

To: Perry Finelli, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Friday, Jan 12, 2001

Topic: Seasonal Snowfall Accumulation Slowing

Thankfully, the frequency of snowfall has slowed considerably this month over last. Many communities reported that snow removal budgets were depleted rapidly, stocks of salt and sand were running out and roof ice dam damages were building up during December. Both the Twin Cities and Rochester reported over 30 inches of snowfall during December, but have received just 0.5 inches through the first 12 days of January.

Topic: Climate and the Viking Exploration and Settlement Era

Many researchers have contributed to the study of the Viking exploration and settlement across the North Atlantic which took place from about 870 to 1190 AD. During this era, the Vikings explored and established settlements in Iceland, Greenland, and Vinland (perhaps Newfoundland, New Brunswick or even New York). Climatologists have documented that the climate of the North Atlantic was considerably warmer during this era, with a greater absence of sea ice to inhibit ship navigation. Temperatures were significantly warmer at this time across the region and likely analogous to those of the most recent exceptionally warm years of the late 20th Century. Raising crops, operating dairies, and shepherding flocks of sheep and goats were common activities across these Norse settlements, even in Greenland. But the variable climate and fragile soil that was so subject to erosion eventually resulted in failure of the settlements on Greenland during the 14th Century. The exploration and settlement in North America (Vinland) was thought to have been abandoned not so much because of climate, but because of conflicts with the native peoples there. Only some of the settlements in Iceland appear to have survived through the Middle Age and into the modern era, though some of the original Viking settlements and farms have been covered by glacier ice.

Topic: Weather for the Minnesota Viking-New York Giants
NFC Championship Game

Looks like the weather for the big game on Sunday will be somewhat warmer than normal, with cloudy skies, light to moderate southerly winds and temperatures in the 40s F. There will be a chance for rain later in the day on Sunday. No precipitation is expected between now and game time so the field should stay relatively dry and hopefully good for footing.

Topic: Florida Hurting

Though the political headlines have simmered down from Florida, the weather headlines have not. Drought continues to be severe in the state and has combined with unseasonably cold temperatures recently. Earlier this week temperatures dipped to near record-setting lows at Tallahassee with 19 degrees F, at Gainesville with 23 degrees F, at West Palm Beach with 39 degrees F and at Ft Meyers with 36 degrees F. Interestingly enough, parts of Russia were warmer than Florida this week. The cold snap has kept some veterinarians quite busy treating manatees (sea cows) and pelicans for frostbite.

Drought conditions have not improved in many parts of the state and hydrological impacts have worsened with abnormally low streamflow, lake and groundwater levels. Many communities have imposed water restrictions. As of the end of December, the level of Lake Okeechobee was reported to be the 2nd lowest ever for this time of winter.

The risk of wildfires continues to be a major concern in Florida. Drought stressed dry brush and grass easily ignites and burns in the lower than normal humidity. Over 250 fires were reported in the first week of January. The Miami Herald reported that it was the worst start to the winter fire season since 1981. Many cities in southwest Florida and surrounding areas haven't had a drier year going back over 75 years.

MPR listener question: What are the record extremes of temperature in the month of January?

Answer: Only two winters have produced January temperatures in the mid to high 60s F, 1944 and 1981. The all-time record high was on January 24, 1981 when Montevideo (Chippewa County) reached 69 degrees F. On the cold side, six winters have produced January minimum temperature values of -50 degrees F or colder. In chronological order they were 1899, 1904, 1909, 1912, 1972, and 1996. The all-time coldest temperature was -57 degrees F on January 24, 1904 at Pokegama Dam, and January 20-21, 1996 at Embarrass and Tower.

Almanac:

Average Twin Cities maximum temperature for today's date is 22 F (plus or minus 12 degrees standard deviation) and the average minimum is 5 F (plus or minus 14 degrees standard deviation).

MSP records for today's date include: highest maximum temperature of 48 degrees F in 1987; lowest maximum temperature of -13 degrees F in 1912; lowest minimum temperature of -31 degrees F in 1912; highest minimum temperature of 36 degrees F in 1928; record precipitation of 0.70 inches in 1935; and record snowfall of 8.7 inches in 2000 (last year). The maximum snow depth on this date is 18 inches back in 1984. The coldest windchill conditions occurred in 1916 when readings of -84 F were recorded. There have been 40 measurable snowfalls on this date since 1891, the most recent of which was the record-setting 8.7 inches last year (2000).

Average dewpoint temperature for today is 6 degrees F. The highest dewpoint on this date is 35 degrees F, while the lowest is -38 degrees F.

Scanning the state climatic data base: the all-time high for today's date is 58 degrees F at Browns Valley and Wheaton in 1987; the all-time low is -53 degrees F at Pine River Dam (Crow Wing County) in 1912.

This date in 1912 also brought a temperature of -47 degrees F to Washta IA, a record state low.

Word of the Week: Haar

Originally a Scottish term, this word is for listeners who really like to play Scrabble. Haar refers to a cold, fine drizzle or cooling sea fog which blows in from the North Sea in northeast England or eastern Scotland. It occurs most frequently in the summer but can occur in other seasons as well. It is somewhat analogous to the fog or mist that sometimes blows into NE Minnesota off Lake Superior.

Outlook:

Snow likely over the weekend, with the best chance on Sunday into Monday, and particularly in southern counties. Temperatures will be warmer than normal, cooling by Tuesday and Wednesday but still averaging above normal for the week. Another chance for snow by Thursday and again next weekend.

To: Perry Finelli, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Friday, Jan 19, 2001

Topic: January not exactly what we expected

Following one of the coldest Decembers ever across the nation's midsection, the Climate Prediction Center forecasted colder than normal temperatures for the upper midwest and Great Lakes region during January. Just to be contrary, Mother Nature has given us temperatures so far this month that are averaging over 10 degrees F warmer than normal. In fact, despite a few cold spells, it looks like the entire month will average considerably above normal.

Topic: New Climate Outlooks for February through April

The new outlooks from the Climate Prediction Center in Washington, D.C. suggest near normal temperatures and precipitation will prevail for the February through April period across most of Minnesota and Iowa.

Topic: Inauguration Weather: Bring your umbrella

Weather in Washington D.C. for Saturday's inauguration of President-Elect George W. Bush looks unsettled at best. The National Weather Service is calling for a 100 percent chance of rain, sleet or snow with cooler than normal afternoon temperatures in the mid 30s F. There may be some blustery northeast winds as well. A large area of low pressure will be bringing plenty of clouds and rain to the east coast for much of the weekend and not clearing out until later on Sunday.

Other inaugurations having certainly been plagued by the weather.

Early Presidential Inaugurations from 1789 to 1813 took place indoors in the spring, almost invariably March 4th. Then in 1817 for the first inauguration of James Monroe they moved outside and were greeted with warmth (about 50 degrees F) and sunny skies. But Monroe's second inauguration four years later had to be moved indoors because of persistent snow. Other March snows occurred on the inaugurations of Presidents Zachary Taylor (1849), Franklin Pierce (1853), Rutherford Hayes (1877), Grover Cleveland (2nd term 1893)), and William Howard Taft (1909). Since the change to a January 20th inaugural in 1937, it has snowed on three inaugurations: lightly in the morning for FDR's final one in 1945, flurries during Dwight Eisenhower's second inaugural in 1957 and quite heavily (8 inch total accumulation) on JFK's in 1961.

Other notable inaugurations were:

Coldest March Inauguration was in 1873 when people watched Grant take office in -15 degrees F windchill conditions

Coldest January Inaugural was in 1985 when the parade was cancelled and the ceremony was moved indoors for President Reagan. Noon temperature was just 7 degrees F with a windchill of -20 F.

Snowiest Inaugural was for William Howard Taft in 1909 when the total snowfall was nearly 10 inches.

Wettest Inaugural was for FDR in 1937 when 1.77 inches of rain fell.

Most tragic was the inaugural of William Henry Harrison in 1841. It was cold and blustery, but he refused to wear heavy clothing during the parade and ceremony. Further, his speech lasted 1 hour and 40 minutes. He caught a cold, which eventually turned into pneumonia. He died just one month into office.

Similarly in 1853 for the inaugural of President Franklin Pierce, the weather was cold and snowy, ruining plans for the parade. They nevertheless conducted the swearing in ceremony outdoors. Outgoing President Fillmore's wife, Abigail sat patiently through the entire ceremony, catching a nasty cold, which later turned into pneumonia, causing her death one month later.

Other weather-related discussions of past inaugurals can be found at a special National Weather Service web site....

http://www.nws.noaa.gov/er/lwx/Historic_Events/Inauguration/Inauguration.html

MPR listener question: How do the average temperatures in Alaska compare to those of the Twin Cities?

Answer: The answer depends on which part of Alaska you compare. See the table below to compare Fairbanks, Anchorage and the Twin Cities average monthly temperatures.

The Alaska interior, as represented by Fairbanks is consistently much colder, ranging from 30 degrees F cooler in November to 9 degrees F cooler in May. Anchorage, located on the top of the Cook Inlet off the Gulf of Alaska is a coastal climate. It is generally colder than the Twin Cities, except for the middle of winter, when snow cover and dry high pressure systems keep Minnesota temperatures somewhat colder, while the Gulf of Alaska and Cook Inlet waters moderate the temperature of Anchorage. We also experience higher temperature variability during winter than Anchorage does.

Average Monthly Temperatures (F)

Anchorage, AK

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
15	19	23	36	47	53	58	56	48	35	21	17

Fairbanks, AK

-9	-4	9	31	50	59	62	57	45	25	3	-6
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Minneapolis-St Paul, MN

12	18	31	46	59	68	74	71	61	49	33	18
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Almanac:

Average Twin Cities maximum temperature for today's date is 23 F (plus or minus 14 degrees standard deviation) and the average minimum is 5 F (plus or minus 14 degrees standard deviation).

Sunday, the 21st is an anniversary of sorts. On that date in 1888 a low temperature of -52 degrees F was reported at Delano in Wright County. This is perhaps the lowest temperature ever measured so near the Twin Cities area.

MSP records for today's date include: highest maximum temperature of 49 degrees F in 1921; lowest maximum temperature of -10 degrees F in 1943; lowest minimum temperature of degrees -34 degrees F in 1970; highest minimum temperature of 36 degrees F in 1908; record precipitation of 0.57 inches in 1988; and record snowfall of of 7.5 inches also in 1988. The maximum snow depth on this date is 22 inches back in 1967. The coldest windchill conditions occurred in 1985 when readings of -79 F were recorded. There have been 26 measurable snowfalls on this date since 1891, the most recent of which was 5.5 inches last year (2000).

Average dewpoint temperature for today is 4 degrees F. The highest dewpoint on this date is 34 degrees F, while the lowest is -41 degrees F.

Scanning the state climatic data base: the all-time high for today's date is 61 degrees F at Milan (Chippewa County) in 1900; the all-time low is -47 degrees F at Pokegama Dam in 1937, at Bigfork in 1963, and at Brainerd in 1994.

Words of the Week: Cooking snow

Sometimes referred to as water snow, this is a dense snow which when melted yields a higher than normal water content, much like some of the snowfall earlier this month which left so much ice on the surface. Cooking snow may yield as much as a third to a half inch of water for every inch of snow. During the winter in pioneer times, water was harvested from cooking snow, often collected in kettles or buckets and brought inside to be boiled. It was then used for food preparation and drinking.

Outlook:

Dry and cold Saturday, but warming on Sunday and continuing into next week. Much of next week should see above normal temperatures. There will be a chance for snow Tuesday and again towards next weekend.

To: Perry Finelli, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Friday, Jan 26, 2001

Topic: There's something about February

As February approaches next week, those who plan traditional outdoor winter activities, such as the St Paul Winter Carnival, cross country skiing competitions, or ice fishing contests must be wondering if the weather trend of recent years will disrupt their plans. Eight of the most recent eleven Februarys have brought a dominance of above normal temperatures....the most pronounced warming trend of any month of the year. In fact the last three Februarys have averaged nearly 11.5 degrees F warmer than normal.

Lo and behold, the National Weather Service is calling for temperatures to average above normal over the midwest during the first week of February.

Topic: Anniversary of a cold early American winter

Tuesday, January 23rd was the 221st anniversary of perhaps the coldest day during the American Revolutionary War. A temperature of -16 degrees F below zero was registered in New York City. The New York harbor was frozen over, as were all ports along the east coast as far south as North Carolina. The persistent winter cold produced ice so thick that British soldiers could haul cannons from Manhattan across the ice to Staten Island. In fact, Washington ordered Major General Stirling to take 3000 revolutionary soldiers across the ice and attack the British on Staten Island, but they had to turn back because of foul weather. Of course, this type of January was perhaps more typical back then, as the Little Ice Age (an extended period of cold in the northern hemisphere from 1400 to 1850 AD) was in full swing.

Topic: North American winters affected by Siberian snow cover

A recent study suggests that winter temperatures in North America and Europe may be affected by the amount of early fall snow that covers Siberia, at least in the absence of any El Nino or La Nina effects. Researchers examined the severity of northern hemisphere winters from 1972 to 1999 and assessed the relationship to Siberian snow cover, along with pressure patterns in the polar latitudes (called the Arctic Oscillation) and in the North Atlantic (called the North Atlantic Oscillation). Their findings indicate that the more widespread the amount of snow cover in Siberia during the fall, the greater the chance of cold air domination in the winter over parts of North America and Europe. Indeed, this was the case for this winter, as Siberia recorded a very cold and snowy October, November and December. It continues to be cold there still, with

readings of -50 to -70 degrees F and an energy shortage for home heating as well.

MPR listener question: What's the average February snowfall in the Twin Cities area and what has been the greatest amount?

Answer: The historical average Twin Cities February snowfall is just under 8 inches (taken from 115 years of data). The all-time greatest for the month was in 1962 when 26.5 inches fell.

Almanac:

Average Twin Cities maximum temperature for today's date is 20 F (plus or minus 14 degrees standard deviation) and the average minimum is 2 F (plus or minus 16 degrees standard deviation).

MSP records for today's date include: highest maximum temperature of 52 degrees F in 1931; lowest maximum temperature of -9 degrees F in 1904; lowest minimum temperature of degrees -26 degrees F in 1897; highest minimum temperature of 35 degrees F in 1911; record precipitation of 0.37 inches in 1910 and 1916; and record snowfall of 3.4 inches also in 1910. The maximum snow depth on this date is 24 inches back in 1982. The coldest windchill conditions occurred in 1925 when readings of -65 to -70 F were recorded. There have been 32 measurable snowfalls on this date since 1891, the most recent of which was 1.6 inches in 1996.

Average dewpoint temperature for today is 0 degrees F. The highest dewpoint on this date is 36 degrees F, while the lowest is -41 degrees F.

Scanning the state climatic data base: the all-time high for today's date is 63 degrees F at Winnebago (Faribault County) in 1944; the all-time low is -55 degrees F at Pokegama Dam in 1904.

Words of the Week: Cat Connotations

Most people have heard of the term "raining cats and dogs", which has been in use for centuries. 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 scale 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 cat paw prints.

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 cold cat's nose.

Outlook:

Mostly dry over the weekend with nearly seasonal normal temperatures.
Warming trend beginning on Sunday, with a chance for snow on
Monday, Tuesday and Wednesday, then again toward next weekend.
Temperatures will finish out January warmer than normal.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Friday, Feb 2, 2001

Topic: Groundhog Day

Today, February 2nd, marks another Groundhog Day or Candlemas Day, the half way point of winter, and in 1996 the coldest day in Minnesota history, setting a state record of -60 degrees F at Tower, MN.

Popularized by German communities in Pennsylvania, Ground-Hog Day festivals have flourished on the premise that this hibernating animal can predict the weather. When the groundhog or woodchuck emerges from its burrow on February 2nd, it may be frightened by its shadow (if it is a bright clear day) and retreat back into its burrow for another six weeks. If it is cloudy and dull, no shadow can be projected, so the ground hog stays out for a while indicating that spring is just around the corner.

In Roman times, this date was known as the Feast of the Purification of the Virgin Mary or the time according to Luke in the New Testament when the Presentation of Christ in the Temple took place. Later in pre-Reformation England it became Candlemas Day, the half way point of winter, when a church's annual stock of candles for the altar and other sacred uses was blessed. For centuries then, there were public ceremonies on this date and folklore evolved out of the historical observations of the weather.

"If Candlemas Day be fair and bright
Winter will have another fight;
But if Candlemas Day be clouds and rain
Winter is gone, and will not come again."

Down through the centuries in Europe, Canada and the United States the behavior of hibernating animals (badgers, bears, woodchucks, etc) has been observed and associated with the weather that follows this date.

Historical frequencies of weather conditions, primarily cloud cover on Groundhog Day or Candlemas Day suggest that most of the time, between 70 and 80 percent, an animal will cast a shadow on this date in Minnesota and thus forecast for us a continuation of winter weather. Indeed, locally in the Twin Cities, the high temperature on February 2nd has been above the freezing mark (32 degrees F) only about 20 percent of the time. This year, the groundhog's burrow may well still be blocked by accumulated ice from the storm on Monday and Tuesday of this week!

Incidentally, a good Internet web site for historical information about Groundhog Day is

<http://www.groundhogsdays.com/links.html>

Topic: Preliminary January Climate Summary

Following one of the coldest ever Decembers, January temperature departures unexpectedly went in the opposite direction. Many observers report an average January temperature that is 6 to 12 degrees warmer than normal, with the largest departures in northern counties. Both International Falls and Roseau in northern Minnesota report that January of 2001 was one of the warmest in the climatological records. For most other areas of the state it was the warmest January since 1992. Extreme temperatures for the month ranged from 46 degrees F at Canby to -27 degrees F at Fosston. After reporting the nation's low temperature 15 times during the month of December, our state reported the nation's low only three times in January.

January precipitation was generally less than normal in the northern portions of the state and above normal elsewhere, ranging from a low of .15 inches at Crookston (Polk County) to a high of 1.91 inches at Preston (Fillmore County). For Preston it was the 5th wettest January in their historical records. Most of the January precipitation occurred in the ice, sleet, and snow storm which passed over the state on the 29th and 30th. Many communities reported new daily record amounts of precipitation on those dates, including.....

Twin Cities 0.52"	St Cloud 0.48"	Waseca 0.62"
Browns Valley 1.10"	Lakefield 0.82"	Albert Lea 1.02"
Fairmont 0.80"	Faribault 0.84"	Winnebago 1.01"
Brainerd 0.84"	Morris 0.86"	Caledonia 0.71"
La Crescent 0.78"	Rosemount 0.82"	Preston 0.72"

Forest Lake reported the most at 1.20 inches of ice, sleet and snow.

Topic: Cover Story in U.S. News and World Report

The recent issue of U.S. News and World Report (Jan 15) contains a cover story about global climate warming. It reports a widespread consensus among scientists regarding observed increases in global temperature, particularly in the decade of the 1990s and particularly in the northern hemisphere. However, it leaves the reader with the impression that there is an equally significant consensus among scientists concerning some implications of global warming. One feature that is still open to much debate and uncertainty is the attribution of extreme weather events and episodes. Attributing a tornado, hurricane, flood, or drought to global warming remains an exercise in speculation, something most scientists still choose to avoid.

MPR listener question: The windchill conditions around the state

on Thursday of this week were brutal, -60 degrees F and colder. What have been the worst ever windchill conditions in Minnesota during the month of February?

Answer: This question is hard to answer because climatological records of wind speed are pretty scarce in Minnesota. Probably the worst conditions for which measurements are available occurred on February 1st 1996 when many locations in western Minnesota (including Fergus Falls, Morris, and Thief River Falls) reported windchill values of -90 degrees F.

Almanac:

Average Twin Cities maximum temperature for today's date is 21 F (plus or minus 13 degrees standard deviation) and the average minimum is 3 F (plus or minus 15 degrees standard deviation).

MSP records for today's date include: highest maximum temperature of 48 degrees F in 1991; lowest maximum temperature of -14 degrees F in 1917; lowest minimum temperature of degrees -28 degrees F in 1965; highest minimum temperature of 30 degrees F in 1935; record precipitation of 0.80 inches in 1919 and 1983; and record snowfall of 6.2 inches also in 1983. The maximum snow depth on this date is 22 inches back in 1969. The coldest windchill conditions occurred in 1917, 1923, and 1996 when readings of -70 to -75 F were recorded. There have been 32 measurable snowfalls on this date since 1891, the most recent of which was 0.2 inches in 1994.

Average dewpoint temperature for today is 3 degrees F. The highest dewpoint on this date is 34 degrees F, while the lowest is -33 degrees F.

Scanning the state climatic data base: the all-time high for today's date is 66 degrees F at Wheaton (Traverse County) in 1991; the all-time low is -51 degrees F at Pokegama Dam in 1905.

Words of the Week: Robin Hood's wind

A wind which robs the body of heat is referred to by this name. It is a raw and penetrating wind, often occurring in air that is near saturation and air temperature around the freezing point.

Outlook:

A warming trend will start this weekend, but it will bring more clouds and a chance for snowfall, especially in northern counties. Temperatures during the first full week of February will average warmer than normal, but a series of low pressure systems will bring numerous chances for snowfall during the week and perhaps a bigger storm towards next weekend.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Friday, Feb 9, 2001

Topic: Snowy February

Record snowfalls of 6 inches occurred in Northfield, Canby, and Granite Falls on Wednesday (Feb 7) of this week. A record snowfall of 5.0 inches was also recorded at Chanhassen, breaking the old Twin Cities snowfall record for February 7th of 3.0 inches set in 1892, 1904, and 1932.

Then, more record snowfalls occurred in northern areas on Thursday (Feb 8) as a second weather system passed over the region. Aitkin reported a record 12 inches, Brainerd a record 7.5 inches, and Moose Lake a record 5 inches.

February is not normally considered a snowy month. Locally, the Twin Cities has averaged 7.7 inches of snowfall each February for the past 115 years, a figure that is less than that of December (8.4 in), January (10.1 in) or March (9.4 in). Relatively heavy snowfalls are somewhat uncommon in February compared to these other months as well. The list below shows the number of 24-hr snowfalls totaling 6 inches or more in the last 50 years by month:

November 11 times December 16 times January 22 times
February 6 times and March 19 times

In addition the snowiest ever February was in 1962 with a total of 26.5 inches. In that particular February there were three snowfalls of 5 inches or more with 7 days. Even with the fewer number of days in February the extreme value is far from that for the other winter months: November 46.9 inches in 1991, December 33.2 inches in 1969, January 46.4 inches in 1982, and March 40 inches in 1951.

The last time we recorded consecutive February days with significant snowfalls (2 inches or greater) was the 15th and 16th in 1990.

Topic: Cold Anniversary for the Mississippi River Basin

Today is the anniversary of two arctic cold outbreaks which produced some rather striking effects on the mighty Mississippi River. On this date in 1835 and again in 1899 the river was frozen enough for skating and sledding in St Louis, and ice floes were observed as far south as New Orleans. In fact on February 9, 1899 parts of Louisiana recorded their all-time coldest temperatures with 7 degrees F at New Orleans and -4 degrees F at Shreveport.

MPR listener question: How much water is contained in the snow cover around the state and does this present a spring flood

threat?

Answer: The State Climatology Office estimates that many areas have 2 to 3 inches of liquid water stored in the snow pack. Snow depths typically range from 5 to 16 inches in most places. This by itself does not present a serious spring flood threat, but if we continue to have a snowy February, and perhaps a snowy March, then we could be looking at a more serious threat in April when we typically get prolonged thawing periods. Several other factors come into play when assessing the threat of a spring snow-melt flood in Minnesota, including stored soil moisture, depth of ground frost, spring precipitation, and how rapid the snow cover melts. Back in the flood of 1997, many parts of the Minnesota landscape had over 5 inches of water stored in the snow cover.

Almanac:

Average Twin Cities maximum temperature for today's date is 23 F (plus or minus 13 degrees standard deviation) and the average minimum is 5 F (plus or minus 15 degrees standard deviation).

MSP records for today's date include: highest maximum temperature of 52 degrees F in 1966; lowest maximum temperature of -16 degrees F in 1899; lowest minimum temperature of degrees -33 degrees F in 1899; highest minimum temperature of 34 degrees F in 1966; record precipitation of 0.92 inches in 1965 (a spring flood year); and record snowfall of 9.3 inches also in 1909. The maximum snow depth on this date is 21 inches in 1967. The coldest windchill conditions occurred in 1933 when readings of -70 to -75 F were recorded. There have been 21 measurable snowfalls on this date since 1891, the most recent of which was 0.4 inches in 1995.

Average dewpoint temperature for today is 6 degrees F. The highest dewpoint on this date is 46 degrees F, while the lowest is -35 degrees F.

Scanning the state climatic data base: the all-time high for today's date is 63 degrees F at Canby (Yellow Medicine County) in 1991; the all-time low is -59 degrees F at Leech Lake Dam (Cass County) in 1899.

Words of the Week: Ram Penetrometer

This is a cone-tipped metal rod designed to be driven into deposits of snow and ice. The measured force required to drive the rod to a given depth into the snow or ice pack is an indication of the physical properties, primarily density. This is not used much anymore, as most observers take core samples and melt them down to get the water equivalence of the snow or ice pack.

Outlook:

Relatively cold on Saturday around the state, with temperatures well

below normal. Increasing cloudiness on Sunday with a chance for more snow, lingering into Monday. The weekend temperatures will be several degrees colder than normal, but a warming trend will start on Monday and carry through much of next week bringing temperatures back to normal or above. Chance for more snow in the north by Thursday.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Friday, Feb 16, 2001

Topic: New Monthly and Seasonal Climate Outlooks

The Climate Prediction Center released the new monthly and seasonal outlooks on Thursday of this week. Perhaps the most significant feature is cooler than normal temperatures in the Great Lakes states (including Minnesota) during March then moderating near normal for April and May. The outlook also favors above normal precipitation for the spring months of March, April and May. This may contribute to high river flows and large volumes of snowmelt runoff this spring across Minnesota.

