U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data,
and Information Service

Climatography of the United States No. 20 1971-2000

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, North Carolina 28801
www.ncdc.noaa.gov

Station: ST PAUL, MN **COOP ID: 217377**

Climate Division: MN 6 **NWS Call Sign:** **Elevation: 900 Feet** **Lat: 44˚58N** **Lon: 93˚02W**

Temperature (˚F)

	Mean (1)			Extremes										Degree Days (1) Base Temp 65		Mean Number of Days (3)					
Month	Daily Max	Daily Min	Mean	Highest Daily(2)	Year	Day	Highest Month(1) Mean	Year	Lowest Daily(2)	Year	Day	Lowest Month(1) Mean	Year	Heating	Cooling	Max >= 100	Max >= 90	Max >= 50	Max <= 32	Min <= 32	Min <= 0
Jan	22.8	6.2	14.5	57	1981	24	26.7	1990	-29+	1994	18	3.3	1982	1567	0	.0	.0	.2	23.7	30.8	12.1
Feb	29.7	13.0	21.4	61	2000	29	32.6	1998	-32	1996	2	11.4	1989	1221	0	.0	.0	1.1	15.8	26.7	6.8
Mar	41.7	23.9	32.8	83	1986	29	41.4	1973	-25	1962	1	24.9	1996	999	0	.0	.0	7.2	6.5	24.2	1.4
Apr	58.2	36.2	47.2	93	1980	21	55.5	1977	3	1995	4	40.1	1975	540	5	.0	.1	22.5	.4	11.2	.0
May	71.2	48.5	59.9	93	1969	27	69.1	1977	21	1967	3	54.2	1997	217	56	.0	.5	30.7	.0	1.0	.0
Jun	79.1	57.6	68.4	100	1985	8	74.2	1988	36	1993	1	62.8	1982	45	145	@	2.4	30.0	.0	.0	.0
Jul	83.2	62.7	73.0	105	1988	31	77.2	1988	45+	1972	4	65.6	1992	13	258	.2	4.9	31.0	.0	.0	.0
Aug	80.8	60.7	70.8	103	1988	1	76.4	1983	42	1986	27	65.8	1992	21	199	.1	2.8	31.0	.0	.0	.0
Sep	71.8	51.7	61.8	95	1976	7	68.5	1978	26	1965	26	54.6	1993	145	49	.0	.7	29.7	.0	.4	.0
Oct	59.4	40.1	49.8	88	1997	3	57.1	1973	15	1996	31	45.0	1988	475	3	.0	.0	25.5	.2	6.7	.0
Nov	40.5	26.1	33.3	75	1978	3	41.5	1999	-14	1964	30	24.4	1991	952	0	.0	.0	6.9	7.6	22.8	.5
Dec	26.7	12.3	19.5	66	1998	1	29.1	1979	-29	1983	19	5.5	1983	1411	0	.0	.0	.3	20.7	30.4	7.1
Ann	55.4	36.6	46.0	105	Jul 1988	31	77.2	Jul 1988	-32	Feb 1996	2	3.3	Jan 1982	7606	715	.3	11.4	216.1	74.9	154.2	27.9

+ Also occurred on an earlier date(s)

@ Denotes mean number of days greater than 0 but less than .05

Complete documentation available from: www.ncdc.noaa.gov/oa/climate/normals/usnormals.html

(1) From the 1971-2000 Monthly Normals

(2) Derived from station's available digital record: 1956-2001

(3) Derived from 1971-2000 serially complete daily data

Issue Date: February 2004

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Precipitation (inches)

Precipitation Totals

Month	Means/ Medians(1) Mean	Means/ Medians(1) Median	Extremes Highest Daily(2)	Year	Day	Highest Monthly(1)	Year	Lowest Monthly(1)	Year
Jan	1.02	.97	1.28	1975	11	3.12	1975	.12	1990
Feb	.78	.70	1.08	1965	10	2.52	1981	.01	1987
Mar	1.92	1.64	1.66	1998	31	4.34	1998	.35	1994
Apr	2.54	2.29	2.62	1975	28	6.92	1975	.19	1987
May	3.73	3.71	3.49	1973	22	8.57	1991	.84	1976
Jun	4.98	4.93	4.97	1965	1	9.70	1990	.49	1988
Jul	4.41	4.19	5.47	1987	24	11.56	1987	1.24	1974
Aug	4.37	4.58	4.49	1977	31	9.41	1993	1.47	1976
Sep	3.20	2.90	3.90	1992	16	7.59	1986	.94	1974
Oct	2.51	2.18	2.47	1966	15	6.03+	1984	.33	1978
Nov	2.09	1.78	1.62	2001	24	5.27	1996	.13	1976
Dec	1.04	.99	1.89	1982	25	3.55	1982	.21	1986
Ann	32.59	32.97	5.47	Jul 1987	24	11.56	Jul 1987	.01	Feb 1987

