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: SUMMIT 1 W, SD **COOP ID: 398116**

Climate Division: SD 3 **NWS Call Sign:** **Elevation: 1,950 Feet** **Lat: 45˚18N** **Lon: 97˚04W**

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	19.6	-1.3	9.2	64	1981	24	23.9	1990	-36	1996	19	-4.2	1982	1733	0	.0	.0	.2	25.4	31.0	16.4
Feb	26.4	5.9	16.2	62	2000	22	29.8	1987	-40	1994	9	2.9	1979	1368	0	.0	.0	.9	18.4	27.9	9.7
Mar	38.2	17.5	27.9	78	1963	31	37.0	2000	-26	1962	1	18.7	1996	1151	0	.0	.0	4.8	10.3	27.9	3.2
Apr	55.6	30.1	42.9	94	1980	21	50.8	1987	-5	1975	1	33.4	1975	669	4	.0	.1	19.4	1.3	18.0	.2
May	68.9	42.5	55.7	95	1959	1	63.5	1977	18	1976	2	49.9	1979	311	22	.0	.0	30.0	.0	4.4	.0
Jun	77.0	51.5	64.3	103	1988	24	73.0	1988	30+	1989	9	58.8	1982	101	78	.1	1.0	30.0	.0	.3	.0
Jul	81.7	56.4	69.1	103	1966	10	74.3	1988	38+	1971	30	60.9	1992	50	175	.2	4.9	31.0	.0	.0	.0
Aug	80.3	54.9	67.6	102	1965	13	74.8	1983	32	1987	31	62.2	1977	63	143	@	3.5	31.0	.0	@	.0
Sep	71.4	45.0	58.2	96+	1984	19	65.1	1998	15	1974	30	53.4	1993	229	26	.0	.9	29.5	.0	2.5	.0
Oct	58.0	33.3	45.7	88+	1993	6	51.6	1973	5	1991	30	41.4	1976	600	0	.0	.0	23.7	.5	14.0	.0
Nov	36.8	18.1	27.5	75	1978	3	39.2	1999	-25	1985	29	15.9	1985	1126	0	.0	.0	5.6	12.4	27.6	2.0
Dec	23.7	4.3	14.0	57	1998	1	25.7	1979	-34+	1983	25	-4.7	1983	1581	0	.0	.0	.5	23.2	31.0	11.8
Ann	53.1	29.9	41.5	103+	Jun 1988	24	74.8	Aug 1983	-40	Feb 1994	9	-4.7	Dec 1983	8982	448	.3	10.4	206.6	91.5	184.6	43.3

\+ 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: 1956-2001

(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	.59	.56	.72	2001	30	1.41	1999	.00	1974
Feb	.52	.45	1.02	1986	19	1.64	1998	.12	1973
Mar	1.44	1.24	2.75	1977	12	6.46	1977	.01	1971
Apr	2.03	1.94	2.45	1991	12	6.56	1986	.11	1996
May	2.83	2.57	3.25	1973	24	7.18	1972	.52	1976
Jun	3.65	3.15	5.61	1971	29	9.44	1971	.59	1997
Jul	3.64	3.34	3.65	1982	13	9.29	1993	.94	1975
Aug	3.23	3.23	2.65	1966	20	6.86	1995	.99	2000
Sep	2.06	1.90	2.95	1989	21	4.69	1986	.05	1998
Oct	1.86	1.21	1.96	1957	7	6.80	1998	.17+	1978
Nov	.93	.61	1.87	2000	1	4.52	2000	.00+	1979
Dec	.35	.33	1.00	1960	5	.83	1977	.00	1986
Ann	23.13	22.61	5.61	Jun 1971	29	9.44	Jun 1971	.00+	Dec 1986

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	4.9	2.2	.1	@
Feb	4.4	2.0	.1	@
Mar	5.8	3.7	.7	.2
Apr	7.4	4.8	1.3	.2
May	9.1	6.6	1.9	.6
Jun	9.6	6.9	2.4	1.0
Jul	8.7	5.9	2.4	1.1
Aug	8.0	5.9	2.1	.8
Sep	6.9	4.4	1.4	.3
Oct	6.3	4.1	1.2	.4
Nov	4.1	2.5	.5	@
Dec	3.9	1.3	.0	.0
Ann	79.1	50.3	14.1	4.6

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	.05	.12	.21	.30	.39	.48	.59	.73	.91	1.19	1.47
Feb	.11	.15	.23	.30	.37	.45	.53	.63	.77	.99	1.19
Mar	.16	.27	.48	.68	.89	1.13	1.41	1.76	2.24	3.03	3.79
Apr	.36	.54	.84	1.12	1.40	1.71	2.05	2.48	3.04	3.94	4.80
May	.74	1.01	1.42	1.78	2.14	2.51	2.93	3.42	4.06	5.08	6.02
Jun	.69	1.02	1.56	2.05	2.55	3.09	3.71	4.45	5.43	7.01	8.51
Jul	.92	1.26	1.79	2.26	2.72	3.21	3.76	4.40	5.25	6.58	7.83
Aug	1.21	1.52	1.95	2.31	2.65	3.00	3.38	3.81	4.37	5.23	6.02
Sep	.19	.34	.62	.90	1.22	1.57	1.99	2.51	3.23	4.42	5.60
Oct	.15	.27	.51	.77	1.06	1.38	1.77	2.27	2.95	4.09	5.22
Nov	.00	.02	.11	.23	.38	.56	.79	1.10	1.54	2.32	3.11
Dec	.03	.06	.12	.17	.23	.29	.35	.44	.55	.73	.90
Ann	13.62	15.33	17.60	19.36	20.97	22.54	24.19	26.05	28.34	31.72	34.71