Topic: A Hazy February

Normally February is a month that brings sunny skies and relatively little cloud cover. In fact the transmission of the sun's energy through the atmosphere is often higher in February than any other month (something called atmospheric transmissivity). This month has not been a normal one however. Fog, haze and smoke have been reported with high frequency around the state, with over 75 percent of the days so far in the Twin Cities and International Falls having had some reduced degree of visibility. As the sun climbs higher in the sky and stays out longer this month, it would be nice to see it a little more frequently.

Topic: February continues snowy

Huron, SD reports their greatest February snow depth ever with 30 inches on the ground. This is also the second snowiest season in their history with 72 inches so far.

On February 9th (last Friday) some snowfall records were set in the Arrowhead region of Minnesota. Wolf Ridge near Finland reported a record 7.5 inches of snowfall, as did Hibbing with 7.5 inches also. Babbitt with 9.2 inches, Embarrass with 6 inches, Cotton with 9 inches, and Brimson with 6 inches also claimed new record snowfalls for the date. Following the snowfall, Embarrass reported the nation's low last weekend with -39 degrees F.

Still more snowfall records occurred on Monday of this week (Feb 12) across the central portion of the state. New record snowfalls were reported at Alexandria with 6 inches, Long Prairie with 6 inches, Little Falls with 5 inches, Morris with 4 inches, and Brainerd with 4 inches.

February temperatures are averaging below normal across the

state. Much like earlier this winter in December, Minnesota is leading all regions of the country in February cold, having reported the nation's lowest temperature seven times already this month, most recently with -24 degrees F at Hibbing on Thursday of this week.

MPR listener question: I have heard you say that climate "normals" or averages are based on the most recent three complete decades of data. Does this mean that new normals for Minnesota will be based on the 1971 to 2000 period? When will this happen?

Answer: Yes indeed, standards recommended by the World Meteorological Organization will cause all countries to make a shift in their frame of reference for what is "normal." The old frame of reference, 1961-1990 will be discarded for the new one, 1971-1990 during this year. This has interesting implications for Minnesota, because the decade of the 1990s was the wettest of the 20th Century. So the new "normals" for Minnesota will show that average annual precipitation has increased.

Almanac:

Average Twin Cities maximum temperature for today's date is 26 F (plus or minus 13 degrees standard deviation) and the average minimum is 9 F (plus or minus 15 degrees standard deviation).

MSP records for today's date include: highest maximum temperature of 60 degrees F in 1981; lowest maximum temperature of -11 degrees F in 1903; lowest minimum temperature of degrees -26 degrees F in 1936; highest minimum temperature of 36 degrees F in 1899; record precipitation of 0.32 inches in 1932 and 1938; and record snowfall of 3.2 inches also in 1938. The maximum snow depth on this date is 26 inches in 1967. The coldest windchill conditions occurred in 1910 when readings of -50 to -55 F were recorded. There have been 22 measurable snowfalls on this date since 1891, the most recent of which was 0.2 inches in 1999.

Average dewpoint temperature for today is 11 degrees F. The highest dewpoint on this date is 38 degrees F, while the lowest is -29 degrees F.

Scanning the state climatic data base: the all-time high for today's date is 67 degrees F at Canby (Yellow Medicine County) in 1981; the all-time low is -52 degrees F at Baudette (Lake of the Woods County) in 1966.

Word of the Week: Kaavie

This is a Scottish term for a heavy, wet snow, much like the type we have been experiencing this month in Minnesota. These types of snows are more typical of March as well.

Outlook:

Generally cooler than normal temperatures for the weekend, with a chance of light snow Sunday night into Monday. A warming trend will start on Sunday and Monday as temperatures return to the 20s and 30s F. But temperatures will plummet again later in the week, as February continues average colder than normal.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Friday, Feb 23, 2001

Topic: Pothole Prognostications

In a typical winter there are several long periods when the temperature never rises above 32 degrees F. Even in the heat island of the Twin Cities area, the average number of days each winter when the temperature remains below 32 degrees F is about 80. Thanks to a colder than normal November, December, and February, so far this winter we have recorded 82 such days in the metro area, and it is only February 23rd.

Highly fluctuating temperatures either side of the freezing mark combined with moisture conditions are the chief climatic adversaries of paved roads. Asphalt is more subject to cracking as a result of moisture penetration in the presence of freeze-thaw cycles and thermal expansion and contraction caused by diurnal temperature fluctuations and variations in daily solar radiation. Of these climate features, the most consistent this winter has been the snow cover. Abundant solar radiation with daily temperature fluctuations either side of the freezing mark have been relatively absent this winter, except for a few brief periods in January.

With increasing daylength, higher sun angles, and an expected warming trend next week, it is likely that conditions will increasingly promote pavement cracks and potholes. So be warned that the worst of the pothole season is yet ahead of us as we enter the month of March next week.

MPR listener question: This month seems to be unusually cold around the state. Will it rank as one of the coldest Februarys?

Answer: Indeed, a trend of warm February temperatures in recent years has been broken this time around as temperatures so far this month are averaging from 5 to 7 degrees colder than normal. Locally in the Twin Cities, it is the coldest February since 1989, averaging under 12 degrees F (over 8 degrees F colder than January was!). This February will probably rank in the coldest 20 percent of the past 110 years, both on a statewide basis and for the Twin Cities area. The coldest February of the 20th Century was 1936 when the statewide average temperature was -6.5 F and the Twin Cities averaged 0 F. The coldest February in the old pioneer records was 1875, when the average temperature in St Paul was -2.4 degrees F, due in part to 16 consecutive mornings with below zero temperatures.

Almanac:

Average Twin Cities maximum temperature for today's date is 30 F

(plus or minus 12 degrees standard deviation) and the average minimum is 13 F (plus or minus 13 degrees standard deviation).

MSP records for today's date include: highest maximum temperature of 59 degrees F in 1958; lowest maximum temperature of 2 degrees F in 1910; lowest minimum temperature of degrees -18 degrees F in 1910; highest minimum temperature of 40 degrees F in 1931; record precipitation of 0.63 inches in 1909 and 1977; and record snowfall of 6.0 inches in 1922. The maximum snow depth on this date is 27 inches in 1967. The coldest windchill conditions occurred in 1910 when readings of -50 to -55 F were recorded. There have been 25 measurable snowfalls on this date since 1891, the most recent of which was 1.1 inches in 1994.

Average dewpoint temperature for today is 15 degrees F. The highest dewpoint on this date is 37 degrees F, while the lowest is -23 degrees F.

Scanning the state climatic data base: the all-time high for today's date is 66 degrees F at Luverne (Rock County) in 1958; the all-time low is -44 degrees F at Pine River Dam (Crow Wing County) in 1889.

Word of the Week: Sastrugi

This is actually a Russian term which refers to the wave-like sharp ridges of hard snow that are characteristic of the wind swept flat prairie and polar plains regions, where prevailing winds may chiefly come from one direction for long periods in the winter. Sastrugi are also called wind ridges and are oriented perpendicular to the prevailing wind with a gentle slope to the windward and a steep slope to the leeward. Large sastrugi have been observed on glaciers and ice sheets of Greenland and Antarctica (I'm sure Ann Bancroft and Live Arnesen observed these in their recent trek across Antarctica), but they can be found in the prairie landscapes of the Dakotas and western Minnesota, as well as other highly exposed landscapes. Being of higher density, they are usually the last snow features to melt off in the spring.

Outlook:

A significant winter storm will bring snow, rain, sleet, and perhaps freezing rain to the region this weekend. It will also be quite windy at times. There will be a chance for more snowfall on Tuesday and Wednesday of next week, closing the door on what will be for most recorded as a snowy February. On a more positive note, temperatures will warm into the 20s and 30s F for the first few days of March.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Friday, Mar 2, 2001

Topic: Roman and Anglo-Saxon Names for March

The name for this month, March was given by the Romans after the war god Mars, who was originally a god of vegetation and protector of the fields. The month of March usually marked the end of winter when the Roman war campaigns could begin again. Roman festivals to celebrate the god Mars were held in the month of March.

The Germanic or Anglo-Saxon peoples used different names for the month of March which were meteorological in origin. At various times it was called the Hreth monath, meaning the fierce month, the Hlyd monath, meaning the loud or stormy month the Hlyda, meaning the noisy month of wind and rain, and lastly the Lencten monath, meaning the month of lengthening days. I give the Anglo-Saxons an A grade in meteorology, for these names certainly captured the major weather features of the month of March (as we know it in the northern mid latitudes).

Topic: Easy to Kiss February Goodbye

Most people were thankful to see February come to an end. It was the coldest and snowiest since February of 1989. Most observers reported an average temperature for the month that was 6 to 10 degrees F colder than normal. Extremes for the month ranged from 42 degrees F at Preston in southeastern Minnesota to -39 degrees F at Embarrass in north-central Minnesota (twice). In fact, Minnesota reported the nation's lowest temperature on ten days during the month. This February will rank as the 15th coldest statewide since 1895.

Abundant precipitation was also evident throughout the state during February, in the form of both rain and snowfall. On a statewide basis it will likely rank among the ten wettest Februarys since 1895. Many observers reported over twice to three times the normal precipitation for the month. For some February ranked among the wettest in history.....

Location	February Precipitation	Historical Rank
Moose Lake	2.66 inches	wettest ever
Staples	2.95 inches	wettest ever
Rosemount	2.07 inches	2nd wettest
Brainerd	1.83 inches	2nd wettest
Grand Rapids	1.73 inches	3rd wettest
Morris	1.65 inches	4th wettest
Milaca	2.16 inches	5th wettest
Waseca	2.45 inches	5th wettest

In addition, snowfall was abundant during the month in many places, with record snowfalls on the weekend of the 24th and 25th (up to two feet in the Arrowhead region). Listed below are some locations, their February snowfall, and the historical ranking when compared with other Februarys....

Location	February Snowfall	Historical Rank
Duluth	32.1 inches	3rd highest
St Cloud	17.8 inches	3rd highest
Waseca	17.5 inches	3rd highest
Morris	20.0 inches	3rd highest
Lamberton	19.0 inches	2nd highest
MSP	16.5 inches	7th highest

Many places ended the month with a snow depth of two feet or more and a snow water equivalence of 3 to 4 inches. This inflates the risk of spring snow melt flooding along many of the Minnesota watersheds, especially if March and April turn out to be wetter than normal.

MPR listener question: The rainfall last weekend was unusual for February wasn't it? Granted we also received significant snowfall here in the Twin Cities last weekend, but when we get winter precipitation, especially with abundant snow cover, it seems that it always takes the form of snowfall.

Answer: Quite right. Over the past 50 years in the Twin Cities climate record there have only been 44 rainfall events during the month of February during which no mixture with snowfall was recorded. Of these 30 occurred in the presence of snow cover, that is to say rain falling on top of a snow covered landscape. This calculates to a frequency of occurrence that is only about two percent, or two days out of every one hundred in the month of February. Thank goodness it is such a low frequency, because it really makes for a big mess of ice and crusted snow!

Almanac:

Average Twin Cities maximum temperature for today's date is 32 F (plus or minus 10 degrees standard deviation) and the average minimum is 16 F (plus or minus 12 degrees standard deviation).

MSP records for today's date include: highest maximum temperature of 54 degrees F in 1923; lowest maximum temperature of 5 degrees F in 1943 and 1989; lowest minimum temperature of degrees -17 degrees F in 1913; highest minimum temperature of 35 degrees F in 1918 and 1923; record precipitation of 0.58 inches in 1954; and record snowfall of 7.1 inches in 1951. The maximum snow depth on this date is 22 inches in 1962 and 1967. The coldest windchill conditions occurred in 1913 and 1926 when readings of -50 to -55 F were recorded. There have been 25 measurable snowfalls on this date since 1891, the most recent of which was 0.1 inches in 1998.

Average dewpoint temperature for today is 14 degrees F. The

highest dewpoint on this date is 41 degrees F, while the lowest is -26 degrees F.

Scanning the state climatic data base: the all-time high for today's date is 71 degrees F at Browns Valley (Traverse County) in 1992; the all-time low is -50 degrees F at Pokegama Dam (Itasca County) in 1897.

Word of the Week: The Kingston Anemovane

This was a unique instrument invented by Professor G.T. Kingston of Canada in 1876. It was designed for both wind direction and wind speed utilizing two propeller type windmill wheels, each with eight blades, mounted on axles which faced in opposite directions. These vaned windmills would orient into the wind and the axles were geared in such a way that a wind would cause the head to revolve until the wind pressure was equal on the two vanes.

Incidentally, Professor Kingston was a beloved meteorologist who later was known by the nickname "Old Probabilities."

Outlook:

Warming trend will be evident for the weekend and much of next week as temperatures consistently exceed the freezing mark. Some areas may see 40s F over the next week. There will be a chance for snow in the north by Wednesday and in the south by the end of the week. The sun will do its work in melting some of the abundant snow on the Minnesota landscape.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Friday, Mar 9, 2001

Topic: Regional news earlier this week

Earlier this week a cool high pressure cell dominated the weather across the nation's midsection, bringing tranquil conditions for the most part. However, the northerly winds moving across Lake Superior produced locally heavy snow at Marquette, MI, where the 15.6 inches on Monday (March 5th) was a daily record. The 253.8 inches accumulated so far during the current snow season represents the second greatest snowfall ever at Marquette. With all that snow, Marquette reported the nation's low on Wednesday morning with -3 degrees F.

On Monday and Tuesday of this week, Minnesota reported the nation's low with -8 degrees F at Cook and Orr.

Topic: Kudos to the U.K. Meteorological Office

Earlier this week, the British Meteorological Office in collaboration with the Department of Health secured a million pound grant to provide a health advisory and forecast service to the National Health Service (NHS). An earlier pilot study had confirmed the value of using weather forecasts to anticipate workload at many of the NHS facilities. Short, medium and long range forecasts of temperature, precipitation, and air quality are prepared in special formats and released to the NHS staff so that they can anticipate increases in weather-related illness and injury and thereby have sufficient personnel deployed in hospitals and outpatient facilities. Schemes to anticipate increases in respiratory diseases, including influenza and bronchitis, as well as myocardial infarction and strokes are utilized in the new service. Admissions for myocardial infarction have been related to snowfalls, while strokes have been related to exposures to extremes of windchills and humidities. Additionally, freezing rain forecasts are used to anticipate higher frequencies of arm, leg, and hip fractures. These are some of the examples from this new U.K. forecast service.

Could such a service be of value in the United States?

Question from MPR's Midday Program: Last week on the Midday program a caller asked me to explain the cause of an unusual nighttime optical effect in which light from headlights, street lamps or even buildings is directed upward in a vertical shaft. I did not have an answer, but I heard from several others who have observed this. Since then I have visited with others in the meteorological community about this and have a possible explanation.

This effect is not too different from that of sun pillars, which is a vertical shaft of light extending upwards or downwards from the sun as a result of reflection off suspended ice crystals

in the atmosphere. Famed 19th Century British Physicist John Tyndall studied the optical properties of gases and vapours, as well as suspended particulates. He noted that their structure had a great deal to do with how light was scattered, reflected, or absorbed. Ice crystals suspended in the atmosphere will scatter, absorb or reflect light depending on their size, shape, and orientation. When the ice crystals are hexagonal and plate-like in structure, and oriented horizontally, they can reflect light vertically in parallel beams, both upward and downward like sun pillars. This may be the effect observed at night as light from any source is reflected immediately by these crystals into eerie searchlight-looking beams. Overnight inversions in the winter often allow these ice crystals to remain suspended in the atmosphere for long periods of time.

Question from Morning Edition Producer Jim Bickal:

Jim remarked that earlier in the week temperatures as high as 39 and 40 degrees F were observed in northern Minnesota locations like Eveleth, Bigfork, and Littlefork, while central and southern Minnesota locations were 10 to 15 degrees F cooler. Why does this occur and is it just certain times of the year?

The National Weather Service meteorologists in Minnesota noticed that this happens in the late winter. It may be due to a variety of reasons: (1) greater wind speed and mixing of cold surface air (over snow cover) with warmer air aloft, (2) differences in cloud cover, (3) or the absorption of more solar radiation by the coniferous forests of the northern Minnesota counties when compared to the highly reflective, snow covered agricultural and prairie landscapes in southern Minnesota. They referred to explanation number 3 earlier this week to explain the temperature differences, as the sun angle is getting sharply higher and the forests are absorbing more solar radiation.

Almanac:

Average Twin Cities maximum temperature for today's date is 35 F (plus or minus 10 degrees standard deviation) and the average minimum is 18 F (plus or minus 11 degrees standard deviation).

MSP records for today's date include: highest maximum temperature of 60 degrees F in 1911; lowest maximum temperature of 6 degrees F in 1933; lowest minimum temperature of degrees -10 degrees F in 1951; highest minimum temperature of 37 degrees F in 1927; record precipitation of 0.84 inches in 1918; and record snowfall of 10.9 inches also in 1918. The maximum snow depth on this date is 22 inches in 1979. The coldest windchill conditions occurred in 1933 with readings of -45 to -50 F. There have been 22 measurable snowfalls on this date since 1891, the most recent of which was 0.5 inches last year.

Average dewpoint temperature for today is 16 degrees F. The highest dewpoint on this date is 40 degrees F, while the lowest is -15 degrees F.

Scanning the state climatic data base: the all-time high for today's date is 77 degrees F at Caledonia (Houston County) in 2000; the all-time low is -33 degrees F at Tower (St Louis County) in 1984.

Word of the Week: Rafted Ice

Sometimes called telescoped ice, this refers to when an ice floe has been pushed on top of another by tidal pressure or by wind. As lakes thaw this spring in Minnesota, this is sometimes evident, especially on the large lakes like Mille Lacs or the Upper or Lower Red.

Outlook:

Cloudy with a chance of light snow on Saturday, perhaps freezing rain or drizzle in the south. Another chance for light snow Monday through Wednesday, especially in the north. Highs will mostly be in the 30s F. A bit warmer Tuesday and Wednesday, possibly reaching the 40s F. More precipitation possible on Thursday and Friday, perhaps in the form of rain.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Friday, Mar 16, 2001

HAPPY ST PATRICK'S DAY (SAT) TO MPR LISTENERS
(BY THE WAY, ST PATRICK'S DAY IS HISTORICALLY THE WINDIEST CELEBRATION
DAY ON THE CALENDAR!)

Topic: Kudos to England's Royal Mail Service

The recent winter weather has tested our stamina and patience as we anticipate the start of spring. Images of flowing waters, green grass, blooming shrubs, and fragrant flowers are still just dreams. This week however, I was particularly taken with a story about some new heat-sensitive stamps issued by the Royal Mail Service in England. Thermal ink used on each stamp allows the artwork to change color with temperature. Thus on several versions, a stormy or gloomy winter weather scene is suddenly transformed into a beautiful blooming spring scene by the mere touch of a fingertip. What a great idea to cheer people up! I bet such a stamp would be popular with Minnesotans about now.

Topic: Recent record March snowfalls

Monday, March 12th brought record snowfalls to many parts of the state. It was a heavy wet snow, in many cases containing 0.5 to 0.75 inches of liquid water. All of the following locations recorded new record snowfall values for the date:

Spring Valley 11"	Rochester 8.6"	Wabasha 10"
Winona 10.3"	La Crescent 9.5"	Marshall 7.3"
New London 6"	Willmar 8.5"	Owatonna 8.0"

Topic: Record snow cover

Some places in the region are reporting the longest continuous duration of snow cover (1 inch or greater), including Des Moines at 92 days as of Monday of this week, and Sioux Falls at 127 days as of Monday of this week. Huron, SD has reported the deepest snow cover ever measured there at 36 inches. Locally, the Twin Cities reports continuous snow cover of 1 inch or greater since December 7th, a period of 100 days, the 17th winter since 1948 when snow cover has lasted for 100 days or longer. Twin Cities snow depth has been 12 inches or more for 37 consecutive days, only the 11th time since 1948 that this has occurred.

Topic: Key factors in spring snow-melt flooding potential

Most hydrologists agree that there are five key factors which contribute to spring snow-melt flooding in Minnesota. They are:

- High fall soil moisture recharge
- Deep, hard soil freezing

- Deep, heavy, and persistent snow cover
- A rapid spring thaw
- Widespread, above normal spring rains

Certainly all of these features were in place for the great floods of 1997. In comparison, this year is not quite as threatening. Fall soil moisture recharge was later (mostly in November) and not as abundant as it was in 1996 (preceding the 1997 spring flood). In addition, the depth of soil freezing this year is not as great as it was in the winter of 1996-97, nor is the abundant snow cover as widespread. Of course the pace of the spring thaw period and the amount of spring rainfall could mitigate or exacerbate the flood threat this year. We'll have to wait and see.

Question from MPR listener: As a long-time resident, I always associate blizzards or at least significant snowfalls with the Minnesota boy's high school basketball tournament in March. Do we usually have a good snow storm at this time?

Answer:

The most comprehensive study of snowfalls associated with the state high school boys basketball tournament was conducted by local meteorologist Ron Trenda. Examining all tournament dates since 1913, he found that only a small percentage were affected by significant snows, and even fewer by blizzards. However, you are among many Minnesotans who share vivid memories of past tournaments that were impacted by significant weather. In all fifteen tournaments (1915, '20, '32, '51, '52, '64, '65, '66, '70, '72, '74, '75, '78, '83, and 1989) have seen snowfalls totaling 3 inches or greater, and five have coincided with blizzards. The 1920 tournament ended with a blizzard which prevented many people from returning home. The 1951 tournament ended on a Saturday, but the weather turned overnight and produced blizzard conditions which stranded many people in the Twin Cities for Palm Sunday. The very next year, 1952 saw the tournament end again with a severe blizzard that produced up to 14 inches of snow and stranded many people. The 1966 tournament opened with a blizzard, making it difficult for many teams to arrive on time. The last two days of the tournament in 1975 were affected by an ice storm and blizzard which paralyzed much of southern Minnesota. The most recent tournament affected by snows was in 1996, when 4 to 9 inches of snowfall on Sunday March 24th, made traveling home after the games rather difficult for many.

Almanac:

Average Twin Cities maximum temperature for today's date is 37 F (plus or minus 11 degrees standard deviation) and the average minimum is 19 F (plus or minus 11 degrees standard deviation).

MSP records for today's date include: highest maximum temperature of 71 degrees F in 1930; lowest maximum temperature of 8 degrees F in 1900; lowest minimum temperature of degrees -10 degrees F in

1900; highest minimum temperature of 41 degrees F in 1946; record precipitation of 0.80 inches in 1917; and record snowfall of 9.5 inches also in 1917. The maximum snow depth on this date is 23 inches in 1962. The coldest windchill conditions occurred in 1941 with readings of -55 to -60 F. There have been 24 measurable snowfalls on this date since 1891, the most recent of which was 0.5 inches in 1993.

Average dewpoint temperature for today is 19 degrees F. The highest dewpoint on this date is 51 degrees F, while the lowest is -10 degrees F.

Scanning the state climatic data base: the all-time high for today's date is 75 degrees F at Fairmont, Winnebago, Winona, St Peter, and New Ulm in 1930; the all-time low is -34 degrees F at Pokegama Dam (Itasca County) in 1899.

Words of the Week: Threat Score

This is used to assess the accuracy and skill of precipitation forecasting. It considers the landscape area correctly forecast relative to that area which was under the threat of precipitation. It is strictly based on the occurrence of precipitation and not on the quantity.

Outlook:

Generally dry and sunny this weekend, with near normal temperatures. Increasing cloudiness late on Sunday with a chance of some light precipitation (rain or snow) for Monday through Thursday.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Friday, Mar 23, 2001

Topic: Remembering March 23, 1910

On this date in 1910, many places in Minnesota reported 80 plus degree F temperatures. The entire month was marked by very warm temperatures and the absence of precipitation. March of 1910 is still the warmest statewide in the historical record, and by several degrees. There were only three low pressure systems that passed across the state during the month. Many communities recorded only a trace of precipitation for the entire month, including Glencoe, Rochester, and Albert Lea. The Twin Cities recorded only .09 inches. This was a precursor to the driest year in Minnesota history as the statewide average precipitation for 1910 was less than 15 inches.

The soil remained thawed during the month and even some northern lakes were ice-free by the third week. Farmers in southern Minnesota had planted their small grains by the end of the month, and were preparing to plant corn. Fruit trees were budding out and there were even a few dust storms.

Topic: Butter as an indicator of air quality

A recent study from Lancaster University in England suggests that persistent organic pollutants show up in the butter yield of dairy cows. Though not in toxic quantities, they are nevertheless detectable and perhaps an indication of air pollution since they fall-out on pastures where cows graze. Tracking the butter's content of these pollutants over time may provide interesting data on trends in air pollution and air quality. This is a rather novel technique for capturing what is otherwise a rather expensive, tough, and imprecise atmospheric measurement.

Question from MPR listener: It seems that the snow season has ended in March, at least in the Twin Cities area. How many days did measurable snowfall occur this winter in the metro area and how did that compare with the long-term average?

Answer: Good question. To date there have been 49 days with measurable snowfall in the Twin Cities this winter. The long-term average for winter is only 40 days, so the frequency of such events has been higher this year. The record number of days with measurable snowfall occurred in the winter of 1968-1969 with 54 days.

This is nothing compared with Houghton, MI. In 1951 they recorded over 223 inches of snow, 104 days with measurable snowfall, and 53 consecutive days with snowfall in the middle of that winter.

