

To: MPR's Morning Edition
From: Mark Seeley
Re: Topics for MPR's Morning Edition, Friday, Jan 21, 2005

HEADLINES:

- Heavy lake-effect snows this week
- New seasonal climate outlook
- New state record low temperature set on January 17th
- Remembering the blizzard of 1917
- The Metro Area's coldest morning ever on this date in 1888
- Consecutive hours with below zero F temperatures
- Minnesota places with polar-like -50 F temperatures
- Almanac for January 21st
- "on the chute"
- Outlook

Topic: Heavy lake-effect snow in northeastern MN....

Starting on Wednesday night this week, ENE winds off Lake Superior brought heavy snow to parts of Lake, Cook, and St Louis Counties. These conditions persisted most of the day on Thursday. Snowfall rates of up to 2 inches per hour were reported by some observers. The Wolf Ridge Environmental Learning Center outside Finland, MN (Lake County) reported over 15 inches of snowfall and a snow depth of over 50 inches.. need to break out the snowshoes there....

Topic: New Seasonal Climate Outlook....

On January 20th the NOAA Climate Prediction Center released the new seasonal climate outlooks, including the period from February through April.

For Minnesota the climate outlook suggests equal chances for above or below normal temperature and precipitation during the coming three months. The recent outlooks do favor above normal temperature and precipitation for the balance of January however.

Topic: New state record low temperatures set early in the week..

Embarrass (St Louis County) reported morning lows of -48 F on January 16th and -54 F on January 17th, Sunday and Monday of this week. These values are new all-time state lows for those dates, surpassing the -47 F reading at Thorhult on January 16, 1977 and the -52 F reading at Tower on January 17, 1982.

The readings at Embarrass this week were also the coldest in the 48 contiguous states on those dates, only surpassed by a low of -60 F at Chandalar Lake in Alaska on January 17th. Minnesota has reported the coldest temperature in the 48 contiguous states six times so far this month.

Topic: The blizzard of January 21, 1917

This blizzard struck the state on a Sunday and was somewhat well forecasted, so that many were expecting it and prepared. It snowed heavily for a long period of time from about 8:00 am until 6:00 pm. Winds blew with ferocity in western Minnesota, as gusts up to 48 mph were reported. Tracy, MN reported 24 inches of snowfall (on their way to a monthly total of 41 inches), while Redwood Falls reported 22 inches (on their way to a monthly total of 34 inches), and Glencoe reported 16 inches. Roads were drifted shut for days, and trains were delayed.

Topic: Perhaps the coldest morning ever in Southern Minnesota..

January 21st, 1888, roughly one week after the famous Children's Blizzard, saw an arctic air mass settle over southern Minnesota and sink temperatures to all-time record lows. The core of the arctic high pressure system stood at 30.9 inches on the barometer (1046 mb) roughly equivalent to the cold outbreak of February 2, 1996. In addition there was abundant snow cover present with many communities reporting 30 inches or more of snow depth. Record setting temperatures in the present Twin Cities Metro Area and southeastern Minnesota included....

- 46 F at Ft Snelling
- 41 F at the Signal Corps Office in St Paul
- 42 F at William Cheney's house in Minneapolis
- 47 F at Le Sueur
- 47 F at Excelsior
- 52 F at Delano
- 58 F at Rush City
- 47 F at Carelton College in Northfield
- 46 F at Red Wing
- 50 F at St Cloud
- 44 F at Winona

Topic: Remark on consecutive hours below zero F.....

The National Weather Service reported that both Duluth and International Falls recorded nearly 5 consecutive days of below zero temperatures following the arctic outbreak of January 13th. Though this pattern is unusual, it is by no means record setting. From mid January to late February of 1936 Moorhead, MN reported 36 consecutive days of below zero F readings, while Hallock reported 38 consecutive days. That is truly equivalent to living in a polar climate!

MPR listener question: Earlier this week it was reported that Embarrass, MN recorded a low of -54 F and Babbitt, MN a low of -51 F. How many places in the state routinely record temperatures of -50 F or colder?

Answer: Not many. In fact, I hesitate to use the term "routinely"

with a temperature of -50 F. Even for Minnesota's coldest places a temperature reading that cold is at least a bit unusual.

Dozens of Minnesota communities have recorded a temperature of -50 F or colder sometime in history. The reading of -51 F earlier this week at Babbitt was a new all-time record low for that station. The following list shows the weather stations in Minnesota that have recorded temperatures of -50 F or colder the most number of times....please bear in mind that they have variable periods of record (from 10 years to over 100 years) so a comparison is unfair.

Pokegama Dam 30 times
Tower 12 times
Leech Lake 9 times
Embarrass 8 times
Itasca State Park 6 times
Big Falls 5 times
Detroit Lakes 5 times
Roseau 4 times

Twin Cities Almanac for January 21st:

The average MSP high temperature for this date is 23 degrees F (plus or minus 14 degrees F standard deviation), while the average low is 6 degrees F (plus or minus 15 degrees F standard deviation).

MSP Local Records for January 21st:

MSP weather records for this date include: highest daily maximum temperature of 48 degrees F in 1900; lowest daily maximum temperature of -7 degrees F in 1954; lowest daily minimum temperature of -29 degrees F in 1970; highest daily minimum temperature of 35 degrees F in 1934; record precipitation of 0.81 inches in 1917; and record snowfall of 16 inches in 1917. There have been 26 measurable snowfalls on this date since 1891. Greatest snow depth on this date was 24 inches in 1982. The worst wind chill conditions occurred in 1936 with a reading of -47 F.

Average dew point for January 21st is 6 degrees F, with a maximum of 38 degrees F in 1934 and a minimum of -35 degrees F in 1970.

All-time state records for January 21st:

Scanning the state climatic data base: the all-time high for this date is 62 degrees F at Canby (Yellow Medicine County) in 1942; the all-time low is -58 degrees F at Rush City (Chisago County) in 1888 (with 3 feet of snow on the ground). The heaviest snowfall statewide on this date occurred in 1917 at Tracy (Lyon County) when they recorded 24 inches. The state record for precipitation (liquid equivalent) on this date is 2.20 inches at Tracy and Redwood Falls from the same storm in 1917.

Words of the Week: "Mercury on the chute"

This is an expression rarely used anymore, but in the first 50 years

of the National Weather Service it was used to describe the onset of a cold wave, when temperatures fall rapidly and reach levels that are a threat to agriculture and commerce. Often times when the mercury in the thermometer was dropping rapidly, meteorologists would report that the "mercury was on the chute." We have already had two episodes of mercury on the chute this winter in the Twin Cities Metro area, one during Christmas week when temperature dropped 36 degrees over a 24 hour period and the other earlier this month from the 12th to the 13th when it dropped by 41 degrees F.

Outlook:

Some lingering snow flurries in eastern sections on Saturday morning, with blowing snow elsewhere. Saturday's temperatures will likely stay colder than normal, with some moderation on Sunday. Warming trend continues on Monday, with a chance for mixed precipitation by Tuesday in the southeast and light snow elsewhere. Temperatures should remain on the mild side most of the week.

To: MPR's Morning Edition
From: Mark Seeley
Re: Topics for MPR's Morning Edition, Friday, Jan 28, 2005

HEADLINES:

- National Weather Service on display
- Snow depth stabilizing soil temperatures
- Preliminary January climate summary
- question about snowy Februarys
- Almanac for January 28th
- the Jevon's effect
- Outlook

Topic: National Weather Service at Mall of America....

This weekend the Mall of America will host the Annual Government on Display Expo showcasing the technologies and services provided by over 40 of our federal agencies, including the National Weather Service. Their booth will be located in the Sam Goody Rotunda. The NWS booth will feature a Mini-Dopplar Radar, a tornado simulator, NOAA Weather Radio, and a mock up of a river control model. If you have an interest in weather this is the place to go either on Saturday or Sunday.

Topic: Snow depth has stabilized soil freezing depth....

The recent snowfalls have sufficiently blanketed most of the Minnesota landscape to help stabilize the depth of freezing in the soil. Some recent frost depths taken around the state range from 22 to 40 inches, with the shallower depths in areas that have had deeper and longer snow cover so far this winter. The following are reports of frost depth earlier this week...

Crookston 27 inches, Morris 25 inches, Lambertson 22 inches, Waseca 28 inches, and St Paul 40 inches.

Topic: Preliminary January Climate Summary.....

Average monthly temperatures for January will be as much as 3 to 4 degrees F cooler than normal in northern and western areas of Minnesota, near normal in the south. This correlates well with where most of the snowfall occurred during the month. Temperature extremes for the month were 53 degrees F at Pipestone on the 25th and -54 degrees F at Embarrass on the 17th.

Most observers reported above normal precipitation for the month, some places in excess of 2 inches, including Duluth. Speaking of which the National Weather Service in Duluth reports nearly 45.5 inches of snowfall for the month, very near the record amount for January of 46.8 inches set in 1968. In addition Babbitt (northeastern St Louis County) and Wolf Ridge Environmental Learning Center near Finland (Lake County) reported over 40 inches

of snowfall for the month. Many places reported at least 20 inches.

Wind gusts of over 40 mph were observed around the state on the 1st, the 18th, and both the 21st and 22nd. All produced much blowing and drifting snow.

MPR listener question: Though last Friday's snowstorm caused problems for many Twin Citians, it raised the hopes for some of us who like to cross country ski. I am hoping that February will bring a good deal of snow to the Twin Cities. What's been the snowiest February here?

Answer: In 1962 February brought 26.5 inches of snowfall to the Twin Cities, an all-time record for the month. Snowfall in February has only exceeded 20 inches three times in the past 120 years, and it has exceeded 15 inches only twelve times over the same period. So based on climatology, it is difficult to be optimistic about abundant snow in February. Still, most remember that last February brought 19.7 inches.

Twin Cities Almanac for January 28th:

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 4 degrees F (plus or minus 15 degrees F standard deviation).

MSP Local Records for January 28th:

MSP weather records for this date include: highest daily maximum temperature of 47 degrees F in 1892; lowest daily maximum temperature of -15 degrees F in 1966; lowest daily minimum temperature of -26 degrees F in 1966; highest daily minimum temperature of 34 degrees F in 1892; record precipitation of 0.56 inches in 1909; and record snowfall of 4.1 inches in 1912. There have been 30 measurable snowfalls on this date since 1891. Greatest snow depth on this date was 21 inches in both 1979 and 1982. The worst wind chill conditions occurred in 1977 with a reading of -48 F.

Average dew point for January 28th is 4 degrees F, with a maximum of 37 degrees F in 1914 and a minimum of -38 degrees F in 1966.

All-time state records for January 28th:

Scanning the state climatic data base: the all-time high for this date is 57 degrees F at Lambertton in 1989; the all-time low is -50 degrees F at Pokegama Dam (Itasca County) in 1902 and also at Baudette (Lake of the Woods County) in 1966. The heaviest snowfall statewide on this date occurred in 1949 at Caledonia (Houston County) when they recorded 12 inches. The all-time state record for precipitation (liquid equivalent) on this date is 2.0 inches at Tracy in 2003.

Words of the Week: Jevon's effect

This term refers to the disturbance in the distribution and amount of rainfall or snowfall caused by the rain gage itself. William Stanley Jevons, a 19th century English mathematician and economist proposed in 1861 that the rain gage commonly used for the measurement of precipitation produces a disturbance in the air flowing past it, causing an irregularity in the distribution and therefore the catch collected in the gage. He showed that the loss of rainfall which would normally have been caught by the gage is proportional to the wind speed. Subsequent to his findings, the British developed a rain gage which was mounted closer to the ground (approx 1 ft above the surface) and another gage was developed which fit within a hole such that the lip of the gage was flush with the surface of the ground. Since that time several devices have been invented to shield rain and snow gages from these effects of winds and eddies interacting with the gage.

By the way, this is one of the few historical examples of an economist making a significant contribution to the field of climatology. Later in his career, Jevons became famous for his applications of probability to economics and for his description of the business cycle. To my knowledge, he is the only economist recognized in the jargon of climatologists.

Outlook:

Chances for light snow on Saturday and Sunday, then generally dry most of next week. Temperatures will average warmer than normal for this time year.

To: MPR's Morning Edition
From: Mark Seeley
Re: Topics for MPR's Morning Edition, Friday, Feb 4, 2005

HEADLINES:

- Foul air
- Odds and Ends
- Very small daily temperature ranges
- Almanac for February 4th
- What's a hydrolapse
- Outlook

Topic: Foul air....

The MPCA posted air quality alerts for the period Sunday through Thursday this past week, mostly because of trapped particulates in the lower atmosphere (soot). The poor air quality was actually region wide, with Iowa, Illinois, and Wisconsin posting similar alerts. All of these states reported Air Quality Index (AQI) values ranging from 110 to 150, indicating unhealthy air for citizens with diminished or sensitive respiratory function. The Twin Cities actually reported an AQI of 155, the highest since they implemented this system of monitoring and forecasting. (see MPCA web site <http://aqi.pca.state.mn.us/hourly/index.cfm>)

Trapped between two areas of high pressure, with little wind movement and blanketed by a strong inversion layer, the lower atmosphere over the state became more saturated with particulates (soot) from industrial and auto emissions, as well as other small particles. The inversion layer aloft was relatively persistent and strong with temperatures on the order of 4 to 7 degrees F warmer at 4000 to 5000 ft than at the surface.

Such spells of weather are relatively uncommon for Minnesota. The poor air quality is also associated with a higher incidence of fog, haze, and warmer than normal overnight temperatures. All of these were in evidence this week as well. Persistent cloud cover and fog kept the daily temperature range narrow, varying over just 3 to 6 degrees during a 24 hour period. The average daily range in temperature for early February is about 15 to 17 degrees F.

Topic: A few weather odds and ends.....

On this date in 1835, soldiers at old Fort Snelling were suffering from one of the coldest ever February periods, with temperatures remaining below zero F for over 50 consecutive hours, and later bottoming out at -30 degrees F. Wind chills were probably in the -50 to -60 F range. This arctic outbreak was both strong and large, later producing freezes in Florida

and Louisiana.

Though most of Minnesota has seen a mild spell dominate this week, the Ground Hog Day report from Pennsylvania on Wednesday of this week suggested six more weeks of winter. Our neighbors just to the north have had a good dose of winter just this week, with heavy snow and blizzard conditions reported over Manitoba. Temperatures plummeted to the -30s F, with wind chill values of -40 to -50 F. Austria and Greece too have seen strong winds and snow this week, while parts of Russia have been just plain cold. Kazakhstan reported lows of -40 F.

Those suffering from the winter blahs can take heart. Our journey through the winter season has progressed over half way between the winter solstice and spring equinox so that we are gaining 17-20 minutes in daylength each week now. This will become especially noticeable during the morning and evening commute hours.

Some record high temperatures occurred on Thursday, February 3rd around the region. The loss of snow cover combined with bright sunshine, and warm south winds produced the following records.. Sioux Falls, SD 58 F, Little Falls, MN 50 F, St Cloud, MN 48 F, and Duluth 44 F (tied record high for the date). MSP airport missed tying the record high by one degree topping out at 50 F.

MPR listener question: It seems this time of year we have stretches where the air temperature is almost constant for relatively long periods. Recently, the daily temperature range has been rather narrow, only a few degrees (examples: International Falls on Jan 31 with a high of 30 F and a low of 28 F, or Duluth on Feb 1 with a high of 33 F and a low of 30 F). Have we ever had a day when the temperature was constant all day long, giving a daily range of zero?

Answer: Such days have occurred historically but they are very rare. For the temperature to be constant over a full 24 hour period, there must be little wind and sunlight, as well as a relatively strong inversion layer (with a low cloud ceiling or fog). I cannot find a single case of a day with constant temperature in the Twin Cities record. In fact there are only four cases back to 1891 when the daily temperature range was only 1 degree F, most recently January 16, 1998 when the MSP airport reported a high of 23 F and a low of 22 F. In all four cases there was low cloud, fog or haze, little wind, and in some cases all day precipitation going on.

Elsewhere around the state there are a few cases of constant daily temperature. At Rochester on February 18, 1984 the temperature remained at 32 degrees F all day long with constant fog, ice fog, or snow. Duluth too has reported days with constant temperature. On November 25, 1973 the temperature was a constant 32 F with an all day fog, while on December 13, 1974, the temperature remained at 28 F all day with fog and snow.

Though rare historically, days with a daily temperature range of only 5 degrees F or less tend to occur with a frequency of 10-12

times per year, favoring the months of November, December, January, February and March. More often than not, this type of weather produces temperatures that are just a few degrees above or below the freezing mark (32 F).

Twin Cities Almanac for February 4th:

The average MSP high temperature for this date is 21 degrees F (plus or minus 15 degrees F standard deviation), while the average low is 5 degrees F (plus or minus 16 degrees F standard deviation).

MSP Local Records for February 4th:

MSP weather records for this date include: highest daily maximum temperature of 49 degrees F in 1925 and 1990; lowest daily maximum temperature of -10 degrees F in 1895 and 1907; lowest daily minimum temperature of -25 degrees F in 1893; highest daily minimum temperature of 32 degrees F in 1954 and 1991; record precipitation of 0.34 inches in 1955; and record snowfall of 4.4 inches in 1971. There have been 28 measurable snowfalls on this date since 1891. Greatest snow depth on this date was 21 inches in both 1969 and 1979. The worst wind chill conditions occurred in 1917 with a reading of -54 F.

Average dew point for February 4th is 6 degrees F, with a maximum of 35 degrees F in 1925 and a minimum of -42 degrees F in 1947.

All-time state records for February 4th:

Scanning the state climatic data base: the all-time high for this date is 61 degrees F at Browns Valley (Traverse County) in 1991; the all-time low is -52 degrees F at Willow River (Pine County) and Detroit Lakes (Becker County) in 1907. The heaviest snowfall statewide on this date occurred in 1943 at Ortonville (Big Stone County) when they recorded 12 inches. The all-time state record for precipitation (liquid equivalent) on this date is 2.15 inches at old Fort Ridgely (Nicollet County) along the Minnesota River in 1865.

Word of the Week: Hydrolapse

This is the term meteorologists use to refer to the pattern of moisture in the vertical atmosphere, measured as the dew point. Sometimes these changes in moisture aloft will be sudden or rapid, forming a sharp boundary for cloud formation or dissipation. For example, earlier this week under low level stratus clouds blanketing the state, the upper boundary of the clouds was sharply defined by a dry layer aloft where the dew point dropped by over 20 degrees F. Thus viewed from above, the tops of the clouds formed a smooth uniform blanket.

Outlook:

Continuing with mild temperatures into the weekend, but with increasing cloudiness later on Saturday and into Sunday and a chance for rain and snow. Chances for snow on Monday and Tuesday

as well, along with a good dose of windiness. Colder temperatures will prevail across the state next week returning the sting of winter.....bundle up....

To: MPR's Morning Edition
From: Mark Seeley
Re: Topics for MPR's Morning Edition, Friday, Feb 11, 2005

HEADLINES:

- Birth of the Weather Service in 1870
- New Antarctica weather station
- February cold in Minnesota-a perspective
- Climatology of Valentine's Day
- Almanac for February 11th
- Bust or busted
- Outlook

Topic: Anniversary week for the National Weather Service

135 years ago this week (Feb 9, 1870) the National Weather Service was born, formed by the passage of a joint Congressional Resolution proposed by Congressman Halbert Paine of Milwaukee and signed by President U.S. Grant. The impetus for this effort initially was to provide coastal and Great Lakes mariners with better information on what type of weather they might encounter.

In the 19th Century the National Weather Service was called the Signal Service and used telegraph lines to distribute daily forecasts across the nation. These messages were called "probabilities" or "indications" and were disseminated once per day. They featured descriptions of sky conditions, pressure, wind, and temperature expected over the next 24 hours. By 1888 they expanded the forecast period to 36 hours, and in 1898 to 48 hours. There were 24 Signal Service offices initially, but this expanded to several hundred by 1878. Observations were taken three times per day (early morning, late afternoon, and mid evening).

Today, there are about 120 National Weather Service Offices, supplemented by thousands of automated weather observations stations and thousands of volunteer cooperative weather observers. The same type of information still flows, mostly by wireless communications systems, and in many cases minute by minute or hour by hour. If you want to know the weather right now for just about any place in America, you can generally find it on the web. Additionally if you want to know the forecast for the next 24 hours, or even for the next 14 days you can find it for any place in America on the web. (www.noaa.gov)

Topic: New weather station in Antarctica

A Chinese Polar Expedition Team last month scaled the highest ice cap peak in Antarctica (Dome A Ice Cap) located at 80:22 degrees south latitude and 77:21 degrees east longitude. They set up an automated weather station on the peak (13,255 ft) that will make routine measurements of temperature, pressure,

wind, humidity, etc and transmit them to the Bureau of Meteorology in China as well as in Australia. This certainly will be one of the highest and coldest weather stations on Earth...why just Thursday of this week, the Amundsen-Scott weather station at the South Pole reported a high of -40 F and a low of -45 F...and bear in mind it is summer there.

Topic: Minnesota cold February temperatures in perspective.....

Embarrass, MN went down to -25 degrees F this week, not unusual for that community. But this week back in 1857, the first measured temperatures of -50 F and colder were recorded in the Minnesota Territory. The thermometer at Fort Ripley read -50 F at 6 am on February 10, 1857, while further down the Mississippi River at Little Falls it read -56 F. The reading at Fort Ripley remained an all-time record low until -51 F was measured on January 12, 1912. The reading of -56 F at Little Falls is still unsurpassed in the record, with the coldest measurement since being -46 F on February 16, 1936.

Of course Minnesota's two coldest temperatures ever measured occurred in February: -59 F at Leech Lake on February 9, 1899; and -60 F at Tower on February 2, 1996

MPR listener question: My wife is a real romantic. It's in her genes. She says that her grandfather would take her grandmother out for an evening sleigh ride every Valentine's Day when there was fresh snow. My wife too loves it when it snows. What is the climatology for Valentine's Day? How often does it snow?

Answer: In the Twin Cities Valentine's Day is known for being snowy. There is some form of snow cover nearly 80 percent of the time and it actually snows on February 14th about 1 year out of every 4. It snowed 6.4 inches in 1950. It can also be quite cold. Though the average high and low temperature are 25 F and 8 F, respectively, it has been below zero 31 times on Valentine's Day since 1891, bottoming out at -21 F in 1936. By the way that same year (1936) Valentine's Day brought 22 inches of snow to Grand Marais. Wonder if anybody got the sleigh out?

Twin Cities Almanac for February 11th:

The average MSP high temperature for this date is 24 degrees F (plus or minus 14 degrees F standard deviation), while the average low is 7 degrees F (plus or minus 15 degrees F standard deviation).

MSP Local Records for February 11th:

MSP weather records for this date include: highest daily maximum temperature of 51 degrees F in 1961; lowest daily maximum temperature of -15 degrees F in 1899; lowest daily minimum temperature of -31 degrees F in 1899; highest daily minimum temperature of 35 degrees F in 1908; record precipitation of 0.28 inches in 1940 and 1965; and record snowfall of 4.1 inches in 1979. There have been 27 measurable snowfalls on this date

since 1891. Greatest snow depth on this date was 20 inches in both 1967 and 1969. The worst wind chill conditions occurred in 1917 with a reading of -40 F.

Average dew point for February 11th is 9 degrees F, with a maximum of 36 degrees F in 1908 and a minimum of -35 degrees F in 1899.

All-time state records for February 11th:

Scanning the state climatic data base: the all-time high for this date is 61 degrees F at Luverne (Rock County) in 1977; the all-time low is -55 degrees F at Leech Lake Dam (Itasca County) 1899. The heaviest snowfall statewide on this date occurred in 1939 at Mahanomen when they recorded 14 inches. The all-time state record for precipitation (liquid equivalent) on this date is 1.36 inches at Fort Ripley (Crow Wing County) in 1861.

Words of the Week: Bust or busted

In the jargon used by forecasters, this has nothing but negative connotations....a Bust (with a capital B) is a forecast, usually for a significant event like a winter storm or severe thunderstorm, that does not verify. A forecaster who calls for heavy snow or a blizzard is really providing a headline that cannot be ignored by the public. Consequently, when it doesn't happen it is quite an embarrassment. A busted forecast on the other hand can also refer to a single weather element. For example, sky conditions and temperatures may be as predicted, but it will unexpectedly rain, ruining the forecast.

Outlook:

Partly cloudy and mostly mild over the weekend with many temperatures in the 30s, 40s, and 50s F. Chance of drizzle, light rain or snow later on Sunday. Cooling trend on Monday and continuing next week with a chance for snow on Tuesday. Temperatures will be a few degrees either side of normal.

To: MPR's Morning Edition
From: Mark Seeley
Re: Topics for MPR's Morning Edition, Friday, Jan 7, 2005

HEADLINES:

- Cold start for the New Year
- Snow cover around the state
- Quirky weather story
- Remembering the 1873 Blizzard
- Dangerous weather for next week?
- Almanac for January 7th
- Blue norther
- Outlook

Topic: Cold start to January....

Very cold arctic air dominated the state this week with many low temperatures readings well below zero. Embarrass reported the nation's low on both January 3rd and the 5th with observations of -31 F and -43 F, respectively. On January 6th, Cook, MN reported the lowest temperature in the nation with -36 F. Additionally, the January 5th low of -39 degrees F at Grand Forks, ND set a new record, while -34 F at International Falls tied the record low value.

With the cold air and relative absence of snow cover in many places the depth of ground frost increased and now ranges from 20-30 inches in places.

Topic: Snow depth around the state....

Greg Spoden of the DNR-State Climatology Office provides the following early January assessment....

As of January 5, snow cover was minimal across most of the southern one-half of Minnesota. A major storm moving through the Midwest....dropped one to six inches of snow on the far southern tier of Minnesota counties. Snow depths were four to eight inches north of a line from Fergus Falls to Moose Lake. Most communities north of U.S. Highway 2 report snow depths exceeding 12 inches. Along the Lake Superior highlands, snow depths range from 18 to 24 inches. The January 6 snow depth ranking map will show that snow cover in most of the southern one-half of Minnesota ranks below the 20th percentile when compared with other January 6 snow depths in the historical record. In some southern Minnesota communities, seasonal snowfall totals through early-January are among the lowest in the modern record.

Those who want to keep track of snow cover this winter can go to the State Climatology Office web site for weekly updates...

<http://www.134.84.160.120/doc/snowmap.htm>

Topic: Quirky weather news....

The Christmas snow that fell across southern Texas was so unusual, some observers think it might be marketable.....Associated Press reported earlier this week that a man in Brownsville was selling a basketball sized snowball on eBay for \$5000...so far the highest bid was \$5.50. Brownsville had not seen a measurable snowfall since 1895. Another citizen in Corpus Christi was selling a bowl of snow collected there. No takers on that one.....

Topic: Remembering the blizzard of 1873...

On this date in 1873 a lethal blizzard hit southern Minnesota and northwestern Iowa, killing scores of pioneer settlers of all ages. It was estimated that over 70 Minnesota settlers lost their lives, though most counties were sparsely populated at the time.

The storm moved over the region on a Monday afternoon which began as a rather mild January day with temperatures from 30 to 32 F. Observers noted the approach of a large, dark cloud system from the NW, moving very rapidly over the prairie landscape. The well-known meteorologist Bruce Watson studied this storm and reported that..."the clouds sloped to the ground, and where they intersected the ground, they were white, with smoke like swirls.." evoking an image of a moving wall of snowflakes. When the storm hit it almost immediately brought visibility down to just a few feet, and snow accumulated rapidly on top of an already snow covered landscape. People caught in the open had to scramble for some kind of shelter. Many were put up in town or on the nearest farmstead. Trails and roads were closed down for days by huge drifts.

The New Ulm Smithsonian weather observer reported that the storm posed a serious threat in a matter of minutes because in addition to the snow, the wind blew the already existing foot and a half of snow cover all over the countryside. It snowed and blew on the 7th, 8th, and 9th finally coming to an end about 11 pm on Wednesday. Nine inches of snow was recorded at New Ulm with a drop of 43 degrees F in temperature and estimated wind chill values as low as -45 degrees F. The Minneapolis observer reported 8 new inches of snow with a temperature drop of 51 degrees F, and an estimated wind chill of -40 degrees F. Few blizzards of such suddenness and ferocity have occurred in Minnesota history. The Governor, Horace Austin, and the Minnesota Legislature reacted by appropriating \$5000 for a relief fund which was distributed to survivors in 34 Minnesota counties. Memories of this blizzard were as frightening and vivid to this generation of Minnesotans as those who experienced the famous Armistice Day Blizzard of 1940. Evidence for this can be found in many historical documents and accounts.

MPR listener question: Wintry weather was certainly in the headlines this week across the central U.S., but on Tuesday Knight Ridder

newspapers carried a story about an even more extreme winter weather pattern for next week, some meteorologists suggesting that the coldest temperatures in years may descend upon us. Can you comment?

Answer: I saw the story which emanated from the Climate Prediction Center's weekly hazards assessment that was released on Tuesday afternoon. California and the west will undoubtedly get abundant rainfall and snow as a result of the strong low pressure system coming off the Pacific Ocean. The strength and track of this storm system is still uncertain, but it may come our way by Tuesday and Wednesday of next week. Should this happen we would be in for a great deal of wind and some significant snowfall.

The other feature highlighted in the article was the invasion of an arctic air mass that crossed the north pole from Siberia. This too may bring extremely cold air to Minnesota. Some forecast models estimate a central high pressure in this air mass of 1050 mb, or 31 inches on the home barometer, and lows of -40 F or colder. The state record high pressure value is 31.11 inches at Collegeville, MN on January 21, 1922. That air mass brought temperatures of -50 F to northern Minnesota. Of more recent vintage, remember that when the state record low of -60 F was set at Tower on February 2, 1996, the central pressure of the arctic air mass was about 1044 mb, or 30.8 inches on the home barometer.

But much can change over the next several days. Watch the weather maps daily to see if the arctic high pressure system maintains its continuity or breaks down before the middle of next week.

Twin Cities Almanac for January 7th:

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 15 degrees F standard deviation).

MSP Local Records for January 7th:

MSP weather records for this date include: highest daily maximum temperature of 52 degrees F in 2003; lowest daily maximum temperature of -9 degrees F in 1912; lowest daily minimum temperature of -27 degrees F in 1912; highest daily minimum temperature of 34 degrees F in 1965; record precipitation of 0.30 inches in 1989; and record snowfall of 6.0 inches in 1873.

There have been 23 measurable snowfalls on this date since 1891. Greatest snow depth on this date was 18 inches in 1969. The worst wind chill conditions occurred in 1912 with a reading of -47 F.

Average dew point for January 7th is 5 degrees F, with a maximum of 37 degrees F in 1965 and a minimum of -33 degrees F in 1976.

All-time state records for January 7th:

Scanning the state climatic data base: the all-time high for this date is 59 degrees F at New Ulm (Brown County) in 1933 and at

Amboy (Blue Earth County) in 2003; the all-time low is -54 degrees F at International Falls in 1909. The heaviest snowfall statewide on this date occurred in 1994 near Finland (Lake County) when Wolf Ridge reported 36 inches, which happens to be the state record snowfall for 24 hours. The state record for precipitation (liquid equivalent) on this date is 2.50 inches at Hutchinson in 1999.

Words of the Week: Blue Norther

Texans have certainly felt the bite of winter recently. Fast moving cold fronts from the north during the fall and winter seasons are called blue northers. Historical explanations for this name are varied. Some say the sky is dark blue under a polar high pressure system that descends from the Panhandle area. The air mass is so dry it prevents the formation of clouds. Others say that the drop in temperature is so severe that people turn blue in the cold. Variants of the term include "blue whistler" for the strong winds and aeolian sounds they make, or "blue darter" for the speed of the frontal passage.

Outlook:

Near normal to above temperatures over the weekend with a chance for light snow in the north and perhaps some more freezing rain or drizzle in the south. Warming trend for Monday and Tuesday, but with increasing clouds, wind, and chances for precipitation. Mid week looks quite stormy, with significant snowfall for most areas and strong winds.

To: MPR's Morning Edition
From: Mark Seeley
Re: Topics for MPR's Morning Edition, Friday, Jan 14, 2005

HEADLINES:

- Snow depths increasing, help stabilize soil temperature
- Blizzard anniversaries
- 19th Century weather signals
- Consecutive days below zero F
- Almanac for January 14th
- Regime shift
- Outlook

Topic: Snow depth increasing around the state....

Repeated bouts of flurries and light snow have provided a little bit deeper blanket of snow across many areas of the state this week. Parts of western and central Minnesota picked up 3 to 8 inches early in the week, with St Cloud reporting a new record snowfall on the 12th of 6.2 inches. This fell on top of a paltry 1-2 inches that had existed over the recent holiday season. The added depth should help stabilize the penetration of soil frost with the onset of arctic air for the weekend. In many places frost depths have reached well beyond two feet, and shallow soil temperatures have fallen into the teens F. But the added snow cover should prevent them from declining even more. However, areas missed by the recent snow, are likely to see an increase in frost depth of at least one foot if not more by Sunday.

Topic: Significant Blizzard Anniversaries

Last week we mentioned the famous Minnesota blizzard of January 7-10 of 1873. This week is the 30th anniversary of Minnesota's Storm of the Century, a blizzard which occurred on January 10-12, 1975. This storm produced record low barometric pressure values, (28.40 inches at Grand Portage), snowfalls ranging from 6 to 23 inches, winds in excess of 50 mph, windchill values of -40 to -60 degrees F and zero visibilities. Fortunately, it was a well forecasted storm with National Weather Service meteorologists giving up to 14 hours notice on expected blizzard conditions. Up to 35 deaths were blamed on the storm and it took up to 11 days to clear many blocked roads with snow drifts over 20 feet. As many as 168 passengers were stranded on a train in Willmar until the tracks could be cleared. The American Red Cross provided food and shelter to nearly 17,000 people who were either stranded or had lost power at home.

This week is also the 117th anniversary of the 19th Century's most lethal blizzard in Minnesota, that of January 12-13, 1888. Known as "The Children's Blizzard" it is described by author David Laskin in his new book by the same name. Like the blizzard of 1873, this blizzard struck after a mild morning period (temps in the 30s F)

during which people had set off for school or to do outdoor chores. Many ended up being trapped out in fields, on the road or at schools. Dangerous windchill conditions persisted for many hours with very little visibility due to blowing snow. There were about 200 deaths associated with the storm, both in Minnesota and neighboring states. Many were school children trying to get home from school. The mercury dipped to -37 degrees F in St Paul following the storm, and the very next week it hit an all-time record low of -41 degrees F, unsurpassed in the modern weather records of the Twin Cities.

Topic: 19th Century Weather Signals for Great Lakes Shipping

During the 19th century the Weather Service instituted a system of flag and pennant signals to provide tows and shipping vessels with a warning of expected dangerous weather conditions. A square white flag alone indicated fair weather, a square blue flag rain or snow. A white flag with a black square in the center indicated the approach of a cold wave. A red flag with a black center indicated the approach of a severe storm. Pennants displayed with the flags indicated the expected wind direction. A red pennant was used for easterly winds, and a white pennant for westerly. If the pennant was above the flag, favors a northerly quadrant, while the pennant below the flag favors a southerly quadrant.

These weather signals were displayed continuously during daylight hours, but no nighttime signals were provided.

MPR listener question: I moved to the Twin Cities from Alabama in 1999 and have been told repeatedly that the coldest week of the year is the 4th week of January (22-28). Is this true? Also when was the last time we averaged below zero temperatures for several days?

Answer: Based on average daily temperature values, the 4th week of January is the coldest in the Twin Cities over the past 100 years of record. This is not uniformly true across the state however. At Duluth, for example, the coldest week historically is the 3rd week of January (15-21).

Concerning the last spell of several days below zero F in the Twin Cities, we recorded three consecutive days below zero F in 1996, from February 1st to the 3rd. The average high was -13 F and the average low was -28 F. Back in 1994 we had a spell that lasted five consecutive days, from the 14th to the 18th of January. The average daily high was -8 F and the average daily low was -22 F. The longest ever such spell occurred from January 1st to the 7th in 1912, when the average high was -8 F and the average low was -21 F over seven consecutive days.

Twin Cities Almanac for January 14th:

The average MSP high temperature for this date is 23 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 January 14th:

MSP weather records for this date include: highest daily maximum temperature of 49 degrees F in 1944; lowest daily maximum temperature of -16 degrees F in 1972; lowest daily minimum temperature of -26 degrees F in 1963 and 1972; highest daily minimum temperature of 32 degrees F in 2001; record precipitation of 0.34 inches in 2001; and record snowfall of 4.4 inches in 1999. There have been 28 measurable snowfalls on this date since 1891. Greatest snow depth on this date was 17 inches in 1970 and 1984. The worst wind chill conditions occurred in 1972 with a reading of -48 F.

Average dew point for January 14th is 7 degrees F, with a maximum of 37 degrees F in 1947 and a minimum of -38 degrees F in 1972.

All-time state records for January 14th:

Scanning the state climatic data base: the all-time high for this date is 57 degrees F at Browns Valley (Traverse County) in 1987; the all-time low is -50 degrees F at Cook and Cotton (St Louis County) in 1965. The heaviest snowfall statewide on this date occurred in 1923 at Campbell (Wilkin County) when they recorded 12 inches. The state record for precipitation (liquid equivalent) on this date is 1.60 inches at Milan (Chippewa County) in 2001, which fell as rain, freezing rain, sleet, and snow.

Words of the Week: Regime shift

This term has perhaps been used historically to describe changes in political or military leadership rather than changes in the natural world. In the modern scientific context it refers to rapid reorganization and behavioral alteration of ecosystems, more often than not brought on by a change in climate. These shifts may last for years, decades, or centuries. Sometimes the climate change is associated with extent and quantity of sea ice, atmospheric pressure patterns and winds, precipitation, or temperature. All of these can alter the environment enough to change biological species composition, abundance, competition, etc.

Outlook:

Bitterly cold weekend coming up (white flag with a black square signal in the old days)...may have a number of days where the temperature remains below zero F in places. Some moderation in temperature will be in evidence on Monday, with readings above zero F in southern counties. Then a chance for snow on Tuesday, Wednesday and Thursday next week. Temperatures will continue to average cooler than normal, but not so drastically.