Mean Number of Days (3)

Month	Daily Precipitation >= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	8.1	2.7	.2	.1
Feb	6.3	2.6	.3	.0
Mar	8.7	4.8	1.1	.2
Apr	9.6	5.8	1.8	.3
May	11.3	7.2	2.5	.8
Jun	10.5	7.3	3.2	1.3
Jul	10.1	7.0	2.5	1.2
Aug	10.6	6.4	2.9	1.3
Sep	9.8	6.0	1.9	.7
Oct	8.6	4.7	1.6	.5
Nov	7.8	4.1	1.2	.3
Dec	8.3	2.9	.4	.1
Ann	109.7	61.5	19.6	6.8

Precipitation Probabilities (1)

Probability that the monthly/annual precipitation will be equal to or less than the indicated amount

Monthly/Annual Precipitation vs Probability Levels
These values were determined from the incomplete gamma distribution

Month	.05	.10	.20	.30	.40	.50	.60	.70	.80	.90	.95
Jan	.19	.28	.43	.57	.71	.86	1.03	1.24	1.52	1.96	2.39
Feb	.10	.17	.28	.38	.50	.63	.77	.95	1.20	1.60	1.98
Mar	.49	.68	.95	1.20	1.44	1.70	1.98	2.32	2.76	3.45	4.10
Apr	.50	.72	1.10	1.44	1.79	2.16	2.58	3.09	3.77	4.85	5.88
May	1.19	1.54	2.07	2.51	2.95	3.39	3.88	4.46	5.20	6.35	7.42
Jun	1.56	2.03	2.73	3.34	3.92	4.52	5.18	5.96	6.96	8.52	9.97
Jul	1.37	1.79	2.41	2.95	3.46	4.00	4.59	5.28	6.18	7.57	8.86
Aug	1.79	2.19	2.75	3.22	3.66	4.10	4.58	5.13	5.84	6.91	7.88
Sep	1.10	1.40	1.84	2.22	2.57	2.94	3.34	3.81	4.41	5.34	6.20
Oct	.43	.65	1.02	1.36	1.71	2.10	2.53	3.06	3.77	4.91	6.00
Nov	.26	.43	.72	1.02	1.32	1.66	2.06	2.55	3.22	4.31	5.36
Dec	.21	.30	.45	.59	.73	.88	1.06	1.26	1.53	1.97	2.39
Ann	22.46	24.39	26.89	28.79	30.49	32.13	33.84	35.72	38.02	41.36	44.26

\+ Also occurred on an earlier date(s)
\# Denotes amounts of a trace
@ Denotes mean number of days greater than 0 but less than .05
****** Statistics not computed because less than six years out of thirty had measurable precipitation

(1) From the 1971-2000 Monthly Normals
(2) Derived from station's available digital record: 1956-2001
(3) Derived from 1971-2000 serially complete daily data

Complete documentation available from:
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Snow (inches)

Snow Totals

Means/Medians (1)

Month	Snow Fall Mean	Snow Fall Median	Snow Depth Mean	Snow Depth Median
Jan	11.7	11.0	9	9
Feb	7.9	6.4	10	8
Mar	9.4	8.0	4	3
Apr	3.0	1.6	#	#
May	.0	.0	#	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	#	.0	0	0
Oct	.4	.0	#	0
Nov	8.0	7.8	2	1
Dec	9.2	7.8	5	4
Ann	49.6	42.6	N/A	N/A

Extremes (2)

Month	Highest Daily Snow Fall	Year	Day	Highest Monthly Snow Fall	Year	Highest Daily Snow Depth	Year	Day	Highest Monthly Mean Snow Depth	Year
Jan	13.6	1982	23	31.8	1982	32	1982	23	17	1997
Feb	6.4	1990	16	16.2+	1979	32	1979	21	26	1979
Mar	14.0	1985	4	25.4	1985	24	1979	5	14	1979
Apr	8.3	1985	1	18.3	1983	12	1975	2	3	1975
May	.2	1976	3	.2	1976	2	1984	1	#+	1989
Jun	.0	0	0	.0	0	0	0	0	0	0
Jul	.0	0	0	.0	0	0	0	0	0	0
Aug	.0	0	0	.0	0	0	0	0	0	0
Sep	#	1985	25	#+	1985	0	0	0	0	0
Oct	4.0	1991	31	4.0	1991	4	1991	31	#+	1997
Nov	12.5	1983	24	27.5	1983	17	1983	29	9	1991
Dec	15.1	1982	28	18.2	1982	24	1996	23	15	1996
Ann	15.1	Dec 1982	28	31.8	Jan 1982	32+	Jan 1982	23	26	Feb 1979

