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: PACTOLA DAM, SD **COOP ID: 396427**

Climate Division: SD 4 **NWS Call Sign:** **Elevation: 4,720 Feet** **Lat: 44˚04N** **Lon: 103˚29W**

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	34.7	8.3	21.5	68	1981	24	31.6	1986	-34	1963	19	10.8	1979	1349	0	.0	.0	4.0	12.0	30.6	8.2
Feb	38.5	11.4	25.0	68	1982	21	31.6	1977	-34+	1996	3	12.5	1989	1121	0	.0	.0	6.5	8.2	27.9	5.2
Mar	43.6	17.5	30.6	78	1972	11	37.5	1986	-24	1965	25	22.2	1996	1070	0	.0	.0	10.6	6.3	30.0	2.4
Apr	51.3	25.3	38.3	85	1989	23	44.7	1981	-8	1975	2	32.3	1975	801	0	.0	.0	16.7	1.9	24.1	.2
May	61.4	34.7	48.1	93	1969	28	53.6	1985	13	1967	4	43.7	1996	526	0	.0	.0	26.3	.1	11.4	.0
Jun	71.5	43.4	57.5	98	1974	27	67.0	1988	24+	1969	14	51.6	1998	246	19	.0	.8	29.5	.0	1.5	.0
Jul	78.5	48.7	63.6	100+	1989	9	67.6	1989	29	1971	26	57.8	1992	113	70	.1	3.6	31.0	.0	.1	.0
Aug	78.2	46.8	62.5	98+	1988	16	69.0	1983	27	1966	22	57.9	1992	123	46	.0	2.1	30.9	.0	.2	.0
Sep	68.5	36.8	52.7	98	1960	4	59.1	1998	15+	1984	25	47.9	1993	376	6	.0	.6	27.8	.2	8.0	.0
Oct	57.1	27.5	42.3	86	1957	2	45.9	1974	-8	1991	29	38.5	1976	705	0	.0	.0	22.1	1.0	23.1	.1
Nov	43.0	17.7	30.4	75	1999	8	40.2	1999	-21	1959	14	16.6	1985	1039	0	.0	.0	9.7	7.0	28.6	1.6
Dec	36.9	10.6	23.8	65+	1993	12	29.9	1999	-35	1983	23	10.7	1983	1280	0	.0	.0	5.5	10.1	30.5	5.8
Ann	55.3	27.4	41.4	100+	Jul 1989	9	69.0	Aug 1983	-35	Dec 1983	23	10.7	Dec 1983	8749	141	.1	7.1	220.6	46.8	216.0	23.5

\+ 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	.30	.27	.43	1971	31	.76	1975	.02+	1995
Feb	.44	.36	.63	1987	27	1.59	1987	.03	1999
Mar	1.03	.98	1.23	1973	14	2.43	1977	.17	1978
Apr	2.36	2.08	2.27	2000	19	6.96	1971	.18	1987
May	3.70	2.97	3.71	1952	22	8.28	1991	1.40	1979
Jun	3.81	3.16	7.16	1972	10	13.51	1972	.58	1987
Jul	3.18	2.88	3.38	1979	4	8.51	1979	.73	1988
Aug	2.14	2.19	2.87	1970	6	4.52	1999	.85	1994
Sep	1.50	1.07	2.53	1998	14	5.87	1986	.04	1975
Oct	1.59	1.14	2.44	1982	11	4.66	1994	.17	1999
Nov	.65	.49	1.50	1956	2	1.80	1985	.07	1981
Dec	.40	.39	.59	1980	1	.80	1975	.01	1991
Ann	21.10	21.27	7.16	Jun 1972	10	13.51	Jun 1972	.01	Dec 1991

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	5.6	.8	.0	.0
Feb	5.5	1.5	@	.0
Mar	8.0	3.4	.4	.1
Apr	9.9	5.2	1.5	.4
May	12.6	7.5	2.3	.6
Jun	12.7	7.3	2.0	.8
Jul	12.5	6.8	1.8	.5
Aug	10.1	5.3	1.3	.2
Sep	6.9	3.2	.8	.2
Oct	6.2	3.3	.9	.3
Nov	4.9	2.1	.1	.1
Dec	4.9	1.3	@	.0
Ann	99.8	47.7	11.1	3.2

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	.03	.05	.09	.13	.17	.23	.29	.37	.48	.66	.84
Feb	.05	.09	.15	.21	.28	.35	.43	.54	.68	.91	1.14
Mar	.20	.29	.44	.58	.72	.87	1.05	1.26	1.54	1.98	2.41
Apr	.43	.64	.98	1.31	1.63	1.99	2.39	2.88	3.53	4.58	5.58
May	1.14	1.49	2.01	2.46	2.90	3.35	3.85	4.43	5.18	6.36	7.45
Jun	.72	1.06	1.62	2.13	2.66	3.22	3.86	4.64	5.67	7.32	8.90
Jul	1.02	1.32	1.76	2.15	2.52	2.90	3.32	3.81	4.44	5.42	6.33
Aug	.78	.98	1.27	1.51	1.74	1.98	2.24	2.53	2.92	3.51	4.05
Sep	.12	.22	.41	.62	.85	1.11	1.42	1.82	2.37	3.29	4.19
Oct	.21	.34	.57	.79	1.02	1.28	1.57	1.94	2.43	3.23	4.00
Nov	.10	.16	.25	.34	.43	.53	.65	.79	.98	1.29	1.59
Dec	.04	.08	.13	.19	.25	.31	.39	.49	.62	.84	1.05
Ann	13.39	14.81	16.68	18.12	19.41	20.68	22.00	23.47	25.27	27.92	30.23