Almanac:

Average Twin Cities maximum temperature for today's date is 44 F (plus or minus 13 degrees standard deviation) and the average minimum is 26 F (plus or minus 10 degrees standard deviation).

MSP records for today's date include: highest maximum temperature of 83 degrees F in 1910; lowest maximum temperature of 10 degrees F in 1965; lowest minimum temperature of degrees -4 degrees F in 1965; highest minimum temperature of 48 degrees F in 1910 and 1920; record precipitation of 1.18 inches in 1966; and record snowfall of 11.6 inches also in 1966. The maximum snow depth on this date is 22 inches in 1951. The coldest windchill conditions occurred in 1974 with readings of -35 to -40 F. There have been 19 measurable snowfalls on this date since 1891, the most recent of which was 0.2 inches in 1998.

Average dewpoint temperature for today is 24 degrees F. The highest dewpoint on this date is 54 degrees F, while the lowest is -21 degrees F.

Scanning the state climatic data base: the all-time high for today's date is 88 degrees F at Montevideo (Chippewa County) in 1910; the all-time low is -37 degrees F Baudette (Lake of the Wood County) in 1965.

Words of the Week: Stage relation (or gage relation)

This is not your relative who is a stage actor.....it is an empirical and graphical curve which relates stream discharge (flow) or stage at one point along a stream to discharge or stage at one or more upstream points. Thus hydrologists can relate the stage of the Mississippi River at Hastings to the stage upstream at St Paul (if they know one, they can guess the other in case the gage goes faulty). Similarly, the stage of the Minnesota River at Shakopee can provide an idea of what the stage is at Mankato. Such information is useful if there are gaps in the data used to make river forecasts.

Outlook:

A cool weekend with a mixture of clouds and sun. There will be a chance for snow in the north, mostly dry in the south. A warming trend will start on Monday, raising temperatures to near normal values by the middle of next week. There will be another chance for precipitation late Tuesday through Wednesday.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Friday, April 13, 2001

Topic: Relative thinking when it comes to the blues

Before we get too caught up in the blues about our flooding situation around the region....I would like to report that the United Kingdom has had a heck-of-a-year to cope with too. Record flooding in the fall, especially in Shropshire and Yorkshire, caused a great deal of property damage, ruining many homes and some historic pubs (some several hundred years old). Last month (March) ended a record string of wet months, producing the wettest year in recorded history across the UK....dating back to 1765 (and we think our records in Minnesota are old). It was a cold, snowy winter to boot....and energy costs were much higher. (On the brighter side, the Scottish skiing resorts did rather well this winter for the first time in some years).

But the weather blues in the United Kingdom were compounded by other problems.....mad cow disease (BSE) and foot and mouth disease ruined the market for meat exports and caused many farmers to suffer.....the British Army stepped in to help with the slaughter and disposal of many infected animals. Prime Minister Tony Blair postponed an election to attend to the rural constituents. Some accused farmers of infecting their own herds with foot and mouth disease in order to take advantage of emergency payments from the government.

In addition the economic downturn and privatization of certain sectors have caused some stress.....the old British Rail has been privatized and ruined the reputation of one of the best known and respected rail services in Europe. Trains are commonly late..... and track repairs are extensive and far behind. They are reworking the London Underground and say that it will take 20 years of disruption before they have a good working system again.

So singing the blues is perhaps becoming more popular in the UK these days.....we aren't the only ones suffering.....

Question from MPR listener: It seems that the period between 50 degree F readings in the Twin Cities area was exceptionally long this winter. What is the record longest period for temperatures less than 50 F?

Answer: The last reading of 50 F in the Twin Cities last fall was on November 7th, then the mercury did not hit 50 F again until April 4th, a period of 149 days. This ties the record period for temperatures below 50 F which was set in the winter of 1978-1979 and again in 1992-1993.

Almanac:

Average Twin Cities maximum temperature for today's date is 55 F (plus or minus 11 degrees standard deviation) and the average minimum is 35 F (plus or minus 9 degrees standard deviation).

MSP records for today's date include: highest maximum temperature of 78 degrees F in 1938; lowest maximum temperature of 31 degrees F in 1943; lowest minimum temperature of degrees 2 degrees F in 1962; highest minimum temperature of 59 degrees F in 1941; record precipitation of 0.86 inches in 1964; and record snowfall of 8.5 inches in 1928. The maximum snow depth on this date is 5 inches in 1962. The coldest windchill conditions occurred in 1928 with readings of -15 to -20 F. There have been 8 measurable snowfalls on this date since 1891, the most recent of which was 0.8 inches in 1970.

Average dewpoint temperature for today is 31 degrees F. The highest dewpoint on this date is 58 degrees F, while the lowest is -2 degrees F.

Scanning the state climatic data base: the all-time high for today's date is 87 degrees F at Luverne (Rock County) in 1908; the all-time low is -11 degrees F at Roseau in 1950.

Word of the Week: Sump

This is a Scottish word used to describe a heavy rainfall. Certainly some of the rainfall events in Minnesota this month could be termed a sump. When spells of heavy rains last for several days, it is called a sumpy period.

Outlook:

Generally cloudy weather with chances for rainfall in the north and central sections. Temperatures in the 20s and 30s F at night and 40s and 50s F during the day. A warming trend will be in evidence later next week.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Friday, Apr 20, 2001

Topic: Signs of winter persist

Earlier this week snow and cold temperatures returned to the state. Monday's snowfall was significant in some northern areas...Tower reported 8 inches, Ely reported 5 inches, Little Fork reported 6 inches, Babbitt reported 6 inches, and International Falls reported 6 inches...all of which were new record snowfall amounts for April 16th.

In addition, morning low temperatures on Tuesday, April 17th were the lowest in the nation. Tower reported 7 degrees F (the second coldest all-time for the date behind -2 F in 1983), while Embarrass reported a new record low of 8 degrees F and Orr reported a record low of 9 degrees F. On Wednesday morning, Orr, MN reported the nation's low again at 16 degrees F.

Topic: Spring moves northward at a measurable pace

Several climatologists have studied the onset of spring using different measures or indices. Three separate measures of the migration of spring which have been used in Minnesota are described below:

- 1) Historically the dates of "ice-out" on Minnesota lakes (the date that lakes are free of any ice cover) range from early April in southern counties to early May in the far northeast. Taking the distance from south to north and dividing by the number of days equates to a migration in ice-out dates of roughly 15 miles per day.
- 2) The 45 degree F isotherm for average air temperature is sometimes used as a marker of spring, since much of the native vegetation begins to grow and respond phenologically at this temperature. Using climatological maps of the Great Lakes Region which show the average first date of the 45 degree F mean temperature isotherm, spring is seen to migrate at the rate of 22 miles per day.
- 3) The apparent movement of the sun to higher elevation angles in the sky is another, more astronomical marker of spring. Examining the period from the vernal equinox on March 20 (when the sun is 90 degrees over the equator) to the summer solstice on June 21 (when the sun is over the Tropic of Cancer, at 23.5 degrees north latitude) shows that the overhead sun migrates a total of 23.5 degrees latitude, or 1567 miles. Dividing the total miles by the number of days equates to an average migration rate of 17 miles per day.

At least all three measures of spring migration, though somewhat different, seem to estimate values that are similar.

Topic: Slow spring sales

Some economists are blaming the weather for sluggish retail sales in certain sectors. Lawn and garden supplies and equipment, sporting goods, and apparel sales have been cool across the nation as the transition to spring weather has been frustratingly slow, with many outbreaks of cold air, snow, wind, and rain. Certainly regional soils have been very slow to warm and drain enough for gardeners to take action.

Question from MPR listener: With the snow around the state earlier this week, I started wondering what the latest date for measurable snowfall in the spring is?

Answer: Many people were asking that question this week. Scanning the state climate data base reveals that there have been several snowfalls in northern portions of the state during May, including a 1 inch snowfall at Tower on May 31, 1897. Two to four inches of snow fell at Big Falls, International Falls, Orr, and Spring Grove on May 27-28, 1947.

More amazingly, on June 1st, 1946 Gull Lake, Willmar, Park Rapids, Babbitt, and even St Paul's Holman Field reported a trace of snow, while on June 2, 1969, Grand Rapids reported 0.7 inches of snowfall, the latest I can find in the records anywhere in the state.

Almanac:

Average Twin Cities maximum temperature for today's date is 59 F (plus or minus 11 degrees standard deviation) and the average minimum is 39 F (plus or minus 8 degrees standard deviation).

MSP records for today's date include: highest maximum temperature of 83 degrees F in 1980; lowest maximum temperature of 36 degrees F in 1893; lowest minimum temperature of degrees 27 degrees F in 1893; highest minimum temperature of 62 degrees F in 1985; record precipitation of 0.87 inches in 1893; and record snowfall of 8.5 inches also in 1893. The maximum snow depth on this date is 2 inches in 1982. The coldest windchill conditions occurred in 1982 with readings of 0 degrees F. There have been 7 measurable snowfalls on this date since 1891, the most recent of which was 1.8 inches in 1982.

Average dewpoint temperature for today is 35 degrees F. The highest dewpoint on this date is 58 degrees F, while the lowest is 6 degrees F.

Scanning the state climatic data base: the all-time high for today's date is 100 degrees F at Ada (Norman County) and at

Georgetown (Clay County) in 1980...the earliest spring temperature of 100 degrees F in state history; the all-time low is 4 degrees F at Pokegama Falls (Itasca County) in 1928.

Word of the Week: Thalassotherapy

Thalasso is an ancient Greek term referring to the sea. Along the French Riviera many health resorts advertise thalassotherapy as a preventative or curative measure to insure good health. This concept includes bathing in the sea, sea muds, sands, and even eating seaweed derived food products. It also includes the finer elements of the coastal sea climate such as abundant sunshine, warm temperatures, and gentle breezes. The French, as well as other Europeans have suffered through a harsh winter, and in some cases flooding like ours here in Minnesota. This spring several are booking vacations at Mediterranean resorts to take in some thalassotherapy.

Outlook:

Though temperatures will generally be milder, it looks as if a wet period is coming up this weekend and early next week with frequent showers and even some thunderstorms. Hopefully amounts will not be so great as to amplify the flooding problems around the state by creating a second wave of crests on major rivers. By the middle of next week a dry period is seen, but temperatures will remain warmer than normal for the balance of April.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Friday, Apr 27, 2001

Topic: Testing the gardener's patience

The back to back to back Aprils of 1907, 1908, and 1909 really put Minnesota gardeners and farmers to the test. In most years some tilling of the soil, and even fertilizing and planting takes place by the last week of April. But in those years winter would not let go. On April 27, 1907, 8.5 inches of snow fell in the Twin Cities and windchill conditions of -5 to -10 degrees F persisted for much of the day. The following spring on April 27, 1908, 7.1 inches of snow fell and windchill conditions of 0 to -5 degrees F prevailed. Then again, the following spring, on April 27, 1909 a trace of snowfall with record windchill conditions of -15 to -20 degrees F kept most people indoors. In 1909 snowfall also occurred on the 28th, 29th, and 30th of April, as well as May 1st. A snow covered Minnesota landscape on May 1st, what a historical rarity! Ironically, for those traumatized by these brutal spring conditions, the next year (1910), brought the warmest March in Minnesota history as well as one of the earliest springs.

Topic: Extraordinary April

Earlier this week on Sunday and Monday, Mother Nature delivered another memorable weather combination to the state, one which further aggravated the spring flooding situation by creating a second crest on many rivers and streams. Rain, sleet, snow and ice fell in abundance across the state, with many long-standing weather records falling as well. The following reported new record snowfalls for April 23rd....

Park Rapids 8 in. Bemidji 12 in. Campbell 9 in.
Bagley 8 in. Pelican Rapids 6 in. Fergus Falls 3 in.
Brown's Valley 10 in.

Moorhead reported 7.2 inches, but it is unclear whether that was a record.

In addition daily rainfall records were set at the following locations.....

Itasca State Park 1.33 in. Duluth 1.77 in. Canby 2.16 in.
Brown's Valley 1.94 in. Fergus Falls 3.00 in. Morris 1.77 in.
Hutchinson 2.77 in. Olivia 3.25 in. Willmar 2.92 in.
St Cloud 3.52 in. Aitkin 2.74 in. Cambridge 2.40 in.
Winnebago 1.71 in. Rosemount 1.53 in. Twin Cities 2.21 in.
Lamberton 3.51 in. Pipestone 3.20 in. Redwood Falls 3.30 in.
Sioux Falls 3.72 in. Worthington 3.55 in. Becker 3.47 in.

In addition the amounts at St Cloud, Aitkin, Fergus Falls, Lamberton, Pipestone, Redwood Falls, and Worthington were also the heaviest rains ever observed on any date in the month of April.

Lastly, many communities have already reported the wettest April in their climate history. The following are new record totals for April precipitation....

Duluth 7.79 in. Canby 8.00 in. Rochester 7.09 in.
Sioux Falls, SD 6.69 in. Worthington 7.53 in. Aitkin 5.65 in.
Olivia 6.52 in. St Cloud 8.14 in. Hutchinson 6.27 in.
MSP 6.89 in. Cambridge 7.73 in. Pipestone 6.32 in.

In fact, taking all of the reports from around the state, this April ranks as the 2nd wettest in history on a statewide basis, with an average of over 5 inches of precipitation. The wettest ever was April of 1896 when the state average was close to 6 inches.

Question from MPR listener: With the soils so wet, when do you think that farmers will be able to plant crops?

Answer: Indeed, many Minnesota soils have never been wetter. However, the landscape is shedding the surplus moisture fairly rapidly. Coarse textured, well-drained soils may be workable this weekend. Perhaps even some tile drained soils in southern counties may be tillable late in the weekend or early next week. Following a very favorable fall season during which a great deal of soil testing and tillage was already accomplished, most farmers will be ready to roll as soon as soil conditions allow. I would look for a rapid planting pace to be set during all available field working days this spring, with some crop producers putting in very long days. Soil temperatures should not be holding anybody back as they have warmed into the 50s and 60s F over the past few days.

Almanac:

Average Twin Cities maximum temperature for today's date is 62 F (plus or minus 11 degrees standard deviation) and the average minimum is 42 F (plus or minus 9 degrees standard deviation).

MSP records for today's date include: highest maximum temperature of 85 degrees F in 1910, 1952, 1970, and 1977; lowest maximum temperature of 34 degrees F in 1950; lowest minimum temperature of degrees 21 degrees F in 1909; highest minimum temperature of 60 degrees F in 1938 and 1974; record precipitation of 2.22 inches in 1975; and record snowfall of 8.5 inches also in 1907. The maximum snow depth on this date is 8 inches in 1907, though it was shortlived. The coldest windchill conditions occurred in 1909 with readings of -15 to -20 degrees F. There have been 5 measurable snowfalls on this date since 1891, the most recent of which was 0.2 inches in 1969.

Average dewpoint temperature for today is 36 degrees F. The highest dewpoint on this date is 65 degrees F, while the lowest is 14 degrees F.

Scanning the state climatic data base: the all-time high for today's date is 93 degrees F at Red Lake Falls in 1953; the all-time low is 7 degrees F at Halstad (Norman County) in 1909 and at Brimson (St Louis County) in 1996.

Word of the Week: The going

This Irish word is not directly related to weather, but certainly depends on the weather. The going refers to the state of the ground on a horse racing track, and further is scaled from heavy to firm. Naturally, the soil type, including texture and aggregate size, along with moisture conditions helps determine the going. In Ireland the clerk of the racecourse takes a stick around the course and pushes it through the soil surface at various places to determine the firmness by a subjective measure of resistance. He then classifies the course. The going is also judged by another individual called the inspector of racecourses, who has jurisdiction over all race tracks in Ireland. He and the clerk of the racecourse declare the going on the morning of race day so that trainers, owners, and the public (betting agents, etc) can be informed and anticipate how their favorite horse might do. The going can actually change during the day, not so much because of the weather but because of compaction or tearing up by the race horses. Up to seven races on a single day can leave the going rather difficult.

Leave it to the Irish meteorologists to develop a scheme using weather and soil information to predict the going at major Irish racecourses. Some horse owners decide whether or not to enter their animal in a race based on the anticipated going. This is described in a recent article in *Weather* magazine, published by the Royal Meteorological Society in the United Kingdom.

Outlook:

A dry interval should continue in southern Minnesota, with warm temperatures and more sunshine. There will be a chance for showers in the north and east this weekend and into Monday morning. Early next week looks mostly dry and warm. Towards the end of the week there will be an increasing chance for showers and thunderstorms.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Friday, May 4, 2001

Topic: New voices for NOAA Weather Radio

The National Weather Service is conducting an online poll to test the public reaction to new synthesized computer voices for broadcasting over the NOAA Weather Radio system. You can choose among Linda, Paul, Donna, Art, and Craig. My personal preferences are Linda (very homespun and pleasant sounding) and Craig (very credible and professional sounding). How about yours? Use the Internet and go to the following site..

<http://www.nws.noaa.gov/nwr/voicesamples.htm>

Topic: Air quality ratings from the American Lung Association

A new report from the American Lung Association called The State of the Air 2001, rates the air quality (based primarily on ozone pollution) across the USA. Minnesota grades out pretty well, averaging B quality over most of the state (scale is A-F). In fact around the region, Des Moines, Fargo-Moorhead, and Duluth make the top of the national list as cities reporting no ozone air pollution levels in the unhealthy range for the years 1997-1999. Cities like Los Angeles, Houston, Atlanta, Washington D.C. and Philadelphia are on the list with an F grade. More information can be found at the ALA web site...

<http://www.lungusa.org/air2001/>

Topic: A rare April indeed!

As mentioned last week, many communities around the state recorded their wettest ever April. Some reported 8 inches or more, which for our climate represents a monthly total that occurs less than 1 percent of the time historically. Those communities recording such a value included.....

St Cloud 8.42 in. Duluth 8.18 in. Canby 8.30 in.
Milan 8.16 in. Delano 8.38 in. Bruno 8.74 in.
Marshall 8.29 in. Lambertson 8.34 in. Tyler 8.60 in.
Cambridge 8.61 in. Worthington 8.15 in.
Lower St Anthony Falls 8.00 in. and Redwood Falls 9.68 in.

Question from MPR listener: After seeing such a severe winter, and a record-setting wet April, what are the record extremes in Minnesota for the month of May?

Answer: Extreme temperatures for the month of May include a low of just 4 degrees F at Pine River Dam (Crow Wing County) on May 1st and 2nd in 1909, and a high of 108 degrees F at Campbell,

Fairmont, Faribault, New Ulm, and Pipestone on May 31, 1934. Wettest ever May was probably 1908 at Winnebago which recorded 11.70 inches of precipitation, while the most persistently wet May was likely 1938 at Hastings where nearly 11 inches of precipitation fell during 25 days, leaving only six dry days that May. The heaviest single day rainfall in May was 5.84 inches at Collegeville, MN on May 22, 1962. And finally, the snowiest May in state history dates back to 1954 when over the first 8 days of the month, snow fell at Virginia, MN totaling nearly 18 inches, providing a rare opportunity for cross-country skiing in May.

Almanac:

Average Twin Cities maximum temperature for today's date is 66 F (plus or minus 11 degrees standard deviation) and the average minimum is 44 F (plus or minus 9 degrees standard deviation).

MSP records for today's date include: highest maximum temperature of 91 degrees F in 1952; lowest maximum temperature of 36 degrees F in 1944; lowest minimum temperature of 22 degrees F in 1967; highest minimum temperature of 65 degrees F in 1934; record precipitation of 1.01 inches in 1959; and a trace of snowfall was recorded on this date in 1907 and 1944.

Average dewpoint temperature for today is 40 degrees F. The highest dewpoint on this date is 68 degrees F, while the lowest is 13 degrees F.

Scanning the state climatic data base: the all-time high for today's date is 96 degrees F at Wheaton (Traverse County) in 1949 and at Springfield (Brown County) in 1952; the all-time low is 8 degrees F at Cloquet (Carlton County) in 1911.

Word of the Week: : OOPS

As is often the case with many government agencies, the National Weather Service uses a number of acronyms to shorten the names of procedures, equipment, staff positions, and operations. This one is interesting because it refers to something which most organizations ought to have - Organized Operational Panic Systems Handbook. Does MPR have one of these? Of course experience is the best teacher, so the MPR employee who has survived the most panic situations this past year should probably write one of these for the organization.

Outlook:

Partly cloudy early in the weekend, with increasing cloudiness late Saturday and into Monday and a chance for showers and thunderstorms, some lingering into Tuesday. Heavier rains may fall in the southern parts of the state. Temperatures will near normal for much of next week.

To: Perry Finelli, Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Friday, May 11, 2001

Today is Minnesota Statehood Day (1858)

Topic: NOAA Weather Radio in the BWCA

As a follow-up to our discussion last week about NOAA Weather Radio, MPR listeners may be interested to know that a new transmitter is operating from Gunflint Lake in northern Cook County. This transmission, coupled with that coming from Ely, MN now gives NOAA Weather Radio broadcast coverage across much of the Boundary Waters Canoe Area.....good news for campers and fishermen who want to keep track of possible weather changes when they are in the wilderness area.

In addition, the National Weather Service now broadcasts on NOAA Weather Radio from St Ansgar, IA so that residents of Mower and Freeborn counties (homes to Austin and Albert Lea) can immediately access weather information and forecasts for their region. Later this year, NOAA radio transmitters will be installed in Lyon, Brown, Swift, and Cottonwood counties, bringing better weather broadcast services to residents of southwestern Minnesota.

Topic: Earlier sunrise means time to be sun wise

As the sun rises earlier in the morning and higher in the sky during the afternoon, it is time to start paying attention to our sun exposure again. The daily UV (ultra violet radiation) forecast issued at midday by the National Weather Service bears watching when it comes to limiting your exposure outdoors, especially if you have sensitive skin or eyes. The EPA recommends the use of broad spectrum sun screens (at least SPF 15) and UV protective sunglasses when the UV index exceeds 5-6 (moderate category), which has already occurred twice this month. The UV index is scaled 0 to 10 plus. Values in Minnesota typically do not exceed 9, but values that high have occurred in the month of May. For this reason it is wise as you contemplate gardening, fishing, biking, boating, or other outdoor activities consider being sun wise and protecting yourself. Several web sites on the Internet depict the daily UV forecast....

<http://www.weather.com/activities/outdoors/>
(The Weather Channel)

<http://www.usatoday.com/weather/wuv.htm>
(USA Today newspaper)

<http://www.wunderground.com/US/Region/US/UVForecast.html>
(The Weather Underground)

http://www.cpc.ncep.noaa.gov/products/stratosphere/uv_index/uv_current.html
(The Climate Prediction Center)

Topic: Global Oceans Warming

Recent studies by leading oceanographers and climate modelers show that there has been an increase in the heat content of the world's oceans (in the depth layer from 0 to 3000 meters) that is approximately an order of magnitude greater than the increase in the atmospheric heat content over the past 45 to 50 years. Further, there is increasing confidence that this may be due to the increased emissions of greenhouse gases.

This prompts the question of whether or not there has been an increase in the heat content of the Great Lakes or other major lakes on the North American continent. A research question perhaps worth pursuing..

Question from MPR listener: I am from Olmsted County where it has been wet, wetter, and wettest this past year....including a record 7.30 inches of precipitation just last month (April) at Rochester. We have recorded nearly 4.5 inches so far this May, while over at La Crosse, WI they have recorded over 3.5 inches, and it is not even the middle of the month. What is the record at these locations for the wettest May?

Answer: The record wettest May at Rochester is 8.41 inches in 1982, while the record wettest at La Crosse is 8.83 inches in 1960. So each location has a ways to go this month to approach either of those records.

Almanac:

Average Twin Cities maximum temperature for today's date is 66 F (plus or minus 11 degrees standard deviation) and the average minimum is 46 F (plus or minus 8 degrees standard deviation).

MSP records for today's date include: highest maximum temperature of 88 degrees F in 1900; lowest maximum temperature of 40 degrees F in 1914 and 1966; lowest minimum temperature of 27 degrees F in 1946; highest minimum temperature of 64 degrees F in 1915 and 1922; record precipitation of 1.55 inches in 1935; and 2.8 inches of snowfall was recorded on this date in 1946, the greatest amount ever for so late into the spring.

Average dewpoint temperature for today is 40 degrees F. The highest dewpoint on this date is 61 degrees F, while the lowest is 14 degrees F.

Scanning the state climatic data base: the all-time high for today's date is 97 degrees F at Camden (Lyon County) in 1900; the all-time low is 11 degrees F at Fosston (Polk County) in 1946.

Word of the Week: : MOPITT

Another acronym, this time courtesy of the Canadian Space Agency. This one stands for Measurements of Pollution in the Troposphere

(lower atmosphere). Aboard NASA's TERRA Satellite, this Canadian instrument is designed to measure carbon monoxide and methane in the Earth's lower atmosphere. Global measurements of these two gases are made every 4 to 5 days by the orbiting TERRA satellite. Scientists hope to examine seasonal trends in methane and carbon monoxide. They also hope to measure differences resulting from natural sources of emission and those produced by human activity such as industrial combustion and biomass burning. One of the first detailed images of relatively high atmospheric carbon monoxide was produced last summer as the satellite scanned the western U.S. landscape while so many wildfires were going on. MOPITT images can be viewed at NASA's web site for the TERRA satellite...

<http://terra.nasa.gov/>

Outlook:

Fairly nice weekend weather for the Fishing Opener and Mother's Day, as well as for gardening and other outdoor chores. Cool Saturday morning, then warming into the 60s and 70s F. Some widely scattered showers possible in the west and south. Dry and warmer on Mother's Day, with plenty of sunshine and light winds. Increasing cloudiness on Monday and a chance for showers through Wednesday. Temperatures will remain around seasonal normals.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Friday, May 18, 2001

Topic: Record high temperatures this week

Strong warm advection and bright sun brought some record setting temperatures to the region on Monday and Tuesday this week. In fact, the high of 97 degrees F recorded at Redwood Falls, Hutchinson, St Cloud, Litchfield and Montevideo on Tuesday set an all-time state record high for May 15th breaking the old record of 96 degrees F set at Fergus Falls, Canby, and Beardseely in 1931 (the Dust Bowl Years).

