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: MARION, SD **COOP ID: 395228**

Climate Division: SD 9 **NWS Call Sign:** **Elevation: 1,450 Feet** **Lat: 43˚25N** **Lon: 97˚15W**

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	24.7	4.6	14.7	68	1981	25	27.6	1990	-31+	1974	1	.4	1978	1562	0	.0	.0	.7	21.1	30.9	12.4
Feb	31.4	12.1	21.8	72	1981	18	33.6	1987	-30	1994	9	5.4	1979	1211	0	.0	.0	3.3	14.6	27.8	6.9
Mar	43.4	23.6	33.5	86	1968	30	40.9	2000	-25	1960	4	25.6	1984	977	0	.0	.0	9.9	6.7	26.0	1.9
Apr	58.5	36.3	47.4	98	1962	25	54.8	1977	6	1982	6	41.4	1995	532	3	.0	.3	22.2	.8	13.1	.0
May	70.9	48.3	59.6	102	1967	25	66.2	1977	19	1967	3	53.2	1997	215	47	.0	.6	30.3	.0	1.4	.0
Jun	80.3	58.2	69.3	107	1988	22	76.5	1988	35+	1964	2	64.8	1998	38	166	.2	4.0	30.0	.0	.0	.0
Jul	85.4	62.8	74.1	108	1990	4	78.9	1974	39	1971	30	65.6	1992	12	294	.7	9.0	31.0	.0	.0	.0
Aug	83.0	60.6	71.8	106+	1988	1	78.4	1983	37	1950	20	65.5	1992	23	235	.4	6.0	31.0	.0	.0	.0
Sep	74.5	50.2	62.4	104	1970	6	68.5	1978	22	1984	26	55.8	1993	143	62	.1	2.2	29.6	.0	1.1	.0
Oct	61.5	37.1	49.3	95	1963	5	54.6	1973	11	1991	30	44.7	1987	488	0	.0	.1	25.7	.2	10.5	.0
Nov	41.9	23.2	32.6	81	1999	9	43.6	1999	-20	1991	8	21.9	1985	973	0	.0	.0	9.2	7.4	26.3	1.0
Dec	28.5	9.5	19.0	68	1998	3	26.9	1986	-30	1983	24	1.1	1983	1425	0	.0	.0	1.6	18.5	30.7	7.9
Ann	57.0	35.5	46.3	108	Jul 1990	4	78.9	Jul 1974	-31+	Jan 1974	1	.4	Jan 1978	7599	807	1.4	22.2	224.5	69.3	167.8	30.1

\+ 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

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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	.54	.50	.74	1983	10	1.55	1988	.00+	1990
Feb	.56	.49	1.63	1971	19	1.97	1971	.00	1986
Mar	1.86	1.40	1.92	1985	4	5.11	1977	.00	1994
Apr	2.73	2.21	2.60	1984	12	8.39	1984	.46	1987
May	3.41	3.28	3.76	1972	1	9.22	1972	1.06	1981
Jun	3.59	2.92	3.58	1951	18	14.19	1984	1.16	1988
Jul	2.85	2.23	3.24	1963	27	7.60	1992	.21	1975
Aug	2.94	2.42	3.96	1975	1	10.82	1975	.27	1983
Sep	2.57	2.43	3.70	1966	1	7.80	1986	.23	1998
Oct	1.86	1.69	2.53	1998	5	7.22	1998	.13	1988
Nov	1.42	1.47	1.93	2001	24	4.45	1983	.00	1980
Dec	.58	.48	1.28+	1968	22	2.18	1982	.00	1986
Ann	24.91	25.38	3.96	Aug 1975	1	14.19	Jun 1984	.00+	Mar 1994

Mean Number of Days (3)

Month	Daily Precipitation >= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	3.8	1.8	.2	.0
Feb	4.0	1.7	.2	.1
Mar	6.4	3.9	1.1	.6
Apr	9.4	5.8	1.7	.5
May	10.2	7.0	2.3	.7
Jun	9.2	6.4	2.4	.8
Jul	8.3	5.5	1.9	.7
Aug	8.1	5.2	1.9	.7
Sep	6.9	4.7	1.7	.7
Oct	5.5	3.5	1.2	.5
Nov	5.3	3.0	.8	.3
Dec	4.0	1.7	.2	.0
Ann	81.1	50.2	15.6	5.6

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	.03	.12	.20	.29	.39	.51	.66	.87	1.22	1.57
Feb	.03	.08	.16	.24	.33	.43	.54	.69	.88	1.20	1.51
Mar	.14	.33	.63	.90	1.19	1.50	1.86	2.30	2.89	3.86	4.79
Apr	.55	.80	1.20	1.57	1.94	2.33	2.78	3.32	4.03	5.16	6.24
May	.98	1.30	1.79	2.21	2.63	3.06	3.54	4.10	4.83	5.97	7.03
Jun	.97	1.31	1.83	2.28	2.73	3.19	3.71	4.33	5.13	6.38	7.56
Jul	.67	.94	1.35	1.73	2.10	2.49	2.93	3.45	4.14	5.23	6.25
Aug	.64	.91	1.34	1.73	2.12	2.54	3.01	3.57	4.30	5.48	6.59
Sep	.49	.72	1.09	1.44	1.79	2.17	2.61	3.13	3.82	4.93	5.99
Oct	.13	.25	.49	.75	1.03	1.36	1.75	2.25	2.95	4.12	5.27
Nov	.05	.16	.36	.57	.80	1.05	1.36	1.75	2.28	3.17	4.04
Dec	.03	.09	.18	.26	.35	.45	.57	.71	.90	1.22	1.53
Ann	14.25	16.14	18.65	20.62	22.42	24.18	26.04	28.13	30.71	34.54	37.93

