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: CEDAR BUTTE 1 NE, SD **COOP ID: 391539**

Climate Division: SD 8 **NWS Call Sign:** **Elevation: 2,250 Feet** **Lat: 43˚36N** **Lon: 101˚01W**

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	34.4	7.8	21.1	73+	1987	13	32.7	1990	-26	1988	6	6.8	1979	1362	0	.0	.0	5.1	12.5	29.3	8.1
Feb	39.7	13.1	26.4	77	1995	21	38.6	1999	-29	1996	2	12.8	1978	1081	0	.0	.0	8.8	8.7	25.4	4.2
Mar	48.8	21.7	35.3	86+	1993	25	41.7	1986	-19+	1962	1	25.6	1996	923	0	.0	.0	15.7	4.0	24.5	1.2
Apr	60.2	33.4	46.8	96+	1992	30	55.6	1981	4+	1997	8	37.5	1995	549	3	.0	.4	24.2	.4	12.5	.0
May	71.7	45.4	58.6	101	1969	27	65.4	1985	23	1980	8	52.3	1983	235	33	.0	1.6	30.5	.0	1.8	.0
Jun	82.1	54.4	68.3	112	1988	24	77.0	1988	34+	1969	14	62.8	1982	52	150	1.3	6.9	29.9	.0	.0	.0
Jul	90.0	60.4	75.2	112	1989	5	82.0	1974	39	1971	30	67.4	1992	11	327	5.0	17.2	31.0	.0	.0	.0
Aug	88.7	58.7	73.7	110+	1988	15	81.9	1983	39+	1988	29	67.2	1992	19	290	3.5	16.8	31.0	.0	.0	.0
Sep	79.2	48.6	63.9	106+	2001	5	70.8	1998	22	1991	19	58.6	1986	129	97	1.2	6.8	29.8	.0	1.0	.0
Oct	65.1	35.3	50.2	99	1963	5	54.0	1974	1	1991	30	46.3	1976	459	0	.0	.5	27.0	.3	8.5	.0
Nov	46.9	21.2	34.1	87	1999	9	46.2	1999	-15	1959	14	18.4	1985	928	0	.0	.0	12.8	5.0	24.0	1.1
Dec	36.9	11.4	24.2	73	1998	2	33.9	1999	-30	1989	22	5.2	1983	1267	0	.0	.0	6.3	10.3	29.0	5.1
Ann	62.0	34.3	48.2	112+	Jul 1989	5	82.0	Jul 1974	-30	Dec 1989	22	5.2	Dec 1983	7015	900	11.0	50.2	252.1	41.2	156.0	19.7

\+ 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: 1951-2001

(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	.36	.26	.84	1953	15	1.79	1997	.00+	1990
Feb	.42	.35	1.00	1953	9	1.31	1987	.00+	1985
Mar	1.30	1.12	2.07	1996	6	4.55	1977	.00	1997
Apr	2.12	1.55	4.25	1971	20	6.67	1971	.32	1987
May	3.22	3.23	2.83	1983	1	6.71	1982	.69	1980
Jun	3.47	2.93	4.08	1994	21	7.86	1979	.66	1989
Jul	2.86	2.47	2.40	1957	19	6.30	1998	.57	1991
Aug	1.78	1.71	3.01	1966	19	4.69	1994	.22	1988
Sep	1.40	1.18	1.51	1955	20	4.14	1973	.05	1981
Oct	1.50	1.38	2.25	1995	5	4.61	1998	.16	1976
Nov	.58	.49	1.00	1956	2	2.34	1985	.03	1976
Dec	.35	.24	1.05	1955	3	1.20	1977	.00+	1995
Ann	19.36	19.48	4.25	Apr 1971	20	7.86	Jun 1979	.00+	Mar 1997

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	3.9	1.3	.2	.0
Feb	3.7	1.3	.2	.0
Mar	5.9	3.0	.8	.3
Apr	8.2	4.8	1.4	.2
May	9.4	6.3	2.1	.7
Jun	8.9	6.0	2.2	.8
Jul	8.5	5.9	2.0	.8
Aug	6.5	3.9	1.3	.2
Sep	5.2	3.1	1.0	.2
Oct	5.3	3.2	.9	.3
Nov	4.4	1.8	.2	.0
Dec	3.7	1.3	.1	.0
Ann	73.6	41.9	12.4	3.5

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	.05	.11	.17	.24	.33	.45	.60	.88	1.14
Feb	.00	.00	.09	.16	.23	.31	.41	.53	.69	.96	1.22
Mar	.08	.20	.40	.59	.79	1.02	1.28	1.60	2.03	2.75	3.45
Apr	.34	.52	.83	1.12	1.42	1.75	2.13	2.59	3.20	4.20	5.16
May	.81	1.11	1.58	1.99	2.40	2.83	3.32	3.89	4.64	5.82	6.93
Jun	.66	.97	1.48	1.95	2.42	2.94	3.52	4.22	5.16	6.66	8.08
Jul	.75	1.02	1.43	1.80	2.16	2.53	2.95	3.45	4.10	5.12	6.07
Aug	.42	.59	.85	1.08	1.31	1.55	1.83	2.15	2.58	3.26	3.90
Sep	.14	.24	.44	.63	.84	1.08	1.36	1.71	2.18	2.98	3.75
Oct	.16	.27	.48	.69	.91	1.17	1.46	1.83	2.33	3.16	3.97
Nov	.05	.08	.16	.24	.33	.43	.55	.70	.91	1.26	1.61
Dec	.00	.00	.06	.12	.18	.25	.33	.44	.59	.83	1.08
Ann	12.49	13.76	15.43	16.71	17.86	18.98	20.15	21.46	23.05	25.39	27.43