To: MPR's Morning Edition
From: Mark Seeley
Re: Topics for MPR's Morning Edition, Friday, Feb 18, 2005

HEADLINES:

- New Seasonal Climate Outlook
- A February Day
- Cold Returns
- Wireless Weather Station
- Proposal for a World Weather Service
- Almanac for February 18
- Xeriscaping
- Outlook

Topic: New Seasonal Climate Outlook..March through May

The NOAA Climate Prediction Center issued its new seasonal outlooks on Thursday of this week. For Minnesota, the western counties are likely to see a trend toward warmer than normal March temperatures, while the rest of the state will have equal chances for warmer or colder than normal temperatures during the period. In regard to moisture, the outlook favors somewhat above normal precipitation across the southern tier of counties and equal chances for wetter or drier than normal conditions across the balance of the state.

Topic: A wet day in February....

Following a weekend that brought some record setting high temperatures last week, the skies opened up with rain and snow late Sunday and into Monday (Valentine's Day) producing some record setting amounts in places. The following locations reported new record amounts of precipitation for February 13th.

Rochester 0.40 inches of precipitation and with 2.5 inches of snow; Sioux Falls set a record of 0.90 inches of precipitation; Faribault reported a record 0.80 inches of precipitation; New Ulm reported a record 0.68 inches of precipitation; Lakefield reported a record 0.65 inches of precipitation; and Zumbrota reported a record 0.78 inches.

These values may seem modest, but bear in mind that February is our driest month historically, and some of these precipitation amounts are the equivalent of the monthly average!

Topic: Return to cold temperatures.....

After a run of five consecutive days with temperatures well above normal, cold air settled over Minnesota at mid-week and brought several below zero readings to northern counties.

For just the second time this month, Minnesota reported the coldest temperature in the contiguous 48 states on Friday (Feb 18) morning with -36 F at Embarrass.....on the 8th of the month Roseau had a similar distinction with a reading of -20 F.

Topic: New wireless weather stations....

Among the several new wireless weather stations available for the home, Oregon Scientific has released one that not only gives you the temperature outside, but it also serves as an alarm clock and electronic calendar. With an easy to read large LCD display, you can glance over with one eye and decide whether to stay under the covers or get out of bed and enjoy a nice, perhaps brisk, morning walk.

MPR listener question: (a 7th grader from Apple Valley wrote with this one) I have heard you compare and contrast the weather services of a number of countries, and also heard you say that some countries do not have their own weather service. Do you think that the world will ever have one combined weather service that meets the forecasting needs of everyone?

Answer: Actually, that very topic is being discussed at the World Earth Observation Summit in Brussels, Belgium this week. Leaders of government weather services are presenting a proposal to link their observational networks, technologies, and communications systems in such a way that they can provide world wide watch and warning services for severe weather events, and even tsunamis. It is an ambitious goal, but given the recent disaster in the Indian Ocean and the vulnerability of many societies to weather disasters perhaps they will find ways to finance it and make it come to be.

Twin Cities Almanac for February 18th:

The average MSP high temperature for this date is 27 degrees F (plus or minus 13 degrees F standard deviation), while the average low is 11 degrees F (plus or minus 15 degrees F standard deviation).

MSP Local Records for February 18th:

MSP weather records for this date include: highest daily maximum temperature of 58 degrees F in 1981; lowest daily maximum temperature of -7 degrees F in 1941; lowest daily minimum temperature of -21 degrees F in 1903; highest daily minimum temperature of 36 degrees F in 1915, 1998 and 2002; record precipitation of 0.70 inches in 1961; and record snowfall of 7.0 inches also in 1961. There have been 27 measurable snowfalls on this date since 1891. Greatest snow depth on this date was 27 inches in 1967. The worst wind chill conditions occurred in 1941 with a reading of -45 F.

Average dew point for February 18th is 15 degrees F, with a maximum of 42 degrees F in 1981 and a minimum of -29 degrees F in 1941.

All-time state records for February 18th:

Scanning the state climatic data base: the all-time high for this date is 66 degrees F at Pipestone in 1981; the all-time low is -48 degrees F at Roseau in 1966. The heaviest snowfall statewide on this date occurred in 1962 at Worthington (Nobles County) where they record 16 inches. The all-time state record for precipitation (liquid equivalent) on this date is 1.80 inches at Black Duck (Beltrami County) in 2004.

Word of the Week: Xeriscaping

Who's escaping? Just kidding. This term is used to describe landscape planning and planting practices which strive to conserve water by mulching, using soil amendments like compost or manure, and by selecting species with low water requirements such that they can thrive on natural precipitation for the most part. This is not a common practice in Minnesota, but it has been tried in the drier climates of North Dakota, some of the western states, and especially the desert southwest. In some areas of the country over half of the residential water use goes to watering landscape plants and lawns. Xeriscaping has been shown to reduce water usage by up to 70 percent in some cases.

Outlook:

Continuing cold on Saturday, then warmer and increasing cloudiness on Sunday with a chance for snow, perhaps 2-6 inches in places. In some eastern and northern areas snow may linger into Monday. Generally cool and dry weather much of next week, with some warmer temperatures by the end of the week.

To: MPR's Morning Edition
From: Mark Seeley
Re: Topics for MPR's Morning Edition, Friday, Feb 25, 2005

HEADLINES:

- Correction to last week's precipitation report
- National Weather Service User Survey
- Dose of Winter for Europe and Asia
- Preliminary February Climate Summary
- Atmospheric Optics
- Atmospheric Pressure Records
- Almanac for February 25th
- Parry Arcs
- Outlook

Topic: Correction on last week's precipitation at Waseca

The new record precipitation value on February 13th (1.05 inches) reported for Waseca last week was incorrect. The Research and Outreach Center actually reported 0.60 inches, and though this is high for the month of February, it is not a record amount.

Topic: National Weather Service User Survey

In the past the National Weather Service has conducted user surveys for specific products such as aviation or marine forecasts. For the first time they are conducting a survey of the general public concerning all of their products.

This is your chance to give them some feedback and make suggestions. I encourage you to take the online survey at their web site. It takes about 10-12 minutes to complete.
Go to:

<http://www.myfeedback.cfigroup.com/cgi-bin/qwebcorporate.dll?idx=R77JDH>

Topic: Dose of Winter for Europe and Asia

While California storms have produced the weather headlines in America this week, Asian and European nations have been experiencing a severe dose of winter weather, for some the worst in nearly two decades. In the Kashmir region divided between Indian and Pakistan, heavy snowfall has produced avalanches that have killed scores of people. Afghanistan has been crippled by heavy snow and severe cold as well. Across Europe, 4 to 8 inches of snow has fallen across England and Scotland, while the Czech Republic reported up to 16 inches. Air traffic was halted at France's Orly Airport in order to clear snow from the runways and over 200 flights were cancelled at Germany's Munich Airport. Elsewhere, 12 inches of snow fell on Vienna and they even had snow on the beach at Nice on the French Riviera. Good

luck to those taking a winter vacation there!

Topic: Preliminary Climate Summary for February

With more snow likely between now and the end of the month, precipitation and snowfall totals are likely to go up. Nevertheless certain climate characteristics of the month can be highlighted.

Mean February temperature was above normal by 4 to 8 degrees F. The extreme values ranged from a low of -36 degrees F at Embarrass on the 18th to a high of 68 degrees F at Lambert on the 5th. The reading at Lambert was within 5 degrees F of the all-time state high for February of 73 degrees F at Pleasant Mound in 1896.

Highest wind speeds, ranging between 30 and 40 mph, came on the 5th, the warmest day of the month. Strong southerly winds brought a good deal of water vapor as well, with the dew point reaching as high as 37 degrees F in the Twin Cities.

Total monthly precipitation for February was generally short of normal in the northern counties and above normal in the central and southern parts of the state. Many places reported over 1 inch, and a few more than two inches. Snowfall values varied considerably. Several places reported between 10 and 20 inches, including Duluth, Wabasha, Zumbro Falls, Two Harbors, and Finland. But it looks like the last weekend of this month may bring further significant snows to some of these areas.

MPR listener question: I was out walking my dog and thought I saw northern lights, but then realized they were columns of vertical light showing up over bright sources of light on the horizon, some coming from a nearby ski hill. Because it was so cold I wondered if this was due to ice crystals in the air. Is that the explanation?

Answer: What I think you saw were light pillars from artificial lights on the ground rather than from moonlight or sunlight. These vertical shafts of light are indeed seen in cold air when there are suspended ice crystals near the surface that reflect the light in specific ways. The ice crystals are usually horizontally oriented hexagonal plates, whose faces reflect the unshielded light coming up from below and send it back downward, making it appear as a shaft. The depth of the layer of suspended ice crystals can be hundreds to thousands of feet and consequently the vertical shafts of light can appear to be quite tall. Like sun pillars and moon pillars, these shafts of light are more visible in the evening or pre dawn of the morning when the air is still.

More information on the optical properties of ice crystals in the atmosphere can be found on the following web sites..

<http://www.sundog.clara.co.uk>

http://meted.ucar.edu/norlat/snow/micro_ice/1.1.crystal_growth.htm

MPR listener question: What are the state records for lowest and highest atmospheric pressure and how do they compare to world record values? What is the associated weather?

Answer: For Minnesota, the highest atmospheric pressure of 31.11 inches occurred at Collegeville on January 21, 1922, accompanied by a very cold (-22 F), clear, and calm night associated with an arctic air mass. The lowest pressure of 28.40 inches occurred at Grand Portage on January 11, 1975, accompanied by strong winds (40 to 50 mph) and heavy rain (over two inches).

The world record for highest atmospheric pressure is 32.06 inches on December 19, 2001, at Tosontsengel, Mongolia, under an arctic air mass that brought temperatures in the -60 to -70 F range.

The lowest atmospheric pressure ever measured was 25.69 inches on Oct. 12, 1979, in the eye of Super Typhoon Tip, when it was 520 miles northwest of Guam in the northwestern Pacific Ocean. It brought winds up to 190 mph.

Twin Cities Almanac for February 25th:

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 25th:

MSP weather records for this date include: highest daily maximum temperature of 58 degrees F in 1976; lowest daily maximum temperature of 2 degrees F in 1934; lowest daily minimum temperature of -23 degrees F in 1967; highest daily minimum temperature of 42 degrees F in 2000; record precipitation of 0.63 inches in 1944; and record snowfall of 4.8 inches in 2001. There have been 27 measurable snowfalls on this date since 1891. Greatest snow depth on this date was 27 inches in 1967. The worst wind chill conditions occurred in 1919 with a reading of -35 F.

Average dew point for February 25th is 14 degrees F, with a maximum of 40 degrees F in 1930 and a minimum of -30 degrees F in 1967.

All-time state records for February 25th:

Scanning the state climatic data base: the all-time high for this date is 66 degrees F at Beardsley (Big Stone County) in 1958; the all-time low is -50 degrees F at Leech Lake Dam (Cass County) in 1897. The heaviest snowfall statewide on this date occurred in 2001 at Wolf Ridge Environmental Learning Center near Finland (Lake County) where they recorded 19 inches. The all-time state record for precipitation (liquid equivalent) on this date is 2.28 inches at Cass Lake (Cass County) in 1930.

Words of the Week: Parry arcs

First reported and studied by Sir William Edward Parry in the early 19th Century, these arcs of light which sometimes form halos are seen in the early morning or late evening when the sun is near or below the horizon. Parry studied them when he was ice bound in the Arctic Ocean while searching for the Northwest Passage in 1820. The arc or halo effect is produced by the light that is refracted through horizontally-oriented column ice-crystals. These crystals are hexagonal, with angled surfaces that produce prism structures. They are rare and most often seen at high latitudes. The arcs may be concave or convex in form.

Outlook:

Partly to mostly cloudy on Saturday with warmer than normal temperatures. Then rain and snow will develop around the state late in the day and into Sunday. Significant lake-effect snow may fall along the Lake Superior landscape Sunday night into Monday. Most of next week will see temperatures that are cooler than normal, with a warming trend beginning on Thursday.

To: MPR's Morning Edition
From: Mark Seeley
Re: Topics for MPR's Morning Edition, Friday, Mar 4, 2005

HEADLINES:

- March is a wild month weatherwise
- A salute to Don Baker
- Lions and lambs in March
- Almanac for March 4th
- The Water Tower of Europe
- Outlook

Topic: March can be wild.....

Minnesota has reported the coldest temperature in the 48 contiguous states on the first three days this month:
-18 F at Cook on the 1st, -33 F at Embarrass on the 2nd, and -25 F at Tower and Embarrass on the 3rd.

Well we're all familiar with March, probably the most varied month of weather in Minnesota.....and the windiest celebration day on the calendar, St Patrick's Day on the 17th. Consider what March has offered to us in years past.....

Severe thunderstorms and tornadoes (14 in 1998)
Severe blizzards including March 14, 1941 and March 4, 1966
-50 degrees F at Pokegama Dam in 1897
88 degrees F at Montevideo in 1910
75 inches of snow on the ground at Grand Portage in 1950
A 29 inch snow storm at Karlstad in 1966
A monthly total of 66.5 inches of snow at Collegeville in 1965
In dry winters prairie and forest fires
In wet winters spring floods

I always hope for a quiet, dull March, but it never happens.

Topic: Honoring a friend and colleague

This Friday, March 4th the University of Minnesota Board of Regents will honor Dr. Don Baker with the Outstanding Achievement Award for a lifetime of research, teaching and service to the university and the greater Minnesota community. Don is the man who hired me back in the 1970s and also the one who mentored my professional development.

Don Baker has a 66 year relationship with the university, beginning as a high school student in 1939.

He founded the climatology program at the university, serving on the faculty from 1958 to 1994. He published scores of scientific articles, including the Climate of Minnesota series, which is still the best description of the state's climate.

He also founded the St Paul Climate Observatory in 1960. A feature of the St Paul Campus that continues today to record all of the most relevant climate data on a daily basis.

It was Don's study of the state's winds in the 1970s and early 1980s that provided the fundamental knowledge to deploy the wind turbines that generate electricity in western Minnesota. Minnesota ranks third among states in the utilization of this sustainable energy resource.

Aside from all of his scientific accomplishments, Don has been a role model to many university students and faculty members. He is truly a gentleman and a scholar of the first order. Congratulations to him.

MPR listener question: I have always been told if March comes in like a lion, it will go out like a lamb. What is the historical performance of this old saying?

Answer: Actually, I examined this old saying using the Twin Cities climate records and found little evidence to support it. My criteria were if the month started stormy or bitterly cold on the first two days, did it end quietly or with pleasant warmth on the last two days. I used a significant temperature departure beyond one standard deviation as my yardstick, as well as the occurrence of precipitation in the form of rain or snow.

Since 1891, I found only 15 cases where the March climate pattern conformed to this old saying. So that's a rather small percentage.

Twin Cities Almanac for March 4th:

The average MSP high temperature for this date is 33 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 17 degrees F (plus or minus 12 degrees F standard deviation).

MSP Local Records for March 4th:

MSP weather records for this date include: highest daily maximum temperature of 61 degrees F in 1983 and 2000; lowest daily maximum temperature of 8 degrees F in 1917; lowest daily minimum temperature of -26 degrees F in 1865; highest daily minimum temperature of 50 degrees F in 1894; record precipitation of 0.80 inches in 1984; and record snowfall of 9.6 inches in 1984. There have been 31 measurable snowfalls on this date since 1891. Greatest snow depth on this date was 24 inches in 1962. The worst wind chill conditions occurred in 1917 with a reading of -30 F.

Average dew point for March 4th is 16 degrees F, with a maximum of 53 degrees F in 1983 and a minimum of -17 degrees F in 1978.

All-time state records for March 4th:

Scanning the state climatic data base: the all-time high for this

date is 70 degrees F at Currie (Murray County) in 1905 and at Luverne (Rock County) in 2000; the all-time low is -43 degrees F at Bagley (Clearwater County) in 1917. The heaviest snowfall statewide on this date occurred in 1966 at Isabella (Lake County) where they recorded 26 inches. The all-time state record for precipitation (liquid equivalent) on this date is 3.54 inches in that same storm at Isabella.

Words of the Week: "The water tower of Europe"

These words are used to describe the country of Switzerland, specifically the Swiss Alps which serve as a source region for many of Europe's great rivers. Many major watersheds in Germany, France, Austria, and Italy are fed by the spring and summer runoff from the Swiss Alps. These waters are vital to the European community in terms of hydroelectric power generation, agricultural and municipal water supply, and recreation.

Outlook:

Increasing cloudiness on Sunday with a chance for snow and perhaps freezing drizzle. Some chance for light snow continuing into Monday and Tuesday. Otherwise generally a quiet period. Temperatures will be near normal for this time of year. There will be a better chance for snow later next week.

To: MPR's Morning Edition
From: Mark Seeley
Re: Topics for MPR's Morning Edition, Friday, Mar 11, 2005

HEADLINES:

- Warm March 6th
- Sources of soot
- Climate impact on 2004 crop yields
- Wind characteristics of SW Minnesota
- Almanac for March 11th
- Foley weather effects
- Outlook

Topic: Remarkably warm March 6th.....

Sunday, March 6th brought a teasing glimpse of spring to most of the state. Southerly breezes and plenty of sunshine brought us the 3rd warmest March 11th in Minnesota history. Scores of communities reported temperatures in the 60s, about 20-25 degrees warmer than normal, with both Canby and Fairmont reporting 70 degrees F. Only 1987 and 2000 brought warmer temperatures on March 11th.

The warm day produced some interesting human reactions: tennis players taking to the courts; skiers out in shorts and short-sleeve shirts, motorcyclists on the highways, and kite flying in some of the city parks.

Topic: Source of poor air quality in South Asia

Having endured at least two episodes of poor air quality here in the Twin Cities this winter due to high concentrations of small particulates (soot) in the lower atmosphere, I was intrigued by the article in Science magazine last week about sources of soot in India. It seems that soot is a major pollutant in that area and much of it comes from the burning of wood, agricultural wastes, and dried animal manure for cooking. Conversion to cleaner cooking technologies over time will likely help mitigate this situation in India. The major sources of soot in our Minnesota environment are likely fossil fuel combustion involving power generation, industrial processing, or transportation, none of which can be mitigated by cleaner cooking technologies.

Topic: Why such good crop yields in 2004?

With the coolest growing season in quite some time and widespread frost across the state in August last year, many agronomists were puzzled by the very high yields achieved by major crops in the region, notably corn and soybeans. A recent analysis from the Midwest Climate Center in Illinois attributes much of the production achievement to improved plant genetics and

farming practices, but also points out an unappreciated climate feature of last summer that likely contributed to the high yields as well: MORE SUNSHINE. It seems that clear days were in great abundance across the region last summer as a result of the dominance of cool, dry, Canadian high pressure systems. In fact the combination of cool air temperatures and clear sky conditions had not been seen to the same extent since 1927! Historically, most summers with frequent clear days were associated with summer droughts.

The amount of sunshine in September 2004 was exceptional for finishing crops as St Paul, Lamberton, and Waseca all reported solar radiation values for the month that were 10-12 percent above their respective historical averages. In addition, the National Weather Service reported over 76 percent possible sunshine in September compared to a historical average of only 62 percent.

MPR listener question: From a southwestern Minnesota resident, a question comes about which months are the windiest and historically what time of year does the most wind erosion occur?

Answer: Using historical data from Marshall, Redwood Falls, and Windom all three show that based on average wind speeds April is the windiest month of the year, showing an average between 12 and 13 mph. Across the other seasons of the year, January is the windiest of the winter months, November of the fall months, and June of the summer months.

In terms of soil erosion due to high wind speeds, April and November are historically the months when wind blown soil can be observed particularly in dry seasons. These are months when soil is often exposed and unprotected by snow cover. The dominant trajectory for wind blown soil during these months is from the northwest, as wind speeds in excess of 23 mph (10 m/s) required to move soil particles show a statistical frequency spike during these times.

Twin Cities Almanac for March 11th:

The average MSP high temperature for this date is 37 degrees F (plus or minus 10 degrees F standard deviation), while the average low is 21 degrees F (plus or minus 12 degrees F standard deviation).

MSP Local Records for March 11th:

MSP weather records for this date include: highest daily maximum temperature of 61 degrees F in 1822 and 1902; lowest daily maximum temperature of 6 degrees F in 1906; lowest daily minimum temperature of -27 degrees F in 1948; highest daily minimum temperature of 45 degrees F in 1977; record precipitation of 1.30 inches in 1990; and record snowfall of 8.2 inches in 1962. There have been 27 measurable snowfalls on this date since 1891. Greatest snow depth on this date was 22 inches in 1979. The worst wind chill conditions occurred in 1948 with a reading of -43 F.

Average dew point for March 11th is 20 degrees F, with a maximum of 50 degrees F in 1990 and a minimum of -34 degrees F in 1948.

All-time state records for March 11th:

Scanning the state climatic data base: the all-time high for this date is 66 degrees F at Marshall (Lyon County) in 1990; the all-time low is -41 degrees F at Moose Lake (Carlton County) in 1948. The heaviest snowfall statewide on this date occurred in 1897 at both New London (Kandiyohi County) and Sauk Center (Stearns County) where they recorded 16 inches. The all-time state record for precipitation (liquid equivalent) on this date is 3.00 inches at Waseca in 1918, this was accompanied by thunder and lightning, followed by blizzard conditions that left large drifts.

Words of the Week: Foley weather effects

Jack Foley was a Universal Studios motion picture sound effects legend in the 20th Century. He died in 1967. But he pioneered sound effects for the motion picture industry, including weather sounds. Sometimes outdoor scenes were shot to capture images that were made more stunning or menacing by the weather. But on occasion the weather would cooperate in producing the proper visual image, but not the associated sound effects. Jack Foley was able to go into the post production editing process and produce sounds that were appropriate to the weather depicted on film, including thunder, wind, hail, splashing, etc. Today, nearly all weather sounds are available in recorded clips and can be plugged into various audio and visual media productions to add effect.

Outlook:

A cool period of weather coming up. Chance for snow and snow showers over the weekend, in the south on Saturday and north on Sunday, both days should show a good deal of wind. Then remaining cool into next week with below normal temperatures. Another chance for snow on St Patrick's Day (Mar 17) and Friday.

To: MPR's Morning Edition
From: Mark Seeley
Re: Topics for MPR's Morning Edition, Friday, Mar 18, 2005

HEADLINES:

- Remembering March of 1951, the snowiest
- 80th anniversary of the Tri-State Tornado
- Golf in Greenland
- March brings mixed precipitation types
- Almanac for March 18th
- Keck's Swamp Angel of the 19th Century
- Outlook

Topic: March of 1951 is still remembered.....

Much of the weather lore related to Minnesota State High School Tournaments and troublesome weather dates back to March of 1952, when up to 14 inches of snow fell during the boys basketball tournament week making team travel extremely difficult. But in the preceding year, 1951, March delivered perhaps the snowiest month of weather ever seen around the state, with heavy snows before and after the boys high school basketball tournament.

What a month it was. St Cloud reported at least a trace of snowfall on 23 days during the month, while the Twin Cities recorded measurable snowfall on 15 days. Alexandria reported 42 consecutive hours of snowfall over the 17th and 18th, while Marshall and Windom recorded 16 inches of snow over those dates, with winds up to 50 mph. All of the major highways in Minnesota were closed, including Hwy 212, Hwy 12, Hwy 10, Hwy 14, Hwy 61, and Hwy 52.

Some snowfall totals for the March of 1951 included....

Bird Island 41.8 inches	Campbell 40 inches
Montevideo 44 inches	Morris 46.5 inches
New London 48 inches	New Ulm 40 inches
Tracy 40 inches	Wheaton 42.3 inches
Willmar 44.6 inches	Farmington 43 inches
Grand Meadow 42.5 inches	Jordan 45.9 inches
Maple Plain 43.1 inches	Minneapolis 40.0 inches
Rosemount 49.8 inches	Waseca 41 inches

The statewide average monthly snowfall was nearly 30 inches. Roads in the Wheaton area were closed for 11 days. Numerous roofs collapsed as a result of snowload, and the heavy snow set up spring flooding on Minnesota's major watersheds in the spring.

Topic: 80th Anniversary for one of America's worst tornadoes

On this date (March 18) in 1925, some residents of Missouri,

Illinois, and Indiana probably thought the world was coming to an end. The famous Tri-State tornado was crossing those states, along a 219 mile path over a period of 3.5 hours, from 1:00 to 4:30 pm. This F-5 storm (winds near 300 mph) damaged or destroyed 19 communities and killed 695 people. The vortex varied from 1/2 mile to 1 mile in diameter. It caused the greatest loss of life of any historically documented tornadoes in the USA.

Topic: A unique golf experience in Greenland

There is an article in the current edition of Weatherwise magazine that describes the "northernmost ice-free accredited 18-hole golf course on Earth. It is the Sondie Arctic Desert Golf Course in Greenland. The 6040 yard, par 72 course was built in 1990. Located near Kangerhussuaq off the edge of the Greenland ice sheet, at 67 degrees north latitude, 35 miles north of the Arctic Circle, this course has a mobile home for a club house. The course has no turf, but is built on groomed glacial alluvial sand deposits. You carry around a piece of AstroTurf to place your ball on for every shot, until you putt on the sandy "greens." In the summer, you can tee off anytime, because the course never needs watering and the sun is out all of the time! Be sure to bring sun block and sun glasses.

MPR listener question: Is March the month of the year when we get the greatest variety of precipitation in the Twin Cities area? It seems we get about every form of precipitation during this month.

Answer: Yes, indeed, I agree with you. There are other months that get more snow, hail, freezing rain, and thunderstorms, but for variety, based on historical data March can deliver just about anything.

The average number of days with snowfall in March is 6 to 7; the average number of thunderstorms is 1; the frequency of freezing rainfall is once every five years; and frequency of hail is about one year in ten. The overall frequency for any form of precipitation during March is about one day in every three.

Twin Cities Almanac for March 18th:

The average MSP high temperature for this date is 39 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 23 degrees F (plus or minus 11 degrees F standard deviation).

MSP Local Records for March 18th:

MSP weather records for this date include: highest daily maximum temperature of 73 degrees F in 1842; lowest daily maximum temperature of 3 degrees F in 1923; lowest daily minimum temperature of -8 degrees F in 1923; highest daily minimum temperature of 48 degrees F in 1968; record precipitation of 1.07

inches in 1968; and record snowfall of 9.6 inches in 1951. There have been 21 measurable snowfalls on this date since 1891. Greatest snow depth on this date was 27 inches in 1951. The worst wind chill conditions occurred in 1923 with a reading of -37 F.

Average dew point for March 18th is 23 degrees F, with a maximum of 50 degrees F in 1921 and a minimum of -14 degrees F in 1923.

All-time state records for March 18th:

Scanning the state climatic data base: the all-time high for this date is 84 degrees F at Canby (Yellow Medicine County) in 1921; the all-time low is -48 degrees F at Sawbill Camp (Cook County) in 1939, where they had 63 inches of snow on the ground. The heaviest snowfall statewide on this date occurred in 1933 at Albert Lea where they recorded 20 inches. The all-time state record for precipitation (liquid equivalent) on this date is 2.48 inches at Collegeville Stearns County) in 1903, delivered by two separate thunderstorms, one of which included hail.

Words of the Week: Keck's Swamp Angel

Though not a meteorological term, this device is climate related. In the late 19 Century (a relatively wet period climatically) when Minnesota farmers were always plagued by wet and ponded soils in the spring that postponed their ability to get crops planted, pioneer settler Harry Keck devised a deep plow that would assist in cutting drainage ditches to allow the excess water to run off. This device was also used to drain a number of wetland areas in the state.

It was very heavy and difficult to pull through the soil. He had to use a team of 20 oxen. But it accomplished its purpose and was used throughout southern and central Minnesota on wetland soils. The term Swamp Angel may have been derived because of the enormous weight of the plow, perhaps approaching the 8 ton weight of the Swamp Angel cannons used in the Civil War.

Outlook:

Recovery from a very wet, windy, and snowy Friday (10-15 inches of snow in the forecast for southern counties) will slowly begin on Saturday, with some lingering flurries and wind. Sunday will be sunnier and a bit warmer. Temperatures will average a few degrees warmer than normal next week, with another chance for showers by Thursday. Daytime highs in the 40s F will likely make the snow cover in southern Minnesota short-lived.

To: MPR's Morning Edition
From: Mark Seeley
Re: Topics for MPR's Morning Edition, Friday, Mar 25, 2005

HEADLINES:

- Classes Without Quizzes
- March 18th snow storm
- Hurricane track forecasts
- Easter Sunday climatology
- Almanac for March 25th
- Soundings
- Outlook

Topic: Classes Without Quizzes on April 2nd....

The College of Agricultural, Food, and Environmental Sciences will be hosting the Annual Classes Without Quizzes on Saturday, April 2nd from 8:30 am to 2:00 pm on the St Paul Campus. I will be presenting a lecture at 9:00 am entitled "Torrid, Tornadic, and Traumatic: Perceptions and Trends in Minnesota's Severe Weather." There will be other sessions during the morning on pet nutrition, renewable energy, tax law, woody plants and gardening, dietary supplements, improved crops, and food safety. The event is open to the public and just \$20 for adults, \$15 for alumni, and \$10 for students. More information can be found at the COAFES web site: <http://www.coafes.umn.edu/cwq> or by calling (612)-624-1745.

Topic: Final comments on snow storm of March 18, 2005

Kiester in Faribault County reported a grand total of 21 inches of snowfall last Friday, March 18th, breaking the statewide record for that date, formerly held by Albert Lea where it snowed 20 inches in 1933. Numerous locations in southern Minnesota reported between 15 and 20 inches, including Rochester which reported an all-time single date record of 19.8 inches. For several locations, that storm will be noted as one of the heaviest falls of snow ever in the month of March, yet coming in essentially a snow deprived winter.

Topic: Hurricane track forecasts to remain as a drawn line

NOAA administrators attending the National Hurricane Conference this week in New Orleans reported that survey results suggested that they keep using the narrow black line on a map to depict their best estimate of a hurricane track. This method was criticized last year, especially when Hurricane Charley took a sharp right turn in its path, diverting away from the Tampa, FL area and striking instead into Punta Gorda. It seems the public should perceive that any storm path forecast probably has error bands of 100 miles on either side of the line. Certainly Minnesotans understand this to be the case with the forecasted track of winter storms, so why should it not be implied in hurricane track forecasts as well?

MPR listener question: What is the climatology of Easter Sunday in the Twin Cities area? I know that the date varies considerably, but what can you tell us about the historical weather on Easter Sunday.

Answer: Indeed, the date of Easter has varied from March 23rd to April 25th, and we can certainly have huge differences in weather across such a range of dates. On average a March date for Easter Sunday brings highs in the 40s F and lows in the 20s F. Since the establishment of the National Weather Service in the Twin Cities in 1891, Easter Sunday has occurred in March twenty-five times. Of those dates, eight have been wet, and six have brought snowfall, the most 2.5 inches on March 31, 1929.

Since 1891, Easter Sunday has occurred in April 89 times. By the way it has never occurred on April 24th, but has occurred once as late as April 25th in 1943. Of the April Easter Sundays, 27 have been wet, and 4 have brought snowfall. Two Easter Sundays have seen thunderstorms in the Twin Cities area, both 1941 and 1998. Average daytime highs for Easter Sunday in April are in the 50s and 60s F, with lows in the 40s.

Climate extremes for Easter Sunday include a high of 88 degrees F on April 10, 1977, a low of -2 degrees F on March 25, 1894, and a maximum total precipitation of 0.49 inches on April 13, 1941. The last dense fog on Easter was in 1993, and the worst wind chill conditions were in 1894 and 1920 when readings of -15 degrees F were noted. Looking for Easter eggs was difficult in 1975 as there was still 10 inches of snow on the ground Easter Sunday, March 30th.

Twin Cities Almanac for March 25th:

The average MSP high temperature for this date is 45 degrees F (plus or minus 14 degrees F standard deviation), while the average low is 28 degrees F (plus or minus 11 degrees F standard deviation).

MSP Local Records for March 25th:

MSP weather records for this date include: highest daily maximum temperature of 78 degrees F in 1939; lowest daily maximum temperature of 12 degrees F in 1955; lowest daily minimum temperature of -8 degrees F in 1867; highest daily minimum temperature of 51 degrees F in 1945; record precipitation of 1.43 inches in 1890; and record snowfall of 3.6 inches in 1996. There have been 14 measurable snowfalls on this date since 1891. Greatest snow depth on this date was 20 inches in 1951. The worst wind chill conditions occurred in 1894 and 1955 with a reading of -20 F.

Average dew point for March 25h is 24 degrees F, with a maximum of 58 degrees F in 1945 and a minimum of -12 degrees F in 1955.

All-time state records for March 25th:

Scanning the state climatic data base: the all-time high for this

date is 83 degrees F at Canby (Yellow Medicine County) and Tracy (Lyon County) in 1939; the all-time low is -31 degrees F at Bigfork (Itasca County) in 1965. The heaviest snowfall statewide on this date occurred in 1914 at Bemidji where they recorded 14 inches. The all-time state record for precipitation (liquid equivalent) on this date is 3.31 inches at Halstad (Norman County) in 1996.

Word of the Week: Sounding

This term derives from both Latin and Anglo Saxon terms meaning to submerge something in order to detect depth. In meteorology the term sounding refers to an upper air observation or a complete radiosonde report. Balloons equipped with instrumentation are launched twice each day (12 hours apart) from upper air stations. There are over 900 such stations scattered around the world.

They transmit back data about temperature, pressure, wind, and humidity as they pass through various vertical layers of the atmosphere. These are referred to as radiosondes. Another type of balloon is a rawinsonde, which carries no instruments, but is tracked by either radar or a radio direction finder such that wind direction and speed aloft can be plotted for various vertical layers.

Radiosondes provide the basic data that feed into forecast models. These balloons rise to heights of 80,000 to 100,000 feet before they burst. A small parachute allows for the instrument package to fall to Earth and not be destroyed. Sometimes farmers and others find the instrument package in their fields. There are instructions on the container to mail the package back to the government so the instruments can be reconditioned and reused.

Outlook:

A warming trend begins this weekend with highs in the 40s for Easter Sunday, then even warmer next week. There is a slight chance for snow showers in the far north later on Sunday. Warm temperatures much of next week with a chance for showers on Tuesday and Thursday, may be even some thunderstorms.

To: MPR's Morning Edition
From: Mark Seeley
Re: Topics for MPR's Morning Edition, Friday, Apr 1, 2005

HEADLINES:

- Daylight Savings Time coming up
- Deb Brown retires
- Last call for Classes Without Quizzes
- March climate summary
- When is it too warm to snow?
- Almanac for April 1st
- Awha, is it a baby's cry?
- Outlook

Topic: New Clock and New Sports Season Starts on Sunday

Daylight Savings Time begins Saturday night. Don't forget to set your clock ahead one hour. For those who like to do things outdoors in the evening this will be a blessing as the evening light will be with us until 7:30 to 8:00 pm.

The Major League Baseball season begins on Sunday evening with last year's champ's the Boston Red Sox visiting the New York Yankees. The weather in New York for the opening weekend looks rather stormy but perhaps the rains will have ended by Sunday night. A full slate of American League games begins on Monday, including the Twins first game at Seattle in the afternoon. The nation's weather on Monday looks like it will be far more cooperative for baseball games in most places.

Topic: Best Wishes to the Garden Guri, Deb Brown in retirement

I want to express gratitude and best wishes to Deb Brown on the occasion of her retirement from the Extension Service. She has been a terrific educator and ambassador for our organization. I want to also acknowledge that she has been a role model for me in terms of partnering with the broadcast media and doing public outreach. I understand that she intends to carry on with her Mid-Morning monthly program on gardening at MPR... thank goodness for that.

Topic: Last Call for Classes Without Quizzes on April 2nd....

The College of Agricultural, Food, and Environmental Sciences will be hosting the Annual Classes Without Quizzes on Saturday, April 2nd (tomorrow) from 8:30 am to 2:00 pm on the St Paul Campus. I will be presenting a lecture at 9:00 am entitled "Torrid, Tornadic, and Traumatic: Perceptions and Trends in Minnesota's Severe Weather." How timely since we just had the first tornadoes of 2005 reported in southern Minnesota on Wednesday (March 30) of this week.

If interested, you can still sign up or show up on Saturday. More information about Saturday's program can be found at the COAFES web site: <http://www.coafes.umn.edu/cwq> or by calling (612)-624-1745.

Topic: March 2005 Climate Summary

Many are grateful to see the month of March end. It was a windy, cloudy, and cool month across most parts of the state.

March average temperatures ranged from near normal to 4 degrees F cooler than normal. Extremes for the month were 73 degrees F at Wheaton and Ortonville on the 29th and -30 degrees F on the 8th at Embarrass. Minnesota reported the coldest temperature in the 48 contiguous states eleven times during the month.

March precipitation totals were generally less than normal most places. Over 1 inch less than normal in many northern counties and a few tenths shy of normal in many southern communities. A few communities in southern Minnesota reported above normal precipitation. Thanks to the thunderstorms on March 30th, some areas in the southeast reported over 2 inches of rain, particularly from Hastings through Red wing and south of Lake City. Flash flooding was reported in a number of places, along with hail up to 1.75 inches in diameter. A section of Hwy 61 in SE Minnesota was closed due to flooding for a time. Two tornadoes were reported on March 30th as well, the first two of the year. One occurred in Olmsted County near Chester along Hwy 14 and took the roof off a barn. The other tornado, yet unconfirmed was reported near Adams in Mower County and destroyed two barns.

Winds were strong in March, with gusts of 55-60 mph in SW counties on the 10th associated with a strong cold front, and winds of 50-55 mph on the 30th in SE counties associated with thunderstorms.

As of March 31st there was still frost reported in many soils, but the top 12 to 18 inches had thawed out and was absorbing moisture from the recent rains.

MPR listener question: When does it become too warm to snow? Have there been any cases of snow falling at surface air temperatures in the 40s F?

Answer: I had not previously considered this question and since we are nearing the end of the snow season, it is quite relevant. Examining the National Weather Service hourly climate data for the Twin Cities I can find a number of cases when snow has fallen with air temperatures in the mid to high 30s F. In fact we have accumulated snowfall as much as 5.5 inches in air temperatures of 33-34 degrees F.

The warmest temperature I can find with snowfall occurring was 41 degrees F on May 2, 1976. The cloud ceiling was low, as was the dew point which was only 22 degrees F. So the snow was falling through relatively dry air out of the cloud base.

Nevertheless, the snowflakes didn't melt right away and accumulated to a depth of 1.2 inches on the ground. May snowfall is very rare in the Twin Cities and this one undoubtedly put the brakes on the gardening activity.

