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: MORA, MN **COOP ID: 215615**

Climate Division: MN 6 **NWS Call Sign:** **Elevation: 1,005 Feet** **Lat: 45˚53N** **Lon: 93˚18W**

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	21.1	-6.1	7.5	54	1942	23	19.4	1990	-46+	1977	9	-7.1	1982	1785	0	.0	.0	.1	25.5	31.0	19.0
Feb	28.2	1.0	14.6	58	1932	28	29.7	1998	-46+	1982	5	2.2	1989	1411	0	.0	.0	.6	17.0	27.7	12.3
Mar	39.8	15.1	27.5	78+	1968	30	36.7	2000	-35	1962	1	20.1	1996	1164	0	.0	.0	5.2	7.5	28.3	4.6
Apr	55.9	29.5	42.7	94	1980	21	50.4	1977	-4	1975	1	36.4	1975	669	0	.0	.1	20.3	.6	18.6	.1
May	69.7	41.0	55.4	107	1934	31	63.6	1977	17	1988	16	49.9	1983	321	22	.0	.4	29.9	.0	5.6	.0
Jun	78.3	50.6	64.5	101	1934	1	70.0	1988	23	1988	8	58.7	1982	94	77	.0	1.8	30.0	.0	.4	.0
Jul	82.6	55.1	68.9	108+	1936	13	72.8	1974	33	1984	6	62.5	1992	34	153	.2	3.9	31.0	.0	.0	.0
Aug	80.1	52.5	66.3	104	1988	16	70.8	1973	27	1987	23	60.9	1992	73	114	.1	2.3	31.0	.0	.2	.0
Sep	70.2	42.6	56.4	97	1976	7	62.2	1998	13	1984	29	51.6	1984	271	13	.0	.4	29.5	.0	4.2	.0
Oct	58.2	30.9	44.6	91	1992	2	51.3	1973	4	1976	27	38.9	1988	634	0	.0	@	23.2	.2	16.8	.0
Nov	39.6	17.6	28.6	74	1978	3	37.7	1999	-25+	1985	28	19.6	1985	1093	0	.0	.0	5.5	9.5	27.2	2.4
Dec	25.5	1.5	13.5	59+	1982	2	25.2	1997	-52+	1983	19	.7	1985	1596	0	.0	.0	.2	22.5	30.9	13.4
Ann	54.1	27.6	40.9	108+	Jul 1936	13	72.8	Jul 1974	-52+	Dec 1983	19	-7.1	Jan 1982	9145	379	.3	8.9	206.5	82.8	190.9	51.8

\+ 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: 1932-2001

(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	.84	.79	1.20	1949	4	2.91	1975	.09	1981
Feb	.68	.60	.85	1948	28	1.97	1971	.02	1997
Mar	1.64	1.63	1.91	1977	12	4.32	1977	.25	1987
Apr	2.11	1.75	3.41	1954	26	5.68	1986	.07	1987
May	3.15	2.92	2.82	1939	24	6.10	1991	.87	1994
Jun	3.93	3.57	3.34	1954	18	8.95	1984	.91	1987
Jul	4.07	3.56	3.00	1952	20	9.02	1972	1.58	1976
Aug	3.93	3.51	3.91	1995	7	13.41	1995	.72	1976
Sep	3.01	2.51	2.61	1978	12	7.67	1986	.44	1976
Oct	2.39	1.70	2.55	1949	8	8.49	1971	.23	1976
Nov	1.87	1.49	1.94	2000	7	6.19	1996	.11	1976
Dec	.82	.66	1.51	1984	15	2.20	2000	.15	1975
Ann	28.44	29.07	3.91	Aug 1995	7	13.41	Aug 1995	.02	Feb 1997

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	6.9	2.6	.2	.0
Feb	5.2	2.3	.3	.0
Mar	7.0	4.1	1.1	.2
Apr	8.5	4.9	1.3	.3
May	10.5	6.5	2.1	.7
Jun	11.4	7.7	2.5	.9
Jul	10.7	7.1	2.6	1.1
Aug	10.2	6.6	2.5	1.0
Sep	9.4	5.4	2.0	.6
Oct	8.9	4.8	1.4	.5
Nov	7.2	4.0	1.3	.4
Dec	7.1	2.5	.3	.1
Ann	103.0	58.5	17.6	5.8

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	.14	.22	.34	.46	.57	.70	.85	1.03	1.26	1.65	2.01
Feb	.06	.10	.19	.28	.39	.51	.65	.83	1.08	1.50	1.91
Mar	.37	.52	.76	.97	1.19	1.42	1.68	1.99	2.39	3.04	3.65
Apr	.27	.44	.74	1.04	1.35	1.69	2.09	2.58	3.24	4.33	5.39
May	1.10	1.40	1.83	2.20	2.55	2.90	3.29	3.75	4.33	5.23	6.05
Jun	1.34	1.71	2.25	2.71	3.16	3.61	4.10	4.68	5.43	6.58	7.63
Jul	1.50	1.89	2.43	2.89	3.33	3.77	4.26	4.82	5.53	6.63	7.64
Aug	1.08	1.45	2.02	2.51	3.00	3.51	4.07	4.74	5.60	6.96	8.23
Sep	.72	1.00	1.44	1.83	2.22	2.63	3.09	3.64	4.36	5.50	6.57
Oct	.35	.55	.89	1.22	1.57	1.95	2.38	2.92	3.63	4.80	5.93
Nov	.19	.32	.58	.84	1.12	1.44	1.81	2.28	2.92	3.99	5.03
Dec	.11	.18	.30	.41	.53	.66	.82	1.00	1.25	1.67	2.06
Ann	18.26	20.16	22.63	24.53	26.24	27.90	29.64	31.57	33.94	37.42	40.46

