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: HIGHMORE 23 N, SD **COOP ID: 393838**

Climate Division: SD 6 **NWS Call Sign:** **Elevation: 1,870 Feet** **Lat: 44˚51N** **Lon: 99˚29W**

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	24.4	.3	12.4	65	1981	23	26.5	1990	-38	1972	15	-1.7	1978	1632	0	.0	.0	.9	20.2	30.9	13.5
Feb	30.8	7.3	19.1	72	2000	23	31.3	1999	-38+	1994	9	2.9	1979	1288	0	.0	.0	3.3	14.1	27.8	7.5
Mar	42.5	18.5	30.5	82	1988	27	40.0	2000	-22	1978	4	22.7	1996	1070	0	.0	.0	10.4	6.8	27.5	2.4
Apr	58.4	30.9	44.7	96	1980	21	51.2	1977	-5	1975	1	38.0	1995	612	1	.0	.2	23.4	.8	16.8	.1
May	70.6	43.1	56.9	101	1969	27	63.8	1977	15	1980	8	51.5	1996	278	25	.0	.7	30.4	.0	3.4	.0
Jun	79.8	52.8	66.3	110	1988	24	75.0	1988	28	1964	2	60.9	1993	75	113	.3	3.8	30.0	.0	.1	.0
Jul	86.7	57.7	72.2	111+	1989	5	78.0	1974	32	1971	30	63.8	1992	24	248	2.2	11.5	31.0	.0	@	.0
Aug	85.1	55.5	70.3	114	1965	13	75.8	1976	31	1964	12	64.7	1985	39	202	1.5	10.8	31.0	.0	.0	.0
Sep	75.1	45.2	60.2	105	1976	6	67.5	1998	11	1974	30	54.6	1993	195	50	.3	3.8	29.7	.0	2.6	.0
Oct	61.4	32.3	46.9	95+	1963	5	50.7	2000	-1	1991	30	41.9	1987	562	0	.0	.3	26.5	.3	13.2	@
Nov	40.8	17.6	29.2	81	1990	1	42.3	1999	-28	1964	30	15.9	1985	1074	0	.0	.0	8.7	7.7	27.5	1.8
Dec	27.7	5.1	16.4	66	1998	3	28.5	1997	-38	1990	30	.4	1983	1507	0	.0	.0	1.8	17.6	30.9	9.2
Ann	56.9	30.5	43.8	114	Aug 1965	13	78.0	Jul 1974	-38+	Feb 1994	9	-1.7	Jan 1978	8356	639	4.3	31.1	227.1	67.5	180.7	34.5

\+ 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: 1952-2001

(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	.42	.35	.95	1960	1	1.34	1982	.00+	2000
Feb	.58	.45	1.04	1991	18	1.48	1991	.00	1985
Mar	1.20	.92	1.80	1981	31	4.04	1977	.08+	1994
Apr	1.93	1.42	2.44	1989	28	6.85	1986	.05	1987
May	2.56	2.42	2.02	1972	1	7.77	1991	.24	1976
Jun	2.84	2.17	5.34	1969	25	7.68	1984	.27	1989
Jul	2.83	2.03	6.94	1994	8	11.18	1994	.14	1988
Aug	1.91	1.82	4.50	1960	25	4.22	1980	.29	1982
Sep	1.61	1.23	2.78	1985	12	6.37	1996	.00+	1979
Oct	1.47	1.11	1.76	1982	9	4.85	1982	.05	1978
Nov	.72	.53	.83	1981	30	2.56	1985	.00+	1999
Dec	.50	.40	.84	1996	15	2.09	1996	.00+	1999
Ann	18.57	19.33	6.94	Jul 1994	8	11.18	Jul 1994	.00+	Jan 2000

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	2.5	1.8	.1	.0
Feb	2.8	2.0	.3	@
Mar	4.0	2.9	.8	.2
Apr	5.4	3.9	1.3	.4
May	7.3	5.7	1.8	.5
Jun	7.6	5.6	1.8	.7
Jul	7.4	5.1	1.7	.6
Aug	6.1	4.2	1.2	.3
Sep	4.1	2.9	1.0	.3
Oct	4.3	2.9	1.1	.3
Nov	3.7	2.4	.3	.0
Dec	2.7	1.8	.2	.0
Ann	57.9	41.2	11.6	3.3

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	.08	.15	.23	.31	.40	.53	.69	.96	1.23
Feb	.04	.10	.19	.28	.36	.46	.58	.72	.90	1.21	1.51
Mar	.14	.24	.41	.58	.75	.95	1.18	1.47	1.86	2.50	3.12
Apr	.20	.34	.60	.87	1.16	1.48	1.87	2.35	3.01	4.09	5.16
May	.59	.83	1.20	1.54	1.87	2.23	2.62	3.10	3.72	4.71	5.64
Jun	.56	.81	1.23	1.61	2.00	2.42	2.89	3.46	4.21	5.42	6.57
Jul	.28	.49	.87	1.27	1.69	2.18	2.75	3.46	4.43	6.04	7.63
Aug	.40	.57	.85	1.11	1.37	1.64	1.95	2.32	2.81	3.59	4.33
Sep	.00	.14	.40	.66	.92	1.22	1.57	1.99	2.58	3.55	4.51
Oct	.09	.18	.36	.56	.79	1.05	1.37	1.78	2.35	3.31	4.28
Nov	.00	.07	.20	.31	.43	.56	.71	.90	1.15	1.56	1.97
Dec	.00	.00	.04	.13	.22	.33	.46	.62	.84	1.21	1.59
Ann	11.62	12.90	14.57	15.86	17.03	18.17	19.35	20.68	22.31	24.70	26.80

\+ 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: 1952-2001
(3) Derived from 1971-2000 serially complete daily data