Twin Cities Almanac for April 1st:

The average MSP high temperature for this date is 47 degrees F (plus or minus 10 degrees F standard deviation), while the average low is 29 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for April 1st:

MSP weather records for this date include: highest daily maximum temperature of 82 degrees F in 1882; lowest daily maximum temperature of 22 degrees F in 1896; lowest daily minimum temperature of 9 degrees F in 1975; highest daily minimum temperature of 51 degrees F in 1999; record precipitation of 0.54 inches in 1967; and record snowfall of 4.6 inches in 2002. There have been 15 measurable snowfalls on this date since 1891. Greatest snow depth on this date was 10 inches in 1975 and 1985.

Average dew point for April 1st is 27 degrees F, with a maximum of 61 degrees F in 1903 and a minimum of -2 degrees F in 1975.

All-time state records for April 1st:

Scanning the state climatic data base: the all-time high for this date is 85 degrees F at Winona in 1986; the all-time low is -21 degrees F at Thorhult (just north of the Red Lakes in Beltrami County) in 1975. The heaviest snowfall statewide on this date occurred in 1985 at Hastings where they recorded 15 inches. The all-time state record for precipitation (liquid equivalent) on this date is 2.17 inches at Red wing in 1998.

Word of the Week: Awha

This is the name of the storm god in Polynesian culture. Obviously tropical storms visit the Polynesian settlements in the Pacific Ocean with some regularity and can be very destructive. This word reminds me of a baby's cry.

Outlook:

Partly cloudy and spring like with highs in the 50s and 60s F for much of the weekend and next week. Breezy with a chance for showers in the northeast Saturday, then increasing cloudiness later on Sunday with a chance for showers and thunderstorms spreading across the state and lasting into Tuesday. Even warmer later next week.

To: MPR's Morning Edition
From: Mark Seeley
Re: Topics for MPR's Morning Edition, Friday, Apr 8, 2005

HEADLINES:

- Water is a theme for April events
- The April blizzard of 1973
- Weather for the Master's Golf Tournament
- Question about sunrise/sunset times
- Almanac for April 8th
- Precipitable water
- Outlook

Topic: Theme of "Water" prevails this month

The importance of water is being stressed at a number of public venues this month. Cleaning up and better managing Minnesota's water resources has certainly been stressed by Governor Pawlenty. In addition, with the United Nations' declaration concerning the Decade for Action: Water for Life initiative, water will undoubtedly be featured at a number of Earth Day activities later this month.

Two public venues coming up next week will stress water's importance: On Friday, April 15th, Dr. Wayne Skaggs from North Carolina State University will present "Agricultural Drainage: Impacts on Hydrology, Crop Production, and Water Quality" as the keynote address for the Annual Emerging Issues in Soil and Water Program at the University of Minnesota. Dennis Anderson, outdoor writer for the Star Tribune will also be making remarks. The program is at 2:00 pm on the St Paul Campus. More information at the web site: (http://soils.umn.edu/Emerging_Issues/)

From April 15 to 17 the Eisenhower Community Center in Hopkins, MN, will be hosting a program called "Bridging the Water Gap." This program is very diverse and has elements that will appeal to all ages, aimed at being fun and educational. The importance of water to our planet and our lives will be featured through talks, music, art, theatre, and dance. Several well know speakers, including William Marks, Fred Alan Wolf, Tyrone Banks, and Masaru Emoto will make presentations. Scientific, artistic, and spirituality perspectives on water will be shared. More information can be found at the following web site: (<http://www.aquaessencerresource.org/>)

I will be there to give a presentation on water and climate trends.

Topic: The blizzard of April 8-9, 1973

Following a relatively snowless March in 1973, many Minnesota farmers had already taken advantage of warm days in the 50s and

60s F to do some spring tillage in early April, when a blizzard hit across 18 southeastern counties on April 8th. Temperatures fell from the 40s F into the 20s F with a prolonged period of heavy snow and winds up to 70 mph, taking visibility down to zero. Twenty inches of snow fell at Grand Meadow in Mower County, the most ever for April. Preston and Wabasha reported 17 inches of snowfall, also the most ever for April. Hokah reported 16 inches and Rochester 10 inches. Highways and schools were closed from late on the 8th until later on the 9th of April. Additional springtime activities were delayed up to two weeks.

Topic: Weather for the Master's Golf Tournament

Recent history shows this to be the 4th consecutive year, and 7th in the past 8 years that the Master's at Augusta, GA has suffered from weather related delays. This is also the 9th golf tournament in the USA so far in 2005 that has been affected by rainy weather.

Augusta is a golf course that plays somewhat easier after a rain because the ball stops where it lands and the putting greens play slower, allowing for a little better control. The greens are notoriously fast in dry weather.

Rain is in the forecast for Thursday and perhaps some lingering showers for Friday rounds this year, but it is expected to be dry and pleasant for Saturday and Sunday. The last time weather delays mounted up enough to push the final round to Monday was in 1983.

MPR listener question: A school teacher from Hastings asks how come the increase and decrease in daylength is not proportionate between morning sunrise and evening sunset? In other words how come we don't gain 1.5 minutes of daylength in the morning and 1.5 minutes of daylength in the evening this time of year?

Answer: This is a highly complicated question involving the Earth's elliptical orbit, the inclination of the Earth's equatorial plane, and their impacts on the daily transit speed of the sun across the sky as well as its declination, distance above or below the equator. The net result in the month of April is that we gain a total of about 80 minutes in total daylength during the month, but the contribution from an earlier sunrise is 46 minutes, while the contribution from a later sunset is 34 minutes.

Two primary features of importance are the Equation of Time and the daily changes in the sun's elevation above the southern horizon. The Equation of Time calculates the difference between noon on our clock and sundial noon, when the sun is directly over the central meridian of our time zone (CST), a geographic area that is about 700 to 800 miles across. In April this differences ranges up to 8 minutes. Also in April the sun's elevation is changing daily and this too has an effect. Much more on this topic can be found at the U.S. Naval Observatory web site:

http://aa.usno.navy.mil/faq/docs/dark_days.html

Twin Cities Almanac for April 8th:

The average MSP high temperature for this date is 51 degrees F (plus or minus 12 degrees F standard deviation), while the average low is 32 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for April 8th:

MSP weather records for this date include: highest daily maximum temperature of 83 degrees F in 1931; lowest daily maximum temperature of 30 degrees F in 1928; lowest daily minimum temperature of 8 degrees F in 1865; highest daily minimum temperature of 55 degrees F in 1988; record precipitation of 0.73 inches in 1906; and record snowfall of 5.0 inches in 1980. There have been 12 measurable snowfalls on this date since 1891. Greatest snow depth on this date was 4.0 inches in 1975.

Average dew point for April 8th is 26 degrees F, with a maximum of 58 degrees F in 1903 and a minimum of -4 degrees F in 1997.

All-time state records for April 8th

Scanning the state climatic data base: the all-time high for this date is 92 degrees F at Canby (Yellow Medicine County) in 1931; the all-time low is -12 degrees F at Sawbill Camp (Cook County) in 1939. The heaviest snowfall statewide on this date occurred in 1904 at Moorhead (Clay County) where they recorded 13.2 inches. The all-time state record for precipitation (liquid equivalent) on this date is 2.45 inches at Dawson (Lac Qui Parle County) in 1894, much of it falling as heavy wet snow.

Word of the Week: Precipitable water

This is an expression of the total atmospheric water vapor contained in a vertical cross-sectional area, commonly from the surface to the 300 mb height level (approximately 30,000 ft). It is expressed in inches, the height to which the condensed water vapor would stand as a liquid accumulation in a rain gage. Average values range from 0.1 to 0.2 inches in the winter months up to about 1 inch in the summer months. Extreme values during the convective thunderstorm season can range up to 2.5 inches in our region. The range in April values can be from 0.25 to 1.25 inches. This is often referred to by meteorologist as a measure of the extreme precipitation that might fall from a given storm. However, total rainfall can often exceed maximum precipitable water estimates when thunderstorms are slow moving or regenerate over the same area of the landscape. An extreme example in April occurred at Morris, MN on April 26, 1954 when thunderstorms kept regenerating overhead and produced 6.90 inches of rainfall which flooded many parts of the community.

Outlook:

Breezy and warm on Saturday giving way to increased cloudiness and a chance for showers and thunderstorms later on Saturday and into Monday. This is the time of year to be careful about fires. Low humidities and high winds across a drying landscape present a fire danger both on the prairie and in the forests, at least until things really green up. There will be a chance for showers again later next week with temperatures averaging several degrees warmer than normal.

To: MPR's Morning Edition
From: Mark Seeley
Re: Topics for MPR's Morning Edition, Friday, Apr 15, 2005

HEADLINES:

- Tax Time
- 20th Anniversary of TPT's Almanac
- Severe Weather Course
- Weekend Water Conference in Hopkins
- Earliest 90 F day
- Time to plant.....
- The coldest April ever.....1857
- What's the Z-R relationship?
- Almanac for April 15th
- Friable tilth
- Outlook

Topic: Tax time....

I don't worry much about the weather this time of year. Perhaps like many of you, I tend to get preoccupied with another worry.

Have you ever come out of a stuffy, smelly bar or restaurant late at night and been invigorated by the crisp, fresh air?

Have you ever walked uneasily into a crowded room of strangers, only to have a smiling, familiar face suddenly appear, grab your arm and say "come with me"?

Have you ever worked in the heat so long, your clothes are wringing wet, and you come inside to be greeted by your daughter with a glass of ice cold lemonade?

Have you ever dashed to the airport, run to your flight, only to be told that the coach section is full and you have been upgraded free of charge to 1st class seating?

That breath of fresh air, that release of anxiety, that quenching of your thirst, that jolt of 1st class luck, for me, all of these situations bring the same smile of gratitude that the passage of April 15th does. Taxes are done. Now there is room in the personal worry box for other things....like what's the weather going to do? It's embarrassing but I let this happen every year. Just another admission of embarrassment by your local weatherman!

Topic: Happy 20th Anniversary to TPT's Almanac Program....

I offer a weatherman's salute to Eric Eskola, Cathy Wurzer,

and the gang that puts Almanac together every week for Twin Cities Public Television. Twenty years of outstanding weekly public affairs programs have brought us insights into many weather events and episodes, including the flashflood of 1987, drought of 1988, the Halloween Blizzard of 1991, the spring flood of 1997, the heat wave of 1999, and the record tornado year of 2001, among many other stories. Thanks for all your efforts on those stories and of course many other important ones in the political, economic, and cultural arenas as well. I know that many citizens rely on your program to stay informed about important issues in our state. Please keep up the good work.

The 20th Anniversary show can be seen at 8:00 pm on Saturday night.

Topic: Last Call for Compleat Scholar Class.....

There are still some openings in my short (3 weeks) class about Minnesota tornadoes. Called "Twisters: Tornadoes in the North Star State," the class meets on Thursday nights on the St Paul Campus, with a tour of the National Weather Service scheduled for April 28th. If interested in this course go to the web site: <http://www.cce.umn.edu/scholars/> or call (612) 624-4000

Topic: Weekend Water Conference.....

Starting today through Sunday the Eisenhower Community Center in Hopkins, MN, will be hosting "Bridging the Water Gap" presenting many interesting, enlightening, and fun perspectives on water, the environment, human health, and spirituality. Besides many noteworthy speakers, the Bell Museum will be there with live water animals, the National Theatre for Children will show plays, and troubadour Larry Long, a Smithsonian Folkways recording artist will entertain with songs and stories.

More information can be found at the following web site: (<http://www.aquaessenceresource.org/>)

I will be there on Saturday to give a presentation on water and climate trends in Minnesota.

Topic: Earliest 90 F reading in the Twin Cities....

On this date three years ago (2002) the Twin Cities airport reported a temperature of 91 degrees F, the earliest ever spring reading of 90 F or higher.

Topic: Time to think about planting.....

Average temperatures so far this month in the Twin Cities area are about 12 degrees F above normal, remarkably warm. The first half of the month has averaged 55 degrees F for the

first time since 1910. We have now had 20 consecutive days with above normal temperatures in the MSP area.

The frost has finally gone out of most soils and shallow soil temperatures have climbed into the mid to upper 50s F. Consequently, many Minnesota farmers have planting at the top of their "to do list." Some potatoes, wheat and peas have already been planted. But I expect in the next week there will be an acceleration of this activity. From a moisture status viewpoint, prospects for this year's crops look good. For most of the state soil moisture estimates range from 6 to 8 inches of water in the top 5 feet thanks to overwinter infiltration and recent rainfall.

Gardeners are anxious to get started as well. Don't forget to remove mulch used over the winter.....turnover the compost pile....and plant new trees and shrubs in freshly tilled soil. Next week will probably bring out the blossoms on some trees and woody species.

Topic: The Twin Cities coldest April?....1857

As we are experiencing a very warm April, averaging nearly 55 degrees F so far, it is hard to remember that the month can be quite cold. There have been past Aprils with average temperatures only in the mid to upper 30s F (1975, 1961, 1950, 1920, and 1907). But none can compare to the cold of April, 1857, when the average monthly temperature was just 32 F. It was windy, cloudy, snowy, and bitterly cold that April. Snowfall was noted on 8 different days, totaling about 10 inches for the month. Winds blew greater than 45 mph on at least two days, and some combined with the cold temperatures produced wind chill values below zero F. On the 6th a low of just 3 degrees F was reported at Ft Snelling. From the 15th to the 18th morning low temperatures were 13, 11, 12, and 16 F, respectively. Lake Pepin remained covered with ice for the entire month preventing the arrival of any riverboats in St Paul. The first boat did not arrive until the first week of May, the latest date ever.

MPR listener question: What do meteorologists mean when they refer to the radar Z-R relationship?

Answer: The Z-R relationship used in radar meteorology is a method to estimate the rainfall that might be occurring over an area where there are no rain gages to measure it. The Z term represents the radar reflectivity (a nondimensional logarithmic power ratio-dBZ) scaled from 15 to 60, while the R term represents the rainfall rate scaled in millimeters or inches per hour. Estimated rainfall rates can range from less than 0.01 inches/hr to over 12 inches/hr depending on the storm and the Z-R relationship used. Five different Z-R relationships are used depending on location, season, and type of storm. Thus a cool season storm where precipitation falls from layered,

stratiform clouds calls for the use of a different type of Z-R relationship than a warm season, convective thunderstorm type of precipitation where hail stones and large vertical development of clouds exists. In the spring months like April, when different types of precipitation can occur, meteorologists may have to adjust the Z-R relationships on their radar more frequently.

Twin Cities Almanac for April 15th:

The average MSP high temperature for this date is 56 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 36 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for April 15th:

MSP weather records for this date include: highest daily maximum temperature of 91 degrees F in 2002; lowest daily maximum temperature of 32 degrees F in 1951; lowest daily minimum temperature of 13 degrees F in 1857; highest daily minimum temperature of 58 degrees F in 1942; record precipitation of 0.86 inches in 2003; and record snowfall of 2.0 inches in 1961. There have been 7 measurable snowfalls on this date since 1891. Greatest snow depth on this date was 10 inches in 1983.

Average dew point for April 15th is 33 degrees F, with a maximum of 61 degrees F in 1976 and a minimum of 4 degrees F in 1995.

All-time state records for April 15th

Scanning the state climatic data base: the all-time high for this date is 93 degrees F at Canby (Yellow Medicine County) in 2003; the all-time low is 2 degrees F at Zumbrota (Goodhue County) in 1928 and at Orr (St Louis County) in 1962. The heaviest snowfall statewide on this date occurred in 1961 at Itasca State Park where they recorded 13 inches. The all-time state record for precipitation (liquid equivalent) on this date is 2.96 inches at Sandy Lake in Aitkin County in 1894.

Words of the Week: Friable Tilth

Friable is an adjective derived from a Latin root word (friabilis) and used to describe a material or aggregate of materials which easily crumbles or breaks into small pieces when put under pressure. Tilth is from the Anglo Saxon root word (tilian) and is a term used by soil scientists and agronomists to describe the nature of a soil seedbed after cultivation or tillage is done. It is very much a qualitative term referring to the aggregate size (clods), friability, uniformity, looseness, porosity and roughness of the soil surface. This time of year it is very important to plant in a soil with good tilth. Some of the fall tillage has weathered and left a partially sealed surface or aggregates which are too large for a suitable seedbed. Thus many producers will due some form of secondary tillage just before planting, or they will use attachments which run in tandem with the planter and disturb or open up the seedbed just ahead of the planter so that they can till and plant in one pass

across a field. Getting planting done in a timely manner is first priority this time of year.

Outlook:

Periodic cloudiness over the weekend with a chance for showers in southern and eastern sections of the state on Saturday. Continued warm, even warmer on Sunday and Monday. A chance for showers and thunderstorms late Monday and Tuesday, then drier and cooler the second half of next week. Some significant thunderstorms may be possible during the week. Temperatures will still likely average warmer than normal.

To: MPR's Morning Edition
From: Mark Seeley
Re: Topics for MPR's Morning Edition, Friday, Apr 22, 2005

HEADLINES:

- Tornado report on April 19th
- Earth Day and Wind Energy
- New Seasonal Climate Outlooks
- April weather to reverse itself
- question about Spring frost dates
- Almanac for April 22
- Sun Kinks
- Outlook

Topic: Tornado report...

The 3rd tornado of the year for Minnesota was reported on Tuesday, April 19, near Starbuck in Pope County. It was associated with a strong thunderstorm cell moving across the region in a highly unusual trajectory, northeast to southwest. No damage reports were received.

Topic: Happy Earth Day

Among many community celebrations of Earth Day (Friday, April 22), Governor Pawlenty will be at the University of Minnesota Morris Campus to dedicate the new wind turbine energy system. The Renewable Energy Research and Demonstration Center at the Morris Campus will host the ceremony. The basis for the deployment of renewable wind energy in Minnesota is the Wind Energy Resource Assessment Program done in the 1980s when the wind data were analyzed by Climatologist Don Baker of the University of Minnesota.

This 230 ft tall wind turbine at Morris is expected to produce 5.6 million Kilowatt hours of power each year, about half of the total power needs of the UM Morris Campus. Long known as one of the windiest places in Minnesota, Morris provides a great location for producing this kind of renewable energy. Wind speeds there average between 15 and 20 mph at the height of the turbine blades (each of which is 135 feet long). Appropriately enough, wind speeds for the ceremony are expected to range from 20 to 30 mph, well into the optimal range for power production. More on this system can be learned at the following web site....

<http://energy.coafes.umn.edu/>

Topic: New Climate Outlook for May, June, and July

The Climate Prediction Center released the new seasonal outlooks on Thursday this week. For our region they show

a wetter than normal late spring and summer across virtually all of the western Great Lakes states. In fact the expected geographic area of above normal precipitation for the three months is centered on Minnesota.

The temperature outlook favors cooler than normal conditions for our region, associated with increased cloudiness over a wetter than average landscape. Such an outlook should motivate our Minnesota crop producers to get planted early and take advantage of the longer growing season.

Topic: April to reverse itself...

Despite being on track for the warmest ever April at many places around the state, it appears a change may be coming that will cause our temperatures to cool significantly. We have already seen over 50 communities report 80 degrees F or higher temperatures this month. Most places are averaging from 9 to 12 degrees F warmer than normal for April. We have yet to report the lowest temperature in the nation this month, and that is an unusual circumstance for Minnesota! If the month ended today, it would surpass April of 1915 as the warmest ever statewide. In addition, most places are reporting above normal precipitation for the month, ranging from 2 to 3 inches so far.

Climatology shows us that very warm Aprils are usually associated with dry weather. Five of the top ten warmest Aprils statewide have been drier than normal, four have seen rainfall that is near normal, and only one has recorded above normal rainfall.

The outlook for the balance of the month favors cooler than normal temperatures and drier than normal conditions. Though this will be greeted with cries of "Bah Humbug" by some, for Minnesota farmers it is a good sign. Drying soils and cooler temperatures provide a better environment for those long field working days needed to get this year's crops planted.

MPR listener question: This unusually warm April made me wonder what is the earliest last occurrence of a 32 degree F temperature in the spring for the Twin Cities? The only freezing temperature we have recorded this month was back on the 2nd. Has there ever been an April when the temperature never dropped as low as 32 F?

Answer: Going all the way back to 1891 in the Twin Cities climate record, there has never been an April without a temperature of 32 F or colder. However, in 1955 the freezing mark was reached on only one day in April. In that year the last freezing temperature was recorded on April 7th when it reached 29 F. There have been three other years when only two days reached the freezing mark or colder in April. They

were 1999, 1941, and 1925. However, in 1925 two additional frosts were recorded in May thus shortening the freeze-free growing season considerably.

A comparison of the growing season freeze dates and length of the freeze free season for the three years 1999, 1955, and 1941 can be found in the table below.....

Year	Last Spring Frost (temp, date)	First Fall Frost (temp, date)	Growing Season Length (days)
1999	30 F, Apr 24	32 F, Oct 17	176
1955	29 F, Apr 7	32 F, Oct 21	197
1941	31 F, Apr 24	26 F, Oct 27	186

The freeze free growing season of 1955 of 197 days is similar to the growing season of Columbia, MO.

Twin Cities Almanac for April 22nd:

The average MSP high temperature for this date is 59 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 39 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for April 22nd:

MSP weather records for this date include: highest daily maximum temperature of 90 degrees F in 1980; lowest daily maximum temperature of 34 degrees F in 1967; lowest daily minimum temperature of 25 degrees F in 1927 and 1967; highest daily minimum temperature of 61 degrees F in 1913; record precipitation of 2.21 inches in 2001; and record snowfall of 5.4 inches in 1963. There have been 4 measurable snowfalls on this date since 1891.

Average dew point for April 22nd is 35 degrees F, with a maximum of 67 degrees F in 1925 and a minimum of 10 degrees F in 1953.

All-time state records for April 22nd

Scanning the state climatic data base: the all-time high for this date is 101 degrees F at Hawley (Clay County) in 1980, a reading that is 46 degrees above normal. In addition, Ada, Browns Valley, Georgetown, Campbell, and Montevideo reported high temperatures of 100 degrees F on either the 21st or 22nd, the earliest such readings ever measured in the spring season in Minnesota. The all-time low for this date is 1 degree F at Sawbill Camp (Cook County) in 1936. The heaviest snowfall statewide on this date occurred in 1902 at Moorhead where they recorded 10 inches and in 1931 at Pigeon River where they also recorded 10 inches. The all-time state record for precipitation (liquid equivalent) on this date is 3.52 inches at St Cloud in 2001.

Word of the Week: Sun Kinks

Actually this is a railroad term, but it does relate to the weather. Large temperature changes (such as those experienced earlier this

week) cause rails to expand and/or contract excessively, especially on bright sunny hot days. This can lead to sun kinks or bending of the rails. These are sometimes visible if you look down the line of track closely. Occasionally these kinks are large enough that they can prevent drawbridges from opening or closing properly.

Outlook:

Partly cloudy, rather windy, and cooler over the weekend. There will be a chance for rain or snow showers late Sunday in the north, and a chance for rain showers Monday into Tuesday next week. Many lows will drop into the 20s and 30s F over the weekend. Much of next week looks to be cool and dry.

To: WeatherTalk for MPR's Morning Edition
From: Mark Seeley
Re: Topics for MPR's Morning Edition, Friday, Apr 29, 2005

Headlines:

- A correction about April frosts
- Preliminary Climate Summary for April, 2005
- Arbor Day
- The frequency of summer climate types
- Almanac for April 29th
- Interception coefficients
- Outlook

A Correction: Concerning April frosts...

Last week in reply to an MPR listener question, I wrote that there has never been an April in the Twin Cities metro area when no frost (temperature of 32 F or colder) was recorded. This is true, but only in the context of the modern National Weather Service records for the Twin Cities that date back to 1891. Charles Fisk, Twin Cities weather historian, points out that the old Ft Snelling climate records show that in 1839 there was no April frosts. In fact April of 1839 remains the warmest April ever recorded in the Twin Cities area with a mean monthly temperature of 58 degrees F (next warmest was 1915 with 56 F). There were, however, two May frosts in 1839, one on the 3rd and one on the 14th.

Topic: Preliminary Climate Summary for April.....

A wild ride in April....near record setting early warmth, then 9 consecutive days of below normal temperatures to finish the month, including a record low of 28 degrees F at Mankato on the 27th.

Average temperatures for the month were still 3 to 6 degrees F above normal in most places, ranking as the 8th warmest April of all time statewide, and the warmest since April of 1987. Extremes were 87 degrees F at Moorhead on the 18th, and just 8 degrees F at Embarrass on the 24th. In fact, Embarrass reported the lowest temperature in the 48 contiguous states just three times in April.

Precipitation for the month was near normal or above normal in most counties. Wettest areas were generally in southern Minnesota. St James reported over 4.50 inches for the month, while Mankato reported nearly 4.25 inches. Daily rainfall records were set at a few locations. A new record for the 19th was set at International Falls with 1.59 inches and at Winona with 2.41 inches. A new record rainfall was also set at St James on the 12th with 2.03 inches. Snowfalls occurred

in some northeastern counties, ranging from 0.2 inches to 1.5 inches.

April was a windy month. Strong winds accompanied both the warm and cold temperatures. On April 22nd several communities reported wind gusts over 40 mph and on the 25th the Fargo-Moorhead area had winds over 50 mph.

A modest amount of planting occurred across the agricultural landscape. As the month ended most farmers will still be waiting for drier soils.

Topic: Happy Arbor Day

Today marks the 133rd celebration of Arbor Day, founded by J. Morton Sterling in Nebraska in 1872. Governor Pawlenty and DNR Forestry Director Mike Carroll will host a ceremony Friday afternoon on the Capitol lawn at 1:30 pm to talk about the value of trees.

Trees are a huge asset to the Minnesota landscape, not just for their beauty or ability to provide wildlife habitat. Climatically, trees provide a beneficial moderation of sun, wind, and rain. They also improve air quality by filtering dusts and other particulates. If you have got space on your property consider planting a tree.

MPR listener question: You mentioned that the outlook favors another cool-wet summer. How often do we get cool-wet summers in Minnesota? What about the other extremes, warm-dry, warm-wet, and cool-dry, how often do these types occur?

Answer: The answer depends on how we define these climate types. One approach is to take the state data base for the past 110 years (1895-2004), and partition the growing season months of May to September into the warmest third, coolest third, and middle third. Then do the same sorting on the growing season rainfall values, wettest third, driest third, and middle third. Now we can look for the combinations that match the types you mentioned.

There have been 14 warm-dry growing seasons, the last ones coming in 1988 and 1989. There have been 13 cool-wet growing seasons, the most recent just last year. There have been 11 warm-wet growing seasons, the last ones coming in 2002 and 1999. And there have been 12 cool-dry growing seasons, the last one coming in 1974. The other 55 growing seasons in the statewide climatic record have recorded either near normal temperature, near normal rainfall, or both.

The most recent 20 growing seasons (May-September) are listed below and coded to show the prevalent patterns of temperature and rainfall. Codes used include C=cold, W=warm, d=Dry, w=wet, and NN=Near normal.

Year	Temperature	Rainfall	Year	Temperature	Rainfall
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1985	C	w	1986	NN	w
1987	W	NN	1988	W	d
1989	W	d	1990	NN	NN
1991	W	w	1992	C	NN
1993	C	w	1994	NN	NN
1995	W	w	1996	NN	d
1997	NN	NN	1998	W	NN
1999	W	w	2000	NN	NN
2001	W	NN	2002	W	w
2003	NN	d	2004	C	w

Cool-dry is a growing season climate combination we have not seen in over 30 years.

Twin Cities Almanac for April 29th:

The average MSP high temperature for this date is 62 degrees F (plus or minus 12 degrees F standard deviation), while the average low is 43 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for April 29th:

MSP weather records for this date include: highest daily maximum temperature of 92 degrees F in 1952; lowest daily maximum temperature of 35 degrees F in 1909; lowest daily minimum temperature of 22 degrees F in 1958; highest daily minimum temperature of 61 degrees F in 1952; record precipitation of 1.30 inches in 1991; and record snowfall of 6.6 inches in 1984. There have been 6 measurable snowfalls on this date since 1891. There was a 2 inch snow depth reported on this date in 1994.

Average dew point for April 29th is 37 degrees F, with a maximum of 66 degrees F in 1942 and a minimum of 7 degrees F in 1958.

All-time state records for April 29th

Scanning the state climatic data base: the all-time high for this date is 93 degrees F at New Ulm and Pipestone in 1910, at Pine River in 1952, and at Wheaton in 1934. The all-time low for this date is 3 degrees F at Babbitt (St Louis County) in 1958. The heaviest snowfall statewide on this date occurred in 1956 at Windom where they recorded 14 inches. The all-time state record for precipitation on this date (expressed as liquid equivalent) is 3.25 inches at Orr (St Louis County) in 1940.

Word of the Week: Interception coefficient

This term is used in micrometeorological research and modeling for two purposes. With respect to solar radiation (sunshine), it denotes the amount that is intercepted by the plant canopy with depth. The topmost part of the canopy intercepts the most, and then the lower leaves receive diminished amounts. With respect to precipitation this term represents the amount of rainfall that is intercepted by a plant canopy with depth. The leaf size, orientation and density of the plant canopy obviously dictates much of this. Tree canopies provide great

protection from the erosive forces of heavy thunderstorm rains..yet another reason for planting trees.

Outlook:

Generally a dry weekend, with below normal temperatures. There is a chance for rain and snow showers in the central and northeastern counties. A warming trend will begin by Wednesday and bring a chance for showers by the end of next week as daytime highs stretch into the 60s F.

To: WeatherTalk for MPR's Morning Edition
From: Mark Seeley
Re: Topics for MPR's Morning Edition, Friday, May 6, 2005

Headlines:

- No WeatherTalk next week
- Cold start to May
- Alfalfa weather injury
- 40th anniversary of Twin Cities tornadoes
- Metro area variability in low temperatures
- Almanac for May 6th
- Irish weather words
- Outlook

ANNOUNCEMENT: NO MINNESOTA WEATHERTALK NEXT WEEK (MAY 13)

I will be away next week and no Minnesota WeatherTalk commentary will be available.....to keep up on the latest weather developments please browse the Climate Journal section of our web site at.....www.134.84.160.120

Topic: Cold start to May....

The first three days of May averaged about 14 to 16 degrees cooler than normal, with blustery winds and snow in some areas on the 1st and 2nd. Most of the snow occurred as flurries or brief showers, however some areas reported measurable amounts. Red Lake Falls measured 0.5 inches, Marcell Forestry Station in Itasca County reported nearly 1 inch and Spring Valley in southeastern Minnesota reported 0.4 inches.

Several cold temperature records were tied or broken in the first few days of the month. La Crosse, WI reported a new record cold maximum temperature on May 2nd with a high of only 39 F. Embarrass reported a new record low of just 8 degrees F on May 3rd, the coldest reading in the nation on that date. Record lows on May 3rd also occurred at Madison (Lac Qui Parle County) with 19 F, at Marshall (Lyon County) with 21 F, at Grand Meadow (Mower County) with 21 F, and at Preston (Fillmore County) with 18 F which tied the coldest temperature ever measured in May there.

Some fruit growers irrigated overnight earlier this week to protect plant crowns and emerging buds from severe frost damage.

Topic: Tough times for alfalfa growers....

Earlier this spring as vegetation was greening up, some alfalfa growers in central Minnesota counties reported winterkill. This was primarily due to the absence of protective snow cover

during the severe cold that occurred during Christmas week and again in mid-January, though some could have occurred from ice sheeting (smothering) during March. As if that was not enough, the severe cold temperatures of late April and early May when overnight lows dipped into the teens and 20s F produced some frost damage to alfalfa. This may have produced some visible damage, but most stands should recover. Thankfully, no further threat of frost is seen in the forecast through the 3rd week of the month.

Topic: 40th Anniversary of the Worst Twin Cities Tornadoes

Today marks the 40th anniversary of the worst ever outbreak of tornadoes across the Twin Cities area. Six tornadoes inflicted over \$350,000,000 in damages (today's dollars) across an 11 county county area, including the Twin Cities. They all occurred between 6:30 and 9:30 pm. There were 13 deaths and 683 reported injuries. Over 400 homes were destroyed, another 1200 damaged. Over 250 mobile homes were lost, along with 241 farms. Locally 65 businesses were damaged or destroyed and over 27,000 victims were aided by the Red Cross. Ten planes were also destroyed at the Anoka County Airport.

Communities damaged significantly by these tornadoes included Chanhassen, Deephaven, Mound, Spring Lake Park, and Golden Valley. Fridley recorded the touchdown of three tornadoes. This outbreak included four F4 tornadoes (winds > 206 mph), one F3 tornado (wind > 158 mph), and one F2 tornado (winds > 112 mph).

Though the temperature that day only reached a high of 78 F, the dew point hit an all-time high for May 6th of 66 degrees F, a measure of the latent energy in the atmosphere that is nearly 30 degrees above normal.

Many lives were saved as a result of tornado warnings put out by the National Weather Service, through the siren system, and broadcast by the local radio and television stations. It was the first time the civil defense sirens were used for such a purpose.

More detail about this outbreak of tornadoes can be found at the National Weather Service Forecast Office web site...

<http://www.crh.noaa.gov/mpx/May6Tornadoes.htm>

MPR listener question: Locally within the Twin Cities metro area it seems that overnight low temperatures can vary considerably. What causes these large variations and how big have they been.

Answer: This has been noted for generations. Sometimes overnight lows around the 7 county metro area have varied by 10 to 15 degrees F. Most recently this week on the morning of May 3rd, minimum temperatures around the area varied considerably...here are some

reported lows that morning.....

MSP airport 29 F Anoka County airport 21 F Lakeville 24 F
Rosemount 25 F Maple Lake 30 F N. St Paul 25 F

This variation is caused by a number of factors including, elevation differences, the composition of the surrounding landscape (concrete, buildings, fields of vegetation, wind obstruction, etc), presence or absence of moisture, exposure of the instruments, and variable sky cover conditions (cloudiness). Even the height of the instrument above the ground can have a significant effect. Measuring the minimum temperature at 2-3 feet above the ground versus 5-6 feet on a calm night can produce a difference of a few degrees F.

Twin Cities Almanac for May 6th:

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 44 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for May 6th:

MSP weather records for this date include: highest daily maximum temperature of 89 degrees F in 1896 and 1934; lowest daily maximum temperature of 35 degrees F in 1931; lowest daily minimum temperature of 25 degrees F in 1989; highest daily minimum temperature of 67 degrees F in 1896; record precipitation of 1.51 inches in 1939; and record snowfall of 0.2 inches in 1947.

Average dew point for May 6th is 37 degrees F, with a maximum of 66 degrees F in 1965 and a minimum of 14 degrees F in 1989.

All-time state records for May 6th

Scanning the state climatic data base: the all-time high for this date is 98 degrees F at Grand Meadow (Mower County) in 1934. The all-time low for this date is 12 degrees F at Alborn (St Louis County) in 1944. The heaviest snowfall statewide on this date occurred in 1938 at Roseau where they recorded 10 inches. The all-time state record for precipitation on this date (expressed as liquid equivalent) is 3.48 inches at Minneota (Lyon County) in 1983.

Word of the Week: Irish (Gaelic) weather words....

Since I will be in Ireland next week, I thought it appropriate to share a few Irish weather words....not that I can speak the language, but perhaps I will know when my Irish friends are referring to the weather if I remember a few of these.....

Weather is "Aimsear" (pronounced am-shir)

Hot is "te" (pronounced cheh)

Cold is "fuair" (pronounced foo-er)

Wind is "gaoth" (pronounced gwee)

Storm is "stoirm" (pronounced stherm)

Who knows what kind of weather I will encounter, but so far the weather has been warmer and drier than normal for May in Ireland.

Outlook:

Continuing spring-like temperatures into the weekend, but with a chance for showers and thunderstorms on Saturday and Sunday. In fact, Mother's Day will probably start out dry, then cloud up in the afternoon with a chance for showers and thunderstorms. Lingering showers in the east on Monday with cooler temperatures. Chance for showers and thunderstorms again late on Tuesday through Thursday next week.

To: WeatherTalk for MPR's Morning Edition
From: Mark Seeley
Re: Topics for MPR's Morning Edition, Friday, May 20, 2005

Headlines:

- Weather in Ireland and Scotland
- Continued wet and cool May
- Summer climate outlook update
- Safe from frost?
- Almanac for May 20th
- Acclimate and other terms
- Outlook

Topic: Comments on weather in Ireland and Scotland...

Having just returned from 12 days in Ireland and Scotland, I thought I would provide a few remarks concerning their weather.

The month of May has been sunnier and drier than normal. It was magnificent for the 12 days my wife and I were visiting. It only rained twice, which is very unusual. Temperatures were 55 to 65 F during the day and 45 to 55 F at night...quite comfortable. There are more shades of green across the Irish landscape than any other country I have ever visited.

Most significant is that these are large islands and may get weather coming from almost any direction. Unlike Minnesotans who continually look to the west to see what kind of weather is coming, the Irish don't quite know which direction to look. The weather is in part so changeable because it can come from direction. One of the most common forecasts given by meteorologists is that "today will be a mixture of sunshine and showers" It is a somewhat safe statement as brief showers occur quite frequently, nearly twice as often in May for example as we have here in Minnesota.

A recent controversy surfaced while I was visiting. This appeared in all the newspapers as a major story. The BBC was changing its weather graphics on its television broadcasts. They purchased a new 3D graphics package from New Zealand that changes the characteristic look of the landscape as well as atmospheric features. People were up in arms about this. Graphically speaking, the land of green has been turned to shades of brown. One disgruntled viewer remarked that the new graphics make his country look like a field of mud on a PlayStation video game. I suspect the BBC Weather Centre may have to abandon or modify their plan when it comes to showing weather graphics.

Topic: Wet and cool May continues...

Cool temperatures and frequent rains have slowed planting of

soybeans and the emergence of already planted crops such as corn, some of which has been in the ground for three weeks. The abundant moisture has been evident in both heavy amounts and the frequency of rainfall. Rochester reported a new daily record rainfall on the 18th this week with 1.56 inches. Some locations have already received measurable rain on 14-15 days this month. Many locations in southern Minnesota have recorded over 5 inches of rainfall so far this month, including Fairmont, Waseca, Lakefield, and Winnebago.

Consequently stored soil moisture in the top 5 ft of the root zone in most places is well above the value for this time last year. Many soils currently contain 7-9 inches of available moisture for the 2005 crop season.

Topic: New summer outlook from the CPC....

The NOAA Climate Prediction Center released a summer climate outlook update on Thursday (May 19) of this week. It calls for cooler than normal temperatures across the western Great Lakes states, including Minnesota during June, July, and August. This is a feature highlighted in the last CPC outlook as well.

The outlook for rainfall specifies equal chances for above or below normal conditions during June, July, and August, except for Minnesota's western counties, which are expected to be wetter than normal.