Many other places set daily high temperature records on Tuesday, including the following.....

MSP 94 F Rochester 89 F Waterloo, IA 92 F
Sioux city, IA 101 F LaCross, WI 91 F Mankato 95 F
Morris 93 F Faribault 93 F Fairmont 93 F

Topic: New monthly and seasonal outlooks

The Climate Prediction Center released the new monthly and seasonal outlooks on Thursday afternoon this week. Using a variety of models, one of which includes the effects of the surplus soil moisture we have this spring, they see a tendency for much of southern Minnesota to experience below normal temperatures for this June through August. Rainfall is expected to be above normal for most of the state, continuing a trend of summer wetness begun back in the 1990s. They caution that they are not as confident in these climate predictions as they have been in the past, because these models do not perform as well as others in pinpointing the dominant conditions for summer.

Question from MPR listener: How much does one of these large cumulonimbus thunderstorm clouds weigh? It must contain a lot of water.

Answer: Thomas Schlatter, a NOAA meteorologist who writes for Weatherwise magazine addressed this question in a past issue. This is highly dependent on cloud volume. But take a cumulonimbus cloud with a volume of one cubic mile and a water content of 1 gram/cubic meter. This would calculate to a weight of about 9 million pounds. That's quite a load to remain suspended in the atmosphere, but of course it does, primarily because of the strong updraft winds that build in such a storm system and hold the water droplets and ice crystals aloft until they reach a critical mass.

Almanac:

Average Twin Cities maximum temperature for today's date is 69 F (plus or minus 11 degrees standard deviation) and the average minimum is 49 F (plus or minus 7 degrees standard deviation).

MSP records for today's date include: highest maximum temperature of 91 degrees F in 1911; lowest maximum temperature of 47 degrees F in 1968; lowest minimum temperature of 27 degrees F in 1915; highest minimum temperature of 68 degrees F in 1911; the record precipitation is 1.85 inches in 1892.

Average dewpoint temperature for today is 46 degrees F. The highest dewpoint on this date is 69 degrees F, while the lowest is 20 degrees F.

Scanning the state climatic data base: the all-time high for today's date is 101 degrees F at Fairmont and Pipestone in 1934; the all-time low is 17 degrees F at Tower in 1981.

Words of the Week: POP and QPF

In precipitation forecasting two types of guidance are used by the National Weather Service; the probability of precipitation (POP); and the quantified precipitation forecast (QPF)

There are two dimensions to POP: one is used as an average probability or chance of receiving precipitation at a point in a forecast zone, given how a large number of storms with exactly the same characteristics would affect that location in the same way based on statistics; secondly, the POP is used to indicate the expected areal coverage of the precipitation across the forecast zone.

QPF guidance is provided to forecasters every 12 hours and refers to the amount of precipitation expected to occur in at least one point in the forecast area over a 24 hour period. Typically, this might range from 0.1 to 0.5 inches.

Outlook:

Mostly cloudy weekend coming up with a chance for showers in the north and west on Saturday, and elsewhere around the state later in the day and into Sunday. Temperatures will fall on Monday and Tuesday with some lingering showers. A generally cooler week coming up with a chance for showers toward next weekend as well.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Friday, May 25, 2001

Topic: Ice problems in Siberia

Having suffered through one of the toughest winters in recent memory, residents of Siberian Russia have been fighting floods this month along the Lena River. The floods are not only attributed to the runoff from the heavy, dense winter snow cover, but also from an 18 mile long ice dam in the river near the city of Yakutsk. This ice dam has been broken up with explosives several times in recent days. Like our Red River along the border with North Dakota, the Lena River flows north, eventually emptying into the Laptev Sea, an arm of the Arctic Ocean. However, the Lena River is much longer than the Red River and flows through higher latitude regions. As the landscape thaws in the south, the runoff begins to accumulate and flow north into a successively more frozen landscape. Thus the region is prone to have ice dams form which hold back the flowing water and force it out along the low lying landscape. I suspect that the Russian hydrologists who forecast spring snowmelt flooding have had their difficulties this month.

Topic: Weary of Wetness

Following the wettest April in history, Rochester, MN has reported 13 rainy days so far this month, and most recently six consecutive days. The May total rainfall already exceeds 6 inches there and the total since March 1st of nearly 15 inches is approaching a new record value for spring. Only the spring (March, April and May) of 1888 was wetter (at 15.99 inches) according to the National Weather Service.

In fact, for the Twin Cities area six consecutive days of rain this week have tested the patience of gardeners, golfers, and construction workers. Six or more consecutive days of rain during the month of May has only about a 10 percent probability historically, having occurred only 12 times in the past 111 years.

Topic: The Minnesota Hot/Dry and Cold/Wet Treatment

On Tuesday this week, May 22, Hutchinson, MN reported a record cold maximum temperature of only 48 degrees F, following three days of cloudiness and rain. This occurred exactly one week after the same observer had reported a new all-time state record high temperature for May 15th of 99 degrees F and daytime humidities only in the 20 percent range!

Cold and rainy weather was a common theme across the upper

midwest this week, with many new records set. Williston, ND reported a new record low for May 23rd with 27 degrees F, while North Platte, NE reported a new record low of 30 degrees F on the same morning. Minnesota was too cloudy to report record low temperatures this week, but many record cold maximum temperature records were broken, especially on Tuesday (May 22nd). The following were all new records.....

MSP 47 F Rochester 47 F Eau Claire, WI 49 F
Baudette 44 F Park Rapids 43 F Bemidji 41 F Roseau 50 F
Thief River Falls 43 F Detroit Lakes 43 F Crookston 45 F
Flag Island 43 F Waskish 45 F Wadena 45 F Fosston 39 F
Alexandria 46 F St Cloud 47 F Albert Lea 48 F
Cambridge 46 F Faribault 48 F Little Falls 43 F
Montevideo 54 F (tied record) New Ulm 52 F (tied record)
Staples 41 F St James 52 F Willmar 46 F Brainerd 41 F
International Falls 41 F Hibbing 42 F Eveleth 41 F
Orr 39 F Bigfork 39 F Grand Rapids 39 F Aitkin 43 F
Pine River 39 F Moose Lake 45 F Cloquet 45 F

Bigfork, Warroad, International Falls, Flag Island, Baudette, and Bemidji all reported snowfall on May 22nd as well.

Wednesday, May 23rd also produced more record cold maximum temperatures, though fewer in number than on Tuesday. The following were all new records....

MSP 52 F Eau Claire, WI 53 F Rochester 46 F Austin 48 F
Redwood Falls 53 F Albert Lea 48 F LaCrosse, WI 50 F
Sioux City, IA 56 F Fairmont 48 F Sioux Falls, SD 50 F

Montevideo tied the record cold maximum temperature with 52 F.

The string of cold late May days preceding the Memorial Weekend is not unprecedented in the Twin Cities climate record. Similar temperatures averaging just in the 40s F occurred in 1893, 1901, 1917, 1924, and 1963.

Question from MPR listener: Isn't it quite unusual to have so many record-setting high maximum temperatures (May 15th) followed just a week later by so many record-setting low maximum temperatures? Even for Minnesota this seems odd.

Answer: Indeed, it is. Examining the Twin Cities climate record back to 1891, I can find only one other case where high and low maximum temperature records occurred within a week of each other. This was in 1931, when the old Twin Cities maximum temperature record for May 15th was set at 91 degrees F (broken just this past May 15th with 94 F), and followed 5 days later by the record lowest maximum temperature for May 20th of 45 degrees F. It is interesting that we have seen the same feature occur this week, only 7 days apart instead of 5 days.

Almanac:

Average Twin Cities maximum temperature for today's date is 72 F (plus or minus 9 degrees standard deviation) and the average minimum is 51 F (plus or minus 8 degrees standard deviation).

MSP records for today's date include: highest maximum temperature of 94 degrees F in 1978; lowest maximum temperature of 48 degrees F in 1904; lowest minimum temperature of 33 degrees F in 1901; highest minimum temperature of 70 degrees F in 1914; the record precipitation is 1.88 inches in 1942.

Average dewpoint temperature for today is 47 degrees F. The highest dewpoint on this date is 68 degrees F, while the lowest is 25 degrees F.

Scanning the state climatic data base: the all-time high for today's date is 100 degrees F at Luverne (Rock County) in 1967; the all-time low is 19 degrees F at Tower (St Louis County) in 1983.

Words of the Week: Good sailing days

This term is highly subjective and therefore has a variable definition, but I did come across the official definition used by the National Oceanographic Data Center. Good sailing days require visibility of at least 2 miles, temperatures of 65 degrees F or higher, wind speeds of 8 to 18 mph, and no precipitation. Perhaps MPR listeners and sailors who are getting ready for the Memorial weekend holiday have other favorite definitions.

Outlook:

A persistent low pressure system will continue to bring clouds, with modest temperatures and scattered showers through Saturday. Improving for Sunday and Monday of the Memorial Weekend, skies should become partly cloudy with more sunshine, as temperatures climb into the 60s F. Generally more sun with a warming trend next week. Temperatures will be in the 70s F most places. Another chance for showers by Thursday and Friday.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Friday, June 1, 2001

Topic: Preliminary climate summary for May, 2001

With a few exceptions May averaged from 1 to 2 degrees F warmer than normal in most places. There were pronounced temperature extremes, ranging from 99 degrees F at Olivia and Hutchinson on the 15th (a new state record for the date) to just 25 degrees F at Tower on the morning of May 30th.

Most observers reported above normal rainfall in May, with the number of rainy days ranging from 13 to 17. Statewide, some western counties recorded a little over 2 inches while some southeastern counties exceeded 7 inches. Following a record-setting wet April, the May totals combined with the previous two months produced a near record-setting wet spring. Some total rainfall amounts for March-May are shown below.....

Rochester 15.88 inches (2nd wettest spring to 1888 - 15.99)
St Cloud 13.33 inches (3rd wettest spring)
MSP 12.61 inches (5th wettest spring)
Marshall 15.41 inches (new record wettest spring)
Grand Meadow 14.76 inches (2nd wettest spring)
Springfield 13.28 inches (3rd wettest spring)

This wetness produced a challenge for Minnesota crop producers, who still have yet to finish soybean planting. Thankfully, nearly all corn planting is done, the latest planting season since 1986 for some.

Topic: Extreme temperatures for the month of June

The June outlook for Minnesota favored cooler than normal temperatures and above normal rainfall. Historically June has produced some mighty cold temperatures as recently as 1964 and 1985 when overnight lows of 20 degrees F or colder were recorded in northern counties. The all-time coldest temperature was just 15 degrees F at Bigfork (Itasca County) on June 1, 1964. This froze the leaves on the oak and ash trees in the area. The most recent exceptionally warm June was in 1988 when several locations reported temperatures as high as 106-107 degrees F. 1931, 1933, and 1934 brought extreme June heat as well. The all-time highest June reading was 110 degrees F on June 29, 1931 at Canby (Yellow Medicine County).

Topic: Climatology and renewable alternative sources of energy

It is interesting to consider the seasonal climate dimension

associated with alternative forms of energy production. Recent articles in Science magazine point to the increasing efficiencies in harnessing the wave motions of the oceans to produce electricity. Some estimate that improved technology may allow up to 16 percent of the world's electricity output to be generated by wave motions. Coastal areas are rated for energy production based on the waves average energy production in kilowatts per meter of shoreline. Coastal areas of Scotland, northern Canada, the northwest and northeastern United States, southern Africa, and Australia are rated as having the most potential for wave generated power production. It is interesting that the maximum power production by waves is achieved during the winter season, when atmospheric pressure differences produce a magnitude and constancy of waves due to winds.

Conversely, solar generated power production is maximized during the summer months, when higher sun angles and longer days assist the efficiency and storage of solar cells which may recharge batteries, heat water, or store electricity. Latitude, elevation, and clear day frequencies are important climate features in locating solar collectors. Their energy production is maximized during the summer month, increasingly at higher latitudes.

Lastly, wind generated power is of course a function of wind speed and wind constancy. In a study of Minnesota's winds, Professor Donald Baker showed that the maximum power output by the wind is achieved generally in the transition months of April (Spring) and November (Fall). Thus maximum production of wind generated electricity might be expected during these times.

These seasonal associations for renewable, alternative energy production (oceans-winter, solar-summer, wind-fall/spring) are certainly an over simplification, but perhaps storage and transmission of energy will evolve to make better use of the seasonal variability in Earth's natural energy producing systems.

Question from MPR listener: Since atmospheric inversions (increase of temperature with height) are often associated with poor air quality, what is the season with the most frequent occurrence of inversions in Minnesota?

Answer: A study done at St Cloud State University showed that inversions are far more common during the winter season. This was based on taking historical atmospheric soundings of the National Weather Service from 1948 to 1992 (instrumented balloons launched twice each day to measure the atmosphere's vertical profile). Inversions occurred about 90 percent of all days in the winter, and about 50 to 55 percent of all days in the summer. Inversions were also shown to be far more common in the early morning hours than in the evening hours.

Almanac:

Average Twin Cities maximum temperature for today's date is 73 F (plus or minus 9 degrees standard deviation) and the average minimum is 54 F (plus or minus 7 degrees standard deviation).

MSP records for today's date include: highest maximum temperature of 92 degrees F in 1939; lowest maximum temperature of 51 degrees F in 1945; lowest minimum temperature of 37 degrees F in 1946; highest minimum temperature of 72 degrees F in 1939; the record precipitation is 2.16 inches in 1944. Snow flurries were recorded at St Paul's Holman Field on this date in 1946.

Average dewpoint temperature for today is 48 degrees F. The highest dewpoint on this date is 70 degrees F, while the lowest is 29 degrees F.

Scanning the state climatic data base: the all-time high for today's date is 105 degrees F at Faribault in 1934; the all-time low is 15 degrees F at Bigfork (Itasca County) in 1964.

Word of the Week: gust

This term is widely used to describe a sudden burst of wind which greatly exceeds the average wind speed. Officially, it is an expression of transient wind speed that may last 20 seconds or less. Often if the wind speed varies by 10 knots (12 mph) or more over a 10 minute interval, the National Weather Service will also report wind gusts.

Outlook:

Generally pleasant weekend in northern Minnesota, with a chance for widely scattered showers in the southeast. Increasing cloudiness Monday and Tuesday with a chance for showers statewide. Temperatures will generally warm next week with chances for showers and thunderstorms more frequent.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Friday, June 8, 2001

Topic: A cold start to the farming and gardening season

Looks like today (Friday, June 8th) will end a remarkably long run of colder than normal temperatures in many locations.

Rochester tied a record on Tuesday of this week (June 5th) for the coldest maximum temperature with only 54 degrees F reported. In fact, the Twin Cities, Rochester, Sioux Falls, SD, and La Crosse, WI all report 18 consecutive days of below normal temperature readings (dating back to May 20th). This is highly unusual for this time of year and reflects the magnitude and consistency of cloud cover that has prevailed across the upper midwest. St Paul has recorded 25 percent less than normal daily solar radiation since May 20th.

Historically speaking for the Twin Cities, this late May and early June period has never seen 18 consecutive days of below normal temperatures. There have only been three years when the mean temperature for the period from May 20 to June 7 was colder than this year (55 F or less). They were 1897, 1910, and 1917.

The below normal temperatures have retarded normal crop development across the agricultural landscape. Conversely, many home landscapes have seen flowering shrubs remain fragrant and beautiful for longer periods of time thanks to the cool conditions.

Topic: Tropical weather update

The hurricane season is underway in the eastern Pacific, Atlantic, and of Gulf of Mexico regions. In late May and early June, hurricane Adolph formed off the west coast of Mexico. Fortunately it remained well off the coast and eventually dissipated over the open ocean. At one time it was a class 4 hurricane (winds of 130-140 mph). Earlier this week, tropical storm Allison formed in the Gulf of Mexico and came ashore on the Texas coast dumping as much as 11 inches of rainfall in places. Even as late as Thursday this week, remnants of this tropical storm produced rainfalls of 4 to 6 inches across parts of Louisiana and Mississippi.

This early season tropical weather may be indicative of an active hurricane season. Dr. William Gray of Colorado State University, a widely respected hurricane forecaster, has recently updated his outlook for the 2001 season. He now forecasts 12 named storms for the Atlantic, and states that 7 will probably reach hurricane status. This may be the only way that the state of Florida eventually gets some relief from its multiple year drought that has produced so many wild fires.

Topic:

Question from MPR listener: It looks like the Twin Cities is going to have another wetter than normal year. We have already received about six inches more precipitation than we normally get by this time of the year. What day of the week has seen the most frequent precipitation so far this year?

Answer: Precipitation has been pretty evenly distributed by day of the week, but the days with the most frequent occurrence have been Fridays and Saturdays so far (each with 9 measurable precipitation events). The driest days of the week have been Wednesdays and Sundays.

Almanac:

Average Twin Cities maximum temperature for today's date is 75 F (plus or minus 9 degrees standard deviation) and the average minimum is 55 F (plus or minus 7 degrees standard deviation).

MSP records for today's date include: highest maximum temperature of 102 degrees F in 1985; lowest maximum temperature of 54 degrees F in 1937; lowest minimum temperature of 39 degrees F in 1978 and 1996; highest minimum temperature of 70 degrees F in 1959 and 1976; the record precipitation is 2.12 inches in 1918.

Average dewpoint temperature for today is 53 degrees F. The highest dewpoint on this date is 73 degrees F, while the lowest is 31 degrees F.

Scanning the state climatic data base: the all-time high for today's date is 102 degrees F at New Ulm and Montevideo in 1911 and again in 1985 at several Minnesota locations, including the Twin Cities; the all-time low is 24 degrees F at Tower in 1897 and again in 1995.

Word of the Week: Thunder-plump

This is a Scottish expression for a sudden thunder shower of relatively short duration. This is often the type that occurs on a highly unstable summer's day

Outlook:

A change in the weather will become more evident this weekend. Temperatures will increase to near normal, but there will be a noticeable increase in dewpoint, therefore increasing the chances for thundershowers. A chance for showers and thunderstorms in the north on Saturday and the south on Sunday. More showers and thunderstorms are expected Monday and Tuesday as well, and some may be heavy. It will be cooler toward the end of next week.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Friday, June 15, 2001

Topic: New Climate Outlooks for July and the Balance of Summer

The new monthly and seasonal climate outlooks were released by the Climate Prediction Center on Thursday of this week. Though the outlook for July in Minnesota calls for near normal rainfall and temperature, the overall outlook for the rest of the summer (July-Sept) calls for cooler than normal temperatures and above normal rainfall.

Topic: A stormy June so far

After reporting that many places around the state had experienced their wettest spring (March through May) in decades, I was hoping that June would bring a respite from this weather pattern. Fat chance. We are barely half way through June and many places have already reported 10 or more days with measurable rainfall. In fact in the Twin Cities for the year so far we have recorded over 20 inches of precipitation, the wettest ever (1891-2001) start through June 15th.

The National Weather Service has been extremely busy this week forecasting severe thunderstorms, tornadoes, and flash flooding. Insurance companies are busy too with claims on flooded basements, hail damage, and wind damage. The average number of days with thunderstorms in June for the Twin Cities area is 7, but we have already had that many and it is just mid-month. It was especially stormy on Wednesday, June 13th, with many record rainfalls. The following reports represent all new record amounts for June 13th....

MSP 2.37 inches Blue Earth 3.70 inches Dawson 2.53 inches
Bricelyn 2.42 inches Faribault 2.38 inches Owatonna 3.50 inches
Sherburn 3.12 inches Waseca 3.13 inches Jackson 2.77 inches
Wells 4.20 inches Windom 2.26 inches Huron, SD 4.93 inches
Sibely, IA 2.59 inches Madison, SD 1.88 inches

Dodge, Mower, and Freeborn counties in SE Minnesota reported from 4-5 inches of rainfall, with many roads flooded. By evening of the 13th tornadoes had been reported in Douglas, Otter Tail, Pipestone, Lincoln, and Morrison Counties.

Record dew points (atmospheric water vapor) also arrived on June 13th. MSP set a new record dew point for the date with a tropical 74 degrees F. Many other places reported record dew points in the low 70s F as well including Marshall, Austin, Pipestone, Willmar, Monevideo, and New Ulm.

Topic: Anniversary of a violent tornado in Iowa

Wednesday of this week (June 13) was the 25 anniversary of the Jordan tornado in Iowa, the last F5 tornado to hit the state. On June 13 of 1976 a family of tornadoes developed between Boone and Ames in central Iowa. The strongest passed through and destroyed the town of Jordan. Miraculously, there were no deaths. Dr. Theodore Fujita, at the time a leading tornado expert visited the site and remarked that he had never seen such damage, much of which was the result of winds in excess of 300 mph. The tornado was reputed to look like a spinning saucer and was on the ground for an hour. To the east of this tornado, a rare sister tornado with clockwise rotation developed. Many people photographed these tornadoes and their destruction (over 100 homes and farm buildings) was well documented. 2000 hogs, 500 cattle, and over 6000 turkeys were lost.

Question from MPR listener: Earlier this week severe weather, including a reported tornado caused damages and injuries near Benson, MN in Swift County. Has Benson ever been hit by a tornado before? Also, do tornadoes occur more frequently in June or July in Minnesota?

Answer: Scanning the state tornado records, I can only find documentation for four other tornadoes passing through Swift county. There were July 15, 1881, August 15, 1911, June 23, 1952, and August 15, 1954. The 1952 tornado actually did over \$675,000 in damages to the Benson area.

In Minnesota, June is the month with the most tornadoes historically. More than 30 percent of all tornadoes reported in the state have occurred during this month. July has the second highest frequency at about 20 percent.

Almanac:

Average Twin Cities maximum temperature for today's date is 78 F (plus or minus 7 degrees standard deviation) and the average minimum is 59 F (plus or minus 7 degrees standard deviation).

MSP records for today's date include: highest maximum temperature of 94 degrees F in 1913; lowest maximum temperature of 61 degrees F in 1945; lowest minimum temperature of 41 degrees F in 1989; highest minimum temperature of 70 degrees F in 1944, 1952, 1973, and 1979; and record precipitation is 0.99 inches in 1938.

Average dewpoint temperature for today is 54 degrees F. The highest dewpoint on this date is 73 degrees F, while the lowest is 32 degrees F.

Scanning the state climatic data base: the all-time high for today's date is 106 degrees F at Lamberton (Redwood County) in 1979; the all-time low is 21 degrees F at Brainerd in 1917.

Word of the Week: CEP

This is an acronym used by environmental scientists to refer to creeping environmental problems. This terminology was coined by Dr. Mickey Glantz of the National Center for Atmospheric Research. There are slow, incremental environmental changes which are overlooked, but nevertheless degrade the quality of our air, land, and water. Some of these include coastal erosion, soil salinity, desertification, and declining shallow aquifers.

Outlook:

Drier over the weekend most places, with a chance for scattered showers in the north on Saturday. Temperatures will be cooler than of late, with overnight lows in the 40s and 50s F and highs in the 60s and 70s F. Dew points will be less as well. A chance for widely scattered showers Monday and Tuesday, but generally a much quieter and cooler week coming up.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Friday, June 29, 2001

Topic: Preliminary Climate Summary for June, 2001

Though roughly half of the days saw below normal temperatures during the month June will end up averaging about normal or even warmer than normal thanks to this week's heat wave. Temperature extremes during the month ranged from 99 degrees F on the 25th at Redwood Falls, Litchfield, Maple Lake, and Benson to 25 degrees F at Orr on June 3rd.

Rainfall in June was mixed with below normal amounts in some northern counties, while many central and southern counties reported above normal rainfall. Long Prairie, Dodge Center, Waseca, Byron, and Albert Lea all reported over 6 inches of rainfall. The heaviest rains occurred on the 13th and 14th when a number of locations received over 3 inches from severe thunderstorms.

There were dozens of tornado, hail, and flash flood reports during the month, most of which occurred on the 11th, the 13th, and the 18th. Twenty-seven counties have reported tornadoes so far this year, while 53 counties have reported hail. The worst damage was the result of a tornado in Siren, WI on the 18th.

Topic: Unusual temperature record at Duluth

On Tuesday, June 26th, this week Duluth reported a new record warm minimum temperature for the date of 70 degrees F. This is only the third time since 1930 that such a high minimum temperature (70 F or higher) has been recorded there in the month of June. Normally, Lake Superior breezes tend to keep the minimum temperatures there much lower during the summer months.

Question from MPR listener: The heat wave and high dew points this week have been very stressful. Is this unusual for June? How often do we have four consecutive days in the 90s F during June here in the Twin Cities?

Answer: On an annual basis since 1891, the Twin Cities show an average of 15 days with temperatures in the 90s F, most of which occur during July and August. June ranks third in the frequency of 90 degree F temperatures. In terms of four consecutive days with such temperatures, there have been 40 such episodes in June over the past 111 years, so that is fairly common. The longest streak was 8 consecutive days back in 1995.

So far we have recorded six days with temperatures of 90 degrees F or above this year. The record is 44 days which occurred in 1988.

