through September period.

Outlook:

Early part of the weekend should be little problem with temperatures in the 20s to low 30s F. Then Saturday night through Monday morning brings a major winter storm. Mixed precipitation across southern Minnesota may cause travel problems for some on Sunday, while heavier snow will likely occur across portions of northern and western Minnesota where up to a foot of snow may be measured. Winds will be gusty Sunday night into Monday with falling temperatures. Monday through Wednesday will be cold, with many below zero F readings and daytime highs only reaching the single digits in the warmest places. Another chance for snow will come by late Tuesday and Wednesday.

Minnesota WeatherTalk for Friday, December 26, 2008

To: MPR's Morning Edition

From: Mark Seeley, Univ. of MN Extension, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk for Friday, December 26, 2008

Headlines:

- Jet Streaming podcast this week
- Special Edition....the Minnesota weather of 2008 in review...
- Almanac for December 26th
- Past weather features
- Outlook

Topic: Jet Streaming Podcast this week.....

We welcome Mark Wheat from the Current (FM 89.3) this week. He has brought a number of holiday music selections to talk about and play. We hope you will enjoy this and perhaps it will evoke some fond memories.....

To listen to the entire Jet Streaming podcast online, please go to....

http://minnesota.publicradio.org/radio/programs/morning_edition/

or

http://minnesota.publicradio.org/radio/podcasts/jet_streaming/

Topic: Significant Weather of 2008

January 5-7, 2008 brought an extraordinary thaw to Minnesota with 48 degrees F reported at Grand Rapids and Marshall. These temperatures were roughly 30 degrees F warmer than normal.

In early February, 2008 the International Falls, MN city attorney opened an envelope containing Reg. No. 3,375,139 from the U.S. Patent and Trademark Office. The document confirmed that International Falls is legally, rightfully and officially the Icebox of the Nation. Upholding its reputation, International Falls reported the coldest temperature in the nation a number of times this year. Also in February International Falls, Embarrass, Kettle Falls, and Fosston reported lows of -40 degrees F, the coldest readings of the year in Minnesota.

An Easter Weekend snow over March 21-23 made egg hunting more difficult. Some southern Minnesota locations reported 6-12 inches of snowfall. Some western Minnesota locations saw over 20 inches of snowfall during the month. An Easter Sunday snow is a rare event even in Minnesota.

Two late season blizzards made headlines in April. The first on April 10-11 produced snowfall amounts of 6 to 14 inches across central and northern counties, but also brought winds of over 40 mph to many areas. Duluth reported large waves on Lake Superior with winds gusting to over 60 mph. The second blizzard came on April 25-26 bringing over a foot of snow to some western and northern counties. This storm also brought some record rainfall amounts to SE Minnesota. April 2008 was the snowiest in history for some locations including 43 inches at Blackduck, 43.5 inches at Itasca State Park, and 49 inches at Zerkel, all breaking the state record for the month of 37 inches.

An EF-3 tornado (winds up to 165 mph) struck Hugo, MN on May 25th, killing a two year old boy. It was one of 43 tornadoes in the state during the year, and one of 3 EF-3 storms.

Another EF-3 tornado struck near Emmaville in Hubbard County on June 6, 2008. June also brought some flash flood producing thunderstorms to SE Minnesota, especially Mower, Fillmore, and Houston Counties. The Root River spilled out into Preston flooding many properties there, and an observer near Caledonia reported over 10.6 inches of rainfall from a storm on June 9-10.

July brought 18 more tornadoes and some heavy rains. The third and last EF-3 tornado passed near Kandiyohi on the 11th. Areas of the Minnesota landscape began to turn dry as well with western counties designated for moderate drought. The warmest temperatures of the year were reported on July 13th. Canby reported a high of 96 degrees F, the highest reading for an otherwise cool growing season. La Crescent reported a rainfall of 5.21 inches on the 18th.

More areas of moderate drought emerged in central and SE Minnesota during August. There were some heavy local thunderstorms as Breckenridge reported some flooding as a result of a 5.22 inch thunderstorm on the 13th. August 25th brought frost to some northeastern counties.

Some much needed rain fell in western and central counties during September, helping to alleviate drought in those areas. With late maturing crops, Mother Nature dealt a favorable hand to most growers, holding off frost until October.

October 26 brought the first autumn snowfall. The month was generally wet for most weather observers. A storm brought over 3 inches to Itasca State Park.