MPR listener question: As cold as May has been, do you think it is safe to transplant frost sensitive plants in the garden yet?

Answer: Yes, for most places but the far northern counties it is very likely safe to do so now. As wet as the environment is the overnight low temperatures have been modified upward and the outlook is for continued trend mostly in the 40s F at night through the end of May.

Twin Cities Almanac for May 20th:

The average MSP high temperature for this date is 71 degrees F (plus or minus 10 degrees F standard deviation), while the average low is 49 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for May 20th:

MSP weather records for this date include: highest daily maximum temperature of 91 degrees F in 1934, 1948, and 1975; lowest daily maximum temperature of 45 degrees F in 1931; lowest daily minimum temperature of 30 degrees F in 1892; highest daily minimum temperature of 66 degrees F in 1972; record precipitation of 3.34 inches in 1877; and record snowfall of 3.0 inches in 1892, the largest amount ever for so late the spring.

Average dew point for May 20th is 46 degrees F, with a maximum

of 69 degrees F in 1974 and a minimum of 19 degrees F in 1929.

All-time state records for May 20th

Scanning the state climatic data base: the all-time high for this date is 100 degrees F at Fairmont, Pipestone, St Peter, and Redwood Falls in 1934. The all-time low for this date is 16 degrees F at Embarrass (St Louis County) in 2002. The heaviest snowfall statewide on this date occurred in 1931 at Virginia (St Louis County) where they recorded 4.8 inches. The all-time state record for precipitation on this date (expressed as liquid equivalent) is 4.83 inches at Winton Power Plant in Lake County.

Words of the Week: acclimatate, acclimate and acclimatize

These terms are often used synonymously to refer to the process by which a living organism adapts to a change of environment. Sometimes acclimatize refers to the use of human ingenuity in adaptation, such as the utilization of air conditioning in the desert southwest or employing special diets to survive on polar expeditions. And on the other hand acclimate is sometimes used to refer to natural adaptation, such as the adjustment in the eyes which takes place in moving from inside a somewhat darkened building out into the bright sun, or an increase in appetite, particularly for carbohydrates, when living or exercising in cold conditions.

Outlook:

Chance for showers and thunderstorms over the weekend, and windy on Sunday. Daytime temperatures will be in the 60s to low 70s F. Drier and somewhat cooler early next week. Temperatures will continue to average cooler than normal. The drier period should allow farmers to catch up on planting and perhaps other field work. There will be another chance for showers by next Thursday.

To: WeatherTalk for MPR's Morning Edition
From: Mark Seeley
Re: Topics for MPR's Morning Edition, Friday, May 27, 2005

Headlines:

- Record rainfalls this week
- Preliminary May Climate Summary
- Construction Weather
- Caught in a rut
- Almanac for May 27th
- Words to describe this May
- Outlook

Topic: Record rainfalls on May 25th....

A slow moving low pressure system passed across the state on May 25th bringing prolonged periods of rain across central counties. Many communities reported new record rainfall amounts for the date, including...

International Falls 2.21" Cook 1.86" Tower 1.60"
Little Fork 2.64" Marcell 1.87" Isle 1.29"
Grand Rapids 2.42" Itasca State Park 1.95" Wadena 1.57"
Leech Lake 2.16" Blackduck 2.30" Babbitt 2.17"

This time of year, record rainfall amounts tend to fall from shortlived thunderstorms. However, this rainfall had very little lightning and thunder, but great persistence. Some areas reported rain for up to 19 consecutive hours.

Topic: Preliminary Climate Summary for May

Talk about a cloudy, rainy month....good riddance as we say goodbye to the month of May next week. According to solar radiation measurements at the University of Minnesota St Paul Campus, the amount of solar energy this May will be the lowest measured for the month since records began in 1960. At the University Research and Outreach Center in Waseca, the solar radiation for May is likewise very low, nearly 23 percent below average. In addition, the long term average percent possible sunshine during May in the Twin Cities area is 61 percent..that is 61 percent of the daylight hours are typically sunny. However, according to the National Weather Service in Chanhassen, so far this month the average is only 34 percent, indicating why May of 2005 will go down as one of the gloomiest in recent memory (see jargon section below).

Overall, the month has been wetter and cooler than normal. Average monthly temperature departures from around the state range from 1 to 4 degrees F cooler than normal, marking the 4th consecutive cool May across Minnesota. Temperature extremes for the month ranged from just 8 degrees F at

Embarrass on the 3rd to a high of 85 degrees F at Browns Valley on the 22nd. Minnesota reported the lowest temperature in the 48 contiguous states on three dates during the month: 8 F and 12 F at Embarrass on the 3rd and 4th, respectively, and 25 F at Bigfork on the 16th.

Many record cold temperatures occurred on May 2nd as snowfall was observed across the state. Bruno in Pine County reported 0.8 inches of snow, while Spring Valley in the southeast reported 0.4 inches, and Grand Rapids 0.3 inches. Most places reported either no measurable snow or a trace. Soil temperatures for the month have averaged from 3 to 5 degrees F cooler than normal and resulted in slow germination and emergence of crops.

Most communities have reported rainfall on nearly half the days of the month, an above normal frequency. Resulting total amounts for the month are above normal by 1 to 2 inches. Several communities have reported totals that range between 5 and 7 inches, amounts that have saturated soils. This is the third consecutive May with above normal rainfall statewide.

It was a windy month as well. Overall average wind speeds were higher than normal and maximum gusts on both the 21st and 22nd of the month exceeded 40 mph in several areas.

Topic: Weather and the Construction Industry

We are in the midst of the peak construction season for Minnesota. Weather and climate information are used a great deal by the construction industry. Climatic data are used to estimate probable working days for construction projects, including likelihood of rainfall disruptions. Downtime or lost working days due to weather are often the basis for amending contracts, particularly time schedules for the completion of various construction phases. Many specific activities are weather sensitive: pouring and curing of concrete, roofing (shingles or tiles), brickwork, paving, excavating, painting, and of course re-landscaping denuded work sites. In addition to rainfall climatology and precipitation forecasting, wind forecasting can be very important, particularly to sites where tall structures are being erected and they are storing or moving around materials like sheeting, shingles, duct work, insulation, tiles, sheet rock and other things which can be caught up by the wind. In Minnesota, like most other states, private meteorologists often provide construction companies with custom forecasts for specific sites and projects. These generally prove to be a valuable investment, especially for long projects which require several months to complete.

MPR listener question: Is it just me, or are we caught in a rut of wet, cool Mays over the past several years?

Answer: Indeed, the data support your conclusion. Seven of

the past eight Mays both in the Twin Cities and statewide have been wetter than normal, while four of the past five have been cooler than normal. On a positive note, this type of weather has certainly been good for starting new grass seed.

Twin Cities Almanac for May 27th:

The average MSP high temperature for this date is 71 degrees F (plus or minus 9 degrees F standard deviation), while the average low is 52 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for May 27th:

MSP weather records for this date include: highest daily maximum temperature of 95 degrees F in 1969; lowest daily maximum temperature of 44 degrees F in 1965; lowest daily minimum temperature of 34 degrees F in 1907; highest daily minimum temperature of 70 degrees F in 1969; record precipitation of 2.17 inches in 1978; and a trace of snowfall on this date in 1965.

Average dew point for May 27th is 48 degrees F, with a maximum of 69 degrees F in 1969 and a minimum of 25 degrees F in 1917.

All-time state records for May 27th

Scanning the state climatic data base: the all-time high for this date is 104 degrees F at Hallock (Kittson County) in 1934. The all-time low for this date is 19 degrees F at Blackduck in 1907, at Roseau in 1917, and at Alborn in 1947. The heaviest snowfall statewide on this date occurred in 1932 at Virginia (St Louis County) where they recorded 5.0 inches. The all-time state record for precipitation on this date (expressed as liquid equivalent) is 3.90 inches at Mahnommen in 1963

Words of the Week: gloomy, dreary, glum, dull, or dingy

These are all words that have been used to describe my personality at times, but aside from that they are all terms used by forecasters to refer to persistent cloudy periods, particularly during the seasons when more sun is expected. Thick vertical clouds or very low stratoform clouds casts a gray tinge over everything, and some would argue dull the senses and even bring on depression. We are more tolerant of this when it occurs in February, March, or November, than when it occurs in the month of May.

Outlook:

Cooler than normal over the weekend most places, with scattered showers. This pattern will linger into Memorial Day on Monday as well. Sunday has historically seen the most cloudiness over the Memorial weekend and it looks like that historical pattern will prevail again. A warming trend will begin on Tuesday, bringing temperatures back up to normal levels for this time of year. A chance for thunderstorms by Thursday, with closer to normal daytime high temperatures to usher in the month of June.

To: WeatherTalk for MPR's Morning Edition
From: Mark Seeley, Dept of Soil, Water, and Climate
Re: Topics for MPR's Morning Edition, Friday, June 3, 2005

Headlines:

- Time to be wary about the sun
- 2005 tornado statistics
- Analysis of the Benson, MN tornado of 2001
- Anniversary of the Comanche, IA tornado
- Almanac for June 3rd
- Dismasting blast
- Outlook

Twin Cities temperature topped out at 85 degrees F on Thursday, June 2nd this week. This was the highest temperature there since last September 22nd, a period of 253 days...quite a wait for summerlike temperatures....

Topic: Reminder about UV radiation....

Though cloudiness and the general lack of solar radiation has dominated the spring weather pattern in Minnesota, we should all pay heed to the daily ultraviolet radiation forecasts supplied by the National Weather Service... (<http://www.cpc.ncep.noaa.gov/products/forecasts/>).

As daylength increases this month, along with the overhead sun angle, the risk of daily exposure to solar radiation will rise as well. It is important to wear appropriate clothes, sunglasses, and sun screen if you are planning to be in the sun for periods of more than one hour during the midday period. Daily UV index values commonly range from 5 to 8 (high to very high) in Minnesota during June.

MPR listener question: I see that NOAA's Storm Prediction Center (SPC) announced this week that tornado activity across the country has been down compared to recent years, with just 362 tornadoes reported in the first 5 months of 2005. How does this compare to the average and how many have been reported in Minnesota so far?

Answer: The tornado count for the first five months this year, 362, is down quite a bit from the first five months last year, 696, when a record annual total of 1816 was reported across the nation. The recent historical average for the first five months of the year is just over 400, so this year's numbers are down by only about 10 percent.

So far in Minnesota, six tornado reports have been filed with the National Weather Service. This too is less than the average in recent years. The reports so far in 2005 include...

(1) March 30 near Adams in Mower County, (2) April 19 near Starbuck in Pope County, (3) May 5 near Baudette in Lake of the Woods County, (4) May 8 near Faribault in Rice County a waterspout was reported that may have briefly been a tornado, (5) May 18 near Benson and Murdock in Swift County (probably the same tornado), and (6) May 21 near Crookston in Polk County.

Topic: Revisiting the Benson, MN Tornado of June 11, 2001.....

A research paper in the current edition of the Bulletin of the American Meteorological Society describes the weather features associated with the F2 tornado (wind speeds 113 to 157 mph) near Benson on June 11, 2001. This tornado was spawned by a thunderstorm supercell, but the researchers document that the latent energy properties of the regional air mass that produced it were amplified by abundant surface moisture being swept up into the boundary layer by evaporation and transpiration from agricultural crops in Iowa, Illinois, eastern Nebraska and northern Missouri. Abundant rainfall over the previous days and weeks had left the land surface quite moist and the flux of water vapor into the lower atmosphere was highly magnified by the warm up that occurred on that June date. Temperatures climbed into the mid 80s to low 90s F that day, but much more importantly, strong southerly winds brought in moist air from Iowa and Missouri that raised the dewpoint up to 72 degrees F. Moisture from the Gulf of Mexico was cut off further south such that the source of water vapor for this storm system to develop was from the land surface to the south. This is one of the few research papers that documents the dynamics of land surface interaction with the atmosphere in amplifying the conditions that produced a supercell thunderstorm, and subsequent tornado.

Topic: The Comanche, IA tornado of June 3, 1860

On this date 145 years ago an F5 tornado cut a path across Iowa from Dewitt to Comanche, along the Mississippi River near the Illinois border. As described by eyewitnesses, this strong tornado actually formed as a merger of two lesser tornadoes that collided. It remains one of the worst to ever strike the midwest, resulting in 92 deaths and 200 injuries. The town of Comanche, IA was completely destroyed, including 39 businesses and 150 homes. The tornado was 1000 yards wide and cut a path of over 80 miles. When it crossed the Mississippi River and struck Albany, IL it tore up the cemetery and scattered grave stones for miles.

Twin Cities Almanac for June 3rd:

The average MSP high temperature for this date is 76 degrees F (plus or minus 9 degrees F standard deviation), while the average low is 54 degrees F (plus or minus 7 degrees F standard deviation).

MSP Local Records for June 3rd:

MSP weather records for this date include: highest daily maximum temperature of 92 degrees F in 1923; lowest daily maximum temperature of 53 degrees F in 1897 and 1990; lowest daily minimum temperature of 34 degrees F in 1945; highest daily minimum temperature of 70 degrees F in 1898; record precipitation of 1.71 inches in 1914.

Average dew point for June 3rd is 49 degrees F, with a maximum of 73 degrees F in 1963 and a minimum of 24 degrees F in 1929.

All-time state records for June 3rd:

Scanning the state climatic data base: the all-time high for this date is 98 degrees F at Canby in 1940 and at Lambertson, Madison, Montevideo, and Springfield in 1968. The all-time low for this date is 18 degrees F at Remer (Cass County) in 1985. The all-time state record for precipitation on this date is 7.10 inches at Pine River (Crow Wing County) in 1898. Being one of the heaviest rainfalls in the month of June, this storm produced hail and flash flooding in the area. The monthly total rainfall at Pine River for June of 1898 was 11.39 inches, their 2nd highest total for historically for the month. As a consequence there was a dramatic rise in the Mississippi River, similar to what occurred the previous year (1859) when Sauk Rapids recorded flash flooding as a result of early June rains.

Words of the Week: Dismasting blast

The image invoked by this term, first used by author Herman Melville in 'Moby Dick', is a wind blast so strong that it snaps the mast of a sailing ship. Though rare, this sometimes occurred when masts were made of wood. Today, many masts are made of steel, aluminium or plastic and not as likely to snap under the stress of a powerful wind gust.

Outlook:

The unsettled pattern for early June will continue over the weekend and into next week. Temperatures will generally be at or above seasonal averages. Chance for thunderstorms Saturday and Sunday, some may be severe. Generally drier on Monday through Wednesday, then another chance for thunderstorms by Thursday.

To: WeatherTalk for MPR's Morning Edition
From: Mark Seeley, Dept of Soil, Water, and Climate
Re: Topics for MPR's Morning Edition, Friday, June 10, 2005

Headlines:

- Heavy thunderstorms inflict damage
- Similar weather in western Canada
- First Tropical Storm to enter Gulf of Mexico
- Which is the wettest month of the year?
- Almanac for June 10th
- Sheep's Cold
- Outlook

Topic: Heavy thunderstorms this week.....

Two rounds of heavy thunderstorms this week brought hail, heavy rainfall, flash flooding, and damaging winds to the region. On Tuesday, June 7th Eau Claire, WI reported record rainfall of 3.04 inches, an amount that produced some local flooding. Then early on Wednesday, June 8th, more widespread thunderstorms brought 60-70 mph winds to western Minnesota counties, along with numerous hail reports and very heavy rainfall. The following locations reported record rainfall for the date: Chaska with 1.78 inches, Theilman with 3.30 inches, Zumbro Falls with 5.95 inches, Farmington with 2.13 inches, Faribault with 3.10 inches, and Zumbrota with 4.48 inches. An estimated 3.13 inches of rain flooded out the water treatment plant at Wanamingo (Goodhue County). Numerous points of flooding occurred along the Zumbro River and other area creeks where waters rose by as much as 20 feet.

These storm events were preceded by an airmass that brought dewpoints in the 70s F and air temperatures reaching the upper 80s and lows 90s F, both of which fueled plenty of convection. Some high temperatures and (dewpoints) noted in various communities were: MSP 91 F (70 F), Albert Lea 91 F (70 F) Rochester 90 F (71 F), Preston 90 F (70 F), Winona 92 F (72 F), La Crosse 93 F (72 F), Fairmont 91 F (70 F), Waseca 95 F (70 F). Maximum Heat Index values in the 90s F occurred in southern Minnesota counties, topping out with 97 F at Waseca late Tuesday.

Topic: We're not the only ones....

Rainfalls up to 6 inches in 24 hours inundated areas of southwestern Alberta Province earlier this week as well. High River Alberta lived up to its name with flooding that forced the evacuation of 200 people from their homes. Flood watches were also posted for parts of Saskatchewan and Manitoba as well, as rivers are expected to continue to rise by several feet this week.

Topic: First tropical storm of the season

Tropical Storm Arlene formed this week in the western Caribbean and appears to be heading into the Gulf of Mexico. The storm holds the potential to bring heavy rains to the southeastern states and perhaps even help alleviate some of the drought in Arkansas, eastern Missouri, and southern Illinois.

MPR listener question: June is certainly acting like it will also be a wet month. I have heard you say that based on historical averages June is the wettest month of the year for most locations in Minnesota. Where are the exceptions to this statement?

Answer: For 80-90 percent of the state average precipitation in June is historically the highest of any month. The exceptions can mostly be found in southeastern and north shore locations. The list below shows the historical rank of the wettest three months of the year for selected locations....

Location Wettest three months of the year historically

Winona	August, July, June
Waseca	August, July, June
Red wing	August, July, June
Grand Meadow	August, July, June
Rochester	July, August, June
Duluth Harbor	July, June, August
Two Harbors	July, June, August
Cloquet	August, June, July
Grant Portage	July, June, August
Isabella	July, June, August

These differences are probably attributable to the more random nature of convective rainfall, but also more thunderstorm days in eastern areas of the state from mid to late summer.

Twin Cities Almanac for June 10th

The average MSP high temperature for this date is 76 degrees F (plus or minus 9 degrees F standard deviation), while the average low is 57 degrees F (plus or minus 7 degrees F standard deviation).

MSP Local Records for June 10th:

MSP weather records for this date include: highest daily maximum temperature of 99 degrees F in 1956; lowest daily maximum temperature of 55 degrees F in 1945; lowest daily minimum temperature of 41 degrees F in 1972; highest daily minimum temperature of 73 degrees F in 1973; record precipitation of 1.55 inches in 1946.

Average dew point for June 10th is 53 degrees F, with a maximum of 72 degrees F in 1918 and a minimum of 20 degrees F in 1972.

All-time state records for June 10th:

Scanning the state climatic data base: the all-time high for this date is 106 degrees F at Fairmont (Martin County) in 1933. The all-time low for this date is 22 degrees F at Remer (Cass County) in 1985. The all-time state record for precipitation on this date is 6.05 inches at Agassiz Refuge (Marshall County) in 2002.

Words of the Week: Schafskaelte or "Sheep's Cold"

This expression comes courtesy of Jo Farrow of the BBC Weather Centre. Parts of Europe have been experiencing some late spring cold spells, with frosts in many places. In Austria a late spring or early summer cold spell that comes close to June 11 is referred to as "Schafskaelte" meaning sheep's cold weather. It brings a bit of a shock to the sheep as they have typically just been sheared for the impending summer season and are therefore more susceptible to the cold.

Outlook:

Chance for showers and thunderstorms over the weekend, especially in southern areas on Saturday. Sunday will be dry most places. Temperatures will be warmer than normal. Better chance for showers Sunday night and thunderstorm Monday, then drier for Tuesday and Wednesday. Temperatures may cool with less humidity towards the end of next week.

To: WeatherTalk for MPR's Morning Edition
From: Mark Seeley, Dept of Soil, Water, and Climate
Re: Topics for MPR's Morning Edition, Friday, June 17, 2005

Headlines:

- Severe Weather This Week
- Weather For Grandma's Marathon
- New Climate Outlook For July, August, and September
- Soils And Climate Change At High Latitudes
- Almanac For June 17th
- GOSAT and OCO
- outlook

Topic: This week's severe weather....

Persistent rains and damaging thunderstorms continued to plague the region this week. On Saturday, June 11 an F2 tornado (winds of 113-157 mph) carved a two mile path of destruction near Hammond, WI (St Croix County). Estimated damages exceeded \$3.5 million. Also on Saturday, brief tornado touchdowns were reported in Clay County (near Felton) and Pine County (near Pine City), Minnesota causing some tree damage. After a nice day on Sunday, severe weather struck again on Monday, June 13th with reports of tornadoes in Douglas County (near Miltona) and Chippewa County (near Watson). Large hail fell in 22 Minnesota counties that day as well, and wind gusts of 60-70 mph were reported from Mower, Olmsted, Rice, and Isanti Counties. Some corn and soybean fields were damaged in Nobles County. Isle on the southeast corner of Lake Mille Lacs reported a new record rainfall for the 13th of 2.95 inches.

Topic: Weather for Grandma's Marathon

The 29th running of Grandma's Marathon from Two Harbors to Duluth occurs this Saturday (June 18th). The start of the race is scheduled for 7:30 am. Temperature at the start of the race is expected to be about 50 degrees F, very close to the historical average for this race. The temperature has been as cold as 39 F (1991) and as warm as 68 F (1977) for the race start. During the race the temperature is expected to warm through the 50s F to the low 60s F by midday, but light northeasterly winds over Lake Superior will make it feel cooler than that, especially with dewpoints in the mid 40s F. The historical average daytime high temperature for Grandma's Marathon is in the mid 60s F, but it has been as cold as 53 degrees F and as warm as 93 F at Duluth on the day of the race.

Most of the fastest times in this marathon have been run in cool conditions, with temperatures from the high 40s to high 50s F. Fast times were recorded in 1980, 1981 (Dick Beardsley course record 2:09.37) and 2002 despite some light shower activity. It rains for Grandma's Marathon about one out of four years. A tailwind helped

the runners in 2002 when nearly 3000 of them finished the course in under 4 hours. Conversely warm temperatures, high dewpoints, and headwinds have been detriments to some marathons, especially 1988, when dewpoints were in the mid 60s F, temperatures in the high 70s to low 80s F, and headwinds were blowing 15-20 mph. This made the race rather grueling, reflected in the slow times (men's winning time 2:20.07, women's winning time 2:43.27).

Runners dissipate the heat they generate by conduction, convection (from the skin), evaporation (sweat), warming the inhaled air in the lungs, and exhausting water vapor in their breath. Clothing style and color has a greater impact on heat storage and dissipation when the sun is out, than when it is overcast. Some studies have shown that dark colored clothing may keep the runner 3 to 7 degrees F warmer than light colored clothing of the same material.

Over the years, organizers of Grandma's Marathon have adopted the American College of Sports Medicine color coding system to warn participants about risks from heat or cold stress. Flags are posted along the course to designate stress levels: Black Flag is extremely high risk of heat stress; Red Flag is high risk; Yellow Flag is moderate risk; and Green Flag is low risk. Cold temperature stress which might lead to hypothermia is designated by the posting of a white flag. I suspect a green flag will be posted for this Saturday's race.

Topic: The Climate Outlook for July, August, and September

The NOAA Climate Prediction Center released the new seasonal climate outlooks on Thursday, June 16th. Both temperature and precipitation have an equal chance of being above or below normal across our region during July, August, and September. We have certainly seen a wet start to the 2005 growing season, so some people may regard this outlook as a blessing.

MPR listener question: I have heard you say that climate trends show the higher latitudes (poleward) are warming more than the lower latitudes (subtropical) in recent years. What will happen to the soils in these high latitude regions?

Answer: Several processes come to mind in terms of temperature changes in the soils. The decay of organic matter and mineralization processes will last longer and become more rapid. The populations of biological organisms in the soil will likely change as well. Permeability and weathering will also change. In fact, there is a paper in a recent edition of Science Magazine that documents the loss of permafrost in northern Siberia. It seems that with the warming and loss of permafrost, soil permeability and infiltration have changed sufficiently to cause the disappearance of 125 lakes, and the shrinkage of hundreds of more. Such signatures are seen in a time series of satellite images.

Twin Cities Almanac for June 17th

The average MSP high temperature for this date is 78 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 June 17th:

MSP weather records for this date include: highest daily maximum temperature of 97 degrees F in 1933; lowest daily maximum temperature of 59 degrees F in 1892; lowest daily minimum temperature of 42 degrees F in 1960; highest daily minimum temperature of 75 degrees F in 1921; record precipitation of 1.45 inches in 1976. The Heat Index approached 100 degrees F on this date in 1921.

Average dew point for June 17th is 56 degrees F, with a maximum of 74 degrees F in 1944 and a minimum of 39 degrees F in 1958.

All-time state records for June 17th:

Scanning the state climatic data base: the all-time high for this date is 102 degrees F at Lower St Anthony Falls in 1995; The all-time low for this date is 22 degrees F at Tower (St Louis County) in 2000. The all-time state record for precipitation on this date is 8.67 inches at Minneota (Lyon County) in 1957. In fact on June 17, 1957, severe thunderstorms produced all-time record setting 24-hr rainfall totals at Minneota, Bird Island (8.40"), Marshall (8.07"), Tyler (8.57"), and Montevideo (7.30"). These rains caused the Yellow Medicine River and other local watersheds to flood.

Words of the Week: GOSAT AND OCO

These are not new robots designed for cleaning your house, but both are acronyms for new satellites that will be launched for the purpose of monitoring and studying the carbon dioxide in the Earth's atmosphere. The Japanese Aerospace Exploration Agency will launch the Greenhouse Gases Observing Satellite (GOSAT) in 2008, while NASA will launch its own such platform called the Orbiting Carbon Observatory (OCO) in 2007. These satellites will be equipped with instruments to study one of the most important greenhouse gases, carbon dioxide. The hope is that they will help fill a knowledge gap in understanding the carbon cycle of our planet, including rates of storage, release, and transport of carbon dioxide.

Outlook:

Generally a pleasant weekend with high temperatures above normal. It will be mostly sunny for a change with light winds. Increasing cloudiness on Monday with a chance for showers and thunderstorms late Sunday night, Monday, and Tuesday. A warming trend should take hold next week and send many areas into the 90s F during the day.

To: WeatherTalk for MPR's Morning Edition
From: Mark Seeley, Dept of Soil, Water, and Climate
Re: Topics for MPR's Morning Edition, Friday, June 24, 2005

Headlines:

- Annual Garden Tour
- Hot and Humid
- Keeping elephants out of the garden
- Anniversary of 1957 Fargo Tornado
- A wet June
- Almanac for June 24th
- Jevon's Effect
- Outlook

Topic: Annual Garden Tour in St Anthony Park

For those who like to get their gardening and home landscaping ideas by observing what others do, here's your chance. The Annual St Anthony Park Garden Tour is Saturday, June 25. It starts at 9:00 am from the St Anthony Park Library at Como Avenue and Carter Ave. This year 12 gardens will be on display and the cost is just \$12, one dollar per stop.

Topic: Hot and Humid

The recent run of warmer than normal temperatures around the state has produced Growing Degree Day values (accumulation of temperature above a base value of 50 F) that are now slightly ahead of normal in many places, helping to make up for a slow, cool start to the growing season. But there is a price to pay in discomfort.

Many places reported temperatures in the 90s F this week, reaching 99 F at Benson, Wheaton, and Ortonville in western areas. St Cloud set a new high temperature record on June 23 with a reading of 98 degrees F. But scores of communities reported new high minimum temperature records on that date, with overnight lows dropping to only 74-80 degrees F. In fact the Twin Cities low of 80 degrees F on June 23rd was only the 5th time since 1891 that the overnight temperature has remained that high in the month of June. With a dewpoint in the 80s F (tropical), Roseau reached a Heat Index Value of 117 degrees F on the 23rd as well.

Topic: Keeping elephants out of your garden

An interesting climate-related story out of Zambia in Africa appeared in the news this week. It seems that drought has caused many elephants to migrate from their usual foraging areas. They are now searching for food in villages and other agricultural areas of Zambia that normally don't have these kinds of animals nearby. In order to protect gardens and

agricultural crops from elephants, the Director of the Zambia Wildlife Association recommends planting the perimeter of fields with chilli fences. The red pepper plant will grow rapidly on poles and stakes, forming a barrier around gardens. Elephants hate chilli and will likely stay away.

Topic: Anniversary of 1957 tornadoes in Fargo, ND

June 20 of 1957 brought an outbreak of five tornadoes to the Fargo-Moorhead area, some of the most damaging in North Dakota history. Beginning about 6:30 pm that day an F5 (winds greater than 260 mph) tornado cut a five block wide path over a twenty block length through Fargo, destroying over 1300 homes. The storm left 10 dead and over 100 injured as it was on the ground for over 9 miles, finally dissipating NNE of Moorhead. Much of the debris from this tornado was later found in Detroit Lakes, MN, over 45 miles away. Other communities like Hawley and Glyndon in Minnesota were struck by lesser tornadoes that day as well, thankfully with no fatalities.

Dr. Fujita from the University of Chicago studied the storms aftermath and found that the damages in Fargo were caused by five different tornadoes, something that had not been detected by the Weather Service at the time.

MPR listener question: As wet as this June has been around the state, is this a record setter? What are the wettest Junes in state history?

Answer: Indeed, many areas of western MN and southeastern MN have reported rainfall totals exceeding 6 inches this month, well above normal. Places like Moorhead, Onamia, Zumbro Falls, and Wheaton have already doubled normal June rainfall totals and may approach 10 inches before the month is finished.

However, none of these values are approaching the all-time state records for June. The wettest June on a statewide basis was 1914 when the average value for all stations was 8 inches. The most recent excessively wet June was 2002 when the statewide average rainfall was over 6.2 inches. Some individual station records for June include: Grand Meadow and Winona with over 14 inches in 1914; Milaca with 15 inches in 1944; Marshall with 13.83 inches in 1957; and Delano with 15.63 inches in 2002.

Though the total amount of rainfall in June is still far from a record in most places, the frequency of rainfall is highly unusual. Some locations have reported rainfall on 14 to 16 days this month. This follows a pattern of high frequency of rainfall that was established in May. Lamberton, in Redwood county for example has reported measurable rainfall on 35 days in May and June, a new record frequency for that location (the old record was 31 days in 1991 - a spring flood year).

Twin Cities Almanac for June 24th

The average MSP high temperature for this date is 80 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 June 24th:

MSP weather records for this date include: highest daily maximum temperature of 101 degrees F in 1988; lowest daily maximum temperature of 59 degrees F in 1928; lowest daily minimum temperature of 44 degrees F in 1972; highest daily minimum temperature of 75 degrees F in 1937; record precipitation of 2.36 inches in 1911. The Heat Index approached 100 degrees F on this date in 1921.

Average dew point for June 24th is 57 degrees F, with a maximum of 74 degrees F in 1943 and a minimum of 29 degrees F in 1972.

All-time state records for June 24th:

Scanning the state climatic data base: the all-time high for this date is 106 degrees F at Artichoke Lake (Big Stone County) and at Marshall (Lyon County) in 1988; The all-time low for this date is 20 degrees F at Remer (Cass County) in 1985. The all-time state record for precipitation on this date is 7.60 inches at Browns Valley (Traverse County) in 2003.

Words of the Week: Jevon's effect

Here's a singular example of an economist helping meteorologists and climatologists understand a bias in their measurements. William Stanley Jevons was a rather well known British economist of the late 19th Century. But early in his career he studied weather while working in Australia. He noted that the disturbance in the wind field around a rain gage caused it to deflect many of the small droplets over and around the funnel opening, resulting in the gage collecting less of the rainfall than actually hit the ground. Jevons showed that the loss of rainfall captured by the gage was proportional to the speed of the wind. Therefore the unshielded rain gage actually gave a measurement of precipitation that was consistently under the actual amount striking the Earth. Subsequent to Jevon's study, many weather services deployed a shielded rain gage to improve their measurements.

Outlook:

Continued warm over the weekend, but not as humid. Chance of showers and thunderstorms later on Saturday in the south, then around more of the state on Sunday. A return of hot temperatures is seen for Monday through Wednesday, with many areas reaching the 90s F. Unstable, humid air next week will bring a chance for showers and thunderstorms nearly everyday, adding to the already inflated rainfall totals for the month.

To: WeatherTalk for MPR's Morning Edition
From: Mark Seeley, Dept of Soil, Water, and Climate
Re: Topics for MPR's Morning Edition, Friday, July 1, 2005

Headlines:

- It's hot and humid elsewhere as well
- Preliminary Climate Summary for June
- Positive Response to the 1978 flash floods
- Extreme heat and rain on the 4th of July
- Almanac for July 1st
- LEWP defined
- Outlooks

Topic: Not alone in coping with heat and humidity

Some central and southern European countries have been suffering from too much heat this month. There were 18 heat related deaths reported from Vicenza and Milan in Italy this week. In fact, Spain, France, and Italy have invoked precautionary procedures to protect the elderly from heat related health risks. Many of these new procedures were instituted in larger European cities as a result of the lethal heat wave of August 2003, which resulted in thousands of deaths. The recent heat has had some detrimental effects on crops in those countries as well. Fortunately the spell of warm weather in France will moderate this week for the start of the Tour de France bike race.

Topic: Preliminary Climate Summary for June

A tropical like weather pattern dominated in June across Minnesota. Dewpoints exceeded 70 degrees F, even 80 degrees F on some days, producing Heat Index values of over 100 degrees F. Rainfall was frequent and abundant. Most locations reported above normal rainfall for the month, with the heaviest amounts in western sections of the state. Rainfall was recorded on 15 to 18 days during the month at most stations. Numerous severe thunders torms occurred bringing hail and heavy rains. It hailed for over 30 minutes in Meeker County on the 27th and on the 8th thunders torms brought 5 to 6 inches of rainfall to parts of Goodhue and Wabasha Counties (near Wanamingo and Zumbro Falls). Thunderstorm generated winds in excess of 70 mph snapped and uprooted trees in several areas on the 20th, the 27th and the 29th. Six Minnesota Counties reported tornadoes on the 29th including Lyon, Cottonwood, Nicollet, Le Sueur, Watonwan, and Blue Earth. An additional 14 counties also reported large hail. June concluded with a record 2.08 inches of rainfall reported at Grand Marais on the 30th.

Temperatures averaged 1 to 6 degrees F warmer than normal for June, mostly thanks to warm nights. In fact in southern locations June of 2005 will rank in the warmest 10 percent historically. Extremes ranged from 99 degrees F at Benson and Ortonville on the 23rd to just 31 degrees F at Embarrass on the 17th. For late planted and slowly developing crops, the warm temperatures of June were beneficial in accelerating plant growth. Growing Degree Days were well above normal for the month.

For the second month in a row Minnesota did not report the nation's lowest temperature on any date, a highly unusual occurrence historically for a state known by some as the American Siberia.

Topic: Positive Response to the flash floods of 1978

As we find ourselves in the midst of yet another wet growing season in Minnesota, all the reports of excessive rainfall bring back memories of the 1978 growing season when nine separate flash floods occurred around the state, two particularly traumatic ones in the Rochester area. On July 1st that year flash floods struck in Goodhue, Wabasha, Winona and Houston Counties of southeastern Minnesota, dumping 7-9 inches of rain in places and flooding most watersheds, including the Zumbro River. Rochester received over 1.5 inches from that storm, but it was a modest precursor of what was to come. A few days later on July 5-6 Rochester received nearly 7 inches of rainfall, five inches coming in just a three hour period. This flooded Bear Creek, Silver Creek, Cascade Creek and the South Fork of the Zumbro River, all of which flow through Rochester. An all-time flood crest record was established on the South Zumbro River with a gage reading of 23.36 feet. Five people were killed and hundreds of properties were damaged, totaling an estimated \$79 million in losses. About 1/4 of the city was under six feet of water and over 5000 were forced to evacuate their homes. And that was just the first chapter of severe weather for Rochester that summer. On September 12th a second flash flood occurred as a result of 7.07 inches of rainfall in the downtown area. Although no deaths were reported, another \$5 million in damages occurred. A drier than normal August, followed by a dry early September was a blessing as the landscape was able to absorb more of the rainfall from the second storm than it had in the July storm.

As a result of this historic summer flood in Rochester, the Army Corps of Engineers, USDA National Resources Conservation Service, and the City of Rochester partnered to undertake a \$92 million flood control project on the south fork of the Zumbro River and its tributaries. The project was completed in 1995. Improvements to the channeling and routing of water through Rochester, as well as the building of upstream impoundment structures has greatly alleviated the flood risk. For example, since 1999 the Rochester area has recorded thunderstorm rainfall of over 4 inches in a 24 hour period on four occasions, only one of which has produced

serious consequence for the downtown area or the local watersheds, that of June 9, 2004 when basements and streets were flooded as a result of getting nearly 2.5 inches of rain in less than one hour. During that storm a ten year old boy was rescued trying to cross Cascade Creek on a surf board.

MPR listener question: When was the hottest 4th of July in Minnesota? Also when was the wettest?

Answer: In the Twin Cities Metro Area, the hottest July 4th was in 1949 when it hit 100 degrees F and the Heat Index reached 111 degrees F. The wettest was in 1900 when 2.27 inches of rain fell in the Twin Cities. Statewide the hottest July 4th was in 1936 when both Pipestone and Worthington reported 107 degrees F. The all-time wettest July 4th was in 1995 when Milan received 9.78 inches of rainfall that produced flash flooding. The Chippewa River rose 9 feet and reached its 2nd highest ever flood crest. Thirty-two sheep were drowned in the flood.

Twin Cities Almanac for July 1st:

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

MSP Local Records for July 1st:

MSP weather records for this date include: highest daily maximum temperature of 100 degrees F in 1883 (NWS 99 F in 1911); lowest daily maximum temperature of 60 degrees F in 1945; lowest daily minimum temperature of 46 degrees F in 1969 and 1995; highest daily minimum temperature of 80 degrees F in 2002; record precipitation of 2.85 inches in 1997. The Heat Index approached 108-110 degrees F on this date in both 1911 and 1916.

Average dew point for July 1st is 58 degrees F, with a maximum of 78 degrees F in 1916 and a minimum of 38 degrees F in 1995.

All-time state records for July 1st:

Scanning the state climatic data base: the all-time high for this date is 103 degrees F at Fergus Falls (Otter Tail County) in 1921 and at Winona in 1931; The all-time low for this date is 30 degrees F at Brimson (St Louis County) in 1988. The all-time state record for precipitation on this date is 8.00 inches at Theilman (Wabasha County) in 1978.