Topic: The Legacy of Tropical Storm Allison

This is perhaps the chief weather story for the month of June. Tropical Storm Allison formed rapidly in the Gulf of Mexico and came ashore in Texas back on the 4th. It meandered across the southeast gulf coast states toward Florida, then turned northeast to pass over the southeast Atlantic states, finally exiting over the Atlantic Ocean on the 18th. Some places reported over two feet of rainfall, with a great deal of flash flooding. Over 40,000 homes suffered some form of damage and the Houston, TX area especially suffered when the Texas Medical Center was flooded, destroying millions of dollars worth of equipment and data. The total damage estimates from this storm are likely to exceed \$5 billion, making this the most damaging tropical storm to strike the United States.

Interestingly enough this tropical storm produced the wettest June ever in the Houston area (16.47 inches), surpassing the previous record (16.28 inches) set in 1989 by another tropical storm named Allison. I think that this tropical storm name should now be retired!!!!

Almanac:

Average Twin Cities maximum temperature for today's date is 81 F (plus or minus 8 degrees standard deviation) and the average minimum is 61 F (plus or minus 7 degrees standard deviation).

MSP records for today's date include: highest maximum temperature of 102 degrees F in 1931; lowest maximum temperature of 64 degrees F in 1959; lowest minimum temperature of 47 degrees F in 1924; highest minimum temperature of 83 degrees F in 1931; and record precipitation is 1.40 inches in 1916.

Average dewpoint temperature for today is 58 degrees F. The highest dewpoint on this date is 76 degrees F, while the lowest is 38 degrees F.

Scanning the state climatic data base: the all-time high for today's date is 110 degrees F at Canby (Yellow Medicine County) in 1931; the all-time low is 28 degrees F at Tower (St Louis County) set just last year in 2000.

Words of the Week: Cloud streets

This term refers to a group or arrangement of clouds, usually cumulus that appear as evenly spaced lines or rows. They often occur under high pressure systems. Their alignment is parallel with the wind, most often west to east. This formation results from rising thermals (convection) reaching a condensation level but then limited by a stable layer of air aloft where subsidence causes rapid evaporation, thus limiting the clouds from spreading out.

Outlook:

A chance of showers or thunderstorms, especially late Saturday, with cooler temperatures by Sunday. The first full week of July looks to have temperatures closer to normal and will be reasonably dry after Monday. The 4th of July holiday looks to be bright with seasonably mild temperatures.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Friday, July 6, 2001

Topic: A cold start to July

Sunday morning July 1st brought some record setting lows to the upper midwest, including 39 degrees F at Fargo-Moorhead, 37 degrees F at Grand Forks, ND, and 43 degrees F at Faribault. The next day, July 2nd produced more records, this time cold maximum temperatures, including 66 degrees F at Faribault, 61 degrees F at Mora, 64 degrees F at Willmar and Red Wing, and only 56 degrees F at Hibbing. These cold daytime highs occurred exactly one week after near record-setting upper 90s F the last week of June.

Finally, Thursday morning, July 5th brought the following new record low temperatures to the state.....

27 degrees F at Orr.....27 degrees F at Embarrass and Tower...
32 degrees F at Hibbing....34 degrees F at International Falls...
and 35 degrees F at Ely. The reading of 27 degrees F was just off the all-time state record low for the month of July of 24 degrees F at Tower on July 7th, 1997.

While we have started July on the cool side in the upper midwest, some of the western states have been struggling to meet energy needs as a result of a heat wave, especially in California and Nevada. New record highs set earlier this week included 109 F at Livermore, CA, 119 F at Indio, CA, 118 F at Palm Springs, 106 at Battle Mountain, NV, and 102 at Reno, NV. Perhaps of more relevance to the demands for air conditioner were the record-setting warm overnight lows such as 87 F at Las Vegas, NV, 81 F at Fresno, CA, 75 F at Sacramento, CA and 93 F at Phoenix, AZ.

Topic: Back to back typhoons hit China

Typhoon Durian made landfall in Guangdong Province, southwest of Hong Kong on Sunday of this week. With winds of over 100 mph, and rainfalls exceeding a foot in many places, it is estimated that this storm caused nearly half a billion dollars in damages. On Thursday of this week, a second typhoon, Utor came ashore near Hong Kong, but rapidly weakened to tropical storm status (winds less than 70 mph). However, heavy rains brought flooding to many areas. Utor caused more damages in the Philippines and Taiwan. It is quite unusual to have back to back typhoons over the same area within a week.

MPR listener question: It seems like the frequency of hail is increasing in the Twin Cities area and that we have also seen larger hail occur? Is this observation substantiated by any data?

Answer: Hail data are most typically documented by the National Weather Service when they are 3/4 of an inch diameter or greater. Other sources of data include the crop-hail insurance industry. Recent studies out of the University of Illinois suggest that for some places in the upper midwest, including Minnesota, the frequency of hail reports has increased over previous decades. As to hail size, I don't know of any studies done to determine if this feature shows a change over time.

It has certainly been a busy year for the crop insurance industry so far. Over 50 counties in the state have reported hail already and we still have the month of July ahead of us.

Speaking of hail, on today's date in 1928 a hailstorm at Potter, NE produced a stone which was 5.5 inches in diameter, and seventeen inches in circumference, weighing a pound and a half, one of the biggest ever measured.

Almanac:

Average Twin Cities maximum temperature for today's date is 83 F (plus or minus 8 degrees standard deviation) and the average minimum is 63 F (plus or minus 6 degrees standard deviation).

MSP records for today's date include: highest maximum temperature of 104 degrees F in 1936; lowest maximum temperature of 60 degrees F in 1972; lowest minimum temperature of 49 degrees F in 1942; highest minimum temperature of 77 degrees F in 1988; and record precipitation is 1.95 inches in 1891.

Average dewpoint temperature for today is 60 degrees F. The highest dewpoint on this date is 76 degrees F, while the lowest is 42 degrees F.

Scanning the state climatic data base: the all-time high for today's date is 114 degrees F at Moorhead (Clay County) in 1936 (this represents the all-time state record high, tied with Beardsley which saw the same temperature on July 29, 1917); the all-time low is 32 degrees F at Tower and Embarrass in 1997.

Words of the Week: Quikscat

Since NASA's launch of the Quikscat satellite in the summer of 1999, meteorologists have had a closer look at the wind patterns over the ocean and are better able to forecast the track and intensity of tropical and mid-latitude storms. Reference to Quikscat data most often refer to the surface winds detected by a special on board radar system called a scatterometer. The winds are analyzed at a standard height of 10 meters above sea level. This system is producing much needed data to study the interactions of the Earth's oceans and atmosphere.

Outlook:

Temperatures will remain near seasonal normals for much of the coming week, but with more humidity. There will be a chance for widely scattered showers in the south early Saturday, then again statewide Monday and Tuesday.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Friday, July 13, 2001

Topic: Orr, MN gaining a reputation for cold

On Wednesday, July 11th this week, Orr, MN recorded a low temperature of 37 degrees F. This was the lowest temperature reported that day in the 48 contiguous states, and the second time this month that Orr has reported the nation's low. On the National Weather Service national weather summary Orr has been listed as reported the nation's low 12 times so far this year.

In fact, for the 194 days in the year 2001 so far, Minnesota has reported the nation's lowest temperature (outside Alaska) on 33 days. Over half of these reports have come from either Orr or Flag Island, both of which are relatively new automated reporting stations. Such reports through the national media help to remind visitors to the state...."to bring warm clothes."

Topic: Fire weather

Little rainfall has occurred around the state over the past three weeks, with most areas reporting values that range from just a trace to a few tenths of an inch. In addition two different spells of hot weather, June 25-29 and July 6-9 produced some very high evaporation losses. Consequently, the risk of grass and forest fires has risen considerably, especially in northeastern Minnesota. As of Thursday July 12, the fire danger rating was high to very high in all or parts of St Louis, Cook, Lake, Itasca, Koochiching, Carlton, and Pine Counties.

Fire danger is quite dependent on both weather and landscape variables, including the dead dry fuel load (brush, grass, duff, or trees), continuity or breaks in the vegetation pattern, rainfall deficits, temperature, wind, and low humidity. Despite some rather sultry summer days, Minnesota has also recorded some very windy days, with extremely low humidity (less than 30 percent) already this month. The National Weather Service issues fire weather forecasts on a daily basis which address these critical variables.

Nationally speaking, an average of 1.2 million acres of woodland burns each year and though lightning strikes are the cause of many wild fires, over four out of five are caused by people. There have been over 45,000 fires reported so far this year, over a thousand from Minnesota. Some of the drought-stricken states like Florida, South Carolina and North Carolina have reported over 3,000 fires so far this year.

Updated fire and fire weather information can be found at many web sites, including.....

<http://www.rfl.psw.fs.fed.us/index.html>

(Riverside Fire Lab)

<http://www.nifc.gov/>

(National Interagency Fire Center)

<http://www.ruf.uni-freiburg.de/fireglobe/welcome.html>

(Global Fire Monitoring Center)

<http://www.usatoday.com/weather/wildfire.htm>

(U.S. Fire Danger Page from USA Today newspaper)

<http://www.crh.noaa.gov/mpx/firewx.html>

(Fire Weather Information Page of the National Weather Service)

http://www.dnr.state.mn.us/current_conditions/

(DNR current conditions web site)

MPR listener question: The National Weather Service official record for the Twin Cities starts in 1891. How many record high and low temperatures, and record precipitation values were established during that first year of operation and still exist today - 111 years later?

Answer: Never thought about this one before....good question! Only two maximum temperature records, both set in January of 1891, have lasted for 111 years. Nine minimum temperature records were set in the first year of operations (1891), six during the summer months and three during the fall. Three daily precipitation records were set in 1891 and have lasted for 111 years. The greatest of these was 1.70 inches of precipitation on December 14, 1891, an amount that remains the largest daily precipitation amount ever recorded during the month of December in the Twin Cities.

Almanac:

Average Twin Cities maximum temperature for today's date is 83 F (plus or minus 8 degrees standard deviation) and the average minimum is 63 F (plus or minus 6 degrees standard deviation).

MSP records for today's date include: highest maximum temperature of 105 degrees F in 1936; lowest maximum temperature of 65 degrees F in 1975; lowest minimum temperature of 50 degrees F in 1926 and 1990; highest minimum temperature of 86 degrees F in 1936; and record precipitation is 2.03 inches in 1919.

Footnote: The highest minimum temperature ever recorded in the Twin Cities was on this date in 1936 when it only cooled off overnight to 86 degrees F....not exactly good sleeping weather!!

Average dewpoint temperature for today is 60 degrees F. The highest dewpoint on this date is 75 degrees F, while the lowest is 41 degrees F.

Scanning the state climatic data base: the all-time high for today's date is 111 degrees F at Minnesota City Dam (Winona County) in 1995; the all-time low is 34 degrees F at Tower in 1903.

Word of the Week: Conflagration

This term is used to describe a large and destructive fire which is magnified by strong winds that can carry burning ashes and firebrands across fire breaks or natural barriers like roads, lakes, and rivers. There are obviously very difficult to control.

Outlook:

Warming trend on the way. High temperatures will be mostly in the 80s F over the weekend with a chance for widely scattered showers and thunderstorms beginning late Saturday in the north and west, and then statewide on Sunday and Monday. Chances for stronger thunderstorms increase next week as the temperatures and dew points rise by several degrees.

To: Perry Finelli, Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Friday, July 20, 2001

Topic: Anniversary of Twin Cities Worst Flash Flood

This Monday will be the 14th anniversary of the famous flash flood of 1987 when 10 inches of rainfall fell on the Twin Cities in a six hour period. Nearly every major highway and interstate was turned into a river and more basements were flooded than any storm before or since. The dew point that evening was well into the 70s F, indicating a great deal of water vapor. The storms across the state this week have been fueled by high dew points as well. Each of the last three days, observers have reported dew points in the low to mid 70s F around the state.

Ten inch rains produced flash flooding and mudslides in parts of West Virginia last week, while six inch rains in the Cincinnati, Ohio area produced flash flooding and power outages on Tuesday of this week. The dew point temperature in both of these cases was very high as well. On Tuesday in Cincinnati the National Weather Service reported dew points well into the 70s F, indicating a great deal of water vapor. In fact, many flash flood events in the United States are preceded by dew point temperatures in the 70s F.

MPR listener question: Where can I find pictures of clouds and information on cloud taxonomy on the Internet?

Answer: There are three sites that come to mind (the National Weather Service Storm Prediction Center, Plymouth State College Meteorology Program, and Nature Stock Photography). The URLs are.....

<http://www.spc.noaa.gov/coolimg/>
(Storm Prediction Center)

<http://vortex.plymouth.edu/clouds.html>
(Plymouth State College Cloud Boutique Program)

<http://www.shastahome.com/kee/>
(Nature Stock Photography)

There was an interesting article in this month's Weatherwise magazine about an artist in New York who designed clouds, some beautiful flower-like figures, and then he hired a crop-dusting pilot to execute the drawing of these clouds by leaving vapor trails with his aircraft. Such art drew raves in New York City and was very amusing in general to the residents there. This could start a national trend where cities hire artists to create unique cloud formations in their own skies.

I think we already see some beautiful cloud formations in Minnesota as a result of the effects of variable convection and the collision of many different air masses.

Almanac:

Average Twin Cities maximum temperature for today's date is 83 F (plus or minus 7 degrees standard deviation) and the average minimum is 63 F (plus or minus 6 degrees standard deviation).

MSP records for today's date include: highest maximum temperature of 103 degrees F in 1901; lowest maximum temperature of 62 degrees F in 1912; lowest minimum temperature of 51 degrees F in 1950; and highest minimum temperature of 76 degrees F in 1901, 1935, and 1940; and record precipitation is 2.75 inches in 1987.

Average dewpoint temperature for today is 62 degrees F. The highest dewpoint on this date is 78 degrees F, while the lowest is 42 degrees F.

Scanning the state climatic data base: the all-time high for today's date is 110 degrees F at New London (Kandiyohi County) in 1901; the all-time low is 36 degrees F at Cloquet (Carlton County) and Virginia (St Louis County) in 1944.

Words of the Week: Threat Scores

This is a tool used by the National Weather Service to evaluate the accuracy of precipitation forecasts. There is an article about it by Lee Greci in the current issue of Weatherwise magazine. The Threat Score computes a ratio based on the landscape area forecasted correctly (for a fixed amount of precipitation - snow or rain) compared to the total area forecasted incorrectly plus the area that received precipitation but was not forecasted to. Many Threat Scores are less than 0.3 out of a possible 1.0. This is like batting less than 300 in baseball. But, of course, forecasting precipitation in terms of both the area and amount which a storm will deliver to the landscape is a formidable challenge.....to me far worse than facing the toughest pitcher in baseball.

Outlook:

Continued chances for showers and thunderstorms throughout the weekend, as the warm and humid air mass lingers. It looks like the transition to cooler and drier air will begin on Sunday or Monday.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Friday, Aug 10, 2001

Topic: A sultry week of weather

Heat and humidity dominated the weather headlines this week as the eastern half of the United States baked under a strong high pressure ridge. Many new record maximum temperature values were reported, as well as record warm overnight minimum temperatures.

MSP reported new record-tying or record high dew points on six consecutive days (Saturday through Thursday) earlier this week. The dew point temperatures and Heat Index values (effect of temperature and dew point combined) of those six days are listed below:

Sat (8/4) dew point 76 F	Heat Index 101 F
Sun (8/5) dew point 78 F	Heat Index 109 F
Mon (8/6) dew point 77 F	Heat Index 112 F
Tue (8/7) dew point 77 F	Heat Index 111 F
Wed (8/8) dew point 75 F	Heat Index 97 F
Thu (8/9) dew point 73 F (T)	Heat Index Not significant

(T) = tied record for date

Several places, including Mankato, Montevideo, and New Ulm reported dew points as high as 80 degrees F on Tuesday, while other southern Minnesota locations recorded Heat Index values from 113 to 117 F. This was the most pronounced and longest heat wave for Minnesota since July of 1999, and the first of its kind for early August since a similar 5 day spell in 1896.

This heat wave was primarily the result of high dew point temperatures. Daily maximum temperatures in the 90s F are fairly common for this time of year across Minnesota, with a probability of about 10 percent (one in 10 years) for any given early August date. However, the combination of temperatures in the 90s F with dew points of 70 degrees F or higher has less than a 5 percent probability historically. The combination of temperatures in the 90s F with dew points of 75 degrees F or higher has roughly only a 1 percent probability based on Minnesota's historical climate records.

Such a spell of weather brings a great deal of stress. Weather Service offices were busy all week issuing heat advisories applicable to the general population as well as livestock producers. Crops grown in soils with low water holding capacities were showing more signs of stress and will likely have reduced yields.

MPR listener question: What is the highest dew point ever recorded in Minnesota? Are we seeing a higher frequency of 80 degrees f dew points in the state?

Answer: The highest dew point in the Twin Cities record is 81 degrees

F on July 30, 1999. During that same heat wave, Jackson, MN recorded a dew point of 84 degrees F on July 29th, while Faribault, MN recorded an 84 degrees F dew point on the 30th. These are the highest values I can find in the state records. Incidentally, the Heat Index at Faribault on July 30, 1999 hit 124 degrees F, which I believe is also a state record.

Concerning a higher frequency of 80 degrees F dew points...there is some evidence to suggest this may be happening. Certainly in the Twin Cities area these values have occurred in the post World War II era only on rare occasions (1983, 1995, 1999, and 2001 are some years), and thankfully for rather brief periods of time, usually over just a few hours. Because dew point records were not as routinely kept in the earlier climate observations of the 20th Century, it is hard to discern changes in the long-term frequency. There is some evidence that Minnesota had some very high dew points in the late 19th Century and early 20th Century as well.

Almanac:

Average Twin Cities maximum temperature for today's date is 81 F (plus or minus 8 degrees standard deviation) and the average minimum is 61 F (plus or minus 6 degrees standard deviation).

MSP records for today's date include: highest maximum temperature of 101 degrees F in 1947; lowest maximum temperature of 62 degrees F in 1994; lowest minimum temperature of 46 degrees F in 1904; and highest minimum temperature of 80 degrees F in 1944; and record precipitation is 1.71 inches in 1945. Record Heat Index value for today is 105 degrees F in 1947.

Average dewpoint temperature for today is 58 degrees F. The highest dewpoint on this date is 72 degrees F, while the lowest is 37 degrees F.

Scanning the state climatic data base: the all-time high for today's date is 110 degrees F at Beardsley (Big Stone County) in 1947; the all-time low is 32 degrees F at Tower (St Louis County) in 1982.

Word of the Week: Sultry

This term has various connotations, but in meteorology it is used (along with the term swelter) to refer to hot and humid conditions, where the air feels "close" or even "oppressive." Forecasters may use the term in their narrative discussion when they expect high dew points, or combinations of high temperature and humidity. It is more commonly used in the tropical latitudes, but certainly applied to conditions in Minnesota this week with record dew points and Heat Index values from ~100 to 115 degrees F. Under such conditions thermoregulation (stability of body temperature) for humans and animals becomes a challenge.

Outlook:

The weather trend is for cooler weather (a few degrees below normal) over the weekend. There will be a chance for showers by Saturday night in the north and west, otherwise dry. Temperatures will be more seasonable for much of next week, with an increasing chance for showers and thunderstorms by Tuesday and Wednesday.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Friday, Aug 17, 2001

Topic: New Monthly and Seasonal Climate Outlooks

The Climate Prediction Center released the new monthly and seasonal climate outlooks on Thursday of this week (Aug 16). All of the outlooks call for near normal temperatures and precipitation across the state during the September through November period.

Topic: Classic Minnesota Rebound Effect

Exactly one week after reporting temperatures in the 90s F with Heat Index values exceeding 100 degrees F, Minnesota reported the nation's low this past Monday (August 13th) when Hibbing came in with a minimum temperature of 34 degrees F. This set a new record low for the date at Hibbing. Similarly, both Aitkin and Eveleth reported new record low temperatures on Monday morning of 39 F.

Topic: Remembering the remarkable storm of August 20, 1904

Next Monday marks the 97th anniversary of one of the worst summer thunderstorms to ever strike the Twin Cities area. Well documented by Tom St Martin, Twin Cities weather historian, the 1904 storm is most remembered for knocking down sections of the St Paul high bridge over the Mississippi River and destroying the Tivoli Concert Garden along Bridge St. It remains somewhat a mystery if the storm produced a true tornado in the Twin Cities area, or was a large derecho (straight-line wind storm) resulting from a mesoscale convective complex or family of thunderstorm cells.

This storm started in the late afternoon over northeastern South Dakota and moved rapidly east-southeast, inflicting heavy damage on Renville, McLeod, and Carver counties before reaching the Twin Cities. Many city buildings and farms were destroyed and some livestock were killed. An F4 tornado passed through and destroyed most of the early Waconia settlement.

Human fatalities from this storm totaled 15 in Minnesota, 2 in South Dakota and one in Wisconsin. Economic losses in Minneapolis were estimated to exceed \$500,000 (1904 dollars). No similar loss figures were tabulated for St Paul, but the total was estimated to exceed \$1 million, including \$60,000 allocated for repairing the high bridge.

Minneapolis recorded 1.23 inches of precipitation in 35 minutes and a total of nearly 2.50 inches over 24 hours. The rain gage in St Paul was destroyed so no valid measurement was recorded, though some residents estimated that between 3 and 4 inches fell along with some hail. In terms of wind speed, an anemometer on the Pioneer Press building in St Paul registered winds over 80

mph, with a peak gust of 180 mph before it blew away. In Minneapolis where Weather Bureau instruments survived, a wind speed of 84 mph was recorded, along with a peak one minute wind gust of 110 mph. Even today, these remain the highest recorded wind speeds in the Twin Cities area. Another notable feature of the weather that day was a tropical-like dew point well into the 70s F.

Topic: Forecasting Partners for the Salt Lake City Winter Olympics

A unique blend of public, private, and education institutions will provide weather services for the 19th Winter Olympic Games hosted by Utah this winter. The National Weather Service will provide travel forecasts for visitors, satellite and radar updates for event managers, and basic meteorological and hydrological model guidance for 1 to 7 days ahead. A team of 13 private meteorologists will provide specific forecasts for each competitive venue during the games. They will focus on briefing the managers, judges and competitors for each outdoor event on expected conditions day to day and whether or not there will be changing weather conditions which may effect competitors performance or the safety of specatoters. They will also forecast specifically for the opening and closing ceremonies. Lastly, meteorologists and students from the University of Utah will be responsible for measuring and monitoring the environmental conditions on site at each of the venues. In this context athletic performances can be gaged against the environmental conditions under which they were achieved. All in all, the weather effects on the coming Olympic Games should be well documented and perhaps studied more than those of any previous competitions.

MPR listener question: Last week you talked about the high dewpoints and high Heat Index values in Minnesota. What are the highest known dew point and Heat Index values?

Answer: I can only guess the answer to this question since I do not know of any documentation related to world extremes of dew point or Heat Index. The countries along the Arabian Peninsula typically report the highest dew points and Heat Index values. A Dept of Defense Handbook reports that the highest known dew point in Saudi Arabia is 93 degrees F, while military personnel near the Red Sea have reported values as high as 94 degrees F. This is certainly believable since the shallow waters of the Persian Gulf and the Red Sea can heat up into the 90s F during the summer months. Values in the mid 80s F are fairly common in countries like Kuwait and Yemen. Earlier this week, on August 13th, Kuwait International Airport reported an air temperature of 111 degrees F and a dew point of 84 F, giving a Heat Index value of 144 degrees F. This is probably close to the world's highest value. An article in Weatherwise magazine from 1991 reported a station near the Red Sea with an air temperature of 100 degrees F and a dew point of 91 F, giving a Heat Index value of 152 degrees F. Large amounts of water vapor from the Arabian Sea, the Red Sea and the Persian Guld circulate over the Arabian Peninsula in summer and likely contribute to these extreme values of dew point and Heat Index.

Almanac:

Average Twin Cities maximum temperature for today's date is 82 F (plus or minus 8 degrees standard deviation) and the average minimum is 61 F (plus or minus 6 degrees standard deviation).

MSP records for today's date include: highest maximum temperature of 100 degrees F in 1947; lowest maximum temperature of 63 degrees F in 1997 lowest minimum temperature of 42 degrees F in 1962; and highest minimum temperature of 73 degrees F in 1922, 1934, and 1972; and record precipitation is 1.62 inches in 1905. Record Heat Index value for today is 106 degrees F in 1947 and again in 1972.

Average dewpoint temperature for today is 59 degrees F. The highest dewpoint on this date is 75 degrees F, while the lowest is 39 degrees F.

Scanning the state climatic data base: the all-time high for today's date is 105 degrees F at Campbell (Wilkin County) in 1988; the all-time low is 29 degrees F at Tower (St Louis County) in 1981.

Word of the Week: Tail-end Charlie

This term is used in severe weather forecasting when referring to the last thunderstorm cell at the southernmost edge of a squall line or band of thunderstorms. Because low-level advection of warm, moist air into the storm is unimpeded by other cloud formations, this last thunderstorm cell often has a higher probability of strengthening to a severe level. Storm spotters and radar operators will keep a close eye on such storms during their development.

Outlook:

Continued pleasant temperatures over the weekend, with some clouds and a chance for showers early Saturday, then clearing. A warming trend will start early next week, with a chance for showers late Monday and again on Thursday. Dew points will be on the rise again as more sultry weather settles in for the opening of the State Fair.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Friday, Sep 7, 2001

INTERESTING SEPTEMBER SO FAR.....32 DEGREES F AT EMBARRASS ON THE
1ST AND 95 DEGREES F AT MOORHEAD AND 99 F AT HALLOCK ON THE 5TH!!!

Topic: Fall brings mixed emotions

The month of September brings very noticeable changes....declining day length (roughly 20 minutes per week), falling temperatures (average temperature declines about 3-4 degrees F per week), onset of foliage color change, and for some areas the first frost.

