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: VERMILLION 2 SE, SD **COOP ID: 398622**

Climate Division: SD 9 **NWS Call Sign:** **Elevation: 1,190 Feet** **Lat: 42˚46N** **Lon: 96˚55W**

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	30.1	8.3	19.2	71	1981	24	32.1	1992	-29	1966	29	4.9	1979	1421	0	.0	.0	2.3	16.2	30.5	9.5
Feb	37.1	14.6	25.9	74	1981	17	36.5	1998	-33	1988	11	10.4	1978	1096	0	.0	.0	5.9	11.0	26.4	4.9
Mar	49.4	25.3	37.4	90	1968	30	44.0	2000	-22	1960	4	28.3	1984	857	0	.0	.0	15.0	3.8	23.5	1.1
Apr	64.0	36.6	50.3	97	1965	30	57.7	1981	7	1975	3	43.2	1983	448	7	.0	.7	26.0	.3	10.9	.0
May	75.1	48.6	61.9	104+	1967	26	68.5	1977	20	1967	3	57.5	1997	165	66	@	1.7	30.9	.0	1.2	.0
Jun	84.5	58.3	71.4	108	1988	21	77.8	1988	36	1956	1	66.0	1982	20	213	.7	7.8	30.0	.0	.0	.0
Jul	88.5	63.4	76.0	108+	1990	4	80.9	1974	37	1972	5	68.4	1992	7	347	2.0	13.5	31.0	.0	.0	.0
Aug	86.3	61.6	74.0	106+	1973	27	81.2	1983	36	1967	31	68.4	1992	13	290	.6	10.6	31.0	.0	.0	.0
Sep	79.3	51.2	65.3	103	1976	7	70.8	1978	23	1984	29	59.6	1993	87	95	.3	4.9	29.9	.0	1.1	.0
Oct	66.5	38.6	52.6	98	1963	1	57.0	1973	10	1972	19	47.3	1976	389	3	.0	.4	28.6	.1	8.3	.0
Nov	46.2	24.8	35.5	83	1999	8	46.4	1999	-24	1959	14	25.3	1985	886	0	.0	.0	12.1	4.6	22.9	1.0
Dec	33.2	12.5	22.9	69	1970	8	30.4	1979	-30	1989	22	3.2	1983	1307	0	.0	.0	3.0	13.0	30.4	5.9
Ann	61.7	37.0	49.4	108+	Jul 1990	4	81.2	Aug 1983	-33	Feb 1988	11	3.2	Dec 1983	6696	1021	3.6	39.6	245.7	49.0	155.2	22.4

\+ 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	.37	.33	.83	1949	3	.81	1982	.00	1998
Feb	.49	.34	1.87	1951	28	1.61	1992	.00	1985
Mar	1.80	1.48	2.54	1979	22	5.35	1973	.00	1994
Apr	2.76	2.00	2.55	1998	26	10.50	1984	.43	1981
May	3.74	3.44	3.00	1990	19	8.33	1990	.60	1989
Jun	3.61	3.12	3.47	1953	7	9.13	1999	.78	1980
Jul	3.40	2.99	4.45	1996	17	7.41	1978	.64	2000
Aug	2.82	2.72	3.71	1960	28	5.89	1988	.36	1984
Sep	2.41	1.99	4.82	1996	3	7.07	1996	.39	1999
Oct	1.97	1.55	2.70+	1992	8	5.20	1992	.06	1989
Nov	1.47	1.23	2.40	1948	19	5.48	1983	.04	1976
Dec	.52	.48	1.59	1953	3	2.03	1982	.00	1995
Ann	25.36	24.54	4.82	Sep 1996	3	10.50	Apr 1984	.00+	Jan 1998

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	3.8	1.1	.1	.0
Feb	3.5	1.3	.2	.1
Mar	5.9	3.9	1.2	.3
Apr	8.0	5.3	1.7	.6
May	9.8	6.8	2.4	.9
Jun	8.9	6.4	2.7	1.1
Jul	7.6	4.9	2.2	.9
Aug	7.3	4.9	2.1	.9
Sep	6.3	4.0	1.5	.6
Oct	6.1	4.1	1.1	.4
Nov	5.6	3.1	1.0	.2
Dec	4.0	1.5	.1	@
Ann	76.8	47.3	16.3	6.0

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	.02	.05	.10	.16	.22	.28	.36	.46	.59	.81	1.03
Feb	.01	.05	.11	.18	.26	.35	.46	.60	.79	1.11	1.44
Mar	.10	.26	.54	.80	1.09	1.40	1.77	2.22	2.84	3.86	4.85
Apr	.48	.72	1.13	1.50	1.89	2.31	2.79	3.37	4.14	5.40	6.59
May	1.25	1.60	2.12	2.56	2.98	3.42	3.90	4.45	5.17	6.28	7.30
Jun	.93	1.27	1.79	2.25	2.71	3.19	3.73	4.36	5.19	6.50	7.72
Jul	.88	1.20	1.69	2.13	2.56	3.01	3.51	4.11	4.89	6.11	7.26
Aug	.61	.87	1.29	1.66	2.04	2.43	2.88	3.42	4.13	5.26	6.33
Sep	.49	.71	1.06	1.39	1.71	2.06	2.46	2.94	3.57	4.58	5.53
Oct	.21	.36	.63	.90	1.20	1.53	1.92	2.40	3.06	4.16	5.23
Nov	.11	.20	.39	.60	.82	1.08	1.39	1.79	2.34	3.26	4.17
Dec	.04	.10	.19	.26	.34	.43	.52	.64	.80	1.06	1.31
Ann	15.84	17.59	19.89	21.66	23.26	24.83	26.46	28.29	30.53	33.82	36.71

