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: WASTA, SD **COOP ID: 398911**

Climate Division: SD 5 **NWS Call Sign:** **Elevation: 2,320 Feet** **Lat: 44˚04N** **Lon: 102˚26W**

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	32.9	6.5	19.7	73	1987	12	30.4	1990	-33	1963	19	3.8	1979	1405	0	.0	.0	4.8	12.6	30.8	8.8
Feb	39.3	12.0	25.7	77	1983	18	37.4	1999	-38	1996	2	11.2	1993	1102	0	.0	.0	8.8	8.3	27.3	4.7
Mar	48.5	21.3	34.9	85	1967	29	42.6	1986	-29	1998	11	26.7	1996	933	0	.0	.0	16.2	3.9	26.3	1.2
Apr	60.3	32.6	46.5	97	1992	30	53.5	1981	5	1975	2	40.5	1983	558	0	.0	.3	24.2	.5	14.0	.0
May	71.0	44.5	57.8	102	1969	27	63.6	1977	15	1950	1	53.0	1995	247	22	.0	1.3	30.2	.0	2.2	.0
Jun	81.0	53.9	67.5	108+	1988	24	76.0	1988	32+	1998	3	60.8	1998	62	135	.6	6.2	30.0	.0	@	.0
Jul	88.5	59.7	74.1	111	1954	12	79.4	1974	38+	1971	30	66.1	1992	14	295	3.0	15.2	31.0	.0	.0	.0
Aug	87.3	57.5	72.4	109+	1985	8	79.1	1983	35	1992	30	66.8	1992	18	247	1.8	14.5	31.0	.0	.0	.0
Sep	77.1	46.0	61.6	107	2001	5	68.7	1998	19	1984	29	56.4	1993	164	60	.7	4.8	29.5	.0	2.0	.0
Oct	63.4	33.1	48.3	98	1963	4	51.1	1979	-4	1991	30	44.6	1976	521	0	.0	.4	27.2	.4	12.1	@
Nov	45.4	19.2	32.3	86	1999	9	42.3	1999	-25	1959	14	16.7	1985	980	0	.0	.0	12.5	5.2	27.0	1.2
Dec	35.7	9.2	22.5	72+	1998	2	33.1	1999	-33+	1990	30	3.5	1983	1320	0	.0	.0	5.2	10.1	30.6	6.2
Ann	60.9	33.0	46.9	111	Jul 1954	12	79.4	Jul 1974	-38	Feb 1996	2	3.5	Dec 1983	7324	759	6.1	42.7	250.6	41.0	172.3	22.1

\+ 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: 1949-2001

(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	.35	.29	1.10	1997	4	1.60	1997	.00+	1984
Feb	.48	.41	.95	2000	26	1.82	1987	.00+	1999
Mar	1.10	.86	2.61	1973	14	3.67	1977	.00	1981
Apr	1.95	2.09	3.00	2000	19	6.04	2000	.00	1987
May	3.05	2.63	3.21	1982	28	9.85	1982	.43	1994
Jun	2.68	2.25	2.63	1963	15	6.20	1998	.23	1974
Jul	2.17	1.54	2.15	1974	17	8.07	1997	.53	1971
Aug	1.68	1.66	2.20	1983	22	4.20	1982	.25	1973
Sep	1.12	.72	1.84	1966	13	4.41	1986	.00+	1994
Oct	1.53	1.21	2.59	1982	9	6.08	1998	.15	1984
Nov	.74	.60	1.65	2000	1	1.98	1998	.00	1982
Dec	.39	.31	.90	1996	22	2.60	1996	.00+	2000
Ann	17.24	16.09	3.21	May 1982	28	9.85	May 1982	.00+	Dec 2000

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	3.1	1.2	@	@
Feb	3.2	1.5	.2	.0
Mar	4.8	2.8	.7	.1
Apr	6.0	4.3	1.3	.5
May	8.0	6.2	2.1	.7
Jun	7.5	5.7	1.9	.6
Jul	6.5	4.5	1.5	.4
Aug	5.0	3.7	1.1	.4
Sep	3.4	2.5	.8	.2
Oct	4.2	3.1	1.1	.3
Nov	3.4	2.4	.3	.1
Dec	2.9	1.5	.1	.0
Ann	58.0	39.4	11.1	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	.02	.08	.13	.19	.26	.34	.43	.57	.79	1.01
Feb	.00	.00	.13	.22	.31	.40	.50	.62	.78	1.02	1.26
Mar	.06	.16	.33	.49	.66	.85	1.07	1.35	1.72	2.34	2.95
Apr	.13	.32	.63	.92	1.22	1.55	1.93	2.40	3.04	4.08	5.09
May	.60	.88	1.33	1.74	2.15	2.60	3.11	3.71	4.52	5.81	7.03
Jun	.57	.81	1.20	1.56	1.92	2.30	2.73	3.25	3.94	5.03	6.07
Jul	.44	.63	.95	1.24	1.54	1.85	2.21	2.64	3.21	4.12	4.99
Aug	.34	.49	.74	.96	1.19	1.43	1.71	2.04	2.48	3.18	3.84
Sep	.00	.00	.16	.34	.53	.75	1.02	1.37	1.85	2.68	3.49
Oct	.16	.27	.48	.69	.92	1.18	1.49	1.87	2.38	3.24	4.08
Nov	.07	.16	.28	.39	.50	.61	.75	.91	1.13	1.48	1.81
Dec	.00	.00	.04	.11	.18	.26	.36	.49	.66	.96	1.25
Ann	10.60	11.81	13.40	14.63	15.74	16.83	17.97	19.25	20.82	23.12	25.15