Word of the Week: LEWP (pronounced loop)

This is another severe weather acronym standing for Line Echo Wave Pattern. It is derived from the radar echo pattern observed on the screen when a line of convective thunderstorms has become subjected to uneven acceleration. As a consequence a portion of the line observed on the radar display develops a bulge or arch,

while another portion shows a kink. The bulge portion of the line is usually associated with damaging winds. This pattern is smaller in scale than the large continuous bulge that is observed with a derecho (straight line wind storm). Some LEWP radar signatures have appeared during the recent June thunderstorms.

Outlook:

Looks like temperatures will stay near seasonal averages over the weekend with a chance for widely scattered showers and thunderstorms later on Saturday in the west and across the state on Sunday. The 4th of July looks to be dry, with increasing chances for showers again Tuesday and Wednesday. Another warming trend will be evident by the end of next week.

To: WeatherTalk for MPR's Morning Edition
From: Mark Seeley, Dept of Soil, Water, and Climate
Re: Topics for MPR's Morning Edition, Friday, July 8, 2005

Headlines:

- Important science questions related to climate
- Recent weather and climate news
- A clarification on temperature variability
- Almanac for July 8th
- What is Delta-T?
- Outlook

Topic: Current issue of Science asks some important questions

To commemorate its 125th anniversary, the current issue of Science magazine (July 1) poses 125 important scientific questions that point to important gaps in our knowledge about the world we live in. A number of them are climate related, including:

What causes ice ages? Is it entirely due to changes in Earth-Sun orbital characteristics?

What is the genetic basis for tolerance to environmental stresses?

How will ecosystems respond to global warming?

How hot will planet Earth get as global warming continues?

What are the effective limitations in producing wind and solar power?

More on these questions and others can be found at the Science magazine web site: www.sciencemag.org/sciext/125th

Topic: Potpourri of recent weather news

NOAA's Storm Prediction Center announced this week that for the first time since official records began in 1950, there are no reported tornado fatalities in the U.S. for the April through June period. There have been nearly 700 tornado reports so far this year, close to the historical average for the first six months. But the only fatalities occurred in January (4) and March (1). The historical average number of fatalities over the April through June period is 52, so the absence of any fatalities is indeed highly unusual. So far there have been just over 30 tornadoes in Minnesota reported this year, with the most recent ones occurring on July 2nd with severe thunderstorms in Roseau and Kittson Counties of the northwestern part of the state.

Speaking of northwestern Minnesota, the Red River has exceeded flood stage in many places this week, thanks to saturated soils combined with 4-5 inch rains in Kittson County and southern Manitoba on July 2nd. In fact, Winnipeg reports the highest flood

stage since 1969 for the summer season, and the highest since the historic snowmelt flood of 1997. At the Forks in downtown Winnipeg, the usual river stage is 6.3 feet, but this week it was at 20 ft. Thousands of acres of agricultural land is under water, while many businesses and homes have been flooded resulting in estimated damages that will exceed \$200 million.

Hurricane Dennis, the 4th named storm of the Atlantic hurricane season is expected to achieve category 3 status (winds up to 130 mph) and reach the southeast coast, likely affecting Florida, Georgia, and Alabama over the weekend. Water temperatures in the Gulf of Mexico of 84 to 86 degrees F are warm enough to sustain or intensify this hurricane.

The National Weather Service in Alaska reported an increase in thunderstorm activity in that state over the past decade. Anchorage has seen a 60 percent increase in thunderstorm activity since 1996. Some meteorologists attribute this to a warming of the waters in the Gulf of Alaska and an increase in air temperatures over the coastal regions of the state. This report comes on the heels of one last year that showed parts of Alaska recorded the warmest summer season ever.

Most of China has been experiencing a heat wave with many areas reporting daily temperatures of 95 degrees F or above for eleven consecutive days. Air temperatures have reached as high as 104 F, while heat index values have risen to 115 degrees F. Hospitals have been crowded with patients seeking treatment for heat related health problems, while electric utilities have been scrambling to keep up with power demands. Forecasts suggest that the heat wave will finally break late in the weekend or early next week.

A stalled warm front and dominant high pressure system to the east have led to one of the worst recent spells of air quality in Moscow. The absence of rain has compounded the problem and allowed pollutants from factory and traffic emissions to build up in the city. Rainfall late this week was expected to alleviate this problem.

MPR listener question: I noted that the standard deviation for high temperature in early July is +/- 7 degrees F. Is the standard deviation fairly consistent across the whole calendar year, or are some seasons more highly variable in temperatures than others? Does the Upper Midwest have higher variability in daily temperatures (greater standard deviation) than other parts of the country?

Answer: Indeed, Minnesota is famous for not only the range in annual temperature conditions (highs to 114 degrees F and lows to -60 degrees F), but the variability day to day. Standard deviations of daily average high and low temperatures range from 13 to 15 degrees F in the winter months to only 6 to 8 degrees F in the summer months. Such statistics provide a sort of moving target for our meteorologists to forecast. We expect them to forecast the daily highs and lows within a few degrees for any season of the year even though the background variation historically is far from consistent.

Twin Cities Almanac for July 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 July 8th:

MSP weather records for this date include: highest daily maximum temperature of 101 degrees F in 1936 and again in 1974; lowest daily maximum temperature of 65 degrees F in 1995 and 1997; lowest daily minimum temperature of 46 degrees F in 1842 at old Ft Snelling, but in the modern record it is 51 degrees F in 1958; highest daily minimum temperature of 82 degrees F in 1936; record precipitation of 3.07 inches in 1925. The top five Heat Index values on this date historically include: 105 degrees F in 1948, 104 degrees F in 1936, 103 degrees F in 1983, and 102 degrees F in 1897 and 1974.

Average dew point for July 8th is 59 degrees F, with a maximum of 74 degrees F in 1983 and a minimum of 42 degrees F in 1953.

All-time state records for July 8th:

Scanning the state climatic data base: the all-time high for this date is 110 degrees F at Fosston (Polk County) in 1936; The all-time low for this date is 25 degrees F at Kelliher (Beltrami County) in 2003. The all-time state record for precipitation on this date is 6.03 inches at White Rock Dam (Traverse County) in 1950.

Word of the Week: Delta-T

This term is used by agricultural meteorologists and farmers. It refers to the difference between the wet bulb temperature and the dry bulb temperature, which is usually several degrees. The difference between these temperatures is highly dependent on the amount of water vapor in the atmosphere. Most importantly the Delta-T indicates the suitability for spraying crops with various herbicides and pesticides, as it relates to evaporation rate and droplet lifetime. The larger the Delta-T the greater the evaporation rate and the shorter the lifetime of a droplet.

The ideal Delta-T ranges from 4 to 14 degrees F, a spread that in the summertime typical indicates a relative humidity of 40 to 80 percent.

Outlook:

A strong warming trend will bring temperatures up to the 90s F in many places over the weekend. A chance for scattered showers and thunderstorms in the north and east on Saturday. A better chance for showers on Monday, with some moderation in temperatures on Tuesday and Wednesday. Temperatures and humidity on Sunday and Monday will be stressful enough to warrant not leaving pets or children in cars.

A recent study reported in Weatherwise magazine that interior temperatures of cars can rise 20-25 degrees F above the outside air temperature in as little as 20 to 25 minutes.

To: WeatherTalk for MPR's Morning Edition
From: Mark Seeley, Dept of Soil, Water, and Climate
Re: Topics for MPR's Morning Edition, Friday, July 15, 2005

Headlines:

- July Heat
- Rain needed in areas
- Weather for the British Open
- Question About Hottest Day of July
- Almanac for July 15th
- Sulfurous readings
- Outlook

Topic: Hot Julys and Heat Waves

Following a cooler than normal May and warmer than normal June, we are half way through what is turning out to be a warm July, something not forecasted for our region by the NOAA Climate Prediction Center.

Furthermore the recent run of warm days, particularly in the Twin Cities area has been marked by daytime highs in the 90s F and nighttime lows remaining in the 70s F. The combination of hot temperatures and high dewpoints has produced Heat Index values from the mid 90s F to the low 100s F around the state this week. Though not life threatening like the current heat wave in Texas which has produced 28 days over 100 degrees F in the El Paso area, the persistent spell of hot weather here is taking its toll on gardens, farm crops, livestock and our air conditioning bills.

How often do we get similar hot spells in July weather? Not terribly often compared to southern plains states like Texas and Oklahoma, but we have had some extraordinary Julys in the past. By far the hottest July ever was 1936, the only time the average monthly temperature in the Twin Cities has exceeded 80 degrees F. The ten warmest Julys in the Twin Cities and on a statewide basis (all observers considered) are listed below.....

Twin Cities		Statewide	
Year	Ave July Temp	Year	Ave July Temp
1936	81.4 F	1936	76.2 F
1935	79.9 F	1916	74.5 F
1916	79.1 F	1935	74.2 F
1988 and 1955	78.0 F	1901	73.8 F
1921	77.5 F	1955	73.5 F
1901	77.3 F	1921	73.2 F
1983	77.2 F	1983	73.0 F
1933	77.1 F	1988	72.9 F
1894, 1937 and 2002	77.0 F	1974 and 1957	72.5 F
1931	76.9 F	2002	72.4 F

July of 1936 also brought the longest spell of consecutive days with

temperatures of 90 F or higher to the Twin Cities, 14 days, as well as total number of days with such temperatures, 18 days. Similar Julys with 17 days of 90 F or higher occurred in 1894, 1935, 1955, and 1988. The only occurrence of five consecutive days with temperatures of 100 degrees F or greater can be found in the Twin Cities record for July of 1936 as well, though this pales when compared to Canby and Beardsley both recording 13 consecutive days with such temperatures in that same year.

It is interesting that neither July of 1995 or 1999 appears in the list above, yet both produced relatively short-lived spells (3-5 days) of high Heat Index Values (110-120 F) and caused a great deal of heat-related health problems and livestock mortality around Minnesota. Recall, that the July 1995 heat wave also caused between 600 and 700 deaths in the Chicago area over only a four day period.

So far the count of days with 90 F or higher temperatures in the Twin Cities stands at six days for July and only eight for the year to date.

Topic: Some areas need rain

Though it has been a wet growing season for many in Minnesota, there are some areas of the state in need of some rain, particularly on the coarse textured soils southeast of the Twin Cities area. Crops in Dakota, Goodhue, Wabasha, Winona, Houston, Olmsted, and Mower Counties are actually showing some signs of moisture stress. Some of these areas have had 4 to 5 inches less than normal rainfall since April 1st.

Topic: British Open Golf Weather

This weekend the British Open Golf Tournament returns to St Andrews, Scotland the birth place of the sport. Though the course has been lengthened since the last time the Open was played there, the weather is supposed to be highly favorable for low scores, with partly cloudy skies, daytime temperatures in the 60s to low 70s F, and light to moderate westerly winds. There is a 40 percent chance for showers late in the day on Sunday, but the closing round will likely be over. Like millions of others, I am hoping Jack Nicklaus is still playing on Sunday since this is his last major tournament.

MPR listener question: Based on Twin Cities climate statistics which date is the hottest day in July, and does this date also show the highest frequency for temperatures of 90 degrees F or higher?

Answer: Based on the data since 1891, it is hard to distinguish the hottest day in July. The 18th, 22nd, 24th, 25th and 26th all show average daily highs over 84 degrees F, so they are the hottest days of the month (and the year) historically. The highest frequency of 90 F plus temperatures has occurred on July 22nd with roughly 30 percent of all years showing a temperature at least that high.

Twin Cities Almanac for July 15th:

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 July 15th:

MSP weather records for this date include: highest daily maximum temperature of 102 degrees F in 1988; lowest daily maximum temperature of 63 degrees F in 1962; lowest daily minimum temperature of 48 degrees F 1863 from the Pioneer Era and 29 degrees F in 1912 from the National Weather Service Era; highest daily minimum temperature of 79 degrees F in 1988; record precipitation of 1.87 inches in 1907.

Average dew point for July 15th is 59 degrees F, with a maximum of 77 degrees F in 1968 and a minimum of 43 degrees F in 1912.

All-time state records for July 15th:

Scanning the state climatic data base: the all-time high for this date is 112 degrees F at Beardsley (Big Stone County) in 1936; The all-time low for this date is 30 degrees F at Alborn (St Louis County) in 1930 and Sawbill Lake (Cook County) in 1939. The all-time state record for precipitation on this date is 7.37 inches at New Ulm (Brown County) in 1916 which produced flooding of roads, rivers, and railroad tracks as it all came over a six hour period.

Word of the Week: Sulfurous readings

This terminology is intended to evoke an image of heat and humidity like that found in natural geothermal sulfur springs used at some health spas. Meteorologists may include such terminology in their forecast discussions, particularly when heat and humidity are expected to prevail for long periods of time, producing Heat Index values of 100 degrees F or greater. Though many people relish an exposure of several minutes to such conditions in a health spa, exposure to this type of outdoor climate for hours and days is not healthy for anybody.

Outlook:

Continued hot temperatures into the weekend with increasing clouds on Sunday and Monday. There will be a chance for showers and thunderstorms Sunday through Monday as some daytime temperatures moderate in the 80s F, but it will remain generally warmer than normal. Some thunderstorms Sunday and Monday, as well as later next week may reach severe levels and create headlines. In addition, Hurricane Emily will likely impact Gulf of Mexico coastline areas around Texas.

To: Minnesota WeatherTalk for MPR's Morning Edition
From: Mark Seeley, Dept of Soil, Water, and Climate
Re: Topics for MPR's Morning Edition, Friday, July 22, 2005

Headlines:

- Some moisture relief in places
- Benefits of Vitamin C
- Heat is a relative term
- Climate Outlook for August-October
- Summer Camps
- Salad Days
- Wetness/Dryness patterns
- Almanac for July 22
- Who or What is Fetid?
- Outlook

Topic: Some moisture relief to southern counties.

A fast moving line of thunderstorms delivered 0.5 to 1 inch amounts of rainfall to many of the southern counties in Minnesota on July 21st. Windom reported 1.58 inches, while Austin and Preston reported just under 1 inch, and Rochester nearly 0.75 inches. These rains were very welcome and beneficial for crops which had been suffering from lack of moisture this month.

Topic: Plants benefit from Vitamin C

A recent study from the University of California Riverside documents the beneficial effects of Vitamin C (ascorbic acid) on plant health. Researchers there found that increased levels of Vitamin C in plant tissue allow for greater tolerance to air pollution (high ozone concentration) as the ascorbic acid detoxifies ozone when it enters the plant. Vitamin C also showed the added benefit of increased photosynthesis. These attributes may be highly beneficial when plants are grown in urban environments which tend to be plagued with higher frequencies of poor air quality. More research may lead plant breeders to develop or select for species that have higher Vitamin C content and therefore greater tolerance to air pollution, higher photosynthetic rates, and increased nutritional quality.

Topic: Heat is a relative term in weather and climate

Though our 9 day streak of 90 F plus temperatures made headlines earlier this month in the Twin Cities, it did not reach quite the same level or have the same detrimental effects as the heat in other American communities. In some areas such as Phoenix (AZ), El Paso (TX) and Philadelphia (PA), there have been heat-related deaths associated with the mid-July heat wave. Denver, CO reported a temperature of 105 degrees F this week, tying the all-time high for that city, while El Paso, TX started a new string of days with 100 F or higher, having recorded 16 already this month (the record

there is 24 days of 100 F set in July of 1980). The table below shows the average high temperature, low temperature, mean temperature, and departure from normal for the mid-July period (nine days from the 12th to 20th), along with the monthly temperature forecast which had been released by the Climate Prediction Center (CPC) in June.

City	Ave High	Ave Low	Mean Temp	Departure from Normal Value	July Temp Forecast
Philadelphia	89 F	74 F	82 F	+4 F	EC
Twin Cities	92 F	71 F	82 F	+7 F	EC
Denver	96 F	63 F	80 F	+6 F	EC
El Paso	100 F	74 F	87 F	+4 F	AN
Phoenix	113 F	89 F	101 F	+6 F	AN

The CPC's above normal (AN) temperature forecasts for July were accurate for El Paso and Phoenix. The forecasts stipulated equal chances (EC) of above or below normal temperatures in July for Philadelphia, the Twin Cities, and Denver, yet the positive temperature departures in these cities during mid month clearly are of equal magnitude to those of El Paso and Phoenix. Thankfully, the remnants of Hurricane Emily will bring rain and cooler temperatures to El Paso and Phoenix this weekend, but continued heat is in the forecast for Denver, Philadelphia, and the Twin Cities.

Topic: New Seasonal Climate Outlook

On Thursday of this week, the Climate Prediction Center (CPC) released the outlooks for the balance of the growing season, August through October. They call for equal chances of above or below normal temperature and rainfall across our region, while favoring continued above normal temperatures in the western and southwestern states, as well as the southeast. A more active hurricane season is expected to continue, inflating the chances for above normal rainfall in the southeastern states.

Topic: Weather Summer Camp a Success in Indiana

Summer camps abound in our state and region. There are sports camps, nature camps, music camps, culture camps, fishing camps, arts and crafts camps, and church camps among many others. Indiana is one of the few states that boasts of a successful weather camp run by the meteorologists at an Indianapolis television station, RTV6. Children get to learn about how to make weather measurements, how to interpret weather maps, and how television meteorologists put their forecasts together. The camps are run in conjunction with community libraries which also encourages young children to read.

Topic: Salad Days of Summer

Shakespeare used the term "salad days" to describe a time of youthful inexperience. However in more modern times, this term is used to describe the time of summer when sunny days and warm

nights chase away our hunger for hot foods and we turn to cool drinks, ice cream and salads. Of course it also happens to be the time of year when fresh ingredients for salads are in great abundance. Witness the success of the new Farmer's Market on the University of Minnesota Minneapolis Campus every Wednesday. Marketing research has indeed shown that our diets and drinking habits are related closely to weather conditions and many food retailers gear up for the peak of "salad days" in the summertime.

In fact marketing research also shows that the public get their daily dose of weather information more from radio and less from television during the summertime since many more activities keep people away from their television sets.

MPR listener question: I've noticed in the past few years a tendency in the Twin Cities climate toward damp spring and early summer, followed by a dry August and September. Is this a very common historical pattern? It presents a real problem in trying to establish new grass or new landscape plants.

Answer: You're right about recent years. During 2001, 2003, and to a lesser degree 2004 rather damp spring conditions gave way to abnormal dryness in July and August. However, this is a very uncommon historical pattern. Since 1891, only 10 other years show this pattern of precipitation, the worst cases being 1908 when April-June brought 18.89 inches of rain, followed by only 2.81 inches in July and August; and 1916 when April-June brought 14.58 inches of rain followed by only 2.93 inches in July and August. So take heart, and keep trying!

Twin Cities Almanac for July 22nd:

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 22nd:

MSP weather records for this date include: highest daily maximum temperature of 105 degrees F in 1934; lowest daily maximum temperature of 64 degrees F in 1992; lowest daily minimum temperature of 49 degrees F in 1947; highest daily minimum temperature of 77 degrees F in 1984; record precipitation of 2.69 inches in 1997.

Average dew point for July 22nd is 60 degrees F, with a maximum of 76 degrees F in 1952 and a minimum of 40 degrees F in 1925.

All-time state records for July 22nd:

Scanning the state climatic data base: the all-time high for this date is 111 degrees F at Beardsley (Big Stone County) in 1934; The all-time low for this date is 31 degrees F at Meadowlands (St Louis County) in 1985. The all-time state record for precipitation on this date is 10.84 inches at Fort Ripley (Crow Wing County) in 1972 which

produced the worst flash flood in the history of Crow Wing and Morrison Counties.

Word of the Week: Fetid regime

This is a foul term used by some meteorologists (Larry Cosgrove who writes the daily enews call "Weather America") to describe the poor air quality that results from the dominance of a high pressure system for days. This time of year such systems not only produce heat waves, but also tend to cap the air, restricting the mixing and dilution of pollutants and odors. Consequently, the air can get a bit foul, or stinky. Fetid (fee-tid) derives from the Latin root word fetidus, meaning to stink. It is not uncommon this time of year to bring the fetid regime in the house with you after you have been working long hours outside in the heat. Of course some of us are more fetid than others!

Outlook:

Warm weekend ahead with a chance for widely scattered thunderstorms on Saturday, especially northern areas.. Chance for showers on Monday and Tuesday, then again Thursday and Friday next week. Cooler temperatures will settle in for Tuesday through Friday next week.

To: Minnesota WeatherTalk for MPR's Morning Edition
From: Mark Seeley, Dept of Soil, Water, and Climate
Re: Topics for MPR's Morning Edition, Friday, July 29, 2005

Headlines:

- Cool air arrives for a few days
- Preliminary climate summary for July
- Multi-million dollar rains on July 25th
- Tropical heat on the 23rd sets records
- Worst late July heat wave? How about 1917
- Question about 24-hr rainfall records
- Almanac for July 29th
- What's a scarf, cap, or hood cloud?
- Outlook

Topic: Finally some cool, Canadian air

While many of the eastern and southern states continued to swelter, Tuesday through Friday mornings this week (July 26-29) brought the coolest temperatures of the month to MN. Many locations reported lows in the 40s and 50s F. Embarrass reported a low of just 32 degrees F on the 27th, tying the all-time record state low for the date set at Sawbill Camp in Cook County in 1937. Hibbing with 34 degrees F and Eveleth with 37 degrees F also set new local record minimum temperatures for the 27th.

International Falls reported record lows of 43 degrees F on the 28th and 36 degrees F on the 29th. Also on the 29th, Embarrass reported a low of just 30 degrees F, tying the state record low for the date (held by Tower in 1903). Cook tied their record low on Friday with 36 degrees F,

It is noteworthy to mention that the reading of 30 degrees F at Embarrass was the nation's lowest temperature on the 29th and the first time that Minnesota has reported the nation's lowest reading in over two months. The last time was a reading of 25 degrees F at Bigfork on the 16th of May.

Topic: Preliminary Climate Summary for July, 2005

July was dominated by hot days and warm nights, consequently, most places reported average monthly temperatures that were 2 to 4 degrees F warmer than normal. For the Twin Cities July of 2005 is ranked in the warmest 15 percent of all time, while for both Rochester and St Cloud it is ranked in the warmest third historically. The highest reading for July came from Winona where it was 99 degrees F on the 18th. The lowest reading came from Embarrass with 30 degrees F on the 29th.

Rainfall was lacking in most places, especially up north. There were a number of southern locations that reported above

normal rainfall. Winona, Caledonia and Preston in the southeast reported over 5 inches, with the Winona Dam receiving 4.71 inches on the 25th.

Duluth will likely report one of the driest Julys in history. With just 0.82 inches so far this month, July 2005 ranks among the driest along with 1936, 1946, and 1947. The record lowest for July at Duluth is just 0.47 inches in 1875.

Strong winds were reported on the 3rd, 7th, 17th, 23rd, and 25th of the month. The winds on the 23rd and 25th exceeded 60 mph in a number of places, topping out at 85 mph near Morris in Stevens County. In fact there were 33 reports of high wind damage (mostly broken tree limbs) in Minnesota on the 23rd.

Topic: Record million dollar rains on July 25th

Monday, July 25th brought some much needed moisture to many areas of Minnesota. Both morning and evening thunderstorms provided a much needed boost to the state's row crops, which are in the moisture sensitive reproductive growth stage. Many areas reported an inch or more of rainfall. Some communities received record setting amounts for the date, including

Rochester 3.48"

Twin Cities 1.56"

Preston 1.49"

Winona 3.20"

New Ulm 2.00"

Windom 1.68"

LaCrescent 1.62"

Spring Valley 1.53"

Minnesota City 3.41"

Decorah, IA 1.75"

Winona Dam 4.71"

During the reproductive growth stage of corn, each inch of rainfall can translate to 5 to 10 bushels in yield. Similarly for soybeans each inch of rainfall can mean an additional 2 to 4 bushel in yield. With approximately 7 million acres of each crop planted this year, and \$2.00/bu corn prices and \$6.50/bu soybean prices, it is easy to see how a one or two inch rainfall across even a part of the state can mean tens of millions of dollars to the agricultural economy of our Minnesota.

Topic: A tropical like air mass on July 23rd sets records....

Saturday, July 23rd brought very hot, humid air to the region. A new state record high dewpoint value of 86 degrees F was observed at Pipestone and at St James. This broke the record dewpoint reading of 84 degrees F set in July of 1999 and July of 2002 at other southern Minnesota locations. Though a stormy day for many (there were 33 reports of high winds from MN and 66 reports of high winds from WI), bright sun and strong southerly breezes ushered in very hot, humid air on Saturday, pushing the Heat Index well past the 100 F mark for many. In fact Pipestone tied the state record Heat Index Value with

a late afternoon reading of 125 degrees F (temp 93 F, dewpoint 86 F), which had previously occurred at Red Wing on July 30, 1999. Some of the most extreme Heat Index readings Saturday included...

Pipestone 125 F St James 122 F New Ulm 114 F Windom 114 F
Willmar 113 F Waseca 113 F Redwood Falls 113 F
Austin 111 F Albert Lea 111 F Owatonna 111 F
Fairmont 111 F Faribault 111 F Luverne 110 F Marshall 110 F

Topic: The hottest last week of July? 1917 is the winner!

Though July of 1936 brought the worst heat wave ever to parts of MN, it was the last week of July 1917 that produced the greatest month ending heat. Unlike the hot and humid conditions of July experienced in recent years, 1917 brought very dry heat, manifested by the large swings in daily temperature. Below are the daily highs and lows for the last week of July, 1917 at Beardsley (Big Stone County).

Date	High Temp	Low Temp
7/25	104 F	64 F
7/26	104 F	66 F
7/27	104 F	50 F
7/28	113 F	51 F
7/29	114 F	60 F
7/30	101 F	61 F
7/31	89 F	56 F

Fortunately the dry air allowed considerable overnight cooling and sleeping in the non-air conditioned environment was not a problem. However, daytime heat stress caused a number of heat prostration cases in Minnesota which required treatment. Across the nation the heat wave caused scores of deaths that year, but this was lost in the headlines of WWI, and subsequently lost in the history books in comparison to the 600,000 deaths from the flu epidemic in 1918.

MPR listener question: The media reported that the Indian Monsoon has brought extreme 24-hr rainfalls lately, including up to 37 inches near Bombay, India. What are the record 24-hr rainfall totals for Minnesota, North America, and the World, respectively?

Answer: According to the Minnesota State Climatology Office the record 24-hr rainfall for Minnesota is 10.84 inches on July 22, 1972 at Fort Ripley. According to the National Weather Service the record 24-hr rainfall for North America is 43 inches at Alvin, TX on July 26, 1979. According to the World Meteorological Organization the world record 24-hr rainfall is 72 inches at La R'union Island in the Southern Indian Ocean on January 8, 1966. This world record amount is equivalent to a day-long rainfall intensity of 3 inches/hour which equates to the 100-year rainfall rate in Minnesota.....quite remarkable.

Twin Cities Almanac for July 29th:

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 63 degrees F (plus or minus 6 degrees F standard deviation).

MSP Local Records for July 29th:

MSP weather records for this date include: highest daily maximum temperature of 98 degrees F in 1933, 1975, and 1999; lowest daily maximum temperature of 70 degrees F in 1971 and 1996; lowest daily minimum temperature of 47 degrees F in 1971; highest daily minimum temperature of 80 degrees F in 1917; record precipitation of 1.11 inches in 1989.

Average dew point for July 29th is 61 degrees F, with a maximum of 79 degrees F in 1955 and a minimum of 35 degrees F in 1936.

All-time state records for July 29th:

Scanning the state climatic data base: the all-time high for this date is 114 degrees F at Beardsley (Big Stone County) in 1917; The all-time low for this date is 30 degrees F at Tower (St Louis County) in 1903. The all-time state record for precipitation on this date is 4.12 inches at Aitkin in 1963.

Word of the Week: Cap, Hood, or Scarf Cloud

This is an accessory cloud form associated with cumulus or cumulonimbus clouds. This cloud is generally of small horizontal extent and is positioned just about the larger cumuloform cloud, sometime penetrated by it. Formation is caused when moist air aloft is lifted over the cumulus cloud form and a thin layer of cirrus forms. Scarf, cap, and hood clouds, so named as they appear like head coverings, are generally short-lived. They are far more frequently seen in the summer months.

Outlook:

Partly cloudy and warmer over the weekend with a small chance for showers and thunderstorms, particularly late on Saturday. Generally sunny and warm most of next week with another chance for showers and thunderstorms by Thursday and Friday.

To: Minnesota WeatherTalk for MPR's Morning Edition
From: Mark Seeley, Dept of Soil, Water, and Climate
MPR's Morning Edition, Friday, August 5, 2005

Headlines:

- Hot August of 1947
- Weather continues to make headlines in 2005
- Extremes of August temperature and rainfall
- Almanac for August 5th
- What are the 5-Cs?
- Outlook

Topic: Remembering the hot August of 1947

The all-time warmest August in the Twin Cities record, all the way back to the establishment of Ft Snelling in 1820 occurred in 1947. There were 15 days with temperatures of 90 degrees F or higher (a record for the month) and the mean monthly temperature ended up at 78.2 F, 7.6 degrees F above normal.

On a statewide basis August of 1947 ranks as the third warmest, surpassed marginally by 1937 and 1900. On an even broader scale, August of 1947 was the warmest for many western European countries as well, that is until the deadly hot August of 2003 which is linked to the deaths of nearly 30,000 citizens there.

The effects from the heat of August 1947 were compounded by a short-lived drought, when July brought only 0.96 inches of rain. As a consequence city water pressure was very low and Twin Cities residents were asked to conserve water, only watering yards and gardens at night. Fortunately five consecutive days with rain brought relief by mid-month. By month's end the heat abated and by the time the Minnesota State Fair opened a comfortable 70 F day greeted visitors who had come to see the brand new 4-H Tower and Octagon shaped Agriculture/Horticulture Building.

The heat of August was further compounded by high dewpoints. On many days the dewpoints were in the low to mid 70s F, including six consecutive days from the 18th to the 23rd. Heat Index values ranged from 100 to 106 degrees F on four days. On 14 nights the temperature never fell below 70 F, tying 1937 for the most ever in August, and making it very difficult to sleep.

Remembering the coping strategies used just 10 years earlier during the terrible drought and heat of the 1930s, many Twin Cities residents slept on porches or outside in the yard where they could rest more comfortably.

Incidentally, preliminary temperature statistics for the summer so far show the combined months of June and July rank as the 9th warmest in history statewide, and the six warmest for the Twin Cities.

Topic: Traumatic year in weather is expected to continue....

Weather has already produced a number of headlines this year, both from specific storms and events, as well as prolonged episodes. Drought has enhanced an already dangerous fire season in western states, and it has drastically reduced crop prospects for farmers in some Midwest states (IL, MO, IN). Heat waves have engulfed much of the country at various times, stressing the capacity of power companies and loading up the health care industry with more patients. This includes our own region, and the heat is expected to continue for some areas well into August. Storms have produced nearly 800 tornadoes across America so far this year. Though not quite as large a number as the past two years (both showed over 1000 at this point in the season), this is still above the historic average. There was even a rare tornado spotted in Alaska this week, though it did not do any damage. On top of this, the NOAA National Hurricane Center has reported on eight named tropical storms in the Atlantic Basin so far this year, two of which became hurricanes, Dennis and Emily. This week NOAA forecasted additional tropical storm activity for the August through October period that may produce a total of 21 named storms for the 2005 season. This would be a record number of tropical storms should it occur.

All of this evidence suggests that headlines will continue to be featuring the weather and its impacts, some of which may have serious and costly consequences this year.

MPR listener question: Now that we are into the month of August, what is the highest temperature ever recorded in Minnesota in this month? Also what is the heaviest rainfall for August?

Answer: The highest temperature ever recorded in Minnesota during August is 110 degrees F. This occurred at Beardsley (Big Stone County) on August 10, 1947 and at Madison (Lac Qui Parle County) on August 1, 1988. To balance things out, the coldest temperature recorded statewide in the month of August is just 21 degrees F at Tower on August 28, 1986. The heaviest rainfall in August occurred at Sibley Indian Agency in the southwest corner of Sibley County along the Rush River on August 6, 1866 when 10.30 inches of rain was recorded, creating a flash flood on the Rush River. In addition, the same storm caused flash flooding to the south along the Root River, where many settlers were drowned. The monthly total rainfall in 1866 was also an August record at 16.25 inches. As recently as 1979, Fairmount in Martin County recorded 13.90 inches in August.

By the way, Duluth remains the only Minnesota climate station to record snow in August. They reported a trace on August 31, 1949.

Twin Cities Almanac for August 5th:

The average MSP high temperature for this date is 83 degrees F (plus or minus 6 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 5th:

MSP weather records for this date include: highest daily maximum temperature of 100 degrees F in 1947; lowest daily maximum temperature of 67 degrees F in 1912; lowest daily minimum temperature of 48 degrees F in 1994; highest daily minimum temperature of 78 degrees F in 1947; record precipitation of 1.88 inches in 1898.

Average dew point for August 5th is 60 degrees F, with a maximum of 75 degrees F in 1959 and a minimum of 33 degrees F in 1910.

All-time state records for August 5th:

Scanning the state climatic data base: the all-time high for this date is 106 degrees F at Lower St Anthony Falls in Minneapolis in 2001. The all-time low for this date is 31 degrees F at Tower and Brimson (both in St Louis County) in 1994, and at Kelliher (Beltrami County) in 2002. The all-time state record for precipitation on this date is 4.75 inches at Albert Lea (Freeborn County) in 1945.

Word of the Week: The CCCCC (5-Cs)

This week, the nations of the Caribbean Community (CARICOM) announced the opening of the Caribbean Community Centre for Climate Change in Belmopan, Belize. This is the first Climate Change Centre to be located in the equatorial latitudes and will concentrate efforts not only on climate modeling, but on adaptive strategies for tropical agriculture, construction, transportation, energy, and coastal development that may mitigate effects from climate change in the region. Dr. Kenrick Leslie is the first Director of the Centre. I am certain their efforts will include studies of the frequency and intensity of hurricanes in the region, particularly in light of the recent paper by Dr. Kerry Emanuel of M.I.T. that suggested hurricane intensity is being enhanced by northern hemisphere warming.

Outlook:

Generally pleasant weekend, with above normal temperatures, but lower humidity than of late. Slight chance of showers on Sunday, especially north. Increasing chance for showers by Tuesday. Temperatures will continue to average warmer than normal much of next week.

To: MPR's Morning Edition
From: Mark Seeley, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, August 12, 2005

Headlines:

- Annual State Fair Weather Quiz
- Turbulent weather this week
- FEMA victimized by false claims
- Cold Minnesota Augusts
- Almanac for August 12th
- What is CIN?
- Outlook

Topic: 9th Annual Minnesota State Fair Weather Quiz

How many weekends have brought rain or snow to the Twin Cities in 2005? Which Minnesota locations received the most snow last winter? What's been our highest recorded dewpoint this year? Do you think you know the answers to these questions, or do you have some weather questions of your own? Then, come to the opening of the Minnesota State Fair on Thursday, August 25th and attend the MPR Midday broadcast starting at 11:00 am on the corner of Judson and Nelson (Fairgrounds). I know host Gary Eichten won't have the answers (he never does!), so I will be counting on you.

Incidentally, the answers to the above are: 17 weekends so far have brought precipitation to the Twin Cities; Wolf Ridge near Finland, MN reported 132.4 inches of snowfall last winter, the most in the state; and Pipestone and St James recorded a state record high dewpoint of 86 degrees F on July 23rd this year.

Topic: More turbulent weather this week.....

On Monday and Tuesday, August 8th and 9th many western and southern counties reported hail and strong winds. Hail was reported from Scott, Martin, Hennepin, Renville, McLeod, Wilkin and Otter Tail Counties. For Otter Tail County it was the second week in a row with hail, some the size of softballs (4.25 inch diameter) which damaged cars and buildings in Underwood, east of Fergus Falls.

Strong winds were reported from Nicollet, Dakota, Goodhue, Wabasha, Freeborn, and Faribault Counties. Winds caused some lodging in corn fields, though for some mainly along headrows and field borders. Some soybean fields appeared to lay down as well.

Topic: FEMA taken to the cleaners in Florida.....

A weather-related story out of Florida this week made some negative headlines for the Federal Emergency Management Agency (FEMA). It appears that as a result of the four landfall hurricanes that struck Florida last year, many residents there filed falsified

claims for funeral expenses of family members whose deaths were not related to the storms at all. At least 319 funeral expense claims were filed with FEMA in Florida associated with the four hurricanes of 2004. These claims totaled \$1.3 million, yet many of the deaths occurred weeks after the hurricanes struck, but were supposedly linked to stress imposed by the trauma of the storm. In the end, some of these people died from terminal illness or ailments contracted well before the storms occurred.

FEMA is changing the rules of its disaster assistance program associated with paying out funeral expenses. Signed documents from a coroner or doctor that attribute death to the weather disaster must accompany any claim forms. It is shameful behavior on the part of some to pull these shenanigans with FEMA, which after all is there to provide emergency and recovery financial resources for those who really need it.

MPR listener question: You spoke about August 1947 last week being the hottest ever August in the Twin Cities. What about the coldest and what was that month like?

Answer: From the official National Weather Service Twin Cities data since 1891, August of 1903 was the coldest, averaging only 65.1 degrees F (remember last week we showed that August 1947 averaged 78.2 degrees F). August of 1903 was dominated by cloudiness, rain, and low daytime high temperatures. On 14 days the temperature never rose higher than the 60s F.

However, the Pioneer Era climate data show there were four colder Augusts: 1849, 1860, 1866, and 1890. The average temperature for each of the first three years listed was just 63.8 degrees F. August of 1849 was also the wettest August in Twin Cities history with 10.07 inches of rainfall, much of it coming in downpours, one of which measured 4.16 inches on the 8th. So in that case wetness combined with cool temperatures. The cool Augusts of 1860 and 1866 were dominated by very cold overnight low temperatures, with several nights dropping into the 40s F. In fact, August of 1866 brought a reading of just 39 degrees F on the 23rd. August of 1890 brought a combination of many cool days and even more cool nights.

The table below characterizes the Twin Cities coldest months of August described above, along with last year (2004) for comparison.

Year	Days with minimum temps below 50 F	Days with maximum temps below 70 F	Lowest Temp Measured
1849	1	3	46 F
1860	6	3	42 F
1866	7	9	39 F
1890	6	9	43 F
1903	1	14	48 F
2004	5	3	44 F

Twin Cities Almanac for August 12th:

The average MSP high temperature for this date is 80 degrees F

(plus or minus 7 degrees F standard deviation), while the average low is 61 degrees F (plus or minus 6 degrees F standard deviation).