November started unusually warm with many days over 70 degrees F. Redwood Falls reported a record 78 degrees F on the 2nd. In Koochiching and St Louis Counties it snowed on Thanksgiving Day.

A cold and snowy December topped off the year and hardened Minnesotans for the winter ahead. Weather observers reported the coldest temperature in the nation, outside Alaska, on twelve days during the month, and several areas recorded at least 30 inches of snowfall. International Falls observed snowfall on the first 24 days of the month.

MPR listener question: As we left Christmas Eve candlelight services this week about 11:00 pm the windchill in the Twin Cities was reported to be -10 to -15 degrees F. My relatives from

Florida who were visiting thought this must be a record cold value, but I assured them it was not. What have been some of the more historically cold windchill values on Christmas Eve?

Answer: Indeed, -10 to -15 degrees F windchill is quite cold, but no where close to a record values. There have been 13 Christmas Eves since 1900 in the Twin Cities when windchill conditions met the advisory criteria for the National Weather Service (-20 F or colder as revised by the new formula in November of 2001). Those years were...

Year Christmas Eve Windchill Conditions (F)

1902* -33 (T=-4 F, WS=34 mph)
1910 -24 (T=-6 F, WS=11 mph)
1914 -27 (T=-5 F, WS=17 mph)
1917 -32 (T=-9 F, WS=16 mph)
1921 -39 (T=-12 F, WS=23 mph)
1924 -23 (T= 1 F, WS=26 mph)
1926 -20 (T= 3 F, WS=24 mph)
1933 -27 (T=-1 F, WS=28 mph)
1935 -24 (T=-1 F, WS=22 mph)
1980 -25 (T=-4 F, WS=16 mph)
1983 -61 (T=-25 F, WS=32 mph)
1985 -32 (T=-6 F, WS=25 mph)
2000 -40 (T=-10 F, WS=32 mph)

1983 was arguably the coldest Christmas Eve in history with a windchill reading of -61 degrees F.

Almanac for December 26th:

The average MSP high temperature for this date is 25 degrees F (plus or minus 12 degrees F standard deviation), while the average low is 8 degrees F (plus or minus 14 degrees F standard deviation).

MSP local Records for December 26th:

MSP weather records for this date include: highest daily maximum temperature of 51 degrees F in 1936; lowest daily maximum temperature of -9 degrees F in 1934; lowest daily minimum temperature of -27 degrees F in 1996; highest daily minimum temperature of 38 F in 1959. Record precipitation for this date is 0.60 inches in 1880. Record snowfall is 5.1 inches in 1988, and a record snow depth of 20 inches in 1983.

Average dew point for December 26th is 10 degrees F, with a maximum of 48 degrees F in 1936 and a minimum of -28 degrees F in 1996.

All-time state records for December 26th:

The all-time state record high temperature for this date is 57 degrees F at Fairmont (Martin County) and at Zumbrota (Goodhue County) in 1936. The all-time state record low temperature for this date is -50 degrees F at Big Falls (Koochiching County) in 1933 and at Tower (St Louis County) in 1993. The all-time state record precipitation for this date is 1.75 inches at Bricelyn (Faribault County) in 1945. State record snowfall for this date is 15.0 inches also at Bricelyn (Faribault County) in 1945.

Past Weather Features:

Two of the snowiest periods between Christmas and New Year's Day occurred in 1852 and 1856, respectively. Over a foot of snow came on December 29-30, 1852 with strong NE winds making visibility fall to near zero in the Twin Cities area. Then over December 28-30, 1856 back to back storms brought over a foot of snow to the Twin Cities area making travel almost impossible. An arctic air mass brought temperatures from -20 to -30 degrees F during that time and established a pattern for a long cold winter. Arguably the winter of 1856-1857 was one of the most traumatic in the 19th Century, as several mornings brought lows of -30 degrees F or colder, and downtown St Paul reported over 100 inches of snowfall.

New Year's Eve of 1898 was the coldest in state history, as Pokegama Dam reported a low of -57 degrees F while Leech Lake reported -51 degrees F. Seven other locations reported -40 degrees F or colder on that New Year's Eve.

Outlook:

Chance of snow and mixed precipitation into early Saturday. Then cooler temperatures on Sunday. A warming trend will begin on Monday and keep temperatures near or above seasonal averages much of next week. There will be another chance for snow late Monday into Tuesday, then cooler for New Year's Eve. Chance of snow late on the first day of 2009.