Many people are concerned about the first fall frost. Those suffering from the high pollen (asthma) would prefer to see a frost soon, while many gardeners and crop producers hope that a frost holds off until the end of the month or later. Average first frost dates range from the 7th to the 14th in far northeastern counties to the first week of October in many southern counties. Embarrass already reported a frost this month with 32 degrees F on September 1st. There may be some additional frost in far northern counties early next week.

Fall color changes are eagerly anticipated by many Minnesotans who like to admire the beauty of nature in the northern woods or on a drive along some of the major river valleys. The Department of Natural Resources web site.....

http://www.dnr.state.mn.us/current_conditions/

routinely provides updates on fall colors around the state. Color change occurs first in the far northern counties along the Canadian border, starting about mid September. Southern counties often don't show much color until the first week of October. Reports from the north this week indicate just a few sumac and maples are starting to show color change. Color changes seem to accelerate When overnight temperatures fall into the 30s F for several nights. Some overnight temperatures in the 30s F are predicted for northern Minnesota next week.

Topic: Greening of the northern hemisphere

An interesting article released this week by the NASA Goodard Space Flight Center showed an association between the warming trend in the mid to high latitudes of the northern hemisphere and the greening of the landscape north of 40 degrees latitude. Using satellite data to study the spectral signals from the landscape, NASA scientists have detected a signal for denser vegetation that persists longer in the northern hemisphere growing season, with greater changes seen over Eurasia than over North America. This suggests that the warming trend observed in many areas of the northern hemisphere over the past 20 years has manifested itself

in a longer growing season and the production of more vegetation per unit area of land. This also suggests that more carbon dioxide may be fixed by the denser vegetation at higher latitudes, an uncertain but important feature in studying the global carbon cycle and its implications for global warming.

Topic:

MPR listener question (from Willmar): I attended my son's first school soccer game on Wednesday in 90 degrees F. It was almost unbearable as the boys had to take frequent water breaks. It seems that more often than not, during the first week of school the temperature reverts to mid summer-like conditions. Do you think that this is true?

Answer: You're right about Wednesday....that was a tough day for outdoor sports activity. Temperatures were in the 90s F across much of western Minnesota. Moorhead topped out at 95 degrees F (still 5 degrees F shy of their record for the date of 100 F back in 1947). Examining the climate records of most Minnesota communities shows that there is roughly a 10 percent chance of getting a temperature of 90 degrees F or higher on September 5th. However, the occurrence of a temperature that high on any given day during the first full week of the month (over a period of 7 days) has a likelihood of about 25 to 35 percent, or roughly one year in three or one year in four. This frequency suggests that those who exercise daily during that week will encounter some stressful temperatures fairly often.

Almanac:

Average Twin Cities maximum temperature for today's date is 76 F (plus or minus 9 degrees standard deviation) and the average minimum is 56 F (plus or minus 7 degrees standard deviation).

MSP records for today's date include: highest maximum temperature of 98 degrees F in 1976; lowest maximum temperature of 52 degrees F in 1911; lowest minimum temperature of 40 degrees F in 1956; and highest minimum temperature of 73 degrees F in 1976; and record precipitation is 2.16 inches in 1964. The record Heat Index value for today is 105 degrees F in 1978.

Average dewpoint temperature for today is 54 degrees F. The highest dewpoint on this date is 75 degrees F, while the lowest is 34 degrees F.

Scanning the state climatic data base: the all-time high for today's date is 103 degrees F at Montevideo (Chippewa County) and at Redwood Falls (Redwood County) in 1978; the all-time low is 20 degrees F at Tower (St Louis County) in 1986.

Word of the Week: Pogonip

Much of meteorological jargon is rooted in Latin, Greek, or Arabic

terminology. However this word comes from Native Americans (Indians) who used it to describe a mountain valley fog that is composed of tiny ice crystals. This freezing fog was often observed by them in the western states during the fall and early winter. Pogonip can produce a visually stunning landscape of white-tinted meadows, pastures, and evergreen forests. Actually this term carried a negative connotation for the Native Americans because of perceived harmful health effects. Breathing the air of the pogonip, especially in higher mountain valleys where the air was thin anyway, was thought to be injurious to your lungs, causing wheezing and coughing. This might not have been the ice crystals in the air, but dusts, pollen, or simply the higher elevation.

Outlook:

Windy and showery this weekend, with a cooling trend. Drier weather with cooler temperatures will persist early next week, giving way to a warming trend by Wednesday or Thursday and another chance for showers later in the week.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Friday, Sep 14, 2001

NO RADIO BROADCAST DISCUSSION THIS WEEK IN LIGHT OF NATIONAL MOURNING AND RECOVERY

Topic: Record cold this morning

Both Tower and Embarrass reported morning lows of 26 degrees F this morning (Sept 14). This temperature was the nation's low (outside Alaska) and also record cold for this date at both locations (Tower tied the record value of 26 F set in 1974. Other locations in northern Minnesota also reported lows in the 20s F, including Hibbing, Silver Bay, and Grand Marais. No frosts have been reported in agricultural areas of the state yet.

Topic: Drought Relief for Florida

Tropical Storm Gabrielle has brought drought relief to central Florida with rains of 4 to 8 inches today. Strong winds have created some damage, but many Floridians are grateful for the rainfall, having suffered through many long months of drought and wild fires.

Topic: September Snow

On September 12, 1923 many northern Minnesota locations reported snow, mostly trace amounts. This was one of the earliest dates in history for snowfall. On September 15, 1915 the Twin Cities reported a trace of snow as well, the earliest date in the official records.

Almanac:

Average Twin Cities maximum temperature for today's date is 71 F (plus or minus 9 degrees standard deviation) and the average minimum is 52 F (plus or minus 8 degrees standard deviation).

MSP records for today's date include: highest maximum temperature of 98 degrees F in 1939; lowest maximum temperature of 48 degrees F in 1903 lowest minimum temperature of 33 degrees F in 1996; and highest minimum temperature of 74 degrees F in 1939; and record precipitation is 1.60 inches in 1994.

Average dewpoint temperature for today is 47 degrees F. The highest dewpoint on this date is 67 degrees F, while the lowest is 28 degrees F.

Scanning the state climatic data base: the all-time high for today's date is 100 degrees F at New Ulm, Tracy, and St Peter

in 1939; the all-time low is 22 degrees F at Itasca State Park in 1923.

Outlook:

Continued fall-like weather with cooler than normal temperatures. Highs will reach the 50s and 60s, with lows in the 30s and 40s. Some light precipitation around the state this weekend and again later next week.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Friday, Sep 21, 2001

SHOULD BE A GOOD WEEKEND TO OBSERVE FALL COLORS IN FAR NORTHERN COUNTIES... IF IT IS NOT RAINING.....FOG HAS BEEN UNUSUALLY PERSISTENT FOR THIS TIME OF YEAR AS WELL....

Topic: September 11, 2001: A meteorological perspective

The terrorists who flew commercial aircraft into the World Trade Center in New York City back on September 11th may have factored meteorology into their plans. A cold front with associated thundershowers had just passed through the region the previous night, ending shortly after sunset. As forecasted by the National Weather Service, clearing skies and lighter winds ushered in high pressure on the morning of September 11th, leading to a beautifully clear morning around the region, ideal for visual flight regulations. Written accounts of the incident so far suggest that the terrorists may have crossed into the United States on the 10th and rushed to get tickets earlier on the morning of the 11th at Logan Airport in Boston. Whatever piloting skills they possessed were only minimally challenged by the weather that day, and they probably expected that.

Secondly, atmospheric soundings by the National Weather Service on Long Island show that the overnight inversion persisted in New York City well into the morning hours on the 11th, so that the smoke and debris from the WTC destruction dissipated only very slowly, hanging over the city skyline and spreading laterally like a fog bank. Had the air been more unstable that day with stronger winds, visibility would have improved more rapidly for rescue workers to rush in and help the injured.

It is clear that so much planning and coordination was behind this attack, that it is likely the terrorists considered meteorological factors in the execution of their plot.

Topic: September Snows

Fall-like weather has certainly dominated Minnesota lately. Occasionally intrusions of cold polar air masses in September produce snowfalls in Minnesota. Even the Twin Cities area shows some historical evidence for this, with 15 reported snowfall events of a trace or more recorded during the month. The maximum measured September snowfall in the Twin Cities area was 1.7 inches on the 26th in 1945. All September dates of recorded snowfall in the Twin Cities are listed below, including those of pioneer times.....

9/18/1863 Trace	9/23/1868 0.2 inches
0/28/1883 Trace	9/26/1889 Trace
9/28/1908 Trace	9/29/1908 Trace

9/15/1916 Trace 9/19/1927 Trace
9/20/1927 Trace 9/26/1945 1.7 inches
9/28/1945 Trace 9/28/1951 Trace
9/30/1961 1.0 inches 9/29/1972 Trace
9/23/1985 0.4 inches

MPR listener question: When will the new climate normals for the 1971-2000 period be used by the National Weather Service?

Answer: The National Weather Service announced recently that the new normals will be used as reference for daily temperatures and precipitation beginning in January of 2002. It is interesting to note that the new climate normals (averages) for the Twin Cities show somewhat wetter and cooler summer months compared with the old normals period (1961-1990). On an annual basis, the average precipitation in the Twin Cities has increased by over an inch from the previous normals period (28.32 inches versus 29.41 inches), while the mean temperature has cooled by 0.3 degrees F (44.9 F versus 44.6 F). February is over one degree F warmer than is used to be (17.9 F versus 19.0 F) and July is one degree F cooler than is used to be (73.6 F versus 72.6 F)

Almanac:

Average Twin Cities maximum temperature for today's date is 70 F (plus or minus 10 degrees standard deviation) and the average minimum is 51 F (plus or minus 8 degrees standard deviation).

MSP records for today's date include: highest maximum temperature of 94 degrees F in 1937; lowest maximum temperature of 46 degrees F in 1913 lowest minimum temperature of 32 degrees F in 1974; and highest minimum temperature of 66 degrees F in 1891; and record precipitation is 2.07 inches in 1986.

Average dewpoint temperature for today is 46 degrees F. The highest dewpoint on this date is 69 degrees F, while the lowest is 22 degrees F.

Scanning the state climatic data base: the all-time high for today's date is 101 degrees F at Wheaton (Traverse County) in 1937; the all-time low is 15 degrees F at Pokegama Dam (Itasca County) in 1904 and again in 1934.

Word of the Week: Ann Arbor Flu

The fall season produces some real headaches, itches and sniffles for many who suffer from allergies. One major midwest culprit is ragweed. Cloudy periods with relatively calm winds allow higher concentrations of this pollen to persist in the lower atmosphere. At the University of Michigan as students from others states and countries return to classes in the fall semester there has been

a history of high patient load in the Student Health Services, especially during cloudy periods. Most students exhibit symptoms attributed to the Ann Arbor Flu, later documented to be ragweed allergies.

Outlook:

Cloudy and cool this weekend around the state with a chance for showers late Saturday and into Sunday. Highs will generally be in the 50s and 60s F. Quite cool on Monday and Tuesday, with a possibility of frost, even in southern counties. A warming trend will start on Wednesday pushing temperatures back up towards seasonal averages. There will be an increasing chance for showers near the end of next week.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Friday, Sep 28, 2001

Topic: Soil as a heat source

Chilly weather was prevalent earlier this week as most places in Minnesota recorded a frost either Monday or Tuesday morning. In fact Tower, MN reported the nation's low with 19 degrees F on Monday morning, Embarrass reported the nation's lowest temperature on Tuesday morning with the same value, and then Bigfork reported the nation's low on Wednesday morning with 28 degrees F. The cause of this was a strong high pressure cell centered over Minnesota. This produced dry air, with clear skies and hardly any wind, thus allowing heat from the land surface to readily escape overnight.

Under these conditions, many people noticed white frost on their windshields, on plant leaves, and on blades of grass in the morning, but virtually no signs of frost on the bare soil surface. How is this so? The soil actually stores heat more efficiently during the day than most other surfaces. It does this all summer long and becomes quite a reservoir of heat as we enter the fall season. Thus, it gives off heat at night and prevents the near-surface layer of air from falling to the freezing mark. This characteristic pattern was recorded at the University of Minnesota Climatological Observatory on the St Paul Campus on Tuesday morning. Thermistors measured a soil surface temperature near 35 degrees F at 6 am, while just one foot above the soil surface, a thermistor attached to a pole measured a temperature of 28 degrees F.....a range of 7 degrees F across a paltry 12 inch difference in height. Conversely, on the same morning at the same time, a themistor placed in the grass measured a temperature of 26 degrees F (insulated from the heat contained in the soil below the grass surface), while the air temperature in the instrument shelter approximately 5 ft above the grass surface was 32 degrees F. In fact on calm, clear nights in the fall, some of the largest temperature differences between grass surfaces and standard instrument shelters have been measured, differences as large as 20 degrees F. This proves that there can be remarkable temperature stratification in still, dry air and further indicates how strong overnight temperature inversions can become as the nights get longer.

Topic: A weather service for walkers

The U.K. Meteorological Office initiated a new weather information service for walkers this fall. The office deployed a number of web cameras to offer hikers live pictures from many favorite hiking trails in England and Scotland. These live pictures are accompanied by current weather conditions as recorded by nearby weather stations, along with detailed forecasts of future weather along the hiking trails. Like Minnesotans, many U.K. residents take fall hikes through the hills, mountains, and countryside to observe the bounty and beauty of the color changes, as well as animal behavior, and bird migrations.

This weather service has gained a great deal of visibility for the U.K. Met Office and been quite successful. It might be worth a try in Minnesota..

Topic: Tornadoes in the Washington D.C. area

Late Monday afternoon (Sept 24) two tornadoes passed through the suburbs of the Washington D.C. area causing extensive damage. A weather observer at Reagan Airport reported that one of the tornadoes lifted and passed directly over the Washington Monument before setting down again and causing extensive damage to the University of Maryland in College Park. Three deaths were attributed to the storm, while 47 homes sustained severe damage. In addition, the damage to the University of Maryland campus was extensive and attributed to an F3 tornado (winds of 158 to 206 mph).

MPR listener question: How many tornadoes occurred in Minnesota this year?

Answer: Preliminary data from the National Weather Service indicate that as many as 72 tornadoes were spotted across the state this year. This is a new record number, easily surpassing the previous record of 57 in 1998. Of these 72 tornadoes, 53 were rated F0 on the Fujita Scale (wind speeds less than 73 mph), 12 were rated F1 (wind speeds of 73 to 112 mph), 6 were rated F2 (wind speeds of 113 to 157 mph), and 1 was rated F3 (wind speeds of 158-206 mph). The F2 tornado in Swift County, near Benson on June 11th did perhaps the most damage, while the F3 tornado in Otter Tail and Todd Counties on June 13th thankfully passed over sparsely populated areas.

Almanac:

Average Twin Cities maximum temperature for today's date is 65 F (plus or minus 11 degrees standard deviation) and the average minimum is 45 F (plus or minus 8 degrees standard deviation).

MSP records for today's date include: highest maximum temperature of 91 degrees F in 1898; lowest maximum temperature of 43 degrees F in 1908; lowest minimum temperature of 26 degrees F in 1942; highest minimum temperature of 64 degrees F in 1904; record precipitation is 1.21 inches in 1891; and a trace of snowfall occurred in 1908, 1945, and 1951.

Average dewpoint temperature for today is 44 degrees F. The highest dewpoint on this date is 70 degrees F, while the lowest is 25 degrees F.

Scanning the state climatic data base: the all-time high for today's date is 95 degrees F at Milan in 1897 and again at Montevideo in 1956; the all-time low is 15 degrees F at Tower in 1899 and at Grand Rapids in 1942.

Words of the Week: Weather Breeder

This term can be found in very old books about pioneer settlement of the plains and western states, and refers to exactly the kind of

conditions we have been experiencing in Minnesota this week.....fine fall days, with pleasant temperatures, bright sunshine and light winds. These fine days were thought to be weather breeders, as they were either too good to last, or as superstition would have it Mother Nature would shortly compensate for our over-enjoyment by brewing up a terrible storm. Thus in the 19th century, fine fall weather would certainly be utilized for finishing the harvest and other seasonal chores, but it would also make people a bit edgy, constantly looking at the skies or watching for a change in the winds.

Outlook:

The spell of fine fall weather should continue into the weekend and much of next week. Only a slight chance of showers in the northwest counties this weekend, otherwise sunny and dry. Temperatures will generally be about normal for this time of year. There will be an increasing chance for showers by next Thursday and much cooler weather appears to be in store.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Oct 5, 2001

Topic: Record-setting warmth on Tuesday

Earlier this week on Tuesday (October 2) afternoon, strong southerly winds brought very warm air into parts of western and central Minnesota where high temperature records were set or tied. Hutchinson was the warmest spot with 93 degrees F, setting a new record there for October 2nd. New Ulm also reported a record high with 90 degrees F. Litchfield at 90 degrees F, Montevideo at 90 degrees F, and Willmar at 91 degrees F all tied the record high for October 2nd. In addition the recent absence of significant rains, along with the season ending frosts have dramatically dried out the atmosphere. Afternoon relative humidity values on Tuesday were near record low values as well. Windom reported 19 percent, Willmar 18 percent, Litchfield 15 percent, and Marshall a remarkably low value of 8 percent. Many in the Minnesota countryside remarked what a dry, dusty day it was indeed.

Topic: Symmetry of Minnesota Spring and Fall

The rate at which the sun retreats into the southern latitudes during October is very close to the rate at which it advances into the northern latitudes during the month of March. Does this explain why the daily mean temperature increases 15 degrees in March (from 21 degrees on Mar. 1 to 36 degrees on Mar. 31) and decreases 15 degrees in October (from 55 degrees on Oct. 1 to 40 degrees on Oct. 31).

The heat gain in terms of daily mean temperature during March is in correspondence with the heat loss during October. We also see a gain of a little more than 90 minutes in daylength during March and a loss of more than 90 minutes in October. But there is an interesting discrepancy in the extremes of temperature observed for those months. The extremes for October are a high of 98 degrees F at Beardsley in 1963 (on the 5th) and a low of -16 degrees F at Roseau in 1936 (on the 26th). This is a spread of 114 degrees F for the month. On the other hand the extremes for March are a high of 89 degrees F at Ashby (Douglas County) in 1907 (on the 7th) and a low of -50 degrees F Pokegam Dam in 1897 (on the 2nd). This is a spread of 139 degrees F and considerably greater than that of October. What's the explanation?

The answer is probably snow cover (something we shouldn't talk about until at least Halloween). Snow cover is a greater modifier of March climate in Minnesota as it often exists as a remnant of winter, while the establishment of any extensive snow cover over the state in October is indeed a very rare event, probably less than 10 times in the past 120 years.

Topic: Baseball season wrap-up to be cold

With the regular season extending into October it looks like some outdoor baseball games will be played in very cold weather to wrap up the season this weekend. Chicago and Detroit will see 30s and 40s F, Boston, Baltimore, Kansas city, New York, Cincinnati, Philly, and Pittsburg 40s and 50s F. At least the Twins will be finishing the season in the comfortable confines of the Metrodome.

MPR listener question: What will the weather be like for the Twin Cities marathon this weekend?

Answer: Cold.....but likely dry and with little wind. Temperatures will probably be in the 30s F, so layered clothing may be very appropriate. Runners dissipate the heat they generate by conduction (to their clothing), convection (from the skin), evaporating sweat, and respiration. Clothing style and color has a greater impact on heat storage and dissipation when the sun is out. Some studies have shown that dark colored clothing may keep a runner 3 to 7 degrees F warmer than light colored clothing of the same material. There may be some sun on Sunday as the forecast calls for partly cloudy conditions, with light winds. At least it will be dry.....

Twin Cities Almanac for October 5th:

The average MSP high temperature for this date is 64 degrees F (plus or minus 10 degrees standard deviation), while the average low is 44 degrees F (plus or minus 7 degrees standard deviation).

MSP weather records for this date include: highest daily maximum temperature of 86 degrees F in 1912; lowest daily maximum temperature of 37 degrees F in 1952; lowest daily minimum temperature of 25 degrees F in 1952; highest daily minimum temperature of 62 degrees F in 1955; record rainfall of 2.31 inches in 1911; and a trace of snowfall in 1952.

Average dew point for October 5th is 42 degrees F, with a maximum of 65 degrees F and a minimum of 14 degrees F.

All-time state records for October 5th:

Scanning the state climatic data base: the all-time high for this date is 98 degrees F at Beardsley (Big Stone County) in 1963 (also the highest known Minnesota temperature in the month of October); the all-time low is 11 degrees F at Tower (St Louis County) on this date last year (2000).

Words of the Week: Psychrometric Tables

These are tables used by meteorologists to determine measures of atmospheric water content (dewpoint, vapor pressure, or relative humidity) from the observed dry-bulb and wet-bulb temperature values taken with a psychrometer. Today's modern electronic instrumentation is often programmed to give these values. The term is composed of the Greek word "psychros" meaning cooling, and meter meaning to measure. The cooling power of the air is

related to the water vapor content, the drier the air the more rapidly evaporation, or cooling will occur.

Outlook:

Mostly dry, but quite cool over the weekend with lows in the 20s F and highs in the 40s F. Chance of widely scattered showers (rain or snow) in the north late Saturday. Some moderation early next week with daytime highs mostly in the 50s F. Increasing chances for showers next week beginning on Wednesday.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Oct 12, 2001

Topic: Severe winter of 1916-1917

Though October brings snowfalls with some frequency to northern Minnesota, it is rarely significant in quantity and hardly ever remains on the ground for long. There have been some exceptions to this. October 17-20, 1916 is remembered for one of the earliest fall blizzards to ever occur in Minnesota. Some counties in northwestern Minnesota measured 12 to 16 inches of snowfall from this storm. This storm ushered in one of the snowiest winters of the 20th Century. Though November was relatively quiet, December, January, February, and March were four of the snowiest consecutive months in Minnesota history. In January alone, Tracy, MN (Lyon County) reported 41 inches of snowfall, while Redwood Falls reported 34 inches. One of the snowiest Februarys in history was reported at Red Wing with 23 inches. Duluth reported 48.2 inches in March alone, a monthly snowfall record that stood until January of 1969 when 58.5 inches occurred. Stillwater, MN reported 100 inches of snowfall in the winter of 1916-1917, with many individual heavy snowfalls. In fact, using the modern criteria for declaring snow emergencies, Stillwater would have seen over a dozen episodes that winter.

Snow flurries certainly looks like it may be a possibility in parts of the state for this coming Sunday and Monday.

Topic: Anniversary of the great fires of 1918

On this date in 1918, several major fires broke out in Carlton County, destroying the towns of Brookston, Cloquet, and Moose Lake. This followed a dry August and September in the area. The fires encompassed approximately 1500 square miles, destroyed over 10,000 homes and farm buildings, damaged or destroyed 41 schools, and killed hundreds of people. Weather observers as far away as Massachusetts, New York and Washington D.C. made note of the haze and smoke from these fires.

MPR listener question: How do the standard deviations of the daily maximum and minimum temperature vary with the season?

Answer: Good question. The standard deviation of the daily maximum and minimum temperatures ranges from 12 to 14 degrees F in the winter (Nov-Mar) to as low as 6 to 9 degrees F in the middle of summer (Jun-Aug). This is interesting to ponder in that the standard deviation describes the data range for roughly two-thirds of the historical distribution. The average minimum temperature in July is for the Twin Cities is 60 degrees F plus or minus a standard deviation of 6 degrees F, while the average minimum

temperature for January is just 2 degrees F plus or minus a standard deviation of 14 degrees F. Thus in the summer the standard deviation is about 1/10 of the mean minimum temperature value (a tight range for the meteorologist to forecast), while in the winter the standard deviation is as much as 7 times greater than the mean minimum temperature (giving the meteorologist a rather wide range to forecast).

Topic: A few perspectives on forecasting

Nils Bohr (Nobel Physicist)... "Prediction is very difficult, especially if it's about the future."

William Shakespeare.... "If you can look into the seeds of time, and say which grain will grow and which will not, speak then unto me."

Edgar R. Fiedler (author) ... "He who lives by the crystal ball soon learns to eat ground glass."

Winston Churchill... "I always avoid forecasting beforehand because it is much better to forecast after the event has already taken place."

Anonymous.... "Forecasting is the art of saying what will happen, and then explaining why it didn't."

Twin Cities Almanac for October 12h:

The average MSP high temperature for this date is 59 degrees F (plus or minus 12 degrees standard deviation), while the average low is 41 degrees F (plus or minus 8 degrees standard deviation).

MSP weather records for this date include: highest daily maximum temperature of 87 degrees F in 1975; lowest daily maximum temperature of 32 degrees F in 1909; lowest daily minimum temperature of 23 degrees F in 1917; highest daily minimum temperature of 63 degrees F in 1997; record rainfall of 1.43 inches in 1997; and a 2.0 inches of snowfall in 1959 and 1969.

Average dew point for October 12th is 39 degrees F, with a maximum of 61 degrees F and a minimum of 18 degrees F.

All-time state records for October 12th:

Scanning the state climatic data base: the all-time high for this date is 88 degrees F at North Mankato in 1956 and again at New Ulm and Fairmont in 1975; the all-time low is 0 degrees F at Fosston in 1917 (with snowfall).

Word of the Week: Smirr

This is a Scottish term used to describe a light rain. It dates back many centuries in poetry, as well as meteorology and climatology. Some of the light rains we have experienced so far this fall would probably qualify.