MSP Local Records for August 12th:

MSP weather records for this date include: highest daily maximum temperature of 94 degrees F in 1886 and 1965; lowest daily maximum temperature of 61 degrees F in 1916 and 1964; lowest daily minimum temperature of 45 degrees F in 1961; highest daily minimum temperature of 74 degrees F in 1936; record precipitation of 2.42 inches in 1985.

Average dew point for August 12th is 59 degrees F, with a maximum of 79 degrees F in 1995 and a minimum of 39 degrees F in 1982.

All-time state records for August 12th:

Scanning the state climatic data base: the all-time high for this date is 101 degrees F at Canby, Madison, and Montevideo in 1988; The all-time low for this date is 29 degrees F at Kelliher (Beltrami County) in 2003. The all-time state record for precipitation on this date is 4.22 inches at Milaca (Mille Lacs County) in 1963.

Word of the Week: CIN

Pronounced the same as "sin", CIN is a meteorological acronym for "convective inhibition" or the negative area or cap area on an atmospheric sounding (radiosonde). It is a measure of the energy required to initiate convection in the atmosphere. The larger the value the more likely thunderstorm development will be delayed or prevented during the daytime heating hours.

Outlook:

Chance for widely scattered showers in southern Minnesota early on Saturday, then generally dry for the weekend with cool temperatures. In fact, temperatures will remain on the cool side much of next week. Chance for showers again by Thursday and Friday next week.

In contrast to the first half of the month, it appears Minnesota will experience a trend toward cooler than normal conditions leading up to the State Fair time.

To: MPR's Morning Edition
From: Mark Seeley, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, August 26, 2005

Headlines:

- Record rains on August 26th
- FFA at the State Fair
- State Fair Weather Trivia
- Summer Weather Impacts on Animals
- Relative Absence of cold temperatures this summer
- Almanac for August 26th
- What is Lacunosus?
- Outlook

Topic: Record rains hit Minnesota on August 26th

Very heavy thunderstorms brought record rainfall amounts across much of western and central Minnesota on Friday, August 26th. Preliminary radar data indicate that some western MN locations may have approached the all time state record rainfall for the date of 6.72 inches at Stewart in 1994. Many areas received between 2 and 6 inches of rain.

Record amounts were recorded at the following locations...

MSP airport 2.00 inches; St Cloud 2.84 inches; New London 5.52 inches; Morris 1.73 inches; Glenwood 5.00 inches; and the State Fair 2.03 inches

Topic: State Fair Time.....

This year the Minnesota Future Farmers of America (FFA) celebrates the 50th anniversary of the Children's Barnyard at the Fair. The FFA are also the official weather observers for each State Fair. They report hourly readings from the Barnyard on their web site www.ffa.umn.edu/association/State%20Fair/mn_state_fair_weather_report.htm

The FFA have observed and recorded State Fair weather for over 35 years. They also staff one of the volunteer rainfall observations networks for the Minnesota State Climatology Office, a network started in the 1970s by State Climatologist Earl Kuehnast.

The 9th Annual MPR Midday State Fair Weather Quiz was broadcast the first day of the fair (August 26th). If you missed it, you can still test your knowledge and take the quiz on-line at the MPR web site:

<http://minnesota.publicradio.org/events/2005/08/statefair/>

Topic: State Fair Weather Trivia

Last year's 12 day run at the State Fair saw rainfall on three days, totaling 1.25 inches, while the year before (2003) was unusual showing no rainfall over the entire run of the Fair. State Fair climate records include:

Coldest temperature: 36 F on September 1, 1974
Hottest temperature: 97 F on August 24, 2003 and September 1, 1913
Most rainfall: 6.39 inches in 1977
Highest dewpoint: 77 F on August 28, 1955
Most days with 90 F or higher: 10 days in 1983
Most dominant wind direction during the Fair: south-southwest winds

Topic: Summer weather and animals

Various headlines appeared in the last week around the country regarding weather effects on animals.....

In Pennsylvania the prolonged hot and dry spell of weather earlier this month has forced rattlesnakes to come out of their mountain lairs and seek more shade and water. A number of people have called the Fish and Boat Commission to complain about these snakes in recreation and camping areas.

Similarly, the hot and dry weather in Illinois has made prey rather scarce for the coyote. Consequently more coyotes have been spotted in cities and towns. Besides scavenging the garbage for food, many are there to prey on domestic pets. One town reported the loss of six cats who fell victim to coyotes.

In Michigan livestock producers have seen cattle losing weight due to prolonged heat and humidity over the past week. The animals appetites are affected by the weather stress. In addition milk production from dairy herds is down.

In Arkansas where temperatures have soared to 105 degrees F with Heat Index values to 115 F over the past week, chicken producers faced lethal situations when their climate controlled buildings failed to keep up with the weather. They called on local fire departments to shower their poultry buildings with water and cool them off, saving the lives of tens of thousands of birds.

MPR listener question: With the hotter than normal summer in Minnesota, how many times have we reported the nation's lowest temperature since June 1st?

Answer: According to the daily national weather summary, Minnesota has reported the lowest temperature in the 48 contiguous states only 7 times this summer, an unusually low number for us. We reported the lowest temperature twice in June, just once in July, and four times so far in August. Our coldest temperatures have come from Embarrass, Silver Bay, and Hibbing. Incidentally, Embarrass reported a low of just 29 F on Tuesday of this week.

Twin Cities Almanac for August 26th:

The average MSP high temperature for this date is 78 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 26th:

MSP weather records for this date include: highest daily maximum temperature of 94 degrees F in 1948; lowest daily maximum temperature of 61 degrees F in 1914 and 1964; lowest daily minimum temperature of 44 degrees F in 1964; highest daily minimum temperature of 75 degrees F in 1991; record precipitation of 1.11 inches in 1967.

Average dew point for August 26th is 59 degrees F, with a maximum of 75 degrees F in 1973 and a minimum of 35 degrees F in 1934.

All-time state records for August 26th:

Scanning the state climatic data base: the all-time high for this date is 103 degrees F at Luverne (Rock County) and at Pipestone in 1973; The all-time low for this date is 23 degrees F at Roseau in 1915. The all-time state record for precipitation on this date is 6.72 inches at Stewart (McLeod County) in 1994.

Word of the Week: Lacunosus

This is technically an unusual variety of cloud with the appearance of a thin patchwork sheet or layer with distributed round holes in it. The pattern suggests to the viewer on the ground a fishing net or a honeycomb. I saw such a cloud while driving across the Upper Peninsula of Michigan last week.

Outlook:

Generally dry weather with seasonal temperatures for the first weekend of the State Fair. A warming trend with above normal temperatures by the middle of next week. Another chance for showers by late Wednesday and Thursday.

To: MPR's Morning Edition
From: Mark Seeley, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, September 2, 2005

Headlines:

- Vulnerability a key issue
- Climate Summary for August
- Katrina associated tornadoes?
- September snowfalls
- Almanac for September 2nd
- PTSD
- Outlook

Topic: Vulnerability becomes a big issue.....

The mounting toll of damages and death inflicted by Hurricane Katrina earlier this week has produced a number of public reactions. Public and private offers of aid abound and emergency and relief workers are being stretched to their limits. Refugee needs, especially from the New Orleans area are quite formidable: food, water, clothing, health care, housing, schooling for children, jobs and loans, are all very challenging issues. Restoration of utilities and other infrastructure will take major efforts. Disruptions in America's oil pipeline have manifested themselves in the pump prices for gasoline.

Perhaps the underlying and critical issue is the lack of respect for our vulnerability to storms and climate episodes. Though we have spent billions of dollars to get better at forecasting the weather, and to better understand the Earth's climate system and its fluctuations, we still persist in living anywhere we want to live: along a coastline situated below sea level; atop eroding cliffs overlooking the ocean; along a major flood plain or seismic fault line; in a desert devoid of surface water; and many other places where weather and climate risks are obvious and left many scars on the landscape.

Disasters often lead to a great deal of finger pointing, but they also offer us lessons. Where knowledge is sound and certain about how to mitigate or prevent some of these weather related catastrophes investment of substantial resources would be a solid choice. It has been my observation that where people personally experience a weather-related tragedy, they are forever branded emotionally, to the extent that even a small risk of a recurrence from a similar weather system or pattern is enough to motivate them to action. **NOW IS THE TIME TO DEVOTE MORE ENERGY, ATTENTION, AND RESOURCES TO SOLVING OUR VULNERABILITY.** Since the Minnesota floods of 1997, the Minnesota Association of Floodplain Managers has set many successful plans into motion to better protect the people and infrastructure from flood damages. No question, they serve as a good model for grassroots action. But the Americans who live along coastlines prone to hurricanes need a concerted federal effort directed to awareness, education, and action plans that will mitigate the consequences of future landfall tropical storms and hurricanes.

END OF SERMON

Topic: Climate Summary for August, 2005

The average temperature for the month was near normal, with most communities reporting a value that was within 1 degree F of the long term average. Extreme temperature values for the month ranged from 98 degrees F at Ortonville on the 8th to just 29 degrees F at Embarrass on the 23rd.

Rainfall for August was highly variable. Most locations in the northeast reported less than normal amounts for the month, while much of western, central and southeastern Minnesota reported above normal amounts. Several locations reported rainfall totals greater than six inches for the month. The two heaviest thunderstorms occurred on the 17th and 18th in south-central counties on the 25th and 26th in west central counties. Some areas received 6 to 8 inches of rainfall in these storms, and dozens of locations reported new record amounts for August 26th.

MPR listener question: Were any tornadoes associated with Hurricane Katrina this week?

Answer: Preliminary data from the NOAA Storm Prediction Center suggests that perhaps as many as 10 tornadoes were associated with Katrina, primarily in the convective bands of storm clouds after its landfall on Monday. Tornadoes were reported Monday and Tuesday in Georgia, Ohio, and Virginia. These tornadoes were relatively weak, short-lived and caused little damage, especially when compared to the damage caused by the storm surge and winds of Katrina in Louisiana, Mississippi, and Alabama.

MPR listener question: Now that September has started can you tell me when was the earliest measurable snowfall in Minnesota, and what has been the greatest September snowfall in the state?

Answer: The earliest measurable September was 0.3 inches at International Falls on September 14, 1964. Far and away the greatest September snow storm occurred on September 26, 1942. Starting out as rain, turning to sleet, and then a night snow storm, the heaviest amounts occurred in west central Minnesota. Sauk Center reported 9 inches of snowfall, Bird Island reported 8 inches, and Long Prairie reported 7.5 inches, while Detroit Lakes and Willmar reported 6 inches of snowfall. The heavy, wet snow broke the limbs off many trees which had not yet shed their leaves for the fall. The snow was short-lived as temperatures warmed into the 60s and 70s F the last two days of the month.

Twin Cities Almanac for September 2nd:

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 58 degrees F (plus or minus 7 degrees F standard deviation).

MSP Local Records for September 2nd:

MSP weather records for this date include: highest daily maximum temperature of 97 degrees F in 1937; lowest daily maximum temperature of 55 degrees F in 1952; lowest daily minimum temperature of 42 degrees F in 1974; highest daily minimum temperature of 76 degrees F in 1953; record precipitation of 1.97 inches in 2000.

Average dew point for September 2nd is 56 degrees F, with a maximum of 75 degrees F in 1961 and a minimum of 29 degrees F in 1974.

All-time state records for September 2nd:

Scanning the state climatic data base: the all-time high for this date is 103 degrees F at Beardsley (Big Stone County) in 1929; The all-time low for this date is 22 degrees F at Sawbill Camp (Cook County) in 1935. The all-time state record for precipitation on this date is 5.91 inches at Halstad (Norman County) in 1957.

Word of the Week: PTSD

Post Traumatic Stress Disorder is certainly worth a mention this week given the numbers of people affected by Hurricane Katrina. Next to war and perhaps serious traffic accidents, the trauma brought by natural disasters impacts more people than anything else. Recovery from such trauma is slow, probably more so mentally and emotionally, then physically. Often times trauma brought by a specific weather event such as a hurricane, forever leaves an emotional brand on the memory that is triggered whenever a similar threat reappears. Fortunately PTSD is treatable and will probably be required for a number of Katrina survivors. In some cases such treatment may take longer than rebuilding the infrastructure that was destroyed.

Outlook:

Increasing cloudiness on Saturday with a chance for showers and thunderstorms in the eastern sections later in the day. Warming trend will bring temperatures back into the mid 80s F in places. Chance for showers and thunderstorms on Labor Day, and Tuesday of next week, followed by cooler weather and another chance for showers later in the week.

To: MPR's Morning Edition
From: Mark Seeley, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, September 9, 2005

Headlines:

- September seems like summer
- Elderly vulnerable to extreme weather
- Is it raining harder?
- Almanac for September 9th
- Biofog
- Outlook

Topic: September behaving like a turbulent summer month....

High humidity, frequent thunderstorms, strong wind, heavy rain, and hail have been the signature of September so far around Minnesota.....seems like summer. Record rainfalls occurred over the long Labor Day Weekend at a number of locations including the southwest metro area of the Twin Cities. Chanhassen and Elko reported total amounts of 5 to 6 inches from rains on the 3rd and 4th. In addition, the following locations reported new record amounts of rainfall...

- 1.90 inches at Zumbrota on the 5th
- 1.83 inches at Moorhead on the 5th
- 2.67 inches at Faribault on the 4th
- 2.00 inches at Browns Valley on the 4th
- 3.19 inches at Alexandria on the 3rd

On Labor Day high winds associated with thunderstorms caused some damages in the Fargo-Moorhead area, including the North Dakota Horse Park Race Track. The heavy rains flooded streets and underpasses in the area.

Hail was reported in a number of places this week, some piling up on the ground and inflicting damages to soybean fields across southern Minnesota. Thunder and lightning was on display for a period of 8 consecutive hours in the Twin Cities over the weekend, an unusually long period for such weather.

Topic: Elderly more vulnerable in extreme weather....

With further investigation from the Hurricane Katrina's aftermath, it appears elderly people confined to nursing homes or living on their own may have suffered as much as any segment of the population. There were a number of deaths associated with one nursing home. Similarly in Japan this week, following the aftermath of Typhoon Talim, it was revealed that over half the dead were found to be senior citizens, particularly people whose mobility is restricted, or judgement impaired.

The vulnerability of senior citizens to Heat Waves has been documented

for a number of years and special measures have been taken to assure they are cared for and treated when heat waves strike major urban areas. It appears that similar consideration is warranted for other weather extremes as well....hurricanes, floods, winter storms, tornadoes, and severe thunderstorms to name a few. Certainly such stories remind us how important it is to look out for neighbors and be mindful of the more vulnerable of our citizenry.

MPR listener question: Does it rain harder more often now? It seems rainfall has become more intense.

Answer: No question that our environment is getting wetter. Taking 30 year average annual precipitation for the Twin Cities shows an increase of over 3 inches in the past 50 plus years. In addition it appears that the number of measurable precipitation events per year is on the rise, along with the number of days that at least a half inch of precipitation occurs. See table below for the Twin Cities...

Period of record (years)	Ave Annual Precip Total (inches)	Ave Number of Days W/Measurable Precip	Ave Number of Days P>0.5"
1951-1980	26.30"	113	15.2
1961-1990	28.36"	116	16.8
1971-2000	29.40"	119	17.1
1975-2004	30.37"	118	17.9

So indeed, from simple statistics it appears the associated wetness may be partially due to increased frequency of more intense events. This conclusion is supported by a paper from Stanley Changnon that showed increased contribution from thunderstorm rainfalls to total annual precipitation occurring since the 1950s.

Twin Cities Almanac for September 9th:

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 56 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for September 9th:

MSP weather records for this date include: highest daily maximum temperature of 95 degrees F in 1947; lowest daily maximum temperature of 55 degrees F in 1929 lowest daily minimum temperature of 38 degrees F in 1883; highest daily minimum temperature of 76 degrees F in 1931; record precipitation of 1.79 inches in 1900.

Average dew point for September 9th is 55 degrees F, with a maximum of 75 degrees F in 1964 and a minimum of 33 degrees F in 1976.

All-time state records for September 9th:

Scanning the state climatic data base: the all-time high for this date is 105 degrees F at Beardsley (Big Stone County) in 1931; The all-time low for this date is 22 degrees F at Argyle (Marshall

County) in 1917. The all-time state record for precipitation on this date is 4.75 inches from an 18 hour rain at Gunflint Lake (Cook County)in 1977.

Word of the Week: Biofog

This refers to a type of steamfog that results when a very cold air mass comes into contact with the warm moist air which usually surrounds humans or animals. It is usually very local in nature and sometimes can be seen around livestock feedlots in the fall in Minnesota. Another very small scale example is when people exit from a health club or gymnasium in the evening and the warm moist air from inside the building meets the cold night air near the doorways. Sports fans may have memories or visions of what this looks like as a result of seeing Viking, Lion, Bear or Packer football players emerge from the locker room at halftime. There are also some historical references to this in literature which describes massive steam clouds surrounding buffalo herds on the great plains during the harsh winters of the 19th Century.

Outlook:

Warming trend for the weekend with high temperatures several degrees above normal. Chance for showers later on Sunday and carrying over into Monday and Tuesday. Thunderstorms may bring significant rainfall to some places. Cooler on Tuesday and for the balance of next week.

To: MPR's Morning Edition
From: Mark Seeley, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, September 16, 2005

Headlines:

- September severe weather
- Fall Climate Outlook
- First snows out west
- Possible law on scraping your car free of snow
- Historical September snows in Minnesota
- Almanac for September 16th
- Calm or absence of wind
- Outlook

Topic: Abundant rain and severe weather in September continues...

Still more summer-like severe weather visited the state again this week, with strong winds, hail, and heavy rainfall that produced flash flooding. The latest round of storms came on the 12th and 13th delivering 4-5 inch rains in parts of Anoka, Isanti, Sherburne and Wright Counties. Zimmerman along Hwy 169 in Sherburne County reported 6.20 inches with many flooded roads. Downburst winds up to 70 mph caused damages across central and southeastern parts of the state. A tornado produced F1 scale damage (winds 73-112 mph) near Independence in western Hennepin County, and another tornado caused some damage near Stevenstown, WI north of La Crosse. According to Todd Krause of the National Weather Service, the Hennepin County tornado was one of only three this year that have been greater than FO (winds over 72 mph). The others occurred near Crookston in May where an F2 (113-157 mph) touched down briefly for less than one mile and near Hinckley in June when another F1 was on the ground for about six miles.

A measure of the energy associated with the storms this week can be seen in the very high dewpoints that occurred over the 12th and 13th, with many communities reporting tropical-like values of 70 F or higher. Rochester reported a new record high minimum temperature on the 12th with 70 degrees F.

New record rainfalls on the 12th included Marshall with 2.08 inches, Grand Rapids with 2.03 inches, and St Cloud with 2.45 inches. Record amounts on the 13th included the following:
2.35 inches at La Crescent, 2.61 inches at La Crosse, WI,
4.60 inches at Cambridge, 2.05 inches at Brainerd, 1.50 inches at Pipestone, 2.24 inches at Redwood Falls, 2.40 inches at Moose Lake, and 1.35 inches at Wheaton.

Thunderstorms have produced a remarkable number of severe weather reports across the state so far this month, with 83 reports of large hail and 34 reports of damaging winds, and we have only reached the half way mark in September.

Topic: Climate Outlook for October through December

The Climate Prediction Center of NOAA released the new climate outlooks on Thursday afternoon this week (Sept 15). They show equal chances for above or below normal temperature and precipitation in Minnesota during the October through December period. Not much to hang your hat on. Northeastern counties (Cook, Lake, and St Louis) need considerable precipitation to pull out of their dry spell or the fire danger may start to become a problem there this fall.

Topic: Snow in Colorado and Alberta, Canada this week

Colorado reported its first seasonal snowfall this week, with Steamboat Springs observing a few tenths of an inch. A 27 year-old woman jogger became lost during an evening workout and had to spend the night huddled in the forest, wearing just shorts and a T-shirt. But the Mountain Rescue Aspen Group found her safe the next morning.

Crowsnest Pass along Highway 3 in southern Alberta, Canada along the road to Lethbridge reported heavy snow this week (Sunday, Sept 11). In fact 18-20 inches fell in places resulting in broken trees and power lines, causing a power outage that affected nearly 4000 homes. This kind of snow storm is highly unusual for so early in September.

Topic: Snow scraping may become mandatory in Massachusetts

The MA legislature is considering a bill that would allow for fines or even jail time for motorists who do not completely scrape the snow and ice off their vehicles before driving them. USA Today reported this week that MA would become the first state to pass such a law. Those who do not rid their vehicles of ice and snow pose a two-fold threat to other drivers: chunks of ice and snow can fall from their vehicles and strike other cars, and their own driving can be impaired by reduced visibility. This made me realize I have seen moving snow covered vehicles in Minnesota where only a small spot on the windshield had been cleared for straight-ahead viewing. Apparently some in Massachusetts think this presents intolerably dangerous conditions....I tend to agree.

MPR listener question: Someone mentioned the possible snow season in Minnesota starts on September 14th. How is that figured and which places have had snow that early?

Answer: The start date of the possible snow season in Minnesota is based on the measurement of 0.3 inches at International Falls on September 14, 1964, the earliest date for measurable snow in the state climate data base. Also on that date communities in Kittson, Roseau, Lake of the Woods, St Louis, Cook, and Lake Counties reported traces of snowfall. A similar storm occurred on September 15, 1916 delivering 0.2 inches at Warroad and a trace amount in several other places, including the Twin Cities.

In the Pioneer Era climate records the Twin Cities reported snowfall

on September 18, 1863 (amount unknown) and September 23, 1868 (0.2").

Twin Cities Almanac for September 16th:

The average MSP high temperature for this date is 71 degrees F (plus or minus 9 degrees F standard deviation), while the average low is 52 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for September 16th:

MSP weather records for this date include: highest daily maximum temperature of 94 degrees F in 1955; lowest daily maximum temperature of 50 degrees F in 1916 lowest daily minimum temperature of 35 degrees F in 1842, modern record low is 39 F in 1961; highest daily minimum temperature of 74 degrees F in 1955; record precipitation of 1.97 inches in 1997.

Average dew point for September 16th is 49 degrees F, with a maximum of 71 degrees F in 1992 and a minimum of 29 degrees F in 1937.

All-time state records for September 16th:

Scanning the state climatic data base: the all-time high for this date is 101 degrees F at Montevideo (Chippewa County) in 1891; The all-time low for this date is 17 degrees F at Karlstad (Kittson County) in 1973. The all-time state record for precipitation on this date is 7.10 inches at Ellsworth (Nobles County) in 1992.

Word of the Week: Calm

A demeanor of the atmosphere around us that produces no perceptible wind. For well over a century the definition of a calm was when smoke is observed to rise vertically or the sea surface is mirrorlike. In the modern context with instrumentation to measure wind speed, a calm is generally defined by a wind speed of less than 3 knots (3.5 mph).

In the Twin Cities calm conditions comprise but a small fraction of the annual wind distribution....less than 7 percent of all observations show calm conditions. The peak time for calm conditions occurs at night. During the summer months, calm conditions may prevail from midnight to 6 am about 20 percent of the time or 1 day in 5. However, during the other seasons overnight calms occur only about 10 to 15 percent of the time. During the daytime hours, calms are very infrequent, most often less than 5 percent of the time.

Outlook:

Unsettled weather over the weekend and into Monday with chances for showers and thunderstorms, primarily late Saturday into Sunday. Temperatures will remain warmer than normal. Some cooler and drier air will move across the state by next Tuesday.

To: MPR's Morning Edition
From: Mark Seeley, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, September 23, 2005

Headlines:

- Autumn is here
- More turbulent weather
- MSP Airport festival
- Foul air in Louisiana
- Hurricane names
- Almanac for September 23
- Mariners 1-2-3 rule
- Outlook

Welcome to Autumn in Minnesota.....

Though no immediate frost threat appears on the horizon in southern Minnesota, the daily temperatures are certainly starting to feel like the fall season has begun. Friday morning lows in the northeast dropped into the upper 20s to low 30s with Embarrass reporting just 19 degrees F. Some upper 30s F even showed up in the southeastern counties.

Topic: Turbulent weather on September 21st....

Severe weather struck yet again this month on Wednesday night this week as two supercell thunderstorms passed over the east central counties. At least three reports of tornadoes (Atwater in Kandiyohi County, Blaine and Andover in the Metro area) were filed with the National Weather Service. In addition there were 28 reports of large hail, 14 reports of damaging winds and at least 5 reports of flash floods. The flooding reports came from Anoka, Fridley, Spring Lake Park, Coon Rapids, and Shoreview. The damaging wind reports included Rogers, Andover, Brooklyn Park, Brooklyn Center, Mounds View, Ramsey, Coon Rapids, North Minneapolis, Crystal, Fridley, Blaine, and North St Paul.

Heavy rainfall amounts were reported as well, some setting new records for September 21st such as the St Paul Campus and the St Paul downtown airport. Reports included...

U of MN St Paul	1.87"* new record
Fridley	3.29"
North St. Paul	3.11"
White Bear Township	3.10"
Brooklyn Park	3.06"
Maplewood	2.92"
Crystal Airport	2.38"
New Hope	2.17"
St. Paul	2.13"
Stillwater	2.02"
Golden Valley	1.61"

St. Paul Airport 1.54"* new record

The surface convergence of warm, humid air just prior to these storms is evident in the dew point reports from the 5:00-6:00 pm hour around the Metro area. The following reported dew point spikes of 70 degrees F or higher....

Maple Lake 73 F Buffalo 72 F Litchfield 73 F
Crystal 71 F Anoka 72 F St Paul Campus 74 F

Topic: New runway opening at the MSP International Airport

This Saturday (Sep 24) from 10 am to 5 pm MSP International Airport will host a festival to celebrate the opening of its new runway. Among the booth exhibitors there will be our own National Weather Service Office from Chanhassen. They will have a weather balloon on display, several information pamphlets, and some gifts, including those beautiful cloud classification posters that we gave away at the State Fair this year.

More information on this event can be found at their web site:

http://www.crh.noaa.gov/news/display_story.php?wfo=mpx&sid=1311

This is a rare opportunity to see the airport grounds closeup and to visit with the Weather Service. I encourage you to attend.

Topic: Foul air in Louisiana

A high pressure system that has served to keep Hurricane Rita out in the Gulf of Mexico this week has also brought record heat and a spell of stagnant air pollution to many parts of Louisiana. Northern areas of the state like Shreveport and Monroe have reported record high temperatures over 100 degrees. In addition atmospheric inversion layers and absence of wind speeds have made the air foul from the emissions of manufacturing plants. Many citizens have complained of foul smelling air and even headaches.

Though residents of southern Louisiana fear the onslaught of Hurricane Rita this weekend, those in the northern part of the state will welcome the flushing of foul air that the storm will bring.

MPR listener question: Why does the National Hurricane Center only supply a list of 21 names for tropical storms and hurricanes each year?

Answer: In the Atlantic Basin, there has never been more than 21 tropical storms and hurricanes identified in a single year. But there is more to it than that. The letters q, u, x, y, and z are never used in the list of names provided because there are so few names that start with those letters. Thus that only leaves 21 other letters from the alphabet. Since 1978, the criteria for name selection used by NHC include easily remembered names, gender balanced names, and names in alphabetical order. Since the 17th and

most recent name used is Rita, the remaining four names for this year are Stan, Tammy, Vince, and Wilma. If more than four additional storms develop in the Atlantic Basin this fall, the NHC will revert to using the Greek alphabet for names such as Alpha, Beta, etc.

Twin Cities Almanac for September 23rd:

The average MSP high temperature for this date is 68 degrees F (plus or minus 10 degrees F standard deviation), while the average low is 47 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for September 23rd:

MSP weather records for this date include: highest daily maximum temperature of 90 degrees F in 1891 and 1937; lowest daily maximum temperature of 46 degrees F in 1965; lowest daily minimum temperature of 30 degrees F in 1983; highest daily minimum temperature of 71 degrees F in 1930; record precipitation of 3.10 inches in 1869. Record snowfall of 0.2 inches was recorded in 1868.

Average dew point for September 23rd is 43 degrees F, with a maximum of 73 degrees F in 1945 and a minimum of 20 degrees F in 1928.

All-time state records for September 23rd:

Scanning the state climatic data base: the all-time high for this date is 99 degrees F at Granite Falls (Chippewa County) in 1892. The all-time low for this date is 16 degrees F at Tower (St Louis County) in 1995. The all-time state record for precipitation on this date is 5.75 inches at White Earth Reservation (Becker County) in 1869 on their way to an all-time monthly rainfall total of 18.50 inches. The all-time snowfall record on this date is 2.0 inches at Bigfork (Itasca County) in 1942).

Word of the Week: The Mariners 1-2-3 Rule

This jargon pertains to the forecast of tropical storms and hurricanes. Typical errors associated with 24-hr, 48-hr, and 72-hr forecasts of storm tracks are plus or minus 100 miles, 200 miles, and 300 miles, respectively. Consequently mariners at sea need to give-way or steer away from forecasted storm tracks (preferably at 90 degrees) by at least that many miles in order to avoid tropical storm force winds (39 mph or greater). If you notice the forecasted storm track for Hurricane Rita from the National Hurricane Center, it shows a projected path that is outlined by an expanding envelope over time which defines the error bands associated with the forecast. That is an incorporation of the Mariners 1-2-3 rule.

Outlook:

Occasional showers and thunderstorms on Saturday, giving way to partly cloudy skies for Sunday and Monday. Temperatures will be near seasonal averages or a few degrees above. Chance for showers again on Tuesday

and Thursday to Friday of next week.

To: MPR's Morning Edition
From: Mark Seeley, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, September 30, 2005

Headlines:

- Preliminary climate summary for September
- 2005 tornado update
- new web-based hourly climate information
- question on tropical weather
- Almanac for September 30th
- Differentiating streams
- Outlook

Topic: Preliminary September Climate Summary

September behaved much more like a summer month than a fall month. Temperatures around the state averaged 3 to 6 degrees warmer than normal. Numerous locations recorded temperatures in the 90s topped by 93 degrees F at Browns Valley on the 11th. The monthly average temperature for the Twin Cities ranks among the 10 warmest Septembers historically.

Though temperatures were much warmer than normal, some central and northern counties reported frosts, especially on September 23rd and 29th. Minnesota reported the coldest temperature in the nation only three times during the month: 27 F on the 3rd, 19 F on the 23rd, and 18 F on the 29th, all readings coming from Embarrass.

With the exception of the northern counties, where monthly rainfall was lacking, September was very wet, with numerous thunderstorms. Some locations reported thunderstorms on 11 separate days, many of them bringing hail, flash flooding, and damaging winds. Several communities reported one of the wettest Septembers in their historical record. These are listed below...

Alexandria 7.24" Hutchinson 7.27" Willmar 7.78"
Lamberton 9.63" Becker 7.74" Pipestone 8.00"
Worthington 9.62" Faribault 10.69" Winnebago 11.68"
Litchfield 9.40" Cambridge 8.78" Lakefield 8.95"
Marshall 8.04" Redwood Falls 7.29" Fairmont 8.89"
St Jame 8.36" Zumbrota 8.95" Waseca 6.96"

The values at Faribault, Winnebago, and Lamberton represent station records for the wettest ever September. In addition, several daily rainfall records were broken during the month, too numerous to mention individually. Suffice to say that agricultural fields in many areas are excessively wet and will take days to dry out for harvest.

Topic: Update on 2005 tornadoes

The National Weather Service reported this week that Hurricane Rita spun off at least eight tornadoes across Alabama over last weekend. In fact data from the NOAA Storm Prediction Center in Oklahoma suggest that Rita may have spun off as many as 60 tornadoes in LA, TX, MS, AL over the period from September 23-25.

The national summary for 2005 to date shows a count of 964 tornadoes, the vast majority in the F0 (less than 72 mph) to F1 class (73-112mph). In Minnesota, Todd Krause of our National Weather Service Office in Chanhassen reports a total of 66 tornadoes in the state so far this year. Distributionally, the data show 37 F0 (less than 72 mph), 17 F1 (73-112 mph), and 12 F2 (113-157 mph) tornadoes. The data also show the following distribution over time: 1 in March, 1 in April, 11 in May, 34 in June, 11 in July, 1 in August, and 7 in September. Fortunately no deaths have been attributed to tornadoes this year in Minnesota.

Topic: Hourly mapped climate data available

The Minnesota State Climatology Office has just released a new web site tool that allows users to contour map the distribution of hourly weather data from the ASOS and AWOS automated weather sites around the state. This is a unique tool for analysis or simply to answer your curiosity questions about what happened with the weather. Mapped variables include hourly readings of temperature, dewpoint, pressure, wind speed and direction, heat index, wind chill index, and visibility. For example, the mapped values of temperature at 7 am on Thursday of this week, clearly showed the pockets of frost around central and northeastern Minnesota. The web address for this service is...

<http://www.134.84.160.120/HourMap/>

MPR listener question: Why are hurricanes in the Atlantic and Gulf of Mexico not as strong as those in the western Pacific Ocean where they are called typhoons?

Answer: Well, recent Hurricanes Rita and Katrina in the Gulf of Mexico were the equal of many Pacific Typhoons. However, super typhoons such as Longwang, now located just southeast of Okinawa in the western Pacific grow to immense size and intensity as a result of the larger expanse of warm ocean waters that are present there. Super Typhoon Longwang is packing wind gusts to near 190 mph with 55 foot seas.

Incidentally, although Hurricane Rita was not quite as intense as Hurricane Katrina, it may have inflicted more damage on the oil industry in the Gulf of Mexico. According to reports this week, 13 offshore oil rigs, that account for 10 percent of the regions pumping capacity, suffered significant damage as a result of Rita, more than what Katrina did.

Twin Cities Almanac for September 30th:

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 8 degrees F standard deviation).

MSP Local Records for September 30th:

MSP weather records for this date include: highest daily maximum temperature of 87 degrees F in 1891 and 1897; lowest daily maximum temperature of 44 degrees F in 1985; lowest daily minimum temperature of 26 degrees F in 1939; highest daily minimum temperature of 63 degrees F in 1897; record precipitation of 0.52 inches in 1903 and 1.95 inches from the Pioneer record in 1843. Record snowfall of 0.1 inches was recorded in 1961.

Average dew point for September 30th is 43 degrees F, with a maximum of 66 degrees F in 1971 and a minimum of 18 degrees F in 1974.

All-time state records for September 30th:

Scanning the state climatic data base: the all-time high for this date is 93 degrees F at Montevideo (Chippewa County) in 1897 and at Tracy (Lyon County) in 1952. The all-time low for this date is 10 degrees F at Big Falls (Koochiching County) in 1930. This is the all time lowest reading in the month of September for the state. The all-time state record for precipitation on this date is 5.00 inches at Cook (St Louis County) in 1995. The all-time snowfall record on this date is 3.0 inches at Isabella (Lake County) in 1985.

Words of the Week: Ephemeral, Perennial Stream, and Intermittent Streams

From the Greek word *ephemeros* meaning daily or lasting one day. Ephemeral stream refers to a stream channel (a creek or a brook for example) that carries surface waters only during and immediately after a rain or snow event. Streams like this can be found in areas with some topography or rocky surface features which transport precipitation runoff rapidly. They are also found in some farm fields as grassy waterways which carry off water from substantial rainfall events or during spring snowmelt.

From the Latin work *perennis* meaning lasting the whole year through. A perennial stream is one which carries surface waters at all times, except during periods of extreme drought

From the Latin *intermittere* meaning to send between. An intermittent stream carries surface waters much of the time, but ceases to flow occasionally or seasonally because of a frozen condition, streambed seepage, or evapotranspiration exceeding the available water supply.

Being a state with a good deal of water, some topography, variable geology and soils, and very distinct climatic seasonality, including a prolonged frozen period in winter, we have an abundance of all three kinds of streams in Minnesota. The size and number of ephemeral and intermittent streams which feed the Minnesota River in the southern part of the state contribute to the significant variability observed in the sediment load of that river.

Outlook:

Generally dry and pleasant this weekend with above normal temperatures. This should present good conditions for the running of the Twin Cities Marathon on Sunday, with temperatures starting out in the 50s F, low dewpoints and light southerly winds. Increasing cloudiness late Monday and into Tuesday with an increasing chance for showers Tuesday and Wednesday. This will be followed by much cooler weather, bringing another chance for frost.

To: MPR's Morning Edition
From: Mark Seeley, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, October 7, 2005

Headlines:

- Annual Kuehnast Lecture
- Record setting October so far...
- western governor promotes disaster preparedness
- frosts in October
- Almanac for October 7th
- What is bloxam?
- Outlook

Topic: 13th Annual Kuehnast Lecture coming up....

On Friday, October 14, from 3:30 to 5:00 pm in Rm 335 Borlaug Hall on the University of Minnesota St Paul Campus, former Twin Cities meteorologist Dr. Walt Lyons will give the Annual Kuehnast Lecture. As current President of the American Meteorological Society he will discuss science education and the efforts of the AMS. This will be followed by a movie presentation of the "100 Year Hunt for the Red Sprite" an optical phenomena that occurs above thunderstorms but is rarely seen. The public is invited to attend this lecture, honoring our former State Climatologist Earl Kuehnast. The web site for more information is....

http://134.84.160.120/doc/journal/kuehnast_lecture/

Topic: A wet, warm October has already set many records....

Just one week into October, many weather observers have already seen multiple records broken. Over the 3rd, 4th, and 5th the dew point hovered in the mid 60s to low 70s F setting new record high values on all three days and feeling more like mid July. The Twin Cities dew point of 70 F on the 4th tied the highest ever value measured in the month of October.

Some record temperatures were set over the first week of the month, mostly in the form of record warm minimum temperatures, such as a 71 F low at Rochester on the 4th and a low of 72 at MSP on the 3rd. Such values are more than 25 degrees F above normal for this time of year. Then by the end of the week the "mercury went on the chute" and plummeted into the 20s and 30s F bringing snow to portions of northern Minnesota. Friday morning brought the most widespread frost of the season as most areas reported lows in the 20s to low 30s F, bottoming out at 19 F in Bigfork.

The biggest weather story has been the abundant thunderstorm rainfall. Many individual stations have reported new record amounts. For some stations these amounts were unprecedented

for the month of October, such as the 4.61 inches at MSP and 3.42 inches at St Cloud on the 4th. Storm total rainfall as reported by the State Climatology Office are some of the highest numbers ever seen in October. Observers in 14 counties reported rainfall totals over 4 inches and some in Isanti, Morrison, Anoka, Chisago, and Hennepin Counties reported more than 6 inches. Flooding was widespread as rainfall intensity approached or exceeded 2 inches per hour at times.