\+ 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: 1951-2001
(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	3.8	3.0	2	2	8.0	1992	7	10.5	1985	12	1982	23	8	1982	3.6	1.7	.4	.2	.0	14.8	7.1	3.9	.2
Feb	5.8	5.5	2	1	8.0	1971	19	17.0	1987	18	1978	21	12	1978	3.3	2.3	.6	.1	.0	8.9	4.6	1.6	.4
Mar	7.6	7.5	1	1	16.0	1986	17	19.5	1987	18	1986	18	4	1987	3.5	2.4	.9	.5	.1	6.3	3.3	1.8	.4
Apr	2.7	1.1	#	#	8.0	1997	6	13.0	1971	18	1995	13	3	1997	1.6	1.2	.6	.2	.0	1.6	.9	.5	.1
May	.1	.0	#	0	2.0	1979	10	2.0	1979	#+	1984	5	#+	1984	@	@	.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	.1	.0	#	0	2.0	1985	28	2.0	1985	1	1985	28	#	1985	@	@	.0	.0	.0	@	.0	.0	.0
Oct	1.4	.0	#	0	5.0	1971	29	11.0	1971	6	1971	30	1	1971	.7	.6	.1	.1	.0	.7	.2	.1	.0
Nov	5.1	2.5	1	#	9.0	1985	8	37.2	1985	20	1985	10	9	1985	2.8	1.7	.8	.4	.0	4.4	2.1	.6	.0
Dec	4.3	3.4	2	1	6.0	1981	16	13.2	1981	14	1985	20	9	1985	3.5	1.8	.6	.2	.0	11.0	5.3	2.1	.1
Ann	30.9	23.0	N/A	N/A	16.0	Mar 1986	17	37.2	Nov 1985	20	Nov 1985	10	12	Feb 1978	19.0	11.7	4.0	1.7	.1	47.7	23.5	10.6	1.2

+ 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	5/31	5/26	5/22	5/19	5/16	5/14	5/10	5/07	5/02
32	5/20	5/15	5/11	5/08	5/05	5/02	4/28	4/25	4/19
28	5/10	5/06	5/02	4/29	4/26	4/24	4/21	4/17	4/12
24	4/29	4/25	4/21	4/18	4/15	4/13	4/10	4/06	4/01
20	4/18	4/14	4/10	4/07	4/05	4/02	3/30	3/26	3/22
16	4/10	4/05	4/02	3/30	3/27	3/24	3/21	3/18	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	9/12	9/16	9/18	9/21	9/23	9/25	9/27	9/30	10/03
32	9/19	9/23	9/26	9/29	10/02	10/04	10/07	10/10	10/14
28	9/21	9/28	10/02	10/06	10/10	10/14	10/17	10/22	10/29
24	10/01	10/06	10/10	10/14	10/17	10/20	10/24	10/28	11/02
20	10/12	10/18	10/22	10/25	10/28	10/31	11/04	11/08	11/13
16	10/24	10/30	11/03	11/07	11/10	11/13	11/17	11/21	11/27

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	146	140	136	132	129	125	121	117	111
32	169	162	157	153	149	145	141	136	129
28	191	182	176	171	166	161	155	149	140
24	205	198	193	188	184	180	175	170	162
20	227	220	215	210	206	202	197	192	185
16	250	242	236	232	227	223	218	212	204

***** 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	1362	1081	923	549	235	52	11	19	129	459	928	1267	7015
60	1207	942	768	409	133	16	1	4	59	306	778	1112	5735
57	1114	867	675	330	87	6	0	1	32	221	697	1019	5049
55	1054	814	615	282	63	3	0	0	20	169	640	959	4619
50	910	684	470	178	24	0	0	0	5	73	504	815	3663
32	432	301	98	9	0	0	0	0	0	1	153	351	1345

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	93	144	198	452	822	1088	1338	1294	958	565	215	108	7275
55	3	13	2	36	172	400	625	581	288	20	12	2	2154
57	1	10	0	24	134	343	563	520	240	10	9	0	1854
60	0	1	0	13	87	263	471	430	177	3	0	0	1445
65	0	0	0	3	33	150	327	290	97	0	0	0	900
70	0	0	0	0	9	70	198	171	45	0	0	0	493

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	17	37	108	286	604	875	1113	1079	746	385	89	22	17	54	162	448	1052	1927	3040	4119	4865	5250	5339	5361
45	2	10	53	179	452	725	958	924	600	256	42	6	2	12	65	244	696	1421	2379	3303	3903	4159	4201	4207
50	1	3	23	101	312	575	803	769	456	153	16	0	1	4	27	128	440	1015	1818	2587	3043	3196	3212	3212
55	0	0	6	52	190	428	648	614	321	77	4	0	0	0	6	58	248	676	1324	1938	2259	2336	2340	2340
60	0	0	0	22	101	285	493	460	208	29	1	0	0	0	0	22	123	408	901	1361	1569	1598	1599	1599
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	20	42	96	203	375	555	713	690	471	263	76	26	20	62	158	361	736	1291	2004	2694	3165	3428	3504	3530

(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