\+ 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: 1949-2001
(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	4.8	3.5	2	2
Feb	5.7	4.8	2	1
Mar	7.6	5.5	1	1
Apr	3.2	.8	#	#
May	.1	.0	#	0
Jun	.0	.0	#	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	#	.0	0	0
Oct	1.0	.0	#	0
Nov	5.0	4.5	1	#
Dec	5.2	5.8	2	1
Ann	32.6	24.9	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	1975	7	17.2	1975	12+	1993	15	7	1993
Feb	6.5	1971	18	22.0	1987	16	1987	28	8	1978
Mar	15.0	1988	11	36.0	1977	19	1975	29	6	1988
Apr	10.0	1995	12	17.5	1995	12	1975	2	2	1975
May	2.0	1991	3	2.0	1991	#	1984	3	#	1984
Jun	.0	0	0	.0	0	2	1998	3	#	1998
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	6.0	1971	28	8.0	1971	6	1991	31	1	1991
Nov	8.0	1977	19	28.0	1985	14	1985	30	7	1985
Dec	7.0	1975	31	14.5	1975	13	1985	18	8	1985
Ann	15.0	Mar 1988	11	36.0	Mar 1977	19	Mar 1975	29	8+	Dec 1985

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	2.6	2.0	.6	.1	.0
Feb	2.8	2.3	.6	.1	.0
Mar	2.6	2.0	1.0	.3	.1
Apr	1.1	.9	.5	.2	@
May	@	@	.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	.2	.1	.0
Nov	2.0	1.7	.9	.1	.0
Dec	2.5	1.6	.7	.2	.0
Ann	13.9	10.8	4.5	1.1	.1

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	16.6	9.5	4.8	1.1
Feb	10.3	5.8	3.8	.8
Mar	5.9	3.9	2.2	.9
Apr	1.5	.9	.5	.1
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	.4	.2	.2	.0
Nov	6.0	3.7	1.7	.5
Dec	13.9	7.1	3.6	.3
Ann	54.6	31.1	16.8	3.7

+ 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	6/04	5/30	5/26	5/23	5/20	5/17	5/14	5/10	5/05
32	5/23	5/19	5/15	5/13	5/10	5/07	5/05	5/01	4/27
28	5/15	5/09	5/06	5/03	4/30	4/27	4/24	4/20	4/15
24	5/04	4/29	4/26	4/23	4/21	4/18	4/16	4/12	4/08
20	4/22	4/17	4/13	4/10	4/07	4/05	4/02	3/29	3/24
16	4/13	4/08	4/04	4/01	3/29	3/26	3/22	3/19	3/13

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	9/04	9/08	9/11	9/14	9/16	9/18	9/21	9/23	9/27
32	9/11	9/15	9/18	9/20	9/23	9/25	9/28	10/01	10/05
28	9/19	9/25	9/28	10/01	10/04	10/07	10/11	10/14	10/20
24	9/26	10/03	10/08	10/12	10/16	10/20	10/24	10/29	11/05
20	10/08	10/13	10/17	10/20	10/23	10/26	10/30	11/02	11/08
16	10/17	10/23	10/27	10/30	11/03	11/06	11/10	11/14	11/20

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	135	129	125	122	118	115	111	107	101
32	152	146	142	138	135	132	128	124	118
28	179	171	166	161	157	153	148	143	135
24	202	194	188	183	178	173	168	162	153
20	218	211	206	202	198	194	190	186	179
16	238	232	227	222	218	214	210	205	198

***** 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	1405	1102	933	558	247	62	14	18	164	521	980	1320	7324
60	1250	962	778	412	137	20	2	3	80	367	830	1165	6006
57	1157	885	685	329	87	8	0	1	45	277	740	1072	5286
55	1097	834	624	277	62	4	0	0	29	221	683	1010	4841
50	949	703	477	165	20	0	0	0	7	106	544	867	3838
32	465	312	94	3	0	0	0	0	0	1	161	394	1430

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	83	135	184	436	798	1063	1304	1252	887	504	171	96	6913
55	2	12	1	20	146	377	591	539	225	11	3	0	1927
57	0	8	0	11	110	321	529	478	182	5	0	0	1644
60	0	0	0	5	67	243	438	387	126	1	0	0	1267
65	0	0	0	0	22	135	295	247	60	0	0	0	759
70	0	0	0	0	5	61	174	133	22	0	0	0	395

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	2	23	86	261	574	840	1074	1030	667	313	57	5	2	25	111	372	946	1786	2860	3890	4557	4870	4927	4932
45	0	5	38	157	423	691	919	875	520	193	20	0	0	5	43	200	623	1314	2233	3108	3628	3821	3841	3841
50	0	0	10	78	282	544	764	720	380	98	5	0	0	0	10	88	370	914	1678	2398	2778	2876	2881	2881
55	0	0	0	36	164	396	609	565	253	42	0	0	0	0	0	36	200	596	1205	1770	2023	2065	2065	2065
60	0	0	0	11	77	258	456	412	152	11	0	0	0	0	0	11	88	346	802	1214	1366	1377	1377	1377
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	13	40	91	197	360	536	687	656	427	237	66	19	13	53	144	341	701	1237	1924	2580	3007	3244	3310	3329

(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