It is difficult to find historical analogies to this type of October rainfall. I could only find three: 1900, 1973, and 1984. In 1900 two separate thunderstorms dumped over 4 inches across 12 communities in SE Minnesota, St Charles (Winona County) reporting the most with 6.45 inches. In 1973 it was heavy thunderstorms across the northern portion of the state that dropped 4 or more inches on 30 different communities, topped by 7.66 inches at Remer (Itasca County). Perhaps the most widespread of all heavy rainfall events in October took place in 1984 when a series of thunderstorms moved across the state during the middle part of the month and dumped 4 or more inches of rainfall on 92 different communities, the largest amount being 10.09 inches at Fosston (Polk County).

Topic: Oregon Governor encourages disaster preparedness...

Oregon Governor Ted Kulongoski packs his own disaster kit and encourages citizens of his state to do the same. Noting the misery wrought by Hurricane Katrina, the Governor has become an advocate for keeping a disaster kit handy that contains three days of supplies. This includes food, water, medicine, rain gear, extra clothes, and the old standby duct tape. Such a kit can be contained in a backpack that can be easily carried in the event of an evacuation. This might not be a bad idea for Minnesotans either, although the disaster risks might be somewhat different: certainly flooding, winter storms or blizzards, and severe thunderstorms come to mind. All of these can disrupt normal daily life for days if they are severe enough.

MPR listener question: How many frosts typically occur in the Twin Cities area during the month of October? What's been the fewest and the most?

Answer: On average the temperature hits the 32 F mark or lower six times during the month of October in the Twin Cities. The most ever, 17 days, occurred in 1917 the start of a very long, cold, and snowy winter. Believe it or not in 7 years the low temperature never fell to 32 F during September and October. Those years were 1894, 1900, 1921, 1924, 1931, 1940, and 1958. In 1900 a first frost did not occur in the Twin Cities until November 7th.

Twin Cities Almanac for October 7th:

The average MSP high temperature for this date is 62 degrees F (plus or minus 10 degrees F standard deviation), while the average low is 42 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for October 7th:

MSP weather records for this date include: highest daily maximum temperature of 85 degrees F in 1997 and 2003; lowest daily maximum temperature of 41 degrees F in 1915 and 2000; lowest daily minimum temperature of 25 degrees F in 1976; highest daily minimum temperature of 62 degrees F in 1905; record precipitation of 0.98 inches in 1904. A trace of snowfall occurred on this date in 1915 and 1921.

Average dew point for October 7th is 41 degrees F, with a maximum of 68 degrees F in 1997 and a minimum of 19 degrees F in 1976.

All-time state records for October 7th:

The all-time state record high temperature for this date is 94 F at Canby in 1993; the all-time state low temperature for this date is just 11 degrees F at Fort Ripley (Crow Wing County) in 1876. The most precipitation on this date is 3.50 inches at Mankato in 1931 and the most snowfall 4.0 inches at Morris (Stevens County) in 1894 and at Ottertail in 1977.

Word of the Week: : bloxam

This term honors J.C. Bloxam who wrote "On the Meteorology of Newport in the Isle of Wight" in 1860. In deriving daily values of temperature and other climatic parameters from historical time series (many years) he used a method of calculating a sort of running mean for 10 or 11 consecutive days, using this as a value for the middle day in the order. He iterated this process on the historical data until he derived daily values (temperature for example) which ascended or descended in a regular manner corresponding to the seasons. Thus it provided a smoothing function.

This would be something analogous to calculating the mean daily temperature for October 7th, by computing the mean value for October 2-12 each year, then averaging across years using a similar process. This method is called the bloxam process. With sufficiently long historical climatic records available today, it is rarely used as a means of smoothing data.

Outlook:

Pleasant, fall-like weekend with near normal temperatures and a good deal of sun. Temperatures will remain near normal to above normal much of next week, with an increasing chance for showers by late Tuesday and Wednesday.

To: MPR's Morning Edition
From: Mark Seeley, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, October 14, 2005

Headlines:

- Annual Kuehnast Lecture by Dr. Walt Lyons
- Harvesting weather
- Winter Outlook from NOAA
- An 1880 Blizzard
- Urgent need for new roofs in New Orleans
- Almanac for October 14
- Fun with Met jargon
- Outlook

Topic: 13th Annual Kuehnast Lecture Friday (Oct 14)

Friday (October 14) from 3:30 to 5:00 pm in Rm 335 Borlaug Hall on the University of Minnesota St Paul Campus, former Twin Cities meteorologist Dr. Walt Lyons will give the Annual Kuehnast Lecture. As current President of the American Meteorological Society he will discuss science education and the efforts of the AMS. This will be followed by a movie presentation of the "100 Year Hunt for the Red Sprite" an optical phenomena that occurs above thunderstorms but is rarely seen. The public is invited to attend this lecture, honoring our former State Climatologist Earl Kuehnast. The web site for more information is....

http://134.84.160.120/doc/journal/kuehnast_lecture/

Topic: Full speed ahead on harvest.....

With recent favorable weather, low humidity, sunny skies, and warm temperatures, farmers have resumed harvesting activity, mostly soybeans and some corn. Yields in many areas are better than expected, over 60 bu/a in many soybean fields, and over 200 bu/a in many corn fields. Is there enough storage space for this year's crop? Who knows. Despite heavy early October rains corn continues to dry down in the field with kernel moisture content ranging from 20-23 percent in many fields. Some wet, low spots are being worked around. With a warm, and dry weather outlook through the 4th week of October harvest progress will probably be speedy, finishing perhaps in the next two weeks.

Soil moisture recharge this fall in most agriculture areas is rather abundant, with an estimated 7 to 9 inches of water stored in the top 5 feet of soil across much of the southern half of the state. This is roughly twice the level seen in the soil at this time last fall (2004). Only north central sections of the state appear to be short of stored soil moisture at this time.

Topic: Winter Weather Outlook.....

Given the pressures on the energy sector of the economy, NOAA held a press conference this week to announce the weather outlook for winter (December through February). The outlook for temperature favors generally above normal readings for the central two-thirds of the country, but the National Weather Service cautions that the Great Lake region, including Minnesota will be particularly vulnerable to wide swings in temperature and thus exposed to some bouts of very cold conditions. The precipitation outlook suggests equal chances for wetter or drier than normal conditions.

Those working to rebuild New Orleans and some of the Gulf areas damaged by hurricanes should accelerate their efforts to re-roof buildings as the winter outlook for them favors wetter than normal conditions.

Topic: Early Blizzard Anniversary October 15th

On 15 October 125 years ago parts of SW Minnesota were hit with one of the earliest and fiercest blizzards in their history. That Saturday afternoon in 1880 the wind began to blow from the NW and brought rain, followed by heavy wet snow which stuck to everything. By evening the temperature had dropped to the freezing mark and the snow began to drift and pile up. It kept on snowing throughout the weekend, piling snow into 10-15 foot drifts in pioneer towns like Canby, Granite Falls, and St James. All railroad lines were blocked for days and so began one of the longest winters in Minnesota history. This was probably the earliest onset of winter ever and was written about by Laura Ingalls Wilder as the long winter, when few could even travel to town for supplies. Some unharvested crops set in the ground until the following spring to be harvested before planting. Records from St Paul indicate as much as 110 inches of snow fell that winter of 1880-1881.

MPR listener question: I heard this week that the first order of business in the reconstruction of New Orleans is to put new roofs on the damaged buildings. Is that because of the threat of wet weather?

Answer: Indeed, that is certainly one of the reasons. New Orleans along with many other communities in Louisiana average 12 to 14 inches of rainfall between now and the end of the year. This is substantially more than we might expect here in the Twin Cities (average for Oct-Dec is 4.5 inches), and some of ours will likely be frozen precipitation, while theirs will be all rainfall, and at times heavy rainfall.

Twin Cities Almanac for October 14th:

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 8 degrees F standard deviation).

MSP Local Records for October 14th:

MSP weather records for this date include: highest daily maximum temperature of 86 degrees F in 1997 and 1947; lowest daily maximum temperature of 40 degrees F in 1909 and 1943; lowest daily minimum temperature of 24 degrees F in 1937; highest daily minimum temperature of 66 degrees F in 1968; record precipitation of 1.89 inches in 1966. A trace of snowfall occurred on this date in 1909, 1943, and 1959.

Average dew point for October 14th is 41 degrees F, with a maximum of 70 degrees F in 1962 and a minimum of 19 degrees F in 1937.

All-time state records for October 14th:

The all-time state record high temperature for this date is 91 F at Redwood Falls (Redwood County) in 1947; the all-time state low temperature for this date is just 8 degrees F at Beardsley (Big Stone County) in 1937. The most precipitation on this date is 4.45 inches at Mahnomon in 1984 and the most snowfall 4.1 inches at Argyle (Marshall County) in 1992.

Word of the Week: : Metallurgy and Metaphysical

With their often quirky sense of humor, meteorologists sometimes have fun with the jargon of science. Such is the case here. Often times in the contractions used by weather people they will substitute "met" for meteorological, as in the 'met office' or 'met operations', or 'met forecast.' In this context met-allurgy refers to an allergic reaction to the weather and met-a-physical refers to the medical examination given each year to a forecaster.

Outlook:

Generally warmer than normal and dry for the weekend. Chance of showers in the north on Monday, otherwise dry much of next week as well. Temperatures will average above normal with mostly sunny skies.

To: MPR's Morning Edition
From: Mark Seeley, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, October 21, 2005

Headlines:

- Warm Tuesday
- Fall composting
- Unusual October floods
- Coldest temperature in October
- Almanac for October 21st
- Cat Connotations in Meteorology
- Outlook

Topic: Warm October 18th

Twenty or more Minnesota communities reported a high temperature of 80 degrees F or higher on Tuesday, the 18th, topped by 84 F at Montevideo, Benson, and Ortonville. Mankato reported a new record high that day of 81 F.

Though these readings are 20 or more degrees warmer than normal they only occurred on one day. October of 1947 brought many such days, in fact some communities reported 11-12 days with temperatures of 80 degrees F or higher during one of the warmest Octobers in Minnesota history.

Topic: Composting those leaves

Have you been raking and bagging leaves recently? Seems like in many areas yards are starting to fill with them.

Many homeowners around the state compost leaves in the fall. My university Department Soil, Water, and Climate has developed recommendations for composting and mulching of organic yard wastes, including leaves. Carl Rosen and Tom Halbach among others have published a guide to composting and mulching which is available from county extension offices. In addition there is a CD-ROM available from the Extension Service to learn about practices for home composting.....it can be found at...

<http://www.compost.umn.edu/>

Some of the important points about composting:

Large plastic bags, barrels, wire cages or wooden frames will all work well for composting.

Shredded leaves will decompose faster than whole leaves.
(Basically, smaller breaks down faster than larger)

Key ingredients include: organic waste (leaves, grass clippings, plant residues from gardens), proper aeration (stirring or mixing

occasionally), moisture (periodically water the compost pile), and nitrogen (either from manure, blood meal, or fertilizer).

Depending on the amount of material, composting may take from 6 months to a year or more before you have a usable mulch.

Weather is certainly a factor in governing the speed of the composting process. Leaves placed in a compost pile early this fall will be subject to more decomposition before winter freeze up. During the winter months in Minnesota, compost piles are usually frozen and little if any biological activity occurs. Thus if you would like to use the mulched material by next summer or fall, start composting now and don't wait for the last leaf to fall.

MPR listener question: Earlier this month you commented about the flooding rains on the 4th and 5th in east-central Minnesota and western Wisconsin where some communities reported 5-9 inches of rainfall, amounts almost unheard of for October. Was there ever another flooding event in October like this one?

Answer: Flooding, especially flash flooding is extremely rare in October. The only other event I could find similar to what happened earlier this month occurred on October 9-10, 1973. Thunderstorms, straight-line winds and tornadoes passed over the state from SW to NE. The heaviest rainfalls were widely scattered and not concentrated like those of this month. The largest amounts of rain, ranging from 5 to 7 inches fell in Vesta (Redwood County), Aitkin, Hibbing, Remer (Itasca County), Walker, Grand Rapids, Pokegama Dam, Leech Lake, and Park Rapids. Basement flooding and some washed out roads were noted in and around those communities.

MPR listener question: I heard Embarrass, MN reported the nation's low on Tuesday this week with 17 degrees F, the same day that so many 80s F were reported in southern counties. What is the coldest October temperature ever measured in Minnesota.

Answer: By far the coldest reading reported in October came from Roseau, MN on the 26th in 1936 when they measured -16 degrees F. Following a fresh snowfall of several inches on the 24th and 25th a cloudless arctic high pressure system settled over Minnesota driving the temperatures to -10 F or colder at six different northern communities. The only other equivalent cold snap to this one occurred on October 25, 1887 when fresh snowfall and arctic high pressure again brought temperatures of -10 F or colder to a number of communities.

Twin Cities Almanac for October 21st:

The average MSP high temperature for this date is 57 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 39 degrees F (plus or minus 9 degrees F standard deviation).

MSP Local Records for October 21st:

MSP weather records for this date include: highest daily maximum temperature of 88 degrees F in 1947; lowest daily maximum temperature of 29 degrees F in 1913; lowest daily minimum temperature of 16 degrees F in 1913; highest daily minimum temperature of 62 degrees F in 1920 record precipitation of 1.76 inches in 1894. A record snowfall of 0.1 inches occurred on this date in 1936.

Average dew point for October 21st is 37 degrees F, with a maximum of 64 degrees F in 1920 and a minimum of 8 degrees F in 1952.

All-time state records for October 21st:

The all-time state record high temperature for this date is 91 F at Redwood Falls (Redwood County) in 1947; the all-time state low temperature for this date is just -2 degrees F at Roseau in 1913. The most precipitation on this date is 2.35 inches at Harmony (Fillmore County) in 1982 and the most snowfall is 8.0 inches at Milaca (Mille Lacs County) in 2002 and at Winnie Dam (Itasca County) in 1906.

Words of the Week: Cat Connotations in Meteorology

Most people have heard of the term "raining cats and dogs", which has been in use for centuries. The connotation being that it is raining (thundering, etc) so loudly as to create the same distracting din as a bunch of cats and dogs fighting. But, the word cat is also used by meteorologists to describe other features of the weather.

Cat ice (shell ice) is the thin layer of unbroken ice which remains over a pond, lake or stream after the water level drops, leaving a cavity between the water surface below and the ice above. Presumably the connotation is that this ice could only support the weight of a cat.

Cat's Paw is a term used to describe a very local light breeze that is just enough to cause irregular patches of ripples on an otherwise glassy water surface. This creates a pattern not unlike a series of cats paw prints across dry soil.

Cat's Nose is a term used in England to describe a cool northwest wind which may have the same affect as being touched on the face or hands by a cool cat's nose.

Outlook:

Partly cloudy over the weekend with a chance of scattered light showers and snow flurries. Temperatures will range in the 20s F and 30s F overnight and 40s F during the day. Cool and dry appears to be the pattern for next week, with mostly northerly winds. Some warming later in the week.

To: MPR's Morning Edition
From: Mark Seeley, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, October 28, 2005

DON'T FORGET TO FALL BACK SATURDAY NIGHT BY SETTING YOUR
CLOCKS BACK AN HOUR....ENJOY THE EXTRA REST....

Headlines:

- Cafe Scientifique
- Historical fires
- Preliminary climate summary for October
- Early winter in New Hampshire
- Question on hurricanes
- Almanac for October 28th
- What is paleotempestology?
- Outlook

Topic: U of M Bell Museum to host hurricane benefit

A Special Cafe Scientifique to benefit the Mississippi chapter of the Nature Conservancy will be held at the Varsity Theatre, 1308 Fourth St. S.E., Minneapolis on Tuesday, November 1st at 6:00 pm. For further information Contact: Nina Shepherd, Bell Museum, (612) 624-7389 David Ruth, University News Service, (612) 626-1720

Join University of Minnesota climatologist Mark Seeley and nationally known science policy expert Ken Keller at "Climate Change and Public Policy," a special Cafe Scientifique to benefit for the Mississippi Chapter of the Nature Conservancy.

Dr Keller is director of the university's Center for Science, Technology and Public Policy. Dr. Keller and I will talk about weather and the impact of global climate change on people, the environment and public policy.

Participants will have a chance to ask questions, as well as contribute to the Nature Conservancy's latest efforts to save the fragile wetlands of the Gulf Coast. Coastal wetlands serve as a natural hurricane buffer, reducing storm surge and absorbing wind and wave energy. More than one million acres of these coastal wetlands (1,900 square miles) have been lost since 1930.

Café Scientifique is a monthly series produced by the University of Minnesota's Bell Museum of Natural History. It brings expert-led discussions on provocative science topics out of the labs and into pubs, coffee shops and restaurants throughout the state. For more information go to the web site www.bellmuseum.org.

Topic: Historical fires....

Ft Snelling weather observers noted prairie fires on this date in 1842, 1844, and 1850, all following dry Octobers. Another dry fall produced wildfires on Dayton's Bluff overlooking St Paul on October 29, 1861. Both prairie grasses and the woods caught fire back then, sending billowing smoke across the settlement.

Topic: Preliminary climate summary for October

October was quite wet except for the southeastern counties where total rainfall in places was less than one inch. Most places reported considerably above normal rainfall, some twice normal values. Some communities reported thunderstorms on 4-5 days. Red Lake Falls, Littlefork and International Falls all reported measurable snowfall, ranging from 0.1 to 0.4 inches.

Temperatures for October averaged from 1 to 4 degrees above normal. Extremes ranged from 89 degrees F at Albert Lea and Winnebago on the 4th to just 15 degrees F at Embarrass on the 16th. In fact Embarrass reported the nation's low (contiguous 48 states) three times this month.

Duluth, the Twin Cities, Fargo-Moorhead, International Falls, and several other locations reported winds of over 40 mph associated with thunderstorms.

Topic: Early winter in New Hampshire

A strong nor-easter brought a great deal of rainfall to New England early this week and more snow to New Hampshire's Mount Washington, the highest point in New England at over 6200 feet. The observer there has recorded 72 inches of snow so far, with over 43 inches on the ground at the summit. An October record 24-hour amount of 25.7 inches fell.

Being a highly exposed, somewhat isolated peak above the landscape of New England, Mount Washington has a reputation for snow and wind. They average nearly 315 inches of snowfall each year and the mean daily wind speed is probably the highest in America at over 35 mph. In fact, they record over 100 days per year wind speeds above hurricane force (75 mph)

MPR listener question: What's the count of named 2005 tropical storms now in the North Atlantic and do you expect more?

Answer: There have been 23 named storms in the North Atlantic this year, the current one being Beta off the coast of Nicaragua. Waters are still generally warmer than normal for this time of year, so another tropical wave or two may turn into a tropical storm called Gamma. Fortunately, November usually brings an end to such storms.

Twin Cities Almanac for October 28th:

The average MSP high temperature for this date is 52 degrees F

(plus or minus 11 degrees F standard deviation), while the average low is 35 degrees F (plus or minus 9 degrees F standard deviation).

MSP Local Records for October 28th:

MSP weather records for this date include: highest daily maximum temperature of 75 degrees F in 1948; lowest daily maximum temperature of 24 degrees F in 1925; lowest daily minimum temperature of 17 degrees F in 1905 and 1925; highest daily minimum temperature of 56 degrees F in 1974; record precipitation of 1.09 inches in 1961. A record snowfall of 0.4 inches occurred on this date in 1895.

Average dew point for October 28th is 34 degrees F, with a maximum of 59 degrees F in 1946 and a minimum of 10 degrees F in 1925.

All-time state records for October 28th:

The all-time state high temperature for today's date is 90 degrees F at Chatfield (Fillmore County) in 1927; the all-time state low for today's date is -9 degrees F at Angus (Polk County) in 1919 with 5" of snow on the ground and at Meadowland in 1942 with 10" of snow on the ground; the all-time state record precipitation for this date is 3.10 inches at Caledonia (Houston County) in 1900; and the all-time state record snowfall for this date is 9.5 inches at Big Falls in 1932.

Word of the Week: Paleotempestology

The very active hurricane season has promoted more interest in the study of historical hurricanes beyond those documented by the National Weather Service which goes back to 1851. The study of these ancient hurricanes is accomplished by examination of proxy data such as sand layers deposited by inland storm surges, changes in coral chemistry, variations in coastal tree-ring patterns, and historical documents such as ships logs, letters, diaries, and local newspaper accounts. Such methods can reveal information about hurricanes back many hundreds of years. This study of ancient hurricanes is referred to as paleotempestology, kind of has a Shakespearean ring to it. This may prove to be an important field of study as evidence suggests that hurricane frequency may have been even higher than today in past historical times.

Outlook:

Except for some scattered shower possibilities Saturday night and Sunday the balance of the next week looks like a continuation of Indian Summer like weather with plenty of sun and warmer than normal temperatures. Saturday will be breezy and there may be some lingering showers in the northeast early Monday, but Halloween looks to be dry and pleasant most other places.

To: MPR's Morning Edition
From: Mark Seeley, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, November 4, 2005

HEADLINES:

- Want to learn about winter weather forecasting?
- Warm start to November
- Remember November is a windy month
- Weather Channel fashion
- Is it possible for a record high and low on the same day?
- Almanac for November 4th
- Frontogenesis
- Outlook

Topic: That winter forecast.....

A College of Continuing Education Compleat Scholar course begins next Thursday, November 10th at the University of Minnesota St Paul Campus. The class meets from 6:30 to 8:30 pm in the Continuing Education Conference Center. There will be two class meetings plus a visit to the National Weather Service in Chanhausen. We will look at winter weather including how it is forecasted, memorable winter storms, and how winter's are changing in Minnesota. The course is Compleat Scholar 0526. To register you can contact the program office: Ph: 612-624-4000 or web: www.cce.umn.edu/scholars

Topic: Warm start to the month of November

Temperatures from 10 to 25 degrees F above normal have occurred so far this month around the state. Some record setting high temperatures on November 2nd included:
75 F at Mankato, 73 F at Waseca, 75 F at St James (tied record), and 75 F at Albert Lea (tied record). The high of 71 F in the Twin Cities was only one degree shy of the record high.

The run of warm temperatures has certainly been beneficial with respect to energy for residential and commercial heating. It has also been very beneficial for farmers as they wrap up this year's harvest of bumper crops. Sales of fuel for running grain dryers has been down this year because Mother Nature has provided such good field drying conditions. Farmers have saved thousands of dollars in drying expenses by leaving crops to dry in the field under warm and windy conditions.

Topic: Windy November.....

Regardless of how warm it is so far this month I still see many people wearing flannel shirts, sweaters, and sweatshirts. This is no surprise to me as November is one of the windiest months of the year for most places in Minnesota. More often than not the wind is from the northwest, so it has a cooling effect.

Average wind speed for November is 10 to 15 mph, but winds of 30 mph and stronger are common as storm systems strengthen with the season. So even though the winter parkas are not yet to be seen, layered clothing is in fashion now so we can adjust to the erratic daily course of wind and temperature.

Topic: Speaking of fashion.....

I did not know what to think about the recent revelation that retailer L.L. Bean has teamed up with The Weather Channel to market a line of Severe Weather Clothing just like their meteorologists wear when they report from the scene of a flood, tornado, hurricane, or blizzard. Some items include Stowaway Rainwear Pants and Storm Chaser Boots. The fashion emulation of broadcast meteorologists disturbs me a little for some reason. Should the average citizen stock up on Severe Weather Clothing so he or she can feel good about themselves when they venture out in a blizzard or flood. This seems different to me than wearing the Twins Johan Santana jersey (#52) to go out and play softball.

MPR listener question: I read in the recent Weatherwise magazine about a handful of climate stations in America that have recorded both a record high temperature and a record low temperature on the same date. For example, Sioux City, Iowa reported a record high of 91 F and a record low of 33 F on May 16, 1997. Are there any locations in Minnesota that can stake such a claim?

Answer: I don't think so. Some climate stations come remarkably close though. For example on April 3, 1982, Lamberton in Redwood County reported a high of 78 F (the 2nd highest ever for the date) and a low of 7 F (the 2nd lowest ever for the date). That's a range of 71 degrees, not easy to dress for.....

Twin Cities Almanac for November 4th:

The average MSP high temperature for this date is 48 degrees F (plus or minus 10 degrees F standard deviation), while the average low is 32 degrees F (plus or minus 9 degrees F standard deviation).

MSP Local Records for November 4th:

MSP weather records for this date include: highest daily maximum temperature of 74 degrees F in 1975; lowest daily maximum temperature of 17 degrees F in 1991; lowest daily minimum temperature of -3 degrees F in 1991; highest daily minimum temperature of 51 degrees F in 1895; record precipitation of 0.61 inches in 1988. A record snowfall of 1 inch occurred on this date in 1910.

Average dew point for November 4th is 29 degrees F, with a maximum of 55 degrees F in 1956 and a minimum of -5 degrees F in 1991.

All-time state records for November 4th:

The all-time state high temperature for today's date is 79 degrees F at Redwood Falls in 1975; the all-time state low for today's date is -13 degrees F at Warren (Marshall County) in 1919. The all-time state record precipitation for this date is 1.84 inches at Fairmont (Martin County) in 1922; and the all-time state record snowfall for this date is 15.8 inches at Isabella (Lake County) in 1982.

Word of the Week: frontogenesis

Sometimes used in narratives by meteorologists this term simply means the initial formation of a weather front (warm or cold) or a frontal zone, an area of contrast between cold and warm, wet and dry, often coupled with a wind shift. This time of year this process tends to take place east of the Rocky Mountains in the plains states. Weather fronts often take form here and then move along in an easterly direction. It is also the time of year when frontal zones grow and get bigger, because air mass contrast becomes sharper and the associated cloud systems are much larger in areal extent. I still expect that at least one large winter storm will pass over Minnesota this month.

Outlook:

Generally cloudy for the weekend with a chance for light precipitation, light showers in the south and snow flurries in the north. Temperatures will be cooler than of late, but still generally above normal. Drier late Sunday and into Monday with another warm-up coming. Temperatures will be in the 50s and 60s F on Election Day (Tue) and remain moderate for much of next week. More wind on Wednesday and a chance for precipitation toward the end of the week.

To: MPR's Morning Edition
From: Mark Seeley, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, November 11, 2005

HEADLINES:

- Winter Hazards Awareness
- Turbulent Wednesday
- Kudos to the Opjorden family of Milan
- Fitzgerald Anniversary
- Armistice Blizzard Anniversary
- Weather and Bird Migrations
- Almanac for November 11
- Plimsoll line
- Outlook

Topic: Winter Hazards Awareness Week

It is Winter Hazards Awareness Week in Minnesota. The National Weather Service Forecast Office has been providing information about winter forecasting terminology, home safety and driving tips, and fire safety, among other things. Much more information can be found on their web site at...

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

Topic: Strong winds on Wednesday.....snow in Canada

Many communities reported winds from 40 to 60 mph on Wednesday (Nov 9)...with some associated damages. Both Marshall and Moorhead reported winds of 60 mph. There was little precipitation reported with the passage of this strong low pressure system (as low as 28.94 inches on the barometer in Ontario, Canada) but it did bring snow to southern Canada...up to 6 inches in SW Manitoba and up to a foot in parts of Ontario.

Topic: Congratulations to Luther Opjorden of Milan

Earlier this week the National Weather Service presented the Family Heritage Award to Luther Opjorden of Milan, MN. This award recognizes over 100 years of service in observing the weather and Mr. Opjorden was one of only 3 recipients from the Midwest (the others were in Kansas and South Dakota). The Opjorden family began daily weather observations on their farm in Milan in August of 1893. They have established one of the most utilized climate histories in western Minnesota (Chippewa County).

Milan's climate history shows seven state record high temperatures, including the second highest temperature ever measured in the state of 113 degrees on July 21, 1934, and a very rare 61 degrees F on January 19, 1900. In fact Milan

represents one of the warmest and driest climates in Minnesota. It also gets cold there, -42 degrees F on February 16, 1936 is a station record. In the drought decade of the 1930s Opjordens recorded 73 consecutive days without precipitation from November 26, 1930 to February 6, 1931. In the drought year of 1976 they reported only 7.91 inches of precipitation, one of the lowest annual amounts ever in the state. They also recorded a station record 9.78 inches of rainfall and a flash flood on July 4, 1995.

Topic: 30th Anniversary of the loss of the Edmund Fitzgerald

Perhaps the most memorable winter storm of 1975 struck in the northeast sections of Minnesota on November 10th and 11th. This storm brought strong wind, rain, and snow to Minnesota. Southern counties reported 0.5 to 1 inch of rainfall, while northern counties reported a few inches of snowfall. But this storm really intensified over Lake Superior, producing winds up to 71 mph and creating waves of 12 to 15 feet. The ore carrier Edmund Fitzgerald was caught in this storm and sank rapidly in Lake Superior on the 10th. All 29 crew members were lost.

A good account of this incident has been written by Steve Ackerman, a professor of meteorology at University of Wisconsin-Madison. It combines a description of the weather with comments on the song lyrics, and graphics of the ship's journey. The web site is

<http://cimss.ssec.wisc.edu/wxwise/fitz.html>

In addition the National Weather Service Marquette, MI office has a wealth of information about the Edmund Fitzgerald on their web site

<http://www.crh.noaa.gov/mqt/fitzgerald/index.php>

Topic: 65th Anniversary of the Armistice Day Blizzard

The afternoon of November 11, 1940 brought the devastating Armistice Day Blizzard to Minnesota. The day started mild and promising for duck hunters. But the afternoon deteriorated rapidly with the approach of a strong winter storm that would dropped the Twin Cities barometer to 28.93 inches and the Duluth barometer to a record low of 28.66 inches, certainly hurricane strength. Wind gusts to 45 mph were reported from Collegeville, where they received 26.6" of snowfall. The winds at Duluth reached 63 mph and the temperature dropped 41 F over a 24 hour period. In most places traffic came to a standstill, even the streetcars in the Twin Cities. Drifts were reported as high as 20 feet in the Willmar area. Snowfall measurements showed 19.3" at Milaca, 16.7" at Bird Island, 24" at Meadowlands, 22" at Orr, 15" inches at St Peter, and 16.8" in the Twin Cities. During the storm the snowfall intensity was measured at times between 2 and 3 inches per hour. Across parts of the state ice accumulation took the power lines down. Damages were estimated at over \$1.5 million. Forty-nine people died, including many duck hunters unprepared and exposed on Mississippi

River islands.

MPR listener question: What can you tell me about weather and the fall migration of birds?

Answer: Weather and the Fall Migration of Birds

There are both direct and indirect effects of weather and climate on bird migration behavior. For many birds one of the triggers to prompt fall migration is the declining daylength (a direct effect). For others migration is triggered by local changes in the food chain. Many insects decline in numbers, especially after frosts, thereby prompting insect-eating birds to move south where their food supply is more abundant. In turn, birds of prey may find their quarry (other birds and small mammals) to be scarce as the weather turns more inhospitable, and therefore begin their migration south as well.

Waterfowl which depend on aquatic plants or field crops may hang around longer into the fall as long as their food supply is abundant and accessible. On occasion the formation of lake ice early in the season will prompt waterfowl to begin their migration. Often following the first large snowstorm and outbreak of arctic air, the majority of these birds will embark on their journey. Because this fall has been so mild in the upper midwest, many birds are hanging around waiting for Mother Nature to give them a stronger sign that it is time to leave. It looks like this sign may come next week.

Other interesting characteristics of bird migration include:

- Most birds gorge themselves in the fall to build up fat reserves (energy) necessary to fly long distances.

- Low pressure systems and their associated strong southerly winds will sometimes stall migrating flocks. On the other hand, birds will often fly south on the tailwinds of cold high pressure systems that descend from high latitudes and provide helpful northerly winds. Though most frequently spotted at altitudes of 1000-5000 ft, some migrating birds have been observed at 20,000 to 30,000 ft by aircraft. At these altitudes they can take advantage of tailwinds of 80 mph, shortening their trip.

Often in the fall, the peak migrations will be noted during cold high pressure outbreaks with northerly winds. Cooler temperatures help the birds to dissipate heat from the energy they expend in flying for long distances. During unusually warm conditions in the fall, many waterfowl do not like to fly because they overheat or respire too much water vapor and become dehydrated. Birds also prefer the good visibility (absence of clouds) which often accompanies high pressure systems.

Many of the largest migrations are nocturnal (occur at night) and therefore not visible to most birdwatchers. However,

wildlife biologists can detect and study these migrations using radar. There are some advantages to overnight migrations:

- (1) Nights are longer in the fall, so more distance can be covered at night than during the daytime.
- (2) There is reduced exposure to predators (raptors), except for owls.
- (3) Birds have to expend less energy flying at night, since winds are usually less, there is less turbulence, cooler temperatures (better heat dissipation), and reduced loss of body fluids (less risk of dehydration).
- (4) For some species migration routes can be maintained in night flights by using the stars for navigation.

Lastly, concerning navigation techniques, wildlife biologists have offered a number of explanations, many of which have yet to be fully accepted. Some of these include: celestial markers such as the sun, moon and stars; internal detection of the Earth's magnetic field or subtle changes in the gravitational field; following infra-sound beacons such as the sound frequencies of magnetic storms, sea waves, jetstreams, earth tremors, or wind currents through mountains; following scent beacons or regional odours characteristic of different landscapes over which the birds pass; and simple memory, having flown a route once with its parents or flock, a bird will forever remember it in nearly every detail.

References: (1) Bird Migration by Thomas Alerstam, 1990. Cambridge University Press. Travels and Traditions of Waterfowl by H. Albert Hochbaum, 1956. University of Minnesota Press. Bird Migration: Physiology and Ecophysiology edited by E. Gwinner, 1990. Springer-Verlag. Bird Migration: A General Survey by Peter Berthold, 1993. Oxford University Press.

Twin Cities Almanac for November 11th:

The average MSP high temperature for this date is 43 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 27 degrees F (plus or minus 9 degrees F standard deviation).

MSP Local Records for November 11th:

MSP weather records for this date include: highest daily maximum temperature of 62 degrees F in 1961 and 1964; lowest daily maximum temperature of 18 degrees F in 1986; lowest daily minimum temperature of -1 degrees F in 1986; highest daily minimum temperature of 46 degrees F in 1930; record precipitation of 2.52 inches in 1940. A record snowfall of 8.2 inches occurred on this date in 1940, part of the 16.8 inches of the Great Armistice Day Blizzard.

Average dew point for November 11th is 27 degrees F, with a maximum of 54 degrees F in 1964 and a minimum of -6 degrees F in 1986.

All-time state records for November 11th:

The all-time state high temperature for today's date is 73 degrees F at Grand Meadow (Mower County) in 1949; the all-time state low for today's date is -22 degrees F at Itasca State Park (Clearwater County) in 1919. The all-time state record precipitation for this date is 2.52 inches at Minneapolis-St Paul in 1940; and the all-time state record snowfall for this date is 14.0 inches at Orr (St Louis County) in 1940.

Word of the Week: Plimsoll's Mark or Plimsoll's Line

This is the name given to the conspicuous marks painted on the sides of merchant ships that indicate the limit of submergence allowed by law. It is named for Samuel Plimsoll who championed the law before the British Parliament to prevent captains from overloading their merchant ships. The British merchant ships used this system for years (since at least 1899) before the United States adopted a similar system in 1930.

Load limits or lines were designated as FW for fresh water, S for summer, W for winter and WNA for winter in the North Atlantic. For merchants carrying goods to and from India, there was an additional Plimsoll Mark, IS which stood for Indian Summer, but this actually a misnomer. It was meant for the October to April period in the Indian Ocean when the summer monsoon season had ended and seas were relatively calm. Loads could be greater during this time.

In fact expected or prevailing weather is an important factor in designating load limits on merchant ships both on inland waters and in open seas. Since its inception, the Plimsoll Mark has been partially based upon the seas traveled, the time of year and the prevailing weather. Where the weather historically produced rougher seas with larger swells, Plimsoll Marks designated lighter load limits for ships. If these lines or marks were not rigidly observed, shipping companies could be fined and their insurance policies cancelled.

Outlook:

Mild temperatures but increasing cloudiness on Saturday with a chance for showers by afternoon and evening, even some thunder. Decreasing clouds Sunday and cooler, chance for lingering showers or snow flurries in eastern sections. Windy on Sunday and into Monday, with a chance for showers and snow flurries on Monday and Tuesday, then drier but considerably cooler for the middle part of next week.

To: MPR's Morning Edition
From: Mark Seeley, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, November 25, 2005

HEADLINES:

- Windy November so far..
- Atlantic Tropical Storm Season Lingers
- Weather and Multiple Sclerosis
- Past Weather for the Thanksgiving to Christmas interval
- Almanac for November 25th
- Manitoba Mauler
- Outlook

Topic: A very windy November.....

Though substantial snowfall has been lacking this month there have certainly been a number of strong cold fronts producing gusty winds. The 4th strong cold front of the month passed across the state on Wednesday this week, bringing winds of 40 mph or greater to many areas. In fact for some communities, including the Twin Cities winds have reached or exceeded 40 mph on six days this month already. Both Alexandria and Fargo-Moorhead have reported winds of 50 mph or greater on two days this month.

The month has also been mild, averaging several degrees warmer than normal. Shallow lakes are only just now beginning to freeze and soil temperatures have fallen into the low 30s F, some freezing at the surface.

Topic: Atlantic Tropical Storm Season Lingering....

A record setting North Atlantic Tropical Storm season is slow to end. Tropical Storm Gamma, the 24th named storm of the season dumped heavy rains on Honduras last weekend causing flooding and mudslides. Thirty-two people died as a result of the storm. In addition in the eastern Atlantic a large complex of thunderstorms built around a low pressure wave has developed into Tropical Storm Delta (number 25) this week, but it appears no threat to land. Late season storms have also occurred in the past as a hurricane brushed Nantucket and Cape Cod on November 26, 1888.

This has been the most active North Atlantic Tropical Storm season since 1933, but it will finally come to an end next week.

Topic: Weather and MS

This past year a paper published in the Royal Meteorological Society's Weather Magazine showed evidence that the symptoms associated with multiple sclerosis may become acutely expressed when the dewpoint is high. These symptoms include dizziness, fatigue, loss of balance, and loss of muscle control. Dewpoints of 63 degrees F or higher were shown to be coincident with the frequency of severe symptoms expressed

by those affected with MS in the United Kingdom.

As I have noted in previous comments on MPR, the evidence in Minnesota suggests dewpoints are trending upward during the summer months. This makes me wonder if those in our state afflicted with MS are noticing any change in their symptoms. We have certainly been recording an increased frequency of days with exceptionally high dewpoints.

MPR listener question: When was the coldest and snowiest period between Thanksgiving and Christmas?