\+ 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

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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	6.7	5.4	4	5
Feb	5.0	4.0	4	1
Mar	7.1	6.5	1	#
Apr	2.9	.5	#	0
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	.6	.0	#	0
Nov	6.2	5.3	1	0
Dec	6.7	6.8	2	1
Ann	35.2	28.5	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	7.0	1982	22	17.7	1979	22	1979	31	12	1979
Feb	14.4	1997	4	15.7	1993	23	1979	11	21	1979
Mar	10.0	1975	24	19.9	1983	19	1979	5	9	1979
Apr	9.5	1992	21	12.8	1994	7	1982	7	1	1982
May	.0	0	0	.0	0	0	0	0	0	0
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	4.5	1982	20	4.5	1982	3	1976	19	#+	1980
Nov	12.0	1983	28	14.1	1985	12	1975	30	4	1979
Dec	8.5	1978	3	13.5	1971	12	1975	1	7	1994
Ann	14.4	Feb 1997	4	19.9	Mar 1983	23	Feb 1979	11	21	Feb 1979

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	3.6	2.5	.9	.3	.0
Feb	3.4	2.1	.6	.2	@
Mar	2.5	1.9	.9	.4	@
Apr	1.1	.9	.5	.2	.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	.3	.3	.1	.0	.0
Nov	2.8	2.1	.8	.4	.1
Dec	3.4	2.1	.6	.2	.0
Ann	17.1	11.9	4.4	1.7	.1

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	-9.9	-9.9	-9.9	-9.9
Feb	14.0	8.6	6.1	.8
Mar	5.5	3.2	1.9	.5
Apr	1.1	.5	.3	.0
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	.3	.1	.0	.0
Nov	5.6	3.1	2.3	1.9
Dec	20.1	12.5	7.7	.7
Ann	-9.9	-9.9	-9.9	-9.9

+ 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	5/22	5/17	5/14	5/11	5/08	5/06	5/03	4/29	4/24
32	5/17	5/12	5/08	5/05	5/02	4/29	4/26	4/22	4/17
28	5/05	4/30	4/27	4/24	4/21	4/18	4/15	4/12	4/07
24	4/18	4/14	4/12	4/10	4/08	4/06	4/04	4/01	3/29
20	4/12	4/08	4/05	4/02	3/30	3/28	3/25	3/22	3/17
16	4/07	4/02	3/29	3/26	3/24	3/21	3/18	3/14	3/09

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	9/13	9/17	9/20	9/22	9/25	9/27	9/29	10/02	10/06
32	9/18	9/23	9/26	9/29	10/02	10/05	10/08	10/11	10/16
28	9/24	9/29	10/04	10/07	10/10	10/13	10/17	10/21	10/27
24	10/08	10/12	10/15	10/18	10/21	10/23	10/26	10/29	11/03
20	10/13	10/19	10/23	10/26	10/30	11/02	11/05	11/09	11/15
16	10/26	10/31	11/05	11/08	11/11	11/15	11/18	11/22	11/28

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	159	152	147	143	139	135	130	125	119
32	172	165	160	156	152	148	144	139	133
28	189	183	179	175	172	168	164	160	154
24	211	206	202	198	195	192	189	185	179
20	236	228	222	217	213	208	203	197	189
16	255	247	241	237	232	228	223	217	209

***** 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)

Base	Heating Degree Days (1)												
Below	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
65	1562	1211	977	532	215	38	12	23	143	488	973	1425	7599
60	1407	1071	822	392	121	10	0	5	64	337	823	1270	6322
57	1314	987	729	314	79	3	0	1	34	253	733	1177	5624
55	1252	931	668	267	57	1	0	0	21	203	675	1115	5190
50	1099	804	524	165	21	0	0	0	4	101	536	961	4215
32	590	380	132	7	0	0	0	0	0	2	152	461	1724

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	51	93	178	469	855	1118	1305	1235	910	537	169	59	6979
55	0	0	1	39	199	429	592	522	240	25	2	0	2049
57	0	0	0	26	159	371	530	461	194	13	0	0	1754
60	0	0	0	13	108	288	437	372	134	4	0	0	1356
65	0	0	0	3	47	166	294	235	62	0	0	0	807
70	0	0	0	0	15	79	170	127	22	0	0	0	413

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	60	247	593	861	1042	967	648	302	46	1	0	6	66	313	906	1767	2809	3776	4424	4726	4772	4773
45	0	1	27	148	441	711	887	812	501	187	17	0	0	1	28	176	617	1328	2215	3027	3528	3715	3732	3732
50	0	0	8	82	305	561	732	657	361	101	5	0	0	0	8	90	395	956	1688	2345	2706	2807	2812	2812
55	0	0	1	40	184	414	577	502	237	40	0	0	0	0	1	41	225	639	1216	1718	1955	1995	1995	1995
60	0	0	0	14	93	276	424	349	137	13	0	0	0	0	0	14	107	383	807	1156	1293	1306	1306	1306
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	0	11	48	165	361	556	694	633	403	200	38	0	0	11	59	224	585	1141	1835	2468	2871	3071	3109	3109

(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