\+ 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: 1956-2001
(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	8.1	6.6	9	6	12.0	1996	18	20.5	1996	43	1997	18	39	1997	4.0	3.3	1.1	.2	@	22.3	16.9	12.3	6.7
Feb	7.6	6.1	10	6	6.5	1996	27	17.2	1994	49	1994	12	35	1978	3.5	2.6	1.1	.2	.0	19.6	15.4	11.5	7.4
Mar	8.8	9.0	6	4	18.0	1985	4	19.1	1984	44	1978	6	29	1997	3.1	2.9	1.7	.5	.1	12.1	9.6	6.8	3.2
Apr	3.8	2.5	#	#	10.0	1995	12	11.2	2000	16	1975	3	4	1975	1.2	1.1	.5	.3	@	2.4	1.5	.9	.2
May	#	.0	#	0	#	1997	13	#+	1997	#	1997	13	#	1997	.0	.0	.0	.0	.0	.0	.0	.0	.0
Jun	.1	.0	0	0	2.0	1990	3	2.0	1990	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	0	0	.5	1985	24	.5	1985	0	0	0	0	0	@	.0	.0	.0	.0	.0	.0	.0	.0
Oct	1.1	.0	#	0	5.0	1995	23	14.0	1995	8	1995	23	1	1995	.5	.4	.1	.1	.0	.3	@	.0	.0
Nov	5.5	2.5	2	1	10.0	1983	12	23.0	1992	18	2000	30	8	1992	2.8	2.6	.9	.6	.0	9.9	6.6	4.1	1.0
Dec	5.1	5.0	5	3	6.0	1984	1	13.0	1977	23	1977	31	18	1985	3.0	2.4	.6	.2	.0	17.3	13.4	10.2	5.1
Ann	40.1	31.7	N/A	N/A	18.0	Mar 1985	4	23.0	Nov 1992	49	Feb 1994	12	39	Jan 1997	18.1	15.3	6.0	2.1	.1	83.9	63.4	45.8	23.6

+ 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	6/14	6/08	6/03	5/30	5/27	5/23	5/19	5/14	5/08
32	6/03	5/28	5/25	5/21	5/18	5/15	5/11	5/07	5/02
28	5/18	5/13	5/09	5/07	5/04	5/01	4/28	4/25	4/20
24	5/09	5/04	5/01	4/28	4/25	4/23	4/20	4/17	4/12
20	4/29	4/24	4/21	4/18	4/15	4/12	4/09	4/06	4/01
16	4/16	4/12	4/09	4/06	4/03	4/01	3/29	3/25	3/21

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	8/29	9/03	9/06	9/09	9/12	9/15	9/18	9/21	9/26
32	9/09	9/13	9/16	9/18	9/21	9/23	9/25	9/28	10/02
28	9/17	9/21	9/25	9/28	9/30	10/03	10/06	10/09	10/14
24	9/23	9/28	10/02	10/05	10/07	10/10	10/13	10/17	10/22
20	10/01	10/07	10/10	10/13	10/17	10/20	10/23	10/26	11/01
16	10/12	10/18	10/22	10/25	10/29	11/01	11/04	11/09	11/14

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	133	124	118	113	108	103	97	91	82
32	145	138	133	129	125	121	117	112	105
28	169	162	157	153	149	145	141	136	129
24	185	178	173	168	164	160	156	151	144
20	205	198	193	188	184	180	175	170	162
16	230	222	217	212	208	203	199	193	186

***** 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	1733	1368	1151	669	311	101	50	63	229	600	1126	1581	8982
60	1578	1228	996	527	196	38	15	20	124	446	976	1426	7570
57	1485	1144	903	447	141	17	7	9	77	357	886	1333	6806
55	1423	1088	841	396	110	10	3	4	53	300	826	1271	6325
50	1268	948	689	281	53	1	0	0	15	177	678	1116	5226
32	741	499	234	39	0	0	0	0	0	6	238	609	2366

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	31	54	106	364	735	967	1148	1103	787	429	102	51	5877
55	0	0	0	31	132	287	438	393	150	10	0	0	1441
57	0	0	0	22	100	235	381	337	114	5	0	0	1194
60	0	0	0	12	62	165	296	255	71	1	0	0	862
65	0	0	0	4	22	78	175	143	26	0	0	0	448
70	0	0	0	0	6	26	91	65	6	0	0	0	194

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	169	501	744	923	873	557	236	22	0	0	0	19	188	689	1433	2356	3229	3786	4022	4044	4044
45	0	0	7	95	356	594	768	718	413	134	10	0	0	0	7	102	458	1052	1820	2538	2951	3085	3095	3095
50	0	0	0	53	229	444	613	563	279	68	1	0	0	0	0	53	282	726	1339	1902	2181	2249	2250	2250
55	0	0	0	22	127	303	458	408	171	30	0	0	0	0	0	22	149	452	910	1318	1489	1519	1519	1519
60	0	0	0	8	59	178	309	267	89	9	0	0	0	0	0	8	67	245	554	821	910	919	919	919
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	1	16	128	315	472	599	565	352	160	20	0	0	1	17	145	460	932	1531	2096	2448	2608	2628	2628

(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