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	8.8	3.4	1.1	.4	.1
Feb	6.4	2.6	.7	.2	.0
Mar	5.1	2.7	1.1	.4	@
Apr	1.9	.8	.3	.2	.0
May	@	.0	.0	.0	.0
Jun	.0	.0	.0	.0	.0
Jul	.0	.0	.0	.0	.0
Aug	.0	.0	.0	.0	.0
Sep	.0	.0	.0	.0	.0
Oct	.4	.1	@	.0	.0
Nov	4.9	2.4	.7	.3	.1
Dec	8.3	2.9	.9	.4	@
Ann	35.8	14.9	4.8	1.9	.2

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	28.0	25.8	22.5	12.6
Feb	24.6	23.1	20.3	12.6
Mar	14.6	11.6	9.5	4.4
Apr	1.8	.9	.6	.2
May	@	.0	.0	.0
Jun	.0	.0	.0	.0
Jul	.0	.0	.0	.0
Aug	.0	.0	.0	.0
Sep	.0	.0	.0	.0
Oct	.1	@	.0	.0
Nov	6.9	4.2	2.5	.3
Dec	21.9	14.9	10.1	3.7
Ann	97.9	80.5	65.5	33.8

+ Also occurred on an earlier date(s) #Denotes trace amounts

@ Denotes mean number of days greater than 0 but less than .05

-9/-9.9 represents missing values
Annual statistics for Mean/Median snow depths are not appropriate

(1) Derived from Snow Climatology and 1971-2000 daily data

(2) Derived from 1971-2000 daily data

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Freeze Data

Spring Freeze Dates (Month/Day)

Temp (F)	Probability of later date in spring (thru Jul 31) than indicated(*)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	5/25	5/20	5/16	5/13	5/10	5/07	5/04	5/01	4/26
32	5/14	5/09	5/05	5/02	4/29	4/27	4/24	4/20	4/15
28	5/03	4/28	4/24	4/21	4/18	4/15	4/12	4/09	4/04
24	4/20	4/16	4/14	4/11	4/09	4/07	4/05	4/02	3/29
20	4/13	4/09	4/06	4/04	4/02	3/30	3/28	3/25	3/21
16	4/07	4/03	3/30	3/27	3/25	3/22	3/19	3/16	3/11

Fall Freeze Dates (Month/Day)

Temp (F)	Probability of earlier date in fall (beginning Aug 1) than indicated(*)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	9/16	9/20	9/22	9/25	9/27	9/29	10/01	10/04	10/07
32	9/21	9/26	9/29	10/02	10/05	10/07	10/10	10/13	10/18
28	10/01	10/06	10/10	10/14	10/17	10/20	10/23	10/27	11/02
24	10/15	10/20	10/23	10/26	10/29	11/01	11/04	11/08	11/12
20	10/25	10/30	11/02	11/05	11/07	11/10	11/13	11/16	11/20
16	11/02	11/07	11/10	11/13	11/16	11/19	11/22	11/26	12/01

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	155	149	145	142	139	136	132	128	123
32	177	171	166	162	158	154	150	145	138
28	207	198	191	186	181	176	170	164	155
24	220	214	209	206	202	199	195	190	184
20	237	231	226	222	219	215	212	207	201
16	256	249	244	240	236	232	228	223	216

***** Probability of observing a temperature as cold, or colder, later in the spring or earlier in the fall than the indicated date.

0/00 Indicates that the probability of occurrence of threshold temperature is less than the indicated probability.

Derived from 1971-2000 serially complete daily data

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Degree Days to Selected Base Temperatures (˚F)

Heating Degree Days (1)

Base Below	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
65	1567	1221	999	540	217	45	13	21	145	475	952	1411	7606
60	1412	1081	844	402	126	12	1	3	66	331	802	1256	6336
57	1319	997	751	326	85	4	0	1	35	255	712	1163	5648
55	1257	941	690	279	63	2	0	0	22	209	653	1101	5217
50	1102	801	545	178	25	0	0	0	5	116	513	946	4231
32	570	355	142	10	0	0	0	0	0	3	133	442	1655

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	26	57	166	466	862	1090	1268	1201	893	554	172	55	6810
55	0	0	1	44	212	402	555	488	225	47	2	0	1976
57	0	0	0	31	172	344	493	426	179	31	0	0	1676
60	0	0	0	17	120	262	401	336	119	14	0	0	1269
65	0	0	0	5	56	145	258	199	49	3	0	0	715
70	0	0	0	1	20	63	140	96	13	0	0	0	333

