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: MOTT, ND **COOP ID: 326155**

Climate Division: ND 7 **NWS Call Sign:** **Elevation: 2,525 Feet** **Lat: 46˚23N** **Lon: 102˚20W**

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	23.6	.5	12.1	67	1981	24	26.9	1992	-42	1966	29	-3.9	1978	1641	0	.0	.0	1.0	19.2	30.9	14.0
Feb	30.8	7.9	19.4	71	1992	2	31.5	1984	-44	1962	28	1.9	1979	1277	0	.0	.0	3.7	13.5	28.0	7.8
Mar	40.8	17.0	28.9	80	1967	29	39.2	1986	-33+	1998	11	19.1	1996	1120	0	.0	.0	9.3	8.1	29.4	2.9
Apr	55.0	28.0	41.5	95	1980	21	48.3	1987	-13	1975	1	33.0	1975	705	0	.0	.1	19.9	1.6	19.3	.2
May	67.5	40.9	54.2	96+	1980	22	61.8	1977	4	1967	3	49.2	1996	346	12	.0	.4	29.3	.0	4.6	.0
Jun	76.6	50.3	63.5	103	1988	24	73.5	1988	29+	1992	6	58.7	1993	123	76	.2	2.7	30.0	.0	.1	.0
Jul	83.5	55.2	69.4	108	1981	8	74.4	1989	36+	1968	2	62.0	1993	45	180	.8	7.9	31.0	.0	.0	.0
Aug	83.4	52.3	67.9	108	1949	7	74.5	1983	31+	1964	12	60.3	1977	83	173	.6	9.4	31.0	.0	.0	.0
Sep	72.0	40.8	56.4	105	1948	15	64.9	1998	12	1965	26	51.2+	1993	289	31	.2	2.5	28.9	@	4.2	.0
Oct	58.5	29.3	43.9	95+	1997	2	47.3	1997	-8	1991	30	38.8	1976	655	0	.0	.2	23.8	.7	17.7	.1
Nov	39.0	16.1	27.6	84+	1999	9	39.4	1999	-25	1985	29	15.3	1985	1124	0	.0	.0	7.7	9.2	28.3	2.9
Dec	28.0	4.8	16.4	67	1998	2	26.9	1999	-39	1983	24	-1.5	1983	1506	0	.0	.0	2.1	17.2	30.9	10.3
Ann	54.9	28.6	41.8	108+	Jul 1981	8	74.5	Aug 1983	-44	Feb 1962	28	-3.9	Jan 1978	8914	472	1.8	23.2	217.7	69.5	193.4	38.2

+ 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: 1948-2001

(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	.41	.40	1.00	1997	4	.89	1997	.00+	1987
Feb	.50	.29	2.20	1998	28	3.91	1998	.00+	1985
Mar	.80	.55	1.40	1987	21	2.57	1982	.14	1999
Apr	1.83	1.76	2.30	1989	27	5.08	1989	.01	1987
May	2.59	2.32	3.11	1956	28	6.49	1982	.25	1984
Jun	3.17	2.72	3.24	1969	25	7.05	1971	.59	1974
Jul	2.13	2.02	2.90	1993	16	8.00	1993	.26	1980
Aug	1.69	1.35	2.18	1995	26	4.85	1998	.01	1971
Sep	1.26	.80	1.46	1965	14	5.58	1977	.15	1993
Oct	1.24	.78	1.72	1998	5	4.74	1982	.07	1988
Nov	.55	.33	1.10	1956	2	2.19	1996	.00+	2000
Dec	.38	.34	.70+	1969	27	1.04	1972	.00+	1991
Ann	16.55	15.05	3.24	Jun 1969	25	8.00	Jul 1993	.00+	Nov 2000

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	3.9	1.5	.1	@
Feb	3.9	1.5	.1	@
Mar	5.5	2.4	.3	.1
Apr	7.0	4.2	1.4	.2
May	9.0	5.7	1.9	.5
Jun	10.0	6.8	2.3	.5
Jul	8.0	4.7	1.5	.3
Aug	6.5	3.8	1.0	.4
Sep	5.5	3.3	.6	.2
Oct	4.5	2.6	.8	.3
Nov	4.1	2.0	.0	.0
Dec	4.1	1.5	.1	.0
Ann	72.0	40.0	10.1	2.5

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	.00	.00	.11	.19	.25	.33	.41	.52	.65	.87	1.09
Feb	.00	.00	.04	.11	.19	.29	.42	.60	.85	1.29	1.74
Mar	.10	.17	.28	.39	.51	.64	.79	.98	1.23	1.64	2.04
Apr	.10	.20	.42	.67	.95	1.28	1.68	2.20	2.93	4.18	5.42
May	.57	.81	1.19	1.53	1.88	2.24	2.65	3.14	3.78	4.81	5.78
Jun	.83	1.13	1.59	2.00	2.39	2.81	3.27	3.82	4.53	5.66	6.71
Jul	.47	.67	.98	1.26	1.54	1.85	2.18	2.59	3.12	3.98	4.78
Aug	.15	.26	.49	.72	.98	1.27	1.62	2.06	2.66	3.67	4.66
Sep	.14	.24	.42	.59	.78	.99	1.23	1.53	1.95	2.63	3.29
Oct	.08	.15	.30	.47	.66	.89	1.16	1.50	1.99	2.81	3.63
Nov	.00	.02	.08	.16	.25	.36	.49	.66	.90	1.32	1.74
Dec	.00	.03	.10	.16	.22	.29	.37	.48	.62	.85	1.07
Ann	10.54	11.66	13.11	14.23	15.23	16.22	17.24	18.38	19.78	21.84	23.63