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Snow (inches)

Snow Totals

Means/Medians (1)

Extremes (2)

Mean Number of Days (1)

Snow Fall >= Thresholds

Snow Depth >= Thresholds

Month	Snow Fall Mean	Snow Fall Median	Snow Depth Mean	Snow Depth Median	Highest Daily Snow Fall	Year	Day	Highest Monthly Snow Fall	Year	Highest Daily Snow Depth	Year	Day	Highest Monthly Mean Snow Depth	Year	0.1	1.0	3.0	5.0	10.0	1	3	5	10
Jan	4.5	4.0	3	3	8.0	1982	22	12.0	1975	21	1982	25	13	1982	2.2	2.1	.6	.1	.0	20.7	14.1	9.6	.3
Feb	6.6	5.0	3	2	14.0	1991	18	20.0	1989	19	1978	13	11	1989	2.6	2.3	.9	.4	.1	16.1	12.6	8.3	3.3
Mar	9.5	7.0	2	1	11.0	1985	4	29.5	1975	24	1985	4	7	1989	2.5	2.4	1.3	.7	@	9.2	7.4	4.3	1.7
Apr	2.6	.5	#	0	12.0	1986	14	15.0	1990	19	1975	1	5	1975	.9	.7	.3	.1	@	1.2	.8	.7	.4
May	.1	.0	0	0	1.0	1979	9	2.0	1979	0	0	0	0	0	.1	.1	.0	.0	.0	.0	.0	.0	.0
Jun	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Jul	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Aug	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Sep	#	.0	#	0	#	1995	21	#	1995	#	1995	21	#	1995	.0	.0	.0	.0	.0	.0	.0	.0	.0
Oct	1.1	.0	#	0	6.0	1971	28	8.0	1971	5	1971	30	1	1971	.3	.3	.2	@	.0	.5	.3	.1	.0
Nov	5.8	3.8	1	#	8.0	1981	30	26.5	1985	16	1993	26	5	1985	2.2	2.0	.9	.3	.0	6.1	4.1	1.6	.2
Dec	4.7	3.8	2	#	12.0	1996	15	15.5	1988	16	1985	1	11	1985	2.3	1.9	.8	.2	.1	14.6	11.7	6.8	1.3
Ann	34.9	24.1	N/A	N/A	14.0	Feb 1991	18	29.5	Mar 1975	24	Mar 1985	4	13	Jan 1982	13.1	11.8	5.0	1.8	.2	68.4	51.0	31.4	7.2

+ 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	6/22	6/13	6/07	6/02	5/28	5/23	5/17	5/11	5/03
32	6/10	6/01	5/25	5/20	5/15	5/10	5/05	4/28	4/19
28	5/21	5/15	5/11	5/08	5/05	5/02	4/28	4/25	4/19
24	5/10	5/05	5/01	4/28	4/26	4/23	4/20	4/16	4/12
20	4/30	4/24	4/20	4/17	4/13	4/10	4/06	4/02	3/28
16	4/23	4/16	4/11	4/07	4/03	3/30	3/26	3/21	3/14

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	8/26	9/01	9/04	9/08	9/11	9/14	9/17	9/21	9/26
32	9/09	9/13	9/16	9/18	9/20	9/22	9/25	9/27	10/01
28	9/14	9/19	9/22	9/25	9/27	9/30	10/03	10/06	10/11
24	9/22	9/28	10/03	10/06	10/10	10/13	10/17	10/21	10/27
20	9/30	10/06	10/11	10/15	10/18	10/22	10/26	10/30	11/05
16	10/11	10/17	10/21	10/25	10/29	11/01	11/05	11/10	11/16

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	136	125	118	111	105	99	93	85	75
32	160	149	141	134	128	121	114	106	95
28	170	161	155	150	145	140	135	128	120
24	189	181	176	171	167	162	158	152	145
20	213	204	198	192	187	182	176	170	161
16	238	228	221	214	208	202	196	188	178

***** 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	1632	1288	1070	612	278	75	24	39	195	562	1074	1507	8356
60	1477	1148	915	467	167	25	7	12	104	409	924	1352	7007
57	1384	1064	822	384	115	11	0	4	64	320	834	1259	6261
55	1322	1014	760	332	87	6	0	2	43	264	774	1197	5801
50	1169	884	611	216	36	0	0	0	13	145	633	1043	4750
32	656	456	182	13	0	0	0	0	0	3	212	539	2061

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	47	93	135	392	770	1029	1247	1187	845	464	129	56	6394
55	0	7	0	21	144	344	534	476	198	12	0	0	1736
57	0	0	0	13	110	290	472	416	159	6	0	0	1466
60	0	0	0	6	69	214	386	331	109	2	0	0	1117
65	0	0	0	1	25	113	248	202	50	0	0	0	639
70	0	0	0	0	6	46	141	107	18	0	0	0	318

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	6	45	222	544	804	1012	972	637	293	37	0	0	6	51	273	817	1621	2633	3605	4242	4535	4572	4572
45	0	0	15	129	393	654	857	817	492	177	12	0	0	0	15	144	537	1191	2048	2865	3357	3534	3546	3546
50	0	0	2	68	260	506	702	662	354	91	2	0	0	0	2	70	330	836	1538	2200	2554	2645	2647	2647
55	0	0	0	31	150	360	547	507	230	39	0	0	0	0	0	31	181	541	1088	1595	1825	1864	1864	1864
60	0	0	0	12	70	225	394	355	132	11	0	0	0	0	0	12	82	307	701	1056	1188	1199	1199	1199
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	11	50	176	350	511	651	627	418	218	37	1	0	11	61	237	587	1098	1749	2376	2794	3012	3049	3050

(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