Growing Degree Units (2)

Base	Growing Degree Units (Monthly)												Growing Degree Units (Accumulated Monthly)											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
40	0	3	48	258	614	855	1028	955	654	323	51	2	0	3	51	309	923	1778	2806	3761	4415	4738	4789	4791
45	0	1	19	156	461	705	873	800	505	202	18	0	0	1	20	176	637	1342	2215	3015	3520	3722	3740	3740
50	0	0	6	85	319	555	718	645	364	112	7	0	0	0	6	91	410	965	1683	2328	2692	2804	2811	2811
55	0	0	1	43	194	408	563	490	232	51	1	0	0	0	1	44	238	646	1209	1699	1931	1982	1983	1983
60	0	0	0	18	104	268	409	337	128	15	0	0	0	0	0	18	122	390	799	1136	1264	1279	1279	1279
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	1	30	158	374	556	693	636	397	181	26	0	0	1	31	189	563	1119	1812	2448	2845	3026	3052	3052

(1) Derived from the 1971-2000 Monthly Normals
(2) Derived from 1971-2000 serially complete daily data
Note: For corn, temperatures below 50 are set to 50, and temperatures above 86 are set to 86

Complete documentation available from:
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Notes

a. The monthly means are simple arithmetic averages computed by summing the monthly values for the period 1971-2000 and dividing by thirty. Prior to averaging, the data are adjusted if necessary to compensate for data quality issues, station moves or changes in station reporting practices. Missing months are replaced by estimates based on neighboring stations.

b. The median is defined as the middle value in an ordered set of values. The median is being provided for the snow and precipitation elements because the mean can be a misleading value for precipitation normals.

c. Only observed validated values were used to select the extreme daily values.

d. Extreme monthly temperature/precipitation means were selected from the monthly normals data.
Monthly snow extremes were calculated from daily values quality controlled to be consistent with the Snow Climatology.

e. Degree Days were derived using the same techniques as the 1971-2000 normals.
Compete documentation for the 1971-2000 Normals is available on the internet from:
www.ncdc.noaa.gov/oa/climate/normals/usnormals.html

f. Mean "number of days statistics" for temperature and precipitation were calculated from a serially complete daily data set .
Documentation of the serially complete data set is available from the link below:

g. Snowfall and snow depth statistics were derived from the Snow Climatology.
Documentation for the Snow Climatology project is available from the link under references.

Data Sources for Tables

Several different data sources were used to create the Clim20 climate summaries. In some cases the daily extremes appear inconsistent with the monthly extremes and or the mean number of days statistics. For example, a high daily extreme value may not be reflected in the highest monthly value or the mean number of days threshold that is less than and equal to the extreme value. Some of these difference are caused by different periods of record. Daily extremes are derived from the station's entire period of record while the serial data and normals data were are for the 1971-2000 period. Therefore extremes observed before 1971 would not be included in the 1971-2000 normals or the 1971-2000 serial daily data set. Inconsistencies can also occur when monthly values are adjusted to reflect the current observing conditions or were replaced during the 1971-2000 Monthly Normals processing and are not reconciled with the Summary of the Day data.

a. Temperature/ Precipitation Tables
   1. 1971-2000 Monthly Normals
   2. Cooperative Summary of the Day
   3. National Weather Service station records
   4. 1971-2000 serially complete daily data

b. Degree Day Table
   1. Monthly and Annual Heating and Cooling Degree Days Normals to Selected Bases derived from 1971-2000 Monthly Normals
   2. Daily Normal Growing Degree Units to Selected Base Temperatures derived from 1971-2000 serially complete daily data

c. Snow Tables
   1. Snow Climatology
   2. Cooperative Summary of the Day

d. Freeze Data Table
   1971-2000 serially complete daily data

References

U.S. Climate Normals 1971-2000, www.ncdc.noaa.gov/normals.html
U.S. Climate Normals 1971-2000-Products Clim20, www.ncdc.noaa.gov/oa/climate/normals/usnormalsprods.html
Snow Climatology Project Description, www.ncdc.noaa.gov/oa/climate/monitoring/snowclim/mainpage.html
Eischeid, J. K., P. Pasteris, H. F. Diaz, M. Plantico, and N. Lott, 2000: Creating a serially complete, national daily time series of temperature and precipitation for the Western United States. J. Appl. Meteorol., 39, 1580-1591,
www1.ncdc.noaa.gov/pub/data/special/ serialcomplete_jam_0900.pdf