\+ 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: 1948-2001
(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	5.7	5.8	5	3
Feb	4.7	3.6	5	2
Mar	6.8	5.2	3	1
Apr	2.5	1.5	1	#
May	.6	.0	#	0
Jun	#	.0	#	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.3	.0	#	0
Oct	1.4	.0	#	0
Nov	5.2	3.5	1	#
Dec	5.0	5.0	3	2
Ann	32.2	24.6	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	8.0	1988	12	13.1	1972	25	1978	31	22	1978
Feb	11.0	1998	28	14.4+	1998	35	1978	20	31	1978
Mar	12.0	1972	26	25.0	1975	37	1978	7	20	1978
Apr	9.0	1991	13	10.0	1991	22	1997	8	7	1997
May	5.0	1983	12	6.1	1996	10	1984	1	#+	2000
Jun	#	1998	3	#	1998	#+	1999	26	#+	1999
Jul	.0	0	0	.0	0	0	0	0	0	0
Aug	.0	0	0	.0	0	0	0	0	0	0
Sep	8.0	1984	24	8.0	1984	8	1984	24	1	1984
Oct	7.0	1972	29	8.0	1972	7	1972	31	1	1972
Nov	6.0	1986	8	17.5	1993	13	1985	30	5	1978
Dec	8.0	1988	26	16.8	1977	22	1977	31	14	1977
Ann	12.0	Mar 1972	26	25.0	Mar 1975	37	Mar 1978	7	31	Feb 1978

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	3.1	2.3	.7	.1	.0
Feb	3.3	2.3	.7	.1	@
Mar	2.8	2.3	.6	.3	@
Apr	.9	.9	.3	.1	.0
May	.2	.2	.1	.1	.0
Jun	.0	.0	.0	.0	.0
Jul	.0	.0	.0	.0	.0
Aug	.0	.0	.0	.0	.0
Sep	@	@	@	@	.0
Oct	.5	.5	.2	.1	.0
Nov	2.7	2.2	.8	.2	.0
Dec	3.2	2.4	.5	.1	.0
Ann	16.7	13.1	3.9	1.1	@

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	22.1	18.1	14.3	8.4
Feb	11.3	7.9	6.7	5.9
Mar	8.3	6.0	5.0	3.3
Apr	2.0	1.3	.9	.4
May	.2	@	@	.0
Jun	.0	.0	.0	.0
Jul	.0	.0	.0	.0
Aug	.0	.0	.0	.0
Sep	.1	.1	.1	.0
Oct	.6	.3	.2	.0
Nov	5.7	3.0	2.1	.0
Dec	13.9	8.9	5.6	2.2
Ann	64.2	45.6	34.9	20.2

+ 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	6/10	6/05	6/01	5/29	5/26	5/23	5/20	5/16	5/11
32	6/01	5/26	5/22	5/19	5/15	5/12	5/08	5/04	4/29
28	5/19	5/14	5/11	5/08	5/06	5/03	4/30	4/27	4/22
24	5/11	5/06	5/02	4/29	4/26	4/23	4/20	4/16	4/11
20	4/29	4/24	4/20	4/17	4/15	4/12	4/09	4/05	3/31
16	4/18	4/13	4/10	4/07	4/04	4/01	3/29	3/25	3/20

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	9/01	9/04	9/07	9/09	9/12	9/14	9/16	9/19	9/22
32	9/08	9/11	9/14	9/16	9/18	9/20	9/23	9/25	9/29
28	9/16	9/20	9/23	9/25	9/28	9/30	10/03	10/06	10/10
24	9/19	9/25	9/30	10/04	10/07	10/11	10/15	10/19	10/25
20	9/28	10/04	10/08	10/12	10/16	10/20	10/24	10/28	11/04
16	10/09	10/15	10/19	10/22	10/25	10/29	11/01	11/05	11/11

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	129	122	116	112	108	104	100	94	87
32	146	139	134	129	125	121	117	112	105
28	162	156	152	148	144	141	137	133	126
24	187	179	173	168	163	159	153	148	139
20	207	199	193	188	184	179	174	169	161
16	226	219	213	208	204	199	195	189	181

***** 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	1641	1277	1120	705	346	123	45	83	289	655	1124	1506	8914
60	1486	1137	965	557	220	53	13	35	179	500	974	1351	7470
57	1393	1053	872	471	158	28	6	20	125	408	884	1258	6676
55	1332	1006	810	415	122	17	1	13	95	348	824	1196	6179
50	1186	875	665	287	56	3	0	3	39	210	682	1042	5048
32	686	450	226	29	0	0	0	0	0	7	247	546	2191

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	68	96	129	314	689	944	1158	1113	732	376	114	63	5796
55	1	8	0	10	98	270	446	412	137	3	0	0	1385
57	0	0	0	6	72	221	389	357	107	1	0	0	1153
60	0	0	0	2	41	157	303	280	71	0	0	0	854
65	0	0	0	0	12	76	180	173	31	0	0	0	472
70	0	0	0	0	2	27	93	93	11	0	0	0	226

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	36	163	469	718	927	895	527	214	29	0	0	3	39	202	671	1389	2316	3211	3738	3952	3981	3981
45	0	0	11	91	326	568	772	740	388	119	9	0	0	0	11	102	428	996	1768	2508	2896	3015	3024	3024
50	0	0	1	42	207	421	617	585	258	55	1	0	0	0	1	43	250	671	1288	1873	2131	2186	2187	2187
55	0	0	0	15	110	281	463	431	152	17	0	0	0	0	0	15	125	406	869	1300	1452	1469	1469	1469
60	0	0	0	4	45	160	311	288	83	2	0	0	0	0	0	4	49	209	520	808	891	893	893	893
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	12	40	138	295	443	591	566	344	173	34	1	0	12	52	190	485	928	1519	2085	2429	2602	2636	2637

(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