Outlook:

Unsettled weather this weekend with chances for light rain or snow flurries, especially in the north. Much colder weather Sunday through Tuesday, with a chance for scattered showers or snow flurries. Drier with some moderation of temperatures by Wednesday of next week, and perhaps a lingering Indian Summer.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Oct 19, 2001

Topic: Cold...colder....coldest

Embarrass, MN reported a morning low of just 12 degrees F on Wednesday (Oct 17) of this week, the coldest temperature reported from the contiguous 48 states that day. Only Barrow, Alaska at -15 degrees and a few other interior sites in the 49th state were colder than Embarrass.

Topic: New Monthly and Seasonal Climate Outlooks

The new climate outlooks from the Climate Prediction Center reinforce their predictions of last month. The early portion of winter (Nov-Jan) is favored to be colder than normal across the upper midwest including Minnesota. November is expected to be wetter than normal (perhaps more snow), then December through January are expected to have near normal precipitation.

MPR listener question: It seems like every year as we approach Halloween, the weather turns wetter and we see snowfall around the state more frequently. Is this true or am I just dreaming?

Answer: Examining the past 111 years in the Twin Cities climate record shows that the last week of October is slightly wetter than the earlier weeks of the month. The big difference is in snowfall frequency. Though still somewhat rare, there have been over 30 snowfalls during the last week of October in the past 111 years. This frequency is over three times that of any other week in the month.

Topic: Explanation for trend of increasing annual precipitation

As we have mentioned previously on Morning Edition, most locations around Minnesota show an upward trend in annual precipitation over the past 30 years. Recent further studies have given more details about this trend. A current paper in the Bulletin of the American Meteorological Society (Changnon, Sept. 2001) shows that much of the midwest has seen an increase in thunderstorm frequency, and especially an increase in the frequency of heavy thunderstorm rains. This has produced a measurable increase in annual thunderstorm rainfall, the main contributor to total annual precipitation in our region. A second study (Martha Shulski, U of MN) has shown a modest upward trend in winter season snowfall for many locations in Minnesota. This has increased the winter contribution to total annual precipitation as well. However, this is not uniform true across the state, as some locations indeed show a negative trend in winter snowfall.

Twin Cities Almanac for October 19th:

The average MSP high temperature for this date is 57 degrees F (plus or minus 11 degrees standard deviation), while the average low is 38 degrees F (plus or minus 9 degrees standard deviation).

MSP weather records for this date include: highest daily maximum temperature of 84 degrees F in 2000; lowest daily maximum temperature of 31 degrees F in 1930; lowest daily minimum temperature of 15 degrees F in 1972; highest daily minimum temperature of 61 degrees F in 1920; record rainfall of 2.75 inches in 1934 (the wettest day of that entire drought year); and a 1.3 inches of snowfall in 1916. There have been only six measurable snowfalls on this date since 1891.

Average dew point for October 19th is 36 degrees F, with a maximum of 61 degrees F and a minimum of 11 degrees F.

All-time state records for October 19th:

Scanning the state climatic data base: the all-time high for this date is 88 degrees F at Winona in 1950 and at Milan (Chippewa County) last year (2000); the all-time low is 1 degree F at Tower (St Louis County and Karlstad (Kittson County) in 1972.

Word of the Week: Jimsphere

This term refers to a type of valuable weather balloon manufactured in Duluth, MN. It originated about 35 years ago at the University of Minnesota (Twin Cities) where a group of researchers developed a better tracking balloon for NASA to use in its pre-launch weather analysis and forecasting. It is made of aluminum-coated Mylar, enhanced for better stability by the addition of a highly dimpled surface. Such balloons ascend in a somewhat stable manner and are enhanced targets for ground-based radar systems to track. Pre-launch protocol mandates that 6 or more Jimspheres are launched to track winds aloft and test for dangerous wind shear levels. In addition, they provide very detailed information about wind speeds and direction aloft up to 60,000 ft. Even after 30 years, they are still routinely used before Space Shuttle launches from the Kennedy Space Center, or satellite launches from Vandenberg Air Base in California, or other launch sites. I believe that they may be named for one of their inventors, Jim Scoggins, but that is a guess. Today, they are manufactured by Meteorological Products, Inc in Duluth.

Outlook:

Chance of showers in the north on Saturday, spreading to the south on Sunday. Temperatures will decline next week a few degrees cooler than normal. Drier on Monday, but increasing chances for showers and snow flurries for Tuesday through Thursday.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Oct 26, 2001

Topic: First Blizzard and Heavy Snow of the Season

Wednesday, October 24th brought the first blizzard conditions (named Blizzard Al in ND) and heavy snow of the coming winter season. Grand Forks, ND reported a record-setting 10.8 inches of snow, breaking the record for any previous October snowfall (8.2 inches in 1926). Pembina, ND reported a record 10.0 inches of snowfall, while Drayton, ND reported a record 11.0 inches as well. Fargo, ND reported the most October snowfall since 1951.

Snow began falling in the area shortly after midnight and lasted all day long. The North Dakota Highway Patrol reported that 400 vehicles were stuck on I29 between Grand Forks and Thompson by 3 pm in the afternoon. A blizzard warning was maintained from mid morning, throughout the day and into the night on Wednesday, bringing to mind two other famous October Minnesota blizzards....

October 16, 1880, earliest blizzard in Minnesota, struck SW and WC counties. Over a foot of snow in western counties. Huge drifts exceeding 20 ft formed in the Canby area lasted until the next spring when flooding occurred across the Minnesota River Valley.

Oct 19-20, 1916 earliest blizzard of the 20th Century, with up to 15 inches of snow in western counties, and a 50 degrees F temperature drop over 24 hours.

On the Minnesota side of the Red River Valley on Wednesday, Argyle (Marshall County) reported a whopping 14 inches, setting a new record there. Hallock in Kittson County reported 10 inches of snowfall as well, tying their record snowiest October recorded back in 1916. Crookston reported 8 inches of snowfall, also setting a record amount for the date (and the most since 1917. Other record reports included..

8 inches at Thief River Falls (a new record)
8 inches at Roseau (a new record)
7 inches at Red Lake Falls (a new record)
6.5 inches at Ada (a new record)

History shows that significantly heavy October snowfall totals are rather rare in Northwest Minnesota, with 8 or more inches reported only in 1896, 1906, 1913, 1916, 1917, 1919, 1951, 1970, and now 2001.

MPR listener question: (from Dr. Greg Filce, M.D. and former member of the St Paul School Board)...I was driving east

on Wisconsin Hwy 35 on Sunday, October 14th through the town of Luck, WI and right in town I noticed a strip 100 to 200 yards in diameter covered with 1.5 inches of snowfall. Do local pockets of cold air contribute to snowfalls being so local and focused?

Answer: Yes, indeed. This time of year when strong cold air advection aloft spills down over Minnesota and Wisconsin, cold air funnels can drop the freezing level close enough to the ground to prevent snow crystals from melting as they fall from a cloud base. One area on the landscape where the air near the surface is mixed by the wind may see liquid precipitation, while an adjacent area protected from the wind may see snow. As the freezing level in the atmosphere continues to drop this month and next, snowfalls will likely become less local and focal, but more uniform in nature.

Topic: Snowfall trend upward for much of Minnesota

Recent studies of snowfall trends in the state indicate that the long-term trend is upward. Examination of snowfall records for 46 locations around the state over the past 110 years, shows a positive upward trend in total seasonal snowfall at 41 of them, and a negative trend at only 5 locations. For some, there has been an increase in average seasonal snowfall of 15 to 20 inches over the past 100 years. Even for the Twin Cities area, the 117 year average seasonal snowfall is under 46 inches, but for the past 30 winters the average is closer to 57 inches.

Twin Cities Almanac for October 26th:

The average MSP high temperature for this date is 54 degrees F (plus or minus 11 degrees standard deviation), while the average low is 36 degrees F (plus or minus 8 degrees standard deviation).

MSP weather records for this date include: highest daily maximum temperature of 83 degrees F in 1955; lowest daily maximum temperature of 32 degrees F in 1919; lowest daily minimum temperature of 16 degrees F in 1962; highest daily minimum temperature of 59 degrees F in 1989; record rainfall of 1.54 inches in 1941; and 1.3 inches of record snowfall in 1959. There have been only three measurable snowfalls on this date since 1891.

Average dew point for October 26th is 34 degrees F, with a maximum of 60 degrees F and a minimum of 13 degrees F.

All-time state records for October 26th:

Scanning the state climatic data base: the all-time high for this date is 93 degrees F at Chatfield (Fillmore County) in 1927 (the warmest reading ever in the state for so late in October); the all-time low is -16 degrees F at Roseau in 1936.

Words of the Week: phantasmorgorical skies

This term is used to describe complex skies composed of varying cloud types and mixtures of direct and reflected light. In the fall particularly with the low sun angle some rather unique lighting and colors can appear near dawn or sunset. With strong wind added to the mix, the skies appearance can change rapidly as you watch it creating a fantasy before the eyes. Many artists have described this effect and painted it or photographed it.

Outlook:

Cold weather will give way to moderation this weekend, with a return of 50s F by Sunday to some places. Next week looks to be warmer than normal (50s F), with a chance for precipitation by mid week and again towards next weekend. But Mother Nature will be giving us one more opportunity to wrap up our fall outdoor chores.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Nov 2, 2001

Topic: November 1st, 1870 Milestone

Thursday, November 1st this week marked the 131st anniversary of a significant event in U.S. weather history. Systematic weather observations were taken on the morning of November 1, 1870 at 24 sites across the nation, all of which were operated by observers in the U.S. Army's Signal Corps. Their observations were telegraphed to Headquarters in Washington, DC so that a national weather map could be drawn. These observations made on that morning were the first large-scale, synchronous (or synoptic) observations taken across the nation by the predecessor of the current National Weather Service. Seven days later, the mapped analysis of the weather caused the Signal Corps to issue its first winter storm warning to the public on Nov 8, 1870.

Topic: Top Ten Snowiest Novembers in Twin Cities History

1991 46.9 inches (most monthly snowfall in history)
1983 30.4 inches (preceded coldest December of 20th Century)
1940 26.3 inches (Armistice Day Blizzard was most of it)
1985 23.9 inches (heavy snow ended a late corn harvest)
1947 21.8 inches (snow reported on 21 days in the month)
1886 19.6 inches (continuous snow cover after the 16th)
1921 16.6 inches (10 inch snow depth at Thanksgiving)
1978 16.5 inches (started one of the longest winters
with continuous snow cover)
1975 16.2 inches (Edmund Fitzgerald storm)
1988 15.8 inches (blizzard on the 26th-27th)

MPR listener question: What are the all-time statewide temperature extremes reported for the month of November?

Answer: According to the Minnesota State Climatology Office the warmest reading ever in November was the 1st of the month in 1950 when Winona reported a high of 84 degrees F. The only other years which produced a November reading of 80 degrees F or higher in the state were 1933, 1938, 1965 and most recently 1999 when 80 F was reported throughout southern Minnesota on the 14th and golf courses were still doing a flourishing business.

The coldest temperature reported in November was -45 F at Pokegama Dam on the 30th in 1896. 1896 was by far the coldest November in state history, with a statewide average temperature of about 17 degrees F.

Topic: 50 years ago Saturday, November 3rd

Though many are remembering the famous Halloween Blizzard of 1991 this week, few will remember the blizzard and ice storm that occurred on November 3rd, 1951 and started one of the most weather-plagued Novembers in Minnesota history. The blizzard on the 3rd was followed by a severe ice storm on November 14th, while the month concluded with another blizzard in northeastern Minnesota on the 26th. The month brought nearly 16.5 inches of snowfall to St Peter in southern Minnesota. Snow cover persisted in northern Minnesota throughout the month as temperatures remained bitterly cold. An ice jam on the Mississippi River near St Anthony Falls caused extensive damage to barge terminals, warehouses, houseboats, and homes.

Several nights below 0 degrees F were recorded in northern counties, while a number of nights produced single digit lows in the south. Duluth and International Falls recorded 18 days with at least a trace of snowfall. In fact, International Falls began the month with 7 consecutive days of snowfall. Combinations of ice and snow made driving on Minnesota highways extremely hazardous for the entire month.

Twin Cities Almanac for November 2nd:

The average MSP high temperature for this date is 49 degrees F (plus or minus 12 degrees standard deviation), while the average low is 32 degrees F (plus or minus 9 degrees standard deviation).

MSP weather records for this date include: highest daily maximum temperature of 72 degrees F in 1978; lowest daily maximum temperature of 16 degrees F in 1951; lowest daily minimum temperature of 9 degrees F in 1951; highest daily minimum temperature of 57 degrees F in 1938; record rainfall of 0.72 inches in 1901; and 5.3 inches of record snowfall in 1992. There have been ten measurable snowfalls on this date since 1891.

Average dew point for November 2nd is 32 degrees F, with a maximum of 61 degrees F and a minimum of -5 degrees F.

All-time state records for November 2nd:

Scanning the state climatic data base: the all-time high for this date is 80 degrees F at Canby (Yellow Medicine County) in 1965; the all-time low is -11 degrees F at Moose Lake (Carlton County) in 1951.

Word of the Week: Rig

This word is used in many different contexts, nautical (sails and masts), fashion (to be rigged up in an outfit), fishing (tackle), agriculture (rows, furrows and ridges) to name a few. In England and Scotland it has been historically used to refer to autumn gales (winds greater than 32 mph). The rig can blow hard off the Irish Sea and the North Sea, especially in November

similar to what can happen along the Lake Superior shoreline during this month.

Outlook:

Generally warmer and drier than normal for several days...very un-November-like. Chance of showers and cooler temperatures by next Wednesday and for the balance of next week.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Nov 9, 2001

Topic: Early November Warm Spell

All kinds of temperatures records were set earlier this week, with three consecutive days of extraordinary warmth.

On Monday, November 5th the following locations reported record high temperatures....

Wheaton 79 F (new statewide record for Nov 5th)
MSP 71 F Fergus Falls 73 F Mankato 72 F
Redwood Falls 75 F (tied record) Little Falls 73 F
Alexandria 71 F (tied record) Wadena 72 F
Waskish 70 F Orr 70 F Bigfork 70 F
Appleton 73 F Moose Lake 70 F (tied record)
Mora 72 F Morris 75 F New Ulm 73 F
Cambridge 72 F (tied record) Owatonna 70 F
Willmar 75 F Faribault 70 F (tied record)
St James 73 F Red Wing 70 F Princeton 72 F
and Huron, SD reported a record 80 F

On Tuesday, November 6th, the following locations reported record high temperatures....

St Cloud 70 F (tied record) Moose Lake 70 F
Two Harbors 66 F Grand Marais 66 F Grand Portage 67 F
Cambridge 70 F Hutchinson 72 F Litchfield 70 F
Faribault 70 F (tied record) Mora 72 F
Red Wing 70 F Willmar 70 F Princeton 70 F

On Wednesday, November 7th, the following locations reported record high temperatures....

Rochester 73 F (tied record) Hutchinson 72 F
Redwood Falls 73 F Olivia 73 F Windom 72 F
Mankato 75 F St James 73 F Fairmont 75 F
Faribault 75 F Owatonna 75 F Dodge Center 75 F
Albert Lea 75 F (tied record) Austin 75 F
and the following Iowa cities also set new records..
Spencer 74 F Waterloo 78 F Mason City 74 F

Topic: Record Early November Warmth Often Precedes Unfriendly Weather

The first week of November has averaged nearly 15 degrees F above normal in the Twin Cities area and ranks as the 2nd warmest in history. The following list shows the warmest ever first weeks of November (rank order 1-7). Subsequent weather conditions were often harsh (except for 1904)....

1. 1975 Ave Temp 54.7 F...sinking of the ore ship Edmund Fitzgerald on Nov 10th in a severe winter storm, 16.2 inches of snow second half of the month.

2. 2001 Ave Temp 54.2 F....who knows what.....
3. 1978 Ave Temp 50.3 F...winter storm on the 17th with 8.5 inches of snow, 16.5 inches by month's end with single digit temperatures.
4. 1956 Ave Temp 49.9 F...eleven days with snowfall after the 15th of the month and single digit lows.
5. 1904 Ave Temp 48.4 F..sunniest November with 21 clear days, mild all month, only three days of precipitation totaling just 0.3 inches. (exceptional)
6. 1964 Ave Temp 48.3 F..five days of snow the last week of the month with a -17 F low.
7. 1893 Ave Temp 48.0 F (below zero F readings with 8 inches of snow after the 21st)

MPR listener question: Is it true that November is the cloudiest month of the year in the Twin Cities area?

Answer: Yes, in terms of number of cloudy days, November and December average 18 to 19 days. In addition, the climatic data show that November has the fewest number of clear days, with just 5. However, this month is running counter to the historical average, with 85 percent possible sunshine and many clear days already through the 7th of the month.

Twin Cities Almanac for November 9th:

The average MSP high temperature for this date is 43 degrees F (plus or minus 10 degrees standard deviation), while the average low is 28 degrees F (plus or minus 8 degrees standard deviation).

MSP weather records for this date include: highest daily maximum temperature of 70 degrees F in 1999; lowest daily maximum temperature of 22 degrees F in 1945; lowest daily minimum temperature of 12 degrees F in 1926, 1933, and 1945; highest daily minimum temperature of 52 degrees F in 1999; record rainfall of 1.28 inches in 1970; and 4.5 inches of record snowfall in 1983. There have been seven measurable snowfalls on this date since 1891.

Average dew point for November 9th is 26 degrees F, with a maximum of 54 degrees F and a minimum of 3 degrees F.

All-time state records for November 9th:

Scanning the state climatic data base: the all-time high for this date is 83 degrees F at Springfield (Brown County) in 1999; the all-time low is -9 degrees F at Itasca State Park in 1925.

Words of the Week: Arctic Oscillation

This is a feature of the northern hemisphere that has gained increasing attention in recent years because of its influence on winter weather conditions. It is a relative measure of the pressure anomalies in the high latitudes (north of 60 degrees) versus those in the middle latitudes (37-45 degrees). It also refers to the speed of the polar westerly winds which blow at the surface near 55 degrees north latitude. When the surface pressure is unusually high in the Arctic and unusually low in the middle latitudes, the Arctic Oscillation (AO) is said to be in the negative phase (cool) and westerly winds are weak. This leads to more frequent intrusions of cold arctic air into the mid latitudes of North America and Europe. The opposite condition, or positive phase, produces mild winter conditions. Unlike El Niño/La Niña (ENSO) in the Pacific which changes very slowly over months and seasons, the Arctic Oscillation changes phase over periods of just a week or more.

It was one of the features used to predict a colder than normal November in the upper midwest. This was based on its negative phase in evidence in mid-October. However, for most of late October and early November the AO has been in the positive phase, bringing mild temperatures to much of the nation, including Minnesota.

For more information on the Arctic Oscillation, MPR listeners may want to check out the web site.....

<http://horizon.atmos.colostate.edu/ao>

Outlook:

Generally sunny and dry, with above normal temperatures until Wednesday of next week when a weather disturbance will bring a chance for showers. Temperatures will continue at or above seasonal normals. Possibly stormy for the weekend of November 17-18.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Nov 16, 2001

A footnote: MSP will set a new record this month for the most number of days in November with a temperature of 60 degrees F or higher. Already sitting at 9 days, the new record will be 10 or 11 days depending on the conditions of Friday and Saturday. This breaks the old record of 7 days set in 1893, 1930, and 1981.

Topic: The new monthly and seasonal climate outlooks

The Climate Prediction Center released the new monthly and seasonal climate outlooks on Thursday of this week. Their models call for a near normal December with respect to temperature and precipitation (snowfall). However, they state a high likelihood of colder than normal temperature conditions prevailing throughout the heart of winter (December through February), with near normal snowfall.

Topic: More November Temperature Records Fall

Monday, Tuesday, Wednesday, and Thursday of this week brought more record-setting temperatures to Minnesota. On Monday, new record high maximum temperatures were established at the following locations....

MSP 65 F Alexandria 60 F Redwood Falls 69 F
Rochester 62 F Albert Lea 64 F Hutchinson 66 F
Litchfield 66 F Mankato 66 F Owatonna 64 F
Princeton 64 F Red Wing 64 F Moose Lake 59 F
and Willmar with a high of 70 F tied the all-time state record high for the date (at Beardsley in 1941)

On Tuesday, November 13th the following temperature records were set.....

New record high maximum temperatures were reported at the following....

Grand Forks, ND 60 F Bemidji 63 F Fergus Falls 66 F
Roseau 59 F Warroad 59 F Wadena 64 F
Park Rapids 64 (tied record)

In addition, new record warm minimum temperatures were reported at the following locations....

MSP 50 F (tied record) Duluth 44 F (tied record)
Sioux Falls, SD 50 F Sioux City, IA 59 F

On Wednesday, November 14th the following locations reported new record warm minimum temperatures as well...

MSP 52 F Redwood Falls 50 F Rochester 54 F
Duluth 49 F Albert Lea 57 F Hutchinson 54 F
Faribault 54 F New Ulm 54 F Red Wing 57 F
St James 55 F willmar 52 F Montevideo 52 F
La Crosse, WI 55 F Des Moines, IA 59 F

On Thursday, November 15th the following locations reported new record high maximum temperatures....

Rochester 67 F Austin 68 F Winona 70 F
St Peter 70 F St Cloud 65 F Eau Claire, WI 65 F

The cause was warm, moist southerly winds. In fact these brought record-setting high dew points in the 50s F on both Tuesday and Wednesday. (58 F dew point at MSP was 2nd highest ever measured in November). Dew points this high are more common to late August and early September.

The entire first half of November has been record-setting statewide with an overall average temperature between 45 and 46 degrees F. Only two other years have seen November temperatures average over 38 degrees F statewide. Those years were 1899 and 1999. But, of course the month is not over yet and it appears the warm temperatures will be heading south next week.

Topic: Atmospheric dust

Recent studies have shown that there is indeed rather long distant transport of dust in the Earth's atmosphere. NASA scientists have tracked dust plumes from Africa's Sahara Desert clear across the North Atlantic Ocean and over the Carribbean Sea and South America. Similarly they have tracked dust plumes from the Gobi Desert in Asia across the North Pacific Ocean to the west coast of the United States. These are not common occurrences, but typically are associated with large scale wind storms in the late fall, winter, or early spring when the jet stream is stronger and can carry dusts for thousands of miles.

One recent study suggests that iron rich mineral dusts from the Sahara Desert may be linked to variations in the blue-green algal blooms which occur off the coast of Florida. It appears that shortly after these dust plumes fallout over the Caribbean Sea, there is up to a 100-fold increase in algae populations which benefit from the iron fertilization. Some speculate that even Florida's red tides (due to an alga called *Karenia brevis*) may be linked to the deposition of dusts from the Sahara Desert.

MPR listener question: What are the current soil temperatures and when do you think soils will start to freeze?

Answer: Despite the unusual warm air temperatures this month, soil temperatures are ranging in the 40s F to low 50s F. The low sun angle, shorter day length, and recent cloudiness have kept the daily variation in soil temperature rather small. Typically, the soils, along with area lakes do not start to freeze rapidly until overnight air temperatures drop into the single digits. It looks like next week will bring some temperatures like this, so by the end of the month or early December we may see soils freeze up.

Twin Cities Almanac for November 16th:

The average MSP high temperature for this date is 42 degrees F (plus or minus 12 degrees standard deviation), while the average low is 26 degrees F (plus or minus 10 degrees standard deviation).

MSP weather records for this date include: highest daily maximum temperature of 68 degrees F in 1931 and 1953; lowest daily maximum temperature of 17 degrees F in 1927; lowest daily minimum temperature of -2 degrees F in 1933; highest daily minimum temperature of 50 degrees F in 1918; record rainfall of 1.27 in. in 1996; and record snowfall of 10.5 inches in 1909. There have been seventeen measurable snowfalls on this date since 1891, most recently in 1988 (2.7 in.).

Average dew point for today's date is 27 degrees F, with a maximum of 54 degrees F and a minimum of -10 degrees F.

All-time state records for November 16th:

Scanning the state climatic data base: the all-time high for this date is 75 degrees F at Marshall (Lyon County) in 1939; the all-time low is -27 degrees F at Big Falls (Koochiching County) in 1933.

Word of the Week: TOMS

This is a NASA acronym for Total Ozone Mapping Spectrometer, an instrument aboard one of the satellites which provides a measure of ozone and a measure of dust (aerosols) in the atmosphere. It has been used a great deal in recent years to study annual variations in ozone and to follow the trajectory of dust plumes. You can access to the TOMS data and images at the following NASA web site....

http://toms.gsfc.nasa.gov/aerosols/today_plus.html

Outlook:

Continued mild through Saturday, then a shift to colder

conditions beginning on Sunday and carrying into next week. High temperatures will fall into the 30s F with lows in the teens and single digits. Chance of snow in the north early next week, then statewide over the Thanksgiving Hoiiday, primarily Friday and Saturday.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Nov 23, 2001

Topic: Preserving Minnesota's reputation for cold

Part of the state's reputation as an "ice box" has come from the daily national weather roundup issued by the National Weather Service in which they provide the extreme temperatures reported around the nation. Minnesota frequently reports the nation's low or the lowest temperature in the contiguous 48 states, thanks to observers in International Falls, Orr, Hibbing, Tower, Embarrass, Roseau, and Flag Island. So far this year Minnesota has reported the nation's low temperature on 39 days distributed as follows: 3 times in January, 8 times in February, 12 times in March, twice in April, twice in May, twice in June, twice in July, zero times in August, five times in September, three times in October, and so far zero times in November. It is interesting to note that during both August and November Minnesota never reported the nation's lowest temperature but we nevertheless captured some national headlines in reporting a widespread heat wave in early August (Heat Index values from 112 to 118 F) and possibly the warmest November in Minnesota history!