+ 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: 1932-2001
(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	10.9	10.1	10	9
Feb	7.1	6.3	11	9
Mar	7.4	6.5	7	5
Apr	1.3	.5	#	#
May	#	.0	#	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.0	.0	0	0
Oct	.2	.0	#	0
Nov	7.0	6.0	1	1
Dec	7.3	5.8	5	5
Ann	41.2	35.2	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	8.0	1996	18	32.1	1975	30	1997	15	26	1997
Feb	12.0	1990	16	17.5	1971	28	1975	11	25	1975
Mar	12.5	1985	3	20.8	1985	26	1975	31	22	1975
Apr	5.6	1994	29	7.0	1996	21	1975	2	8	1975
May	#	1991	6	#+	1991	#+	1994	1	#+	1994
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	.0	0	0	.0	0	0	0	0	0	0
Oct	4.0	1987	21	5.5	1987	4	1987	21	#+	1997
Nov	12.0	1994	28	19.2	1985	16	1991	5	7	1991
Dec	12.0	1982	27	16.1	1972	17	1983	30	15	1983
Ann	12.5	Mar 1985	3	32.1	Jan 1975	30	Jan 1997	15	26	Jan 1997

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	6.5	3.9	1.2	.4	.0
Feb	4.2	2.3	.7	.2	@
Mar	3.5	2.5	1.1	.4	@
Apr	1.0	.7	.1	.1	.0
May	.0	.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	.2	.1	@	.0	.0
Nov	3.2	2.3	.9	.4	@
Dec	5.6	3.2	.6	.2	@
Ann	24.2	15.0	4.6	1.7	@

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	29.0	26.8	22.7	13.6
Feb	24.5	23.1	20.6	12.8
Mar	12.3	9.3	7.3	3.7
Apr	1.9	1.2	.9	.4
May	.0	.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	6.1	3.7	1.8	.4
Dec	25.4	18.0	13.1	4.2
Ann	99.3	82.1	66.4	35.1

+ 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	6/30	6/23	6/17	6/13	6/08	6/04	5/30	5/25	5/18
32	6/06	5/31	5/27	5/23	5/20	5/17	5/13	5/09	5/03
28	5/28	5/22	5/17	5/13	5/09	5/05	4/30	4/25	4/19
24	5/15	5/09	5/04	4/30	4/26	4/23	4/19	4/14	4/08
20	5/05	4/29	4/24	4/21	4/17	4/13	4/10	4/05	3/30
16	4/16	4/12	4/09	4/07	4/05	4/02	3/31	3/28	3/24

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	8/23	8/29	9/02	9/05	9/08	9/12	9/15	9/19	9/25
32	8/30	9/04	9/08	9/12	9/15	9/18	9/22	9/26	10/01
28	9/10	9/15	9/19	9/22	9/25	9/28	10/01	10/04	10/09
24	9/21	9/26	9/30	10/04	10/07	10/10	10/14	10/18	10/23
20	10/01	10/08	10/12	10/16	10/20	10/23	10/27	11/01	11/07
16	10/10	10/16	10/21	10/25	10/29	11/02	11/06	11/11	11/18

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	121	111	104	97	91	85	79	72	61
32	143	134	128	122	117	112	106	100	91
28	164	155	149	144	139	133	128	122	113
24	189	180	174	168	163	158	152	145	136
20	216	205	198	191	185	179	172	165	154
16	233	224	218	212	207	202	196	190	180

***** 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	1785	1411	1164	669	321	94	34	73	271	634	1093	1596	9145
60	1630	1271	1009	521	204	34	8	23	155	481	943	1441	7720
57	1537	1187	916	435	147	16	0	10	100	394	853	1348	6943
55	1475	1131	854	380	115	8	0	5	72	339	793	1286	6458
50	1320	991	700	255	54	1	0	0	25	217	646	1131	5340
32	774	524	239	18	0	0	0	0	0	13	209	601	2378

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	13	37	98	339	724	974	1142	1064	733	402	107	28	5661
55	0	0	0	11	126	292	429	355	115	15	0	0	1343
57	0	0	0	6	96	239	367	299	83	8	0	0	1098
60	0	0	0	2	60	168	282	219	47	3	0	0	781
65	0	0	0	0	22	77	153	114	13	0	0	0	379
70	0	0	0	0	6	23	67	45	2	0	0	0	143

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	0	19	170	495	726	893	821	516	199	23	0	0	0	19	189	684	1410	2303	3124	3640	3839	3862	3862
45	0	0	7	95	348	576	738	666	371	109	8	0	0	0	7	102	450	1026	1764	2430	2801	2910	2918	2918
50	0	0	0	45	222	428	583	511	241	52	0	0	0	0	0	45	267	695	1278	1789	2030	2082	2082	2082
55	0	0	0	18	127	285	429	357	136	19	0	0	0	0	0	18	145	430	859	1216	1352	1371	1371	1371
60	0	0	0	5	62	164	280	217	66	2	0	0	0	0	0	5	67	231	511	728	794	796	796	796
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	0	17	134	331	468	579	531	332	149	18	0	0	0	17	151	482	950	1529	2060	2392	2541	2559	2559

(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