Answer: Since this is from a Minnetonka listener I assume you mean the Twin Cities area. The coldest and snowiest periods between the Thanksgiving and Christmas holidays were in 1985 and 1983. Thanksgiving was on November 28 in 1985. Between that date and Christmas Day (Dec 25) the mean temperature was 6.5 degrees F with a total snowfall of 24 inches. Thanksgiving was on November 24 in 1983. Between that date and Christmas Day the mean temperature was 6.9 degrees F with a record setting low of -29 F on December 19th, and total snowfall was 33.5 inches.

Twin Cities Almanac for November 25th:

The average MSP high temperature for this date is 35 degrees F (plus or minus 10 degrees F standard deviation), while the average low is 22 degrees F (plus or minus 10 degrees F standard deviation).

MSP Local Records for November 25th:

MSP weather records for this date include: highest daily maximum temperature of 62 degrees F in 1914; lowest daily maximum temperature of 6 degrees F in 1977; lowest daily minimum temperature of -18 degrees F in 1880; highest daily minimum temperature of 44 degrees F in 1913; record precipitation of 0.97 inches in 1896. A record snowfall of 5.3 inches occurred on this date in 1952.

Average dew point for November 25th is 21 degrees F, with a maximum of 43 degrees F in 1933 and a minimum of -19 degrees F in 1977.

All-time state records for November 25h:

The all-time state high temperature for today's date is 76 degrees F at Faribault (Rice County) in 1933; the all-time state low for today's date is -36 degrees F at Pokegam Dam (Itasca County) in 1903. The all-time state record precipitation for this date is 3.00 inches at Le Sueur in 1896; and the all-time state record snowfall for this date is 16.7 inches at Island Lake (St Louis County) in 1983.

Words of the Week: Manitoba Mauler

This is the name given to a particularly intense Alberta Clipper by meteorologist Larry Cosgrove who writes the daily Weather America newsletter. It is an intense closed low that passes over Canada and

entrains the high latitude polar air on the back side, dragging it down across the Great Lakes and producing large quantities of lake-effect snow, gusty winds and cold windchills.

Outlook:

Chance of rain later on Sunday, especially in southern and western areas. Some thunder may be possible too. Cooler with snow most places on Monday and Tuesday. Then cool and dry for the first two days of December.

To: MPR's Morning Edition
From: Mark Seeley, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, November 18, 2005

HEADLINES:

- Wild temperature pattern
- Thanksgiving extremes
- Unusual November severe weather scenario
- Almanac for November 18
- Sky, soil, and plant color scales
- Outlook

Topic: Unusual Temperature Pattern Lately.....

Last Friday morning Embarrass, MN reported the lowest temperature in the 48 contiguous states with just 16 degrees F....who would have thought that the day would prove to be one of the warmest November 11ths in Minnesota history. Dozens of communities reported record-tying or new record high temperatures during the afternoon later that day, including 64 F in the Twin Cities, 60 F at International Falls, and 69 F at Alexandria. A number of stations reached 70 F or better, including Browns Valley at 70 F, Canby at 70 F, Redwood Falls at 70 F, Montevideo at 71 F, and 72 F at Milan (just one degree shy of the all-time state record high for November 11th).

These high temperatures helped set up a severe weather threat for Saturday November 12th. Marshall in Lyon County received just under 1 inch of rainfall from a thunderstorm and several locations reported hail. There was even a tornado watch in effect for a time on Saturday.

On Tuesday and Wednesday a winter storm brought snow, rain, and sleet to the state, along with very high wind speeds. Duluth reported a total of 5.8 inches of new snow, while Bigfork and Virginia reported over 3 inches. Other areas reported just a trace up to 2 inches. Winds gusted to 40 and 50 mph in many places, blowing snow across roads and highways. Roads were slippery and there were numerous reports of accidents. Four people died from traffic related injuries. The storm ushered in a very cold air mass, as Embarrass and Baudette reported the lowest temperature in the lower 48 states on November 17th with -7 F. Many other communities reported below zero F readings as well.... Hibbing -4 F Park Rapids -3 F Orr -4 F Roseau -2 F

Topic: Thanksgiving's weather extremes....

The snowiest and coldest Thanksgivings on record occurred in 1880, 1896, and 1952. Thanksgiving of 1880 (26th) followed an early winter start which had brought the worst October blizzard in Minnesota history. As a consequence all of November was cold and snowy, with temperatures as low as -18 to -22 degrees F in the Twin Cities area. A severe

blizzard on November 25–26, 1896, bringing ruin to Thanksgiving travel plans for many in western and northern counties. Snowfalls of 10 to 15 inches were blown into drifts as high as 10 to 12 feet blocking wagon trails and even railroads. Windchill values were as cold as -10 to -20 degrees F. Similarly, in 1952 a strong winter storm preceded Thanksgiving Day (28th) and brought several inches of snow with blizzard-like conditions. Windchill readings ranged from -10 to -20 degrees F.

Conversely, Thanksgiving of 1988 was remarkably pleasant with afternoon highs reaching the lower 50s F and some families picnicking in city parks. Ten years later on Thanksgiving 1998 golf courses were open on a sunny day with highs again in the 50s F most places.

MPR listener question: Last Saturday there was a tornado watch issued across southern Minnesota and numerous reports of large hail in southwestern counties. Isn't this quite unusual for November?

Answer: Indeed it is. No tornadoes were sighted but there were several reports of hail. According to Todd Krause of the Weather Service there have only been three reported tornadoes during the month of November. They were on the 1st in 2000 near Prinsburg in Kandiyohi County, on the 2nd in 1938 between Nashwauk and Virginia across Itasca and St Louis Counties, and on the 16th (the latest ever in the fall) in 1931 near Maple Plain in Hennepin County. Hail is also very unusual in November, occurring in less than one year out of 10 across Minnesota.

Twin Cities Almanac for November 18th:

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 25 degrees F (plus or minus 10 degrees F standard deviation).

MSP Local Records for November 18th:

MSP weather records for this date include: highest daily maximum temperature of 68 degrees F in 1904 and 1941; lowest daily maximum temperature of 18 degrees F in 1903; lowest daily minimum temperature of -4 degrees F in 1891; highest daily minimum temperature of 53 degrees F in 1953; record precipitation of 0.82 inches in 1981. A record snowfall of 7.6 inches occurred on this date in 1957.

Average dew point for November 18th is 26 degrees F, with a maximum of 56 degrees F in 1941 and a minimum of -2 degrees F in 1989.

All-time state records for November 18th:

The all-time state high temperature for today's date is 75 degrees F at Faribault (Rice County) in 1923 and at St James Watonwan County) in 1888; the all-time state low for today's date is -19 degrees F at Duluth in 1940. The all-time state record precipitation for this

date is 3.10 inches at Hinckley (Pine County) in 1996; and the all-time state record snowfall for this date is 15.0 inches at Crookston (Polk County) in 1998 which closed Hwy 2 between Crookston and Grand Forks and 15 inches at Spring Valley (Fillmore County) in 1886.

Words of the Week: Linke-scale and Munsell colors

The Linke-scale (named for a German scientist F. Linke) is a type of cyanometer (blue-sky scale) comprised of a set of 8 colored cards, each a standard shade of blue. They are numbered evenly 2 through 16, allowing the observer to interpolate odd numbers if the sky color falls between two successive shades of blue. To a degree this is governed by atmospheric turbidity - that is how much water vapor, dust, or aerosols are in the air.

Actually, this time of year we see very little blue sky, since November tends to be our cloudiest month. February in Minnesota is usually the time when the atmosphere is the least turbid, the air is cleanest and therefore the sky may appear a deep blue shade on cloudless days.

Agricultural scientists use Munsell color notation to describe the color of soils and the color of plant tissues. A.H. Munsell developed a system of color notation based on three attributes: hue, value and chroma. These attributes are used by such organizations as the National Bureau of Standards to define color.

There are 10 major hue notations in the natural color spectrum, each referring to the dominant wavelength of the color: Red, Yellow-Red, Yellow, Green-Yellow, Green, Blue-Green, Blue, Purple-Blue, Purple, and Red-Purple. The value notation indicates brightness or the degree of lightness or darkness of a color in relation to a neutral gray scale, with 0 representing black and 10 representing absolute white. The chroma notation indicates the departure of a given hue from a neutral gray of the same value (brightness). It is a measure of the strength of color saturation or purity of the hue.

Soil colors are described by Munsell color notation using standard color charts developed in conjunction with the Soil Conservation Service for the purpose of conducting soil surveys. Soil hues typically range from 10 Red to 10 Yellow-Red to 5 Yellow. Value notation (brightness) for soils can range from 2 (black) to 8 (almost white), while chroma notation (color purity) can range from 0 (gray) to 8 (saturated hue). Soil color is related to the particle size distribution (sand, silt or clay), mineral content including amount of iron oxide, organic matter and moisture among other factors.

Soil colors in Minnesota tend to be Yellow-Red to Yellow in hue, dark with values of 2 to 4 and tending toward gray with chroma of 1 to 4. For example, the Seeleyville Soil Series (no relation) found along streambeds and depressions in Dakota County has

a Munsell color of 10YR 2/1 (hue/value/chroma).

Munsell color charts for plant tissues can be used to quantify differences in color among plant cultivars and to detect plant stress, such as nutrient deficiencies, herbicide injury, insect damage, or drought stress. Colors of plant tissues range across nearly all hues, but leaves typically fall in the Yellow, Green-Yellow, Green, or Blue-Green hues.

Soybeans inoculated with nitrogen fixing Rhizobia show dark green leaves of 7.5GY 5/4, while those without sufficient nitrogen fixing bacteria may be as pale as 5.0Y 7/4 (yellow). Foliage of Colorado blue spruce are dark with a color notation of 2.5B 6/6, while other varieties of spruce are in the 5.0 to 7.5GY 5/2. Healthy field corn shows a color of 7.5GY 4/2, while nitrogen deficient corn or drought stressed corn may be pale and/or bright in the range of 2.5GY 8/8. Potassium deficiency in alfalfa will cause the plant color to change from 7.5GY 5/6 to 5Y 8/8.

(Munsell Color Charts are also used by anthropologists to characterize skin, hair and eye color as well).

Outlook:

Chance of mixed precipitation including rain, freezing drizzle, and light snow on Saturday and Saturday night, followed by a partly cloudy and dry Sunday. Temperatures will be near normal. A chance for light snow in the north Monday, then a generally dry and colder for the remainder of the, including Thanksgiving.

To: MPR's Morning Edition
From: Mark Seeley, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, November 25, 2005

HEADLINES:

- Windy November so far..
- Atlantic Tropical Storm Season Lingers
- Weather and Multiple Sclerosis
- Past Weather for the Thanksgiving to Christmas interval
- Almanac for November 25th
- Manitoba Mauler
- Outlook

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The month has also been mild, averaging several degrees warmer than normal. Shallow lakes are only just now beginning to freeze and soil temperatures have fallen into the low 30s F, some freezing at the surface.

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by those affected with MS in the United Kingdom.

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Answer: Since this is from a Minnetonka listener I assume you mean the Twin Cities area. The coldest and snowiest periods between the Thanksgiving and Christmas holidays were in 1985 and 1983. Thanksgiving was on November 28 in 1985. Between that date and Christmas Day (Dec 25) the mean temperature was 6.5 degrees F with a total snowfall of 24 inches. Thanksgiving was on November 24 in 1983. Between that date and Christmas Day the mean temperature was 6.9 degrees F with a record setting low of -29 F on December 19th, and total snowfall was 33.5 inches.

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Words of the Week: Manitoba Mauler

This is the name given to a particularly intense Alberta Clipper by meteorologist Larry Cosgrove who writes the daily Weather America newsletter. It is an intense closed low that passes over Canada and

entrains the high latitude polar air on the back side, dragging it down across the Great Lakes and producing large quantities of lake-effect snow, gusty winds and cold windchills.

Outlook:

Chance of rain later on Sunday, especially in southern and western areas. Some thunder may be possible too. Cooler with snow most places on Monday and Tuesday. Then cool and dry for the first two days of December.

To: MPR's Morning Edition
From: Mark Seeley, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, December 2, 2005

HEADLINES:

- Preliminary Climate Summary for November
- Will it get windier?
- Early December snows
- winterTIME
- Almanac for December 2nd
- Singing Icebergs
- Outlook

Topic: Preliminary Climate Summary for November

Average temperatures reported around the state for November ranged generally from 3 to 5 degrees F warmer than normal. Temperature extremes were 76 F at Mankato on the 2nd and -14 F at Embarrass on the 26th. During the month Minnesota reported the lowest temperature in the 48 contiguous states on six dates, mostly thanks to Embarrass.

The three consecutive months of above normal temperatures.. September, October, and November...combined to produce a very warm fall season....tied for 6th warmest in the Twin Cities record for example.

Precipitation for the month was above normal for most locations. Some places reported over 3 inches. Snowfall ranged generally from 4 to 8 inches for most communities. Some places in the north received over 10 inches including Duluth with 11.2 inches, Babbitt with 15.7 inches, and Cook with 17 inches. Most of the snow came over the last ten days of the month.

For many communities it was a windy month. Both Redwood Falls and East Grand Forks reported wind speeds over 40 mph on 9 days in November, and Alexandria reported 8 such days. Many areas saw gusts over 50 mph during the month.

Topic: Speaking of wind.....will Minnesota get windier?

The National Weather Service this week announced that it is making a transition in the measurement of wind, going from mechanical cup anemometers to sonic anemometers, instruments that emit sound waves to detect wind speed. The speed of the propagation in the sound wave is a function of the air temperature and wind speed, so measuring the air temperature and the propagation of the sound can lead to a calculation of the wind speed. With no moving parts, sonic anemometers can measure wind speed in shorter increments of time, like every 3 seconds. The older cup anemometers reported a shortest interval of 5 seconds. Though the difference in frequency of measurement will probably not be detectable in the two-minute average wind speed, it

may be appreciable in the gusts or peak wind speed reported, since a three second sampling interval will be used. As a consequence we may see more reports of wind gusts over 40 mph for example.

Topic: Historic snowfalls in early December.....

December 1-3 of 1945 brought a snow storm across central Minnesota counties that delivered from 6 to 11 inches of new snow setting the stage for a White Christmas that year. Similarly, but larger in scale a snow storm brought abundant snowfall to most of the state from November 30 to December 2 of 1985, setting up not only a White Christmas but one of the coldest Decembers in Minnesota history. Storm totals ranged from 10 to 20 inches in most places, topping out at nearly 31 inches in Willmar.

WinterTIME:

Comment to MPR listener: No question will be answered this week, but I want to take TIME to make a comment about winterTIME. No question winter is here and looks like it is going to stay. The rash of bicycle, pedestrian, and vehicular accidents this week reminded me about adjusting for winterTIME. Our concept of time needs to change as winter sets in. Lengthen the time intervals that you have intuitively built-into your everyday habits and tasks. It takes longer to walk places, longer to drive places, longer to dress and undress, longer to warm up the car, longer to degomble (shed snow) when you come into the house. You need to make time to snovel snow, scrape the windshield, clean the furnace filters, When you walk take shorter steps and not too fast...put the boots, gloves and hat on when you go outside....check on the neighbor if their place hasn't been shoveled.. everything should slow down..except for the long Minnesota goodbye.. that is better shortened...just say goodbye, open the door, leave and close the door behind you....no need to stand in an open doorway for minutes conversing about last minute stuff. WinterTIME is an adjustment that may save you anxiety, regret, or even injury.

Twin Cities Almanac for December 2nd:

The average MSP high temperature for this date is 31 degrees F (plus or minus 12 degrees F standard deviation), while the average low is 17 degrees F (plus or minus 14 degrees F standard deviation).

MSP Local Records for December 2nd:

MSP weather records for this date include: highest daily maximum temperature of 63 degrees F in 1982; lowest daily maximum temperature of 1 degrees F in 1927; lowest daily minimum temperature of -13 degrees F in 1940, 1976, and 1985 (-27 F at Ft Snelling in 1822); highest daily minimum temperature of 49 F in 1962; record precipitation of 0.30 inches in 1933. A record snowfall of 2.7 inches occurred on this date in 1978. The snow depth on this date in 1985 was 17 inches.

Average dew point for December 2nd is 19 degrees F, with a maximum of 53 degrees F in 1982 and a minimum of -27 degrees F in 1976.

All-time state records for December 2nd:

The all-time state high temperature for today's date is 69 degrees F at Mankato (Blue Earth County) and St Peter (Nicollet County) in 1998; the all-time state low for today's date is -47 degrees F at Pokegam Dam (Itasca County) in 1896. The all-time state record precipitation for this date is 2.51 inches at Caledonia (Houston County) in 1984; and the all-time state record snowfall for this date is 14.0 inches at Elbow Lake (Grant County) in 1985.

Words of the Week: Singing Icebergs

In the latest edition of Science Magazine, this was the terminology used to describe the seismic (harmonic tremors) signals emitted from icebergs off Antarctica as they drifted in the shallow coastal ocean currents. The authors state that as large icebergs drift in these waters they occasionally collide with the shallow sea floor. This collision sets up an oscillating fluid flow of the free water contained in the tunnels and crevasses of the iceberg. The consequences of the movement from such a large mass of water includes the emission of elastic vibration-based tremor signals picked up by the seismological network in the southern hemisphere. The resulting harmonic pattern is similar to a human voice singing....Uff Dah.

Outlook:

Continued colder than normal with a chance for light snow over the weekend and into Monday and Tuesday. Generally dry after that, but continuing colder than normal until temperatures begin to moderate next Friday. Some areas may receive a few additional inches of snow, as snow cover around the state continues to build.

To: MPR's Morning Edition
From: Mark Seeley, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, December 9, 2005

HEADLINES:

- Recent Minnesota Weather
- Weather Contrasts This Week
- Health Effects of Winter Weather
- Do meteorologists attract tornadoes?
- Weather disaster costs
- Almanac for December 9th
- Tyndall Flowers
- Outlook

Topic: Recent weather....

Light pillars were observed around the Twin Cities last Saturday night. Following nearly an all day snowfall, plate shaped ice crystals remained floating in the atmosphere in very cold temperature conditions and refracted surface light sources in such a way as to send beams of light straight up into the sky. These light pillars were visible from about 8:00 to 10:00 pm along all horizons. Some citizens mistook them for northern lights. They are a very rare sight in our area. They appeared again early Friday morning this week.

The cold air over the weekend hung around and produced a record cold maximum temperature on Monday, December 5th at Rochester, where they reported a high of only 4 degrees F. Both Caledonia and Dodge Center also reported record cold high temperatures on Monday with just 3 degrees F.

Topic: Constrasts this week....

West Yellowstone, Montana reported a new record low of -45 F on December 7th breaking a record from 1927, while Sydney Australia reported a daytime high of 104 F making it a little stressful for holiday shopping.

Topic: Health Effects of Winter Weather

Though many Minnesotans truly enjoy the winter season, it also tests our health. Shorter daylengths and increased cloudiness are contributors to the depression felt by those who suffer from Seasonal Affective Disorder (SAD). Snow shoveling, slippery sidewalks, and treacherous roads test our stamina, sure-footedness, and driving abilities. Contagious flu bugs usually make an appearance and circulate among us. And perhaps the most widely felt effect of winter is the Minnesota desert, the extraordinary low indoor humidities we are exposed to on most winter days. Relative humidity values sometimes fall into the single digits. This is what produces our dry noses, lips, hands, throat and feet, as well as that

annoying static shock we get from touching metal objects.

There are a number of methods to combat the Minnesota desert, including the use of humidifiers, house plants, keeping exhaust from clothes dryers indoors, hanging laundry on drying racks in the basement, not running kitchen or bathroom exhaust fans in order to keep water vapor indoors. I would be interested in hearing if listeners have other methods to keep indoor humidity levels tolerable in the winter.

Topic: Do meteorologists attract tornadoes?

As reported in the current Bulletin of Meteorology by the American Meteorological Society, students of the discipline need not worry about storm chasing, just let the weather come to you. Students at Iowa State University were watching a demonstration of new weather tracking software in a classroom on campus when an F1 tornado touched down and proceeded across campus coming within a block of the building where they class was held. A maximum wind speed of 83 mph was recorded. Tents and portable toilets in the tailgating area of the football stadium were destroyed or damaged, ironically near the sign that says home of the Iowa State Cyclones. Then in September a tornado passed across the campus at Mississippi State University coming within 100 yards of the MSU Climate Lab, which registered a maximum wind of 68 mph. There was considerable damage on campus, though only superficial injuries.

This story reminded me that the on June 14, 1981 an F3 tornado passed within a few hundred yards of our University Climate Observatory on the St Paul Campus, later inflicting serious damage near the Har-Mar Mall in Roseville.

MPR listener question: With Hurricane Epsilon spinning away this week harmlessly in the middle of the North Atlantic, I wonder if you could comment about the damages associated with the North Atlantic hurricane season this year?

Answer: Indeed it was a landmark year, with 26 named storms in the North Atlantic and several very damaging landfall hurricanes along America's Gulf Coast. I don't believe the final economic consequences in terms of insured and uninsured losses, as well as recovery costs have been tallied. What is striking though is that according to National Climatic Data Center reports of all billion dollar or greater weather-related disasters in the United States from 1980 to 2004, a 25 year period, the grand total was approximately \$400 billion. Early estimates of economic losses associated with 2005 alone will likely come close to half of that amount, putting an exclamation point on the vulnerability issue for American society. This point of increasing vulnerability is emphasized in a recent report from the United Nations Environment Program and the insurance industry which states that world economic losses associated with weather during 2005 were the highest ever

Twin Cities Almanac for December 9th:

The average MSP high temperature for this date is 27 degrees F (plus or minus 13 degrees F standard deviation), while the average low is 13 degrees F (plus or minus 13 degrees F standard deviation).

MSP Local Records for December 9th:

MSP weather records for this date include: highest daily maximum temperature of 58 degrees F in 1939; lowest daily maximum temperature of -5 degrees F in 1977; lowest daily minimum temperature of -14 degrees F in 1927, 1977, and 1978; highest daily minimum temperature of 40 F in 1899; record precipitation of 1.19 inches in 1899. A record snowfall of 7.4 inches occurred on this date in 1961. The snow depth on this date in 1950 and 1991 was 15 inches.

Average dew point for December 9th is 11 degrees F, with a maximum of 35 degrees F in 1982 and a minimum of -25 degrees F in 1977.

All-time state records for December 9th:

The all-time state high temperature for today's date is 74 degrees F at Wheaton (Traverse County) in 1939; the all-time state low for today's date is -39 degrees F at Warroad (Roseau County) in 1909. The all-time state record precipitation for this date is 1.31 inches at the old downtown Minneapolis Weather Bureau in 1899. The all-time state record snowfall for this date is 13.0 inches at Brimson (St Louis County) in 1995.

The 74 F temperature reading at Wheaton on this date in 1939 remains the highest temperature ever measured during the month of December in Minnesota. That December was also the warmest in state history, as farmers were still threshing oats the second week of the month.

Words of the Week: Tyndall Flowers (not botanical)

John Tyndall was an English physicist who studied the scattering of sunlight as it passed through smokey air, mist, fog and ice. He noted the effects of the differential radiative absorption and scattering by ice.

A legacy of his work is the name given to small water-filled, polygon shaped cavities which appear in the interior of ice masses bathed in sunlight. These are called Tyndall flowers. They are formed when ice melts by absorbing the sun's radiation at points of defect in the ice lattice. By mid-winter Tyndall flowers may be occasionally seen through clear lake ice on bright sunny winter days in Minnesota.

Outlook:

Warming up over the weekend with daytime temperatures reaching into the 20s F and a chance for light snow both days, primarily in

central and northern locations. Continued near seasonal temperatures early next week and .

To: MPR's Morning Edition
From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, December 16, 2005

HEADLINES:

- Retraction and Correction
- New Seasonal Outlook
- Recent record snows
- Weather Disaster Attribution Discussion
- Extreme December snowfall records
- Almanac for December 16
- What is CAVU?
- Outlook

Topic: Retraction and Correction....

Among items discussed last week were suggestions for improving indoor humidity during the dry winter months in Minnesota. I passed along a suggestion from several decades ago concerning the venting of clothes driers. Several MPR listeners corrected me on this during the past week. There is evidence to suggest that venting the clothes drier indoors is not a good idea. Combustion products and chemicals released by fabric softeners are not good for indoor air quality. Secondly, the added moisture often rapidly condenses on basement walls and contributes to mildew build-up. In general it is not a good idea to vent such air indoors. I stand corrected.

Topic: New Seasonal Climate Outlooks

The Climate Prediction Center (CPC) released a new seasonal outlook on Thursday this week. Because of persistent pressure patterns at high latitude positions in the northern hemisphere, specifically the Arctic Oscillation and the North Atlantic Oscillation our region is expected to have more winter-like temperatures for the period from January through March. This runs counter to earlier outlooks that suggested we would experience a warmer than normal winter. December is already running 4 to 7 degrees F colder than normal.

The CPC precipitation outlook for January through March remains uncertain and therefore states we could have above or below normal levels of precipitation (rain or snow). The December trend so far is snowy.

Topic: White Christmas is all but assured...

Many received record amounts of snowfall this week on December 14th (Wednesday) and 15th (Thursday), including...

- MSP airport 5.0"
- St Cloud 3.7"
- Brimson 14.5"
- Silver Bay 14.8"
- Wolf Ridge (Finland) 12.7"

Two Harbors 7NW 20.8"
Beaver Bay 17"
Rochester 7.1"
Duluth 13.2"
Glencoe 7.5"
Zumbrota 6.0"
Winsted 9.2"

Some of these amounts exceeded the old statewide snowfall record for December 14th of 14.3 inches at Moorhead in 1927. In addition some north shore locations along the Lake Superior snowbelt received nearly continuous snow on both the 14th and 15th accumulating two day totals of 15 to 25 inches.

Topic: Weather Disaster Attribution Commentaries...

The current edition of Science Magazine (Dec 9th) features viewpoints by Roger Pielke Jr (University of Colorado Center for Science and Technology Policy Research) and Evan Mills (Lawrence National Laboratory, Berkeley, CA) concerning the evidence for attributing increased costs associated with weather related disasters. Pielke argues for increased societal vulnerability, while Mills argues for the role of climate change. A mixture of both is a likely answer. Our knowledge is uncertain about the long-term frequency and amplitude character of many weather events and episodes, some apparently changing and some not. At the same time we are doing a much better job of accounting for all the associated economic impacts of each disaster and finding that changing demographics puts more people in harm's way. As a consequence our summations of damages are getting to be large numbers more consistently. It is an interesting article and I encourage you to read it.

MPR listener question: What's the greatest 24-hr snowfall in Minnesota during the month of December? Also, what is the record total snowfall for the month?

Answer: According to the state climate database, Duluth airport received 23.2 inches on December 6, 1950, while the downtown area reported 23.0 inches. This is the greatest 24-hr amount anywhere in the state for the month of December. The all-time highest total snowfall for the month of December is 48.9 inches at Two Harbors in 1996.

Twin Cities Almanac for December 16th:

The average MSP high temperature for this date is 27 degrees F (plus or minus 13 degrees F standard deviation), while the average low is 11 degrees F (plus or minus 13 degrees F standard deviation).

MSP Local Records for December 16th:

MSP weather records for this date include: highest daily maximum temperature of 58 degrees F in 1939; lowest daily maximum

temperature of 0 degrees F in 1963; lowest daily minimum temperature of -20 degrees F in 1963; highest daily minimum temperature of 34 F in 1977; record precipitation of 0.93 inches in 1894. A record snowfall of 4.9 inches occurred on this date in 1940. The snow depth on this date in 1983 was 19 inches.

Average dew point for December 16th is 9 degrees F, with a maximum of 43 degrees F in 1984 and a minimum of -25 degrees F in 1963.

All-time state records for December 16th:

The all-time state high temperature for today's date is 65 degrees F at St Peter (Nicollet County) in 1939; the all-time state low for today's date is -39 degrees F at Pokegama Dam (Itasca County) in 1903. The all-time state record precipitation for this date is 2.57 inches at Gunflint Lake (Cook County) in 1984. The all-time state record snowfall for this date is 14.0 inches at Farmington (Dakota) in 1940.

The state record precipitation for this date is unusual in that Gunflint Lake almost always reports precipitation in the form of snow on this date, yet in 1984 with temperatures in the upper 30s to low 40s F they received 2.57 inches of rainfall.....a terrific amount for the month of December, and one of the highest ever recorded in the state during this month.

Word of the Week: CAVU

This is an old term still used in aviation meteorology to report cloud ceiling and visibility. It indicates that the ceiling is more than 10,000 feet and that visibility is greater than 10 miles. CAVU is really an acronym for the words "ceiling and visibility unlimited or unrestricted." Of course this is a relatively rare condition this time of year in Minnesota.

Outlook:

For the weekend, chance of light snow, but mostly just cold. The cold will continue into early next week. By midweek there will be some moderation in temperatures, perhaps some reaching a few degrees above normal. But, the week overall looks to be relatively dry leading up to Christmas weekend.

To: MPR's Morning Edition
From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, December 23, 2005

HEADLINES:

- Weather stories in 2005
- Snowy streak in the Twin Cities
- Mild temperatures before Christmas
- Almanac for December 23rd
- Congelifraction
- Outlook

Topic: Katrina is the top story of 2005

It was announced this week that Hurricane Katrina was voted the top story of 2005 in the Associated Press annual poll of editors and news directors. Certainly it will go in the record books as the single most costly weather-related disaster in American history in terms of economic consequence. It also exposed a lack of protective infrastructure around the city of New Orleans, an ineffective and slow responding FEMA, and the differential exposure of the poor to such weather events. There were, however, many other noteworthy weather-related news stories during 2005, many right here in Minnesota.

A relatively open early winter in Minnesota caused widespread winter injury to pasture grasses and alfalfa last January. This caused many fields to be replanted in the spring. Meanwhile out in California heavy rains caused a huge mudslide that buried La Conchita, CA on January 10th. Many homes were buried and ten people lost their lives. The event was captured on video and shown on national television.

For the first time in many years a blizzard brought a foot to a foot and a half of snow during the Boys State Basketball Tournament on March 17-18. Kiester in Faribault County was hit with a record 21 inches of snow and many roads were closed.

July 23 brought a scorcher of a day to southwestern Minnesota, with dewpoints in the 80s F and a Heat Index value of 125 degrees F tying the state record. Fortunately it only lasted for a day.

May, June, and July brought heat waves to India, Pakistan, Italy, Spain, and Portugal. Hundreds died from heat related ailments. Spain and Portugal suffered from drought as well.

Summer flooding occurred in parts of China and India causing thousands to flee their homes. There was one report of 8 inches of rain in only 40 minutes over a Chinese village.

August 18th brought a record 27 tornadoes to Wisconsin. One person was killed and over 30 were injured, with scores of homes and farms

damaged.

Torrential rains over many days in October brought severe flooding to many northeastern states, and over the 4th and 5th heavy thunderstorms produced very rare flash floods in east central Minnesota counties, some receiving 5-6 inch rains.

November 6th brought a deadly overnight F3 tornado to Evansville, IN that killed 24 people and caused millions in damages. Over eleven hundred other tornadoes during 2005 only produced 14 deaths, so it was a rather traumatic end to the severe weather season.

The week following Thanksgiving brought a severe ice storm to the eastern Dakotas and parts of Minnesota along the Red River Valley. Many roads were closed and the ice remained on county and township roads for up to two weeks making driving quite hazardous.

Topic: Twin Cities is on a snow streak.....

Greg Spoden of the Minnesota State Climatology Office points out that from November 29th to December 21st the MSP airport reported at least a trace of snowfall on (23 consecutive days), totaling 12.3 inches of snow. There is no historical analogy to this streak except for December 14, 1969 to January 8, 1970, when each day brought at least a trace of snow and total snowfall was 20.2 inches.

MPR listener question: How often is it 40 degrees F or greater just before Christmas in the Twin Cities area? This seems bizarre!

Answer: Since 1891 such conditions have occurred in 23 years, most recently in 2001 when it hit 40 F on December 22nd. The warmest Christmas weeks in the Twin Cities by far were in 1922, 1957, and 1994. In 1922 it was 51 degrees F on Christmas Day, while in 1994 the average daily high temperature from the 22nd to the 25th was 42 degrees F.

Actually the anticipated warmth for the Christmas weekend coming up will help offset all of the cold weather during the first half of the month. December had been averaging from 7 to 9 degrees F colder than normal around the state.

Twin Cities Almanac for December 23rd:

The average MSP high temperature for this date is 26 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 11 degrees F (plus or minus 13 degrees F standard deviation).

MSP Local Records for December 23rd:

MSP weather records for this date include: highest daily maximum temperature of 51 degrees F in 1899; lowest daily maximum temperature of -17 degrees F in 1983; lowest daily minimum temperature of -25 degrees F in 1983; highest daily minimum temperature of 35 F in 1982; record precipitation of 0.53 inches

in 1996. A record snowfall of 3.5 inches occurred on this date in 1914. The snow depth on this date in 1983 was 20 inches.

On this date in 1983 the Twin Cities recorded one of its coldest ever December days with a daily mean temperature of -21 F and a wind chill reading of -55 F.

Average dew point for December 23rd is 12 degrees F, with a maximum of 36 degrees F in 1982 and a minimum of -37 degrees F in 1983.

All-time state records for December 23rd:

The all-time state high temperature for today's date is 62 degrees F at Faribault (Rice County) in 1923; the all-time state low for today's date is -48 degrees F at St Vincent (Kittson County) in 1884. The all-time state record precipitation for this date is 2.10 inches at Cass Lake (Cass County) in 1968. The all-time state record snowfall for this date is 13.0 inches at Isabella (Lake County) in 1959.

Words of the Week: Congelifraction or frost splitting

This term refers to the splitting of rocks as a result of the freezing of the water that is contained within them. A similar process leads to the many potholes we see forming during the winter months, especially when we have many alternating freezing and thawing cycles with abundant snow cover of frequent precipitation.

Outlook:

Chance of mixed precipitation for the weekend, possibly rain, mist, freezing rain, and snow mostly across northern areas. Temperatures will remain warmer than normal with another chance for snow developing by late Tuesday and Wednesday.

To: MPR's Morning Edition
From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk for Friday, December 30, 2005

HEADLINES:

- Preston, MN
- Preliminary December Climate Summary
- Question about the climate of 2005
- Almanac for December 30th
- Bloxam
- Outlook

Topic: Preston, MN

Located in the heart of Fillmore County along the Root River, this community has a reputation for scenery and affords visitors opportunities to fish along the Root River Valley to bike along the miles of paved trails. The Jail House Inn is one of the more famous Bed & Breakfast establishments in the region.

A climate station was established at the municipal power plant there in June of 1952. Since that time daily climate records of temperature and precipitation have been kept. All-time extremes at Preston include:

- 7.30 inches of rainfall on July 11, 1981
- 14.3 inches of snowfall on March 18, 2005
- A high temperature of 101 F on July 14, 1995
- A bone chilling low of -45 F on February 3, 1996

Topic: Preliminary December Climate Summary.....

Despite starting out quite cold and snowy, most communities in Minnesota will report a mean monthly temperature that is above normal for December. In the southern part of the state mean monthly temperatures were closer to the long term average, while in the central and northern counties mean monthly temperatures ranged from 3 to 5 degrees F above normal. Extreme temperatures for the month were 50 F at Canby (Yellow Medicine County) on the 23rd and -21 F at Wild River State Park on the 19th.

Precipitation for the month was mostly in the form of snow and the total liquid equivalent was slightly less than normal for most communities. Two Harbors reported nearly 3 inches while Browns Valley reported over 4 inches, both amounts being over twice the December normal. Snowfall was above normal for most locations, with well over two feet of snow in many northeastern locations and a foot or more in southeastern counties.

MPR listener question: Now that the end of the year is near, how did 2005 rank climatically in the Minnesota records? Wet or dry? Warm or cold?

Answer: 2005 was a warmer than normal year for Minnesota. Most locations report mean annual temperatures that range from 2 to 5 degrees F warmer than average (1971-2000). On a statewide basis 2005 will rank among the warmest 20 since 1895. Despite this signature of warmth, Minnesota reported the coldest temperature in the 48 contiguous states on at least 35 occasions during the year.

2005 was also another wetter than normal year, ranking in the top ten wettest since 1895 with a statewide average precipitation of over 31 inches. There were some dry areas such as the northeastern counties, where a few communities reported total precipitation that was several inches below normal. Conversely, some southern locations reported total precipitation for the year in excess of 40 inches. These included Fairmont, Windom, Spring Valley, and Winnebago among others.

2005 brought plenty of severe weather to the state. A total of 68 tornadoes were reported, most of them F0 or F1 intensity (winds less than 112 mph). This was the 2nd highest annual number behind the 74 tornadoes of 2001. Scores of damaging hail reports were filed as well, including the grapefruit-sized hail stones that fell near Fergus Falls on August 9th and severely damaged a number of vehicles. A number of flash floods occurred during the summer months and even as late as October 4-5 when east-central communities received 5 to 6 inch amounts.

Twin Cities Almanac for December 30th:

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 30th:

MSP weather records for this date include: highest daily maximum temperature of 51 degrees F in 2004; lowest daily maximum temperature of -6 degrees F in 1976; lowest daily minimum temperature of -20 degrees F in 1973; highest daily minimum temperature of 32 F in 1931; record precipitation of 0.35 inches in 1906. A record snowfall of 4.0 inches also occurred on this date in 1906. The snow depth on this date in 1969 was 19 inches.

Average dew point for December 30th is 10 degrees F, with a maximum of 44 degrees F in 1965 and a minimum of -32 degrees F in 1976.

All-time state records for December 30th:

The all-time state high temperature for today's date is 59 degrees F at Canby (Yellow Medicine County) in 1999 and at Morris (Stevens County) in 1931; the all-time state low for today's date is -47 degrees F at Warroad (Roseau County) in 1910. The all-time state record precipitation for this date is 2.0 inches at Pigeon River (Cook County) in 1936. The

all-time state record snowfall for this date is 14.2 inches at Mankato (Blue Earth County) in 1887.

Word of the Week: Bloxam

Named for J.C. Bloxam, this is a smoothing technique used in climatology. Daily values of climate variables such as temperature and precipitation do not always lead to smoothed ascending or descending values as the seasons change. A Bloxam technique employs the use of running mean values such as 9, 10, or 11 consecutive days. This leads to a better representation of the mean value for the middle day of the period than simply computing a mean from single day values over a 30 year period. Variations of the Bloxam technique are still used today for various calculations of climatic means.

Outlook:

Chance for light snow continuing over the weekend and into next week. It will generally be a cloudy period, but with warmer than normal temperatures.