Topic: Record November a Foregone Conclusion

Jim Zandlo, our Minnesota State Climatologist informs us that it is highly likely a new Twin Cities record high mean temperature will be set this November. Based on data collected to date and the forecasts for the remainder of the month November's mean temperature will end up close to 44 degrees F. This would exceed the modern record of 41.8 degrees F in 1999 and even exceed the pioneer record of 42.8 degrees F set at Ft Snelling in 1830.

MPR listener question: It has been such a dry fall in the Twin Cities area. What has been the longest period without measurable precipitation this year?

Answer: Indeed it has been dry. The longest period without measurable precipitation in the Twin Cities this year was 16 days from July 1-16. However, we also recorded a 15 day period without precipitation this fall from September 23 to October 7. These are far from any record dry spell for the Twin Cities area. The longest period without measurable precipitation was 51 days, from November 15, 1943 to January 4, 1944.

Twin Cities Almanac for November 23rd:

The average MSP high temperature for this date is 34 degrees F (plus or minus 10 degrees standard deviation), while the average low is 20 degrees F (plus or minus 10 degrees standard deviation).

MSP weather records for this date include: highest daily maximum temperature of 55 degrees F in 1905; lowest daily maximum temperature of 7 degrees F in 1898; lowest daily minimum temperature of -6 degrees F in 1898; highest daily minimum temperature of 44 degrees F in 1905; record rainfall of 0.89 in. in 1983; and record snowfall of 11.4 inches also in 1983. There have been seventeen measurable snowfalls on this date since 1891, most recently in 1999 (0.7 in.).

Average dew point for today's date is 19 degrees F, with a maximum of 50 degrees F in 1905 and a minimum of -18 degrees F in 1950.

All-time state records for November 23rd:

Scanning the state climatic data base: the all-time high for this date is 65 degrees F at Marshall (Lyon County) in 1974; the all-time low is -31 degrees F at Tower (St Louis County) in 1898.

Word of the Week: Purga (or Poorga)

This is a Russian term to describe the type of storm we call a blizzard. Such storms frequent the tundra regions of Siberia beginning in November. In fact, already this year a number of purgas have passed across Siberia depositing heavy amounts of snow and bringing temperatures of -25 to -35 degrees F.

Outlook:

Unsettled weather over the weekend with declining temperatures and increasing chances for precipitation through Sunday.

Widespread snow is a possibility for early next week, with temperatures dipping below normal to conclude the last few days of November. Some single digit lows may be in order by mid-week.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Nov 30, 2001

BEST QUOTE OF THE WEEK comes from Ralph Bradley, police chief in Clara City, MN commenting on the snow storm of Monday and Tuesday this week, "If you don't know how to cuss, this will teach you."

Topic: Quite a week to finish off November

Just as the news stories were being written about record warmth in November and prolonged dryness this fall, Mother Nature pulled a switch for the last week of the month. Many record precipitation amounts occurred with the all day rain on Saturday, November 24th, including all of the following.....

MSP 1.06" Rochester 0.74" St Cloud 1.07"
Duluth 1.30" Eau Claire, WI 0.84" Canby 1.37"
Dawson 1.45" Springfield 1.43" La Crosse, WI 0.65"
Faribault 0.90" Rosemount 0.90" Staples 1.08"
Aitkin 1.00" Redwood Falls 2.01" Alexandria 0.75"
Grand Rapids 0.98" Grand Marais 1.34" Hibbing 0.79"

In addition, the following observers reported back to back record-setting precipitation values on Saturday (24th) and Sunday (25th)...

Lamberton 1.40" followed by 1.94"
Pipestone 1.50" followed by 1.30"
Sioux Falls, SD 1.92" followed by 1.28"
Worthington 1.35" followed by 1.36"
Winnebago 1.40" followed by 1.09"

So much for the worry over soil moisture deficits.

These record-setting precipitation values were followed by a brief lull, then record-setting snowfall values on Monday and Tuesday of this week, including the 5.9 inches at Chanhassen on Monday. Other record snowfall amounts included...

21 inches at Willmar
18 inches at New London
13 inches at Litchfield
11.4 inches at Sioux Falls, SD
11 inches at Mora
11 inches at St Cloud
11 inches at Milaca
10 inches at Springfield
9 inches at Montevideo

In addition, the water equivalent of this snowfall set new precipitation records for many locations, with many values

from 1 to 2 inches.

Temperatures fell to near normal values after three weeks of unprecedented warmth. Still, November was the warmest in history both locally in the Twin Cities and on a statewide basis, surpassing the record warm 1899 and 1999 Novembers. Overall, the month was wetter than normal most places, ending a string of four consecutive months with below normal precipitation.

Topic: Preliminary Climate Summary for November, 2001

As mentioned, this was the warmest November on record. Most observers reported a monthly average temperature that was 10 to 12 degrees warmer than normal. Extremes for the month ranged from 3 degrees F at Thief River Falls on the 12th to 77 degrees F at Milan and Browns Valley on the 5th.

Though drier than normal in the north, most observers around the state reported above normal precipitation thanks to storms during the last week of the month. Many places reported new record daily values of precipitation on the 24th, 25th, 26th, and 27th. New monthly total precipitation records were established at Sioux Falls, SD with 4.69 inches, Litchfield (Meeker County) with 4.46 inches, Vesta (Redwood County) with 5.07 inches, and Springfield (Brown County) with 4.34 inches.

Numerous places reported record snowfalls on the 26th and 27th (listed above). In addition new record total monthly snowfall values were reported at Willmar with 39.1 inches and at Isle with 20 inches.

MPR listener question: What is the state record for most snowfall in 24 hours and the most from a single storm event?

Answer: Greg Spoden of the Minnesota State Climatology Office just provided these values this week from a scan of the historical data base. Both records come from the Wolf Ridge Environmental Learning Center outside Finland, MN along the northshore. For January 7, 1994 they reported a 24-hour snowfall of 36 inches and for the storm from January 6-8, 1994 (60 hours in duration) a total of 46.5 inches. This single storm value is higher than most record monthly snowfall totals in the state.

MPR listener question: What were the snowfall to liquid water ratios in the storm on Monday and Tuesday of this week? It seemed to be awfully dense snow.

Answer: In parts of the Metro area and southern Minnesota the snow was mixed with rain and sleet as well. This combined with the relatively warm ground temperatures produced a very dense snow cover. Snow to water ratios in this area ranged from 3/1 to 9/1. Some southern counties received all liquid precipitation. Up north where temperatures were 8 to 10 degrees F colder and the cloud deck was not as thick, the snow to water ratios ranged from 15/1 to 30/1.

Twin Cities Almanac for November 30th:

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

MSP weather records for this date include: highest daily maximum temperature of 62 degrees F in 1922; lowest daily maximum temperature of 2 degrees F in 1896; lowest daily minimum temperature of -17 degrees F in 1964; highest daily minimum temperature of 42 degrees F in 1964; record rainfall of 0.84 in. in 1934; and record snowfall of 8.4 inches also in 1934. There have been twenty measurable snowfalls on this date since 1891, most recently in 1996 (0.4 in.).

Average dew point for today's date is 17 degrees F, with a maximum of 48 degrees F in 1922 and a minimum of -21 degrees F in 1964.

All-time state records for November 30th:

Scanning the state climatic data base: the all-time high for this date is 68 degrees F at Montevideo (Chippewa County) in 1922; the all-time low is -45 degrees F at Pokegama Dam (Itasca County) in 1896.

Word of the Week: earmuffs

There is an interesting article in the current issue of Weatherwise magazine about earmuffs. Sometimes called "earlaps", earmuffs were invented by a young Chester Greenwood (15 years old) of Farmington, Maine in 1873. He tired of having cold ears when he was ice skating on frozen ponds in the winter, so he made small ear-shaped wire loops which he asked his grandmother to cover with pieces of fur. He soon refined his model for earmuffs and patented them in 1877. Demand was great, so he built a factory in Farmington, Maine. This and other inventions later in life made him a rich man. He died in 1937, but as a lasting tribute, the first day of winter (solstice) in Maine is referred to as "Chester Greenwood Day." Think about this when you are putting on your next pair of stylish earmuffs.

Outlook:

Chance of light snow and snow flurries in the east on Saturday,

then mostly cloudy Sunday. Highs will remain in the 20s and 30s F. Chance of snow or rain again Tuesday through Thursday next week with warmer temperatures, possibly some 40s F around the state.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Dec 7, 2001

Topic: Record warmth to start December

Hard to believe, but they were playing golf Wednesday at River Oaks Municipal Golf Course in Cottage Grove, MN, having thunder and lightning in northwestern Minnesota, and one-inch hail in Olmsted County (Eyota).

Both Tuesday and Wednesday brought record high temperatures to the region. La Crosse, WI (64 F), Eau Claire, WI (56 F), Mason City, IA (60 F), and Rochester, MN (56 F) reported new record highs on Tuesday (Dec 4th). A warm front brought many more record high temperatures on Wednesday morning, some even before the sun came up. All of the following were new record high temperatures for December 5th.....

Albert Lea 61 F Fairmont 61 F Faribault 59 F
Mankato 61 F New Ulm 63 F St James 63 F
Rochester 61 F MSP 63 F Austin 63 F
Dodge Center 63 F Red Wing 64 F Winona 64 F

The readings at Red Wing and Winona exceeded the all-time state record high for December 6th of 61 F at Canby in 1939!

Even more unbelievable were the new dew point records set on Wednesday. MSP reported a dew point of 58 degrees F (more typical of August), surpassing the all-time highest dew point ever measured in December (53 F in 1982).

MPR listener question: The widespread 60 degree F readings on Wednesday morning made me wonder about the highest temperatures ever during December. What are the state temperature records for the month of December?

Answer: There have been two years when December temperatures have reached 70 degrees F in Minnesota, in 1939 and again in 1998. The all-time high is 74 degrees F at Wheaton on December 6th of 1939. Campbell and Redwood Falls reported 70 degrees F on December 6th of 1998 when a number of citizens were still golfing the first week of the month!

On the other end of extremes, Pokegama Dam reported -57 degrees F on December 31, 1898, the state record low for the month. As recently as 1993, Tower reported -50 degrees F on the day after Christmas.

Twin Cities Almanac for December 7th:

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

low is 14 degrees F (plus or minus 13 degrees standard deviation).

MSP weather records for this date include: highest daily maximum temperature of 54 degrees F in 1939; lowest daily maximum temperature of 1 degrees F in 1972; lowest daily minimum temperature of -20 degrees F in 1972; highest daily minimum temperature of 41 degrees F in 1894; record rainfall of 0.52 in. in 1969; and record snowfall of 6.3 inches also in 1927. There have been twenty-eight measurable snowfalls on this date since 1891, most recently in 2000 (0.2 in.).

Average dew point for today's date is 14 degrees F, with a maximum of 39 degrees F in 1951 and a minimum of -29 degrees F in 1972.

All-time state records for December 7th:

Scanning the state climatic data base: the all-time high for this date is 68 degrees F at Morris (Stevens County) in 1939; the all-time low is -42 degrees F at Pokegama Dam (Itasca County) in 1936 and at Tower (St Louis County) in 1976.

Words of the Week: Cold Wave and Wind Warning Flags

Shortly after the birth of the Weather Service with the formation of the Army Signal Corps in 1870, a method of alerting the public about threatening weather was developed around the use of display flags. Starting in the fall of 1871 at 24 weather stations along coastal areas and inland lakes shipping interests were warned of high winds by the use of red display flags. These flags were square shaped, 8-ft on each side. At Duluth harbor station, the weather station personnel used a similar flag, but 15-ft on each side so it could be seen from greater distance.

The cold wave warning flag was the second official flag signal adopted by the Signal Corps and was used in nearly 300 cities and towns by the mid 1880s. This flag was six-by-eight feet and was white with a black center of two feet square. Weather Service personnel issued a cold wave warning 12 to 36 hours in advance of an expected cold front passage. The criteria for a cold wave warning varied by region, but was usually based on a rapid and large drop in temperature below some critical level that threatened agriculture, commerce, or social activities. The temperature drop of over 25 degrees F in 10 hours that occurred at MSP and Rochester on Wednesday of this week though significant would not qualify as a cold wave because the temperature did not fall below 32 F.

Outlook:

Cloudy with temperatures near normal Saturday and a warming trend returning on Sunday. Generally dry, with a chance for snow in the north by Monday. Increasing cloudiness with a chance for snow statewide later next week.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Dec 14, 2001

Topic: New Monthly and Seasonal Climate Outlooks

The Climate Prediction Center released the new monthly and seasonal outlooks for winter on Thursday this week. Earlier indications of a colder than normal winter for Minnesota have been dismissed in favor of near normal conditions. This is partially based on the inability of CPC to predict what the phase of the Arctic Oscillation and the North Atlantic Oscillation will dominate during the winter months. Significant negative deviations in these northern hemisphere pressure patterns could still bring outbreaks of colder than normal weather, but such deviations are not predictable at this time.

The CPC outlook favors near normal precipitation for the balance of winter (January through March) across Minnesota and the Western Great Lakes Region.

Topic: Christmas Gift Ideas

A NOAA Weather Radio for a relative or friend to keep up to date with the weather, including watches and warnings...\$30 to \$90 depending on features at local RadioShack stores or other electronics stores.

University of Minnesota Extension Service Gardening Calendar, great timely tips for the gardener (sug. retail \$11.95 at local bookstores and garden centers))

Skymaster Weathermeter, pocket-sized meter provides wind speed, temperature, dewpoint, barometric pressure, etc.(\$160, <http://www.speedtech.com/products/wthmeter.asp>)

"Hurricane Watch: Forecasting the Deadliest Storms on Earth" by Bob Sheets and Jack Williams, Vintage Books (\$15 local bookstores or www.vintage.com)

Topics: Probabilities For a White Christmas at the MPR News and Information Stations

Believe it or not the National Climatic Data Center keeps statistics on a white Christmas, defined as having a snow cover of 1 inch or more on Christmas Day. In fact, a map showing the general probabilities for a white Christmas across the United States can be found on their web site at.....

<http://www.ncdc.noaa.gov/pub/data/techrpts/tr9503/fig2.gif>

However, this map is rather general and based on the period from 1961-1990. I used the Minnesota climatic data base to derive similar probabilities for cities that host stations of the MPR News and Information Network. These probabilities were derived from the 1950 to 2000 time period and based on the same criteria used by the National Climatic Data Center....(1" snow cover on Christmas Day)..rounded to the nearest 5 percent...

Station Location	Probability of white Christmas	Station Location	Probability of white Christmas
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KNCM (88.5FM) Appleton	60%	KNBJ (91.3FM) Bemidji	85%
KLNI (88.7FM) Decorah, IA	55%	WSCN (100.5FM) Duluth/Superior	100%
KXLC (91.1FM) La Crescent/La Crosse	70%	KNOW (91.1FM) MSP	75%
KCCD (90.3FM) Moorhead/Fargo	80%	KZSE (90.7FM) Rochester/Winona Albert Lea	65%
KNSR (88.9FM) St Cloud/Collegeville	75%	KNGA (91.5FM) St Peter/Mankato	70%
KNTN (102.7FM) Thief River Falls	85%	WIRN (92.5FM) Virginia/Hibbing	95%
KNSW (91.7FM) Worthington/Marshall	75%	WLSN (89.7FM) Grand Marais	100%
WGGL (91.1FM) Houghton, MI	100%		

So we certainly have some variation around the region. What does it look like for this Christmas? Well eastern sections of the state may see some measurable snowfall next week and again on the 24th and 25th of the month.

MPR listener question: The record string of days with above normal temperatures in the Twin Cities now stands at 47. How long do you think that this will go on?

Answer: It is hard to say. Based on the medium range forecast models temperatures look to stay above normal until perhaps after Christmas Day, when Arctic high pressure may bring some colder than normal readings for the last week of the month. This would run our string of days with above normal temperatures to near 60 days!

Twin Cities Almanac for December 14th:

The average MSP high temperature for this date is 25 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 weather records for this date include: highest daily maximum temperature of 55 degrees F in 1998; lowest daily maximum temperature of -14 degrees F in 1901; lowest daily minimum temperature of -27 degrees F in 1901; highest daily minimum temperature of 38 degrees F in 1891; record rainfall of 1.50 in. in 1891; and record snowfall of 5.3 inches in 1996. There have been twenty-six measurable snowfalls on this date since 1891, most recently a trace in 2000.

Average dew point for today's date is 10 degrees F, with a maximum of 39 degrees F in 1928 and a minimum of -22 degrees F in 1985.

All-time state records for December 14th:

Scanning the state climatic data base: the all-time high for this date is 59 degrees F at Milan (Chippewa County) and Madison (Lac Qui Parle County) in 1998; the all-time low is -48 degrees F at Detroit Lakes (Becker County) in 1901.

Words of the Week: MetLinkInternational

This is the name given to the e-weather school project sponsored each year since 1999 by the Royal Meteorological Society of the United Kingdom. It is designed to link primary and secondary schools around the world in the exchange of daily weather observations, analyses, and lesson plans. The project has been highly successful so far linking nearly 100 schools from 30 different countries. Course materials and internet exchanges help enliven the Earth Sciences curriculum and professional meteorologists help to mentor the teachers and their students with the lessons. The project will run again in 2002 for two time periods, January 21 to February 1, and March 11-15. Minnesota school teachers interested in signing up can go to the web site...

<http://www.royal-met-soc.org.uk/>

or send an email to education@royal-met-soc.org.uk

Outlook:

Temperatures will continue above normal into the weekend with a chance for mixed precipitation or snowfall by Sunday and continuing into Monday. Cloud cover and fog will keep the temperature range rather narrow, but at least a few degrees warmer than normal for much of next week. Another chance for snow on Thursday of next week.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Dec 21, 2001

I would especially like to wish a merry Christmas to the meteorologists and weather support personnel who are giving round the clock, 24-hour forecasts and observations to the military acting in Afghanistan right now.

Topic: Christmas and New Years Storms

The frequency of storms for Christmas Eve and Christmas Day combined is fairly high. For the Twin Cities area since 1891, approximately half the years show precipitation occurring on either of those days, most in the form of snowfall. For the New Years Eve and New Years Day holiday the frequency is just slightly less than 50 percent, again mostly in the form of snowfall.

One of the most unusual Christmas Day storms occurred in 1916 when southern counties experienced a thunderstorm, with lightning. This storm brought rain, sleet, and eventually snow to the area.

Topic: Winter finally arriving

Gardeners who have planted bulbs and farmers who have waited to spread manure have been hoping to see the soil "chill out" for weeks and it looks like it will finally happen. Soil temperatures indicate that many areas now have a frozen soil horizon down to about 3-4 inches. However, many area lakes still show open water, and even where some bays and shallows have frozen over, the ice is quite thin and dangerous. Better ice making weather is in store for next week as overnight temperatures will drop into the single digits, and even below zero in northern areas.

MPR listener question: When was the last Christmas without snow cover in the Twin Cities and how often does that occur?

Answer: The last time was 1997. Other Christmas Days without snow cover include 1988, 1982, 1979, 1977, 1976, 1967, 1965, 1958, 1957, and 1949. Perhaps the most remarkable case was in 1877, which produced one of the warmest Decembers in Minnesota history. Not only was there no snow cover at Christmas time (several days produced daily highs in the 50s F), but the ground was unfrozen as well. Some farmers celebrated New Years Day by plowing their fields.

Twin Cities Almanac for December 21st:

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 weather records for this date include: highest daily maximum temperature of 51 degrees F in 1967; lowest daily maximum temperature of -9 degrees F in 1989; lowest daily minimum temperature of -24 degrees F in 1916; highest daily minimum temperature of 37 degrees F in 1918; record rainfall of 0.46 in. in 1918; and record snowfall of 5.9 inches in 1920. There have been twenty-one measurable snowfalls on this date since 1891, most recently 1.3 inches in 1993.

Average dew point for today's date is 10 degrees F, with a maximum of 47 degrees F in 1967 and a minimum of -33 degrees F in 1989.

All-time state records for December 21st:

Scanning the state climatic data base: the all-time high for this date is 58 degrees F at Winona in 1967; the all-time low is -44 degrees F at Roseau in 1916.

Words of the Week: AUVs and UAVs

In the scientific world great strides have been made in making measurements with unmanned vehicles...and not just in space exploration. There are even Earthly environments where exploration is more feasible, less costly and less risky using specially designed vehicles and instrumentation. The autonomous underwater vehicle, AUV (a pilotless submarine) is used to measure the environment in the deep oceans. Some are being used to explore the ocean floor for the sites of hydrothermal vents. The unmanned aerial vehicle, UAV (pilotless aircraft) is used to measure atmospheric conditions aloft or to take aerial landscape images from high altitude. The military has used UAVs for surveillance, such as in Afghanistan. More recently scientists propose to use UAVs to study the formation and structure of thunderstorms.

Outlook:

Snowy and windy weekend coming up, with perhaps some rain in the southeastern counties. Temperatures will be falling over Saturday and into Sunday. Snow may linger into Monday in the east. Much cooler next week with many highs only in the teens and lows in the single digits to below zero. Another chance for light snow later in the week.

To: Cathy Wurzer, Jim Bickal, Eugene Cha, and Julie Siple
From: Mark Seeley
Re: Suggestions for MPR's Morning Edition, Dec 28, 2001

Topic: Preliminary Climate Summary for December 2001

Following the warmest November on record statewide, December certainly followed the trend. Most places around the state report a mean temperature for the month that is 9 to 11 degrees F warmer than normal. This will certainly place December of 2001 as one of the warmest five historically for many communities in the state. Precipitation was generally below normal around the state, despite the snowfalls that occurred during the last week. Most places reported less than 0.7 inches of liquid water. Only a few spots in southeastern Minnesota had over an inch for the month.

Topic: Review of the weather for 2001

What weather features will Minnesotans most remember about the year 2001? Some likely candidates....

Return to normal winter...especially a very wet and cold February. Minnesota reported the lowest temperature in the 48 contiguous states on 10 days in February. It was also very snowy....Duluth reported over 32 inches, Morris 20 inches, and St Cloud nearly 18 inches...third snowiest February in their respective records.

2nd Wettest ever April....abundant winter snow cover and heavy April snowfalls (6 to 12 inches in western areas) combined with heavy rainfall events later in the month produced flooding on many Minnesota watersheds. Canby, Lamberton, and Worthington all reported over 8 inches of precipitation. Heavy wet snowflakes were observed in the Twin Cities on April 2nd, some with diameters over 2 inches.

Wet May delayed planting of many crops....a damaging tornado occurred in southeastern MN near Glenville.

Numerous tornadoes occurred over June 11-13, including a very damaging one near Benson in western MN. An F-3 tornado destroyed much of Siren, WI on the evening of June 18th.

Heat waves in July and August...high dewpoints (upper 70s F) produced heat index values from 105 to 112 F across Minnesota, especially over August 6-9. This was the third summer in the past 7 (1995 and 1999 being the others) to cause heat stress.

A rare October blizzard struck the northern Red River Valley on the 24th, dumping 8 to 12 inches of snow in places and reducing visibility to near zero. Over 400 vehicles were

stalled on I29 for several hours.

The fall season was dry and mild producing the warmest ever November for the state. Thankfully, beneficial soaking rains occurred to replenish soil moisture reserves.

A record dewpoint of 58 degrees F was recorded in the Twin Cities on December 5th....this was higher than any previous value measured in December.

A record string of days with above normal temperatures (57) in the Twin Cities and other communities ended on Christmas Eve.

Minnesota reported a record number of tornadoes in 2001 with 74. Nation-wide 1033 tornadoes were reported, less than each of the three previous years.

Nationally.....drought helped lead to water rationing and an extreme outbreak of wildfires in Florida in 2001...and drought also plagued the Pacific Northwest..notably WA, OR, and MT..

Tropical Storm Allison in June was probably the biggest weather story of 2001. It produced 15 to 20 inch rains over eastern Texas and Louisiana, then proceeded across the other Gulf states and up the Atlantic coast...eventually causing 48 deaths several billion dollars in damages.

After a rare snowless November, Christmas week delivered a near record-setting snowfall to western New York, with areas around Buffalo reported nearly 6 ft.

Internationally.....Typhoon Nari caused extensive damage and loss of life in Japan and Taiwan when it passed across those island nations in mid-September.

In early November Hurricane Michelle hit Cuba with a large storm surge, high winds, and heavy rains causing severe damages.

Great Britain recorded the warmest October in history (back to 1659)...

MPR listener question: Did the Twin Cities streak of above normal daily temperatures end earlier this week?

Answer: Yes, on Christmas Eve a mean daily temperature of 14 degrees F in the Twin Cities was 1 degree F colder than normal, ending the string of above normal days at 57.

Twin Cities Almanac for December 28th:

The average MSP high temperature for this date is 25 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 9 degrees F (plus or minus 12 degrees F standard deviation).

MSP weather records for this date include: highest daily maximum temperature of 45 degrees F in 1896; lowest daily maximum temperature of -12 degrees F in 1917; lowest daily minimum temperature of -23 degrees F in 1917; highest daily minimum temperature of 30 degrees F in 1940; record precipitation of 1.09 in. in 1982; and record snowfall of 12.0 inches also in 1982. There have been twenty-six measurable snowfalls on this date since 1891, most recently 0.6 inches in 1997. Record snow depth on this date is 19 inches in 1968.

Average dew point for today's date is 13 degrees F, with a maximum of 39 degrees F in 1984 and a minimum of -26 degrees F in 1976.

All-time state records for December 28th:

Scanning the state climatic data base: the all-time high for this date is 59 degrees F at Winona in 1984; the all-time low is -51 degrees F at Big Falls (Koochiching County) in 1933.

Word of the Week: Scharnitzer

This is the term used for a cold, northerly wind in Austria. We have certainly experienced such a wind this past week. It sounds unfriendly that's for sure.....

Outlook:

Colder and cloudy for much of the weekend with a chance of light snow. Some warm up by the end of next week.