\+ 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: 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	3.5	2.1	4	3
Feb	4.4	2.5	4	3
Mar	5.2	5.0	1	#
Apr	2.4	.9	#	0
May	#	.0	0	0
Jun	.0	.0	#	0
Jul	.0	.0	0	0
Aug	.0	.0	#	0
Sep	#	.0	0	0
Oct	.8	.0	#	0
Nov	4.9	3.5	1	#
Dec	5.6	5.0	3	2
Ann	26.8	19.0	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	11.0	1982	22	11.6	1979	26	1982	27	14	1982
Feb	12.0	1984	18	19.7	1993	24	1982	12	19	1982
Mar	10.0	1983	26	18.0	1983	16	1978	6	6	1978
Apr	10.0	1992	21	12.5	1994	6+	1992	21	1	1975
May	#	1989	5	#	1989	0	0	0	0	0
Jun	.0	0	0	.0	0	#	1981	14	#	1981
Jul	.0	0	0	.0	0	0	0	0	0	0
Aug	.0	0	0	.0	0	#	1982	9	#	1982
Sep	#	1985	28	#	1985	0	0	0	0	0
Oct	6.5	1980	27	6.5	1980	4+	1991	31	#+	1997
Nov	10.0	1975	20	19.5	1991	15	1983	29	4	1991
Dec	8.0	1972	30	18.2	1982	20	1983	30	17	1983
Ann	12.0	Feb 1984	18	19.7	Feb 1993	26	Jan 1982	27	19	Feb 1982

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	3.2	1.8	.7	.2	@
Feb	2.4	1.7	.6	.2	@
Mar	1.9	1.5	.7	.3	@
Apr	.9	.8	.3	.2	@
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
Nov	2.1	1.8	.6	.3	@
Dec	2.9	2.2	.8	.3	.0
Ann	13.7	10.1	3.8	1.5	@

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	12.4	8.7	5.7	.7
Feb	9.2	6.7	4.5	2.7
Mar	4.1	2.4	1.4	.3
Apr	.5	.2	.1	.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	.4	.2	.0	.0
Nov	4.2	2.2	1.4	.7
Dec	13.0	7.9	3.5	.6
Ann	43.8	28.3	16.6	5.0

+ 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	5/18	5/15	5/12	5/10	5/07	5/05	5/02	4/28
32	5/16	5/11	5/08	5/05	5/02	4/29	4/26	4/22	4/17
28	5/13	5/07	5/03	4/29	4/26	4/22	4/19	4/14	4/09
24	4/26	4/21	4/18	4/14	4/12	4/09	4/06	4/02	3/28
20	4/15	4/10	4/07	4/03	4/01	3/29	3/26	3/22	3/17
16	4/08	4/03	3/30	3/26	3/23	3/20	3/17	3/13	3/08

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	9/09	9/14	9/17	9/20	9/22	9/25	9/27	9/30	10/05
32	9/18	9/22	9/25	9/27	9/29	10/01	10/04	10/07	10/11
28	9/22	9/28	10/02	10/06	10/09	10/12	10/16	10/20	10/26
24	10/07	10/11	10/15	10/18	10/20	10/23	10/26	10/29	11/03
20	10/16	10/21	10/24	10/27	10/30	11/02	11/05	11/08	11/13
16	10/23	10/29	11/02	11/06	11/10	11/14	11/17	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	154	147	142	138	135	131	127	122	115
32	167	161	157	153	150	146	143	139	133
28	189	181	175	170	166	161	156	150	142
24	209	203	199	195	191	188	184	179	173
20	232	225	220	216	212	208	203	198	191
16	256	247	241	236	231	226	221	214	206

***** 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	1421	1096	857	448	165	20	7	13	87	389	886	1307	6696
60	1266	956	702	316	85	4	0	2	31	249	736	1152	5499
57	1173	881	612	245	51	1	0	0	13	178	648	1059	4861
55	1112	829	556	203	35	0	0	0	7	137	591	997	4467
50	963	698	414	117	11	0	0	0	0	64	454	850	3571
32	476	310	84	3	0	0	0	0	0	1	110	374	1358

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	79	138	249	552	925	1183	1363	1300	998	637	215	90	7729
55	1	13	9	63	247	493	650	587	314	61	5	0	2443
57	0	9	3	45	201	434	588	525	261	40	2	0	2108
60	0	0	0	25	141	347	495	434	189	18	0	0	1649
65	0	0	0	7	66	213	347	290	95	3	0	0	1021
70	0	0	0	1	23	110	212	169	38	0	0	0	553

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	1	26	113	337	687	950	1127	1059	768	418	77	2	1	27	140	477	1164	2114	3241	4300	5068	5486	5563	5565
45	0	6	59	219	532	800	972	904	618	278	34	1	0	6	65	284	816	1616	2588	3492	4110	4388	4422	4423
50	0	0	23	130	382	650	817	749	472	168	12	0	0	0	23	153	535	1185	2002	2751	3223	3391	3403	3403
55	0	0	7	68	255	500	662	594	336	88	1	0	0	0	7	75	330	830	1492	2086	2422	2510	2511	2511
60	0	0	2	34	145	355	507	440	218	34	0	0	0	0	2	36	181	536	1043	1483	1701	1735	1735	1735
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	4	29	91	234	439	626	749	705	502	282	61	5	4	33	124	358	797	1423	2172	2877	3379	3661	3722	3727

(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