\+ 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)

Month	Snow Fall Mean	Snow Fall Median	Snow Depth Mean	Snow Depth Median
Jan	3.7	3.5	2	2
Feb	5.2	4.5	2	1
Mar	10.4	9.8	2	1
Apr	12.0	10.3	1	1
May	1.5	.0	#	#
Jun	.2	.0	#	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.5	.0	#	0
Oct	3.4	2.0	#	#
Nov	6.8	5.3	1	1
Dec	4.4	4.4	2	1
Ann	48.1	39.8	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	1993	9	13.5	1975	14	1986	7	12	1986
Feb	7.5	1987	27	20.5	1987	12	1987	28	9	1993
Mar	18.0	1973	14	23.0+	1973	18	1973	15	5	1973
Apr	13.9	2000	19	37.5	1984	20	1997	12	6	1997
May	5.5	1991	3	11.0	1996	7	1993	1	1	1984
Jun	3.8	1998	3	4.0	1998	4	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	4.0	1996	26	4.0+	2000	4	1996	26	#+	2000
Oct	10.0	1996	17	19.0	1996	11	1995	23	2	1998
Nov	11.0	1986	7	22.5	1985	14	1985	30	7	1985
Dec	9.0	1980	1	10.5	1985	19	1985	20	14	1985
Ann	18.0	Mar 1973	14	37.5	Apr 1984	20	Apr 1997	12	14	Dec 1985

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	3.0	1.9	.4	.1	.0
Feb	3.1	2.3	.6	@	.0
Mar	4.9	3.6	1.1	.5	.1
Apr	4.1	3.3	1.5	.8	.2
May	.5	.4	.3	.1	.0
Jun	.1	@	@	.0	.0
Jul	.0	.0	.0	.0	.0
Aug	.0	.0	.0	.0	.0
Sep	.3	.3	.1	.0	.0
Oct	1.4	1.2	.3	.1	@
Nov	3.0	2.4	1.0	.1	@
Dec	2.6	1.9	.6	.2	.0
Ann	23.0	17.3	5.9	1.9	.3

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	15.1	6.6	3.5	.4
Feb	10.7	5.4	3.3	.5
Mar	11.0	5.5	3.2	1.0
Apr	6.8	3.7	2.4	1.0
May	1.0	.6	.3	.0
Jun	.1	@	.0	.0
Jul	.0	.0	.0	.0
Aug	.0	.0	.0	.0
Sep	.3	.1	.0	.0
Oct	2.1	1.0	.5	.1
Nov	7.3	4.2	2.0	.6
Dec	14.3	6.9	3.5	.3
Ann	68.7	34.0	18.7	3.9

+ 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	7/15	7/07	7/02	6/27	6/23	6/19	6/15	6/09	6/02
32	7/01	6/23	6/17	6/12	6/08	6/03	5/29	5/23	5/15
28	6/05	5/30	5/25	5/22	5/18	5/15	5/11	5/07	5/01
24	5/19	5/14	5/11	5/08	5/05	5/02	4/29	4/26	4/21
20	5/12	5/06	5/02	4/29	4/26	4/22	4/19	4/15	4/09
16	4/29	4/24	4/21	4/18	4/16	4/13	4/10	4/07	4/02

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	8/15	8/20	8/24	8/28	8/31	9/03	9/07	9/11	9/17
32	8/24	8/29	9/02	9/05	9/09	9/12	9/15	9/19	9/24
28	9/09	9/13	9/15	9/18	9/20	9/22	9/25	9/27	10/01
24	9/16	9/21	9/25	9/28	10/01	10/04	10/07	10/11	10/16
20	9/25	10/01	10/05	10/08	10/11	10/14	10/18	10/22	10/27
16	10/04	10/10	10/15	10/19	10/22	10/26	10/30	11/03	11/09

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	97	87	80	74	68	62	56	49	40
32	118	109	103	97	92	87	82	75	66
28	147	139	133	128	124	119	114	109	101
24	168	161	156	152	148	144	140	135	128
20	190	183	177	172	168	164	159	153	146
16	211	204	198	193	189	184	179	174	166

***** 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	1349	1121	1070	801	526	246	113	123	376	705	1039	1280	8749
60	1194	981	915	651	375	137	43	47	243	550	889	1125	7150
57	1101	897	822	561	290	88	20	21	174	457	799	1032	6262
55	1039	841	760	502	238	61	11	12	134	395	739	970	5702
50	884	701	605	360	129	19	1	2	58	244	595	815	4413
32	372	261	131	33	1	0	0	0	0	6	176	306	1286

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	46	64	84	221	498	764	980	945	620	324	126	49	4721
55	0	0	0	1	22	135	278	244	64	0	0	0	744
57	0	0	0	0	13	101	225	191	44	0	0	0	574
60	0	0	0	0	4	61	155	124	22	0	0	0	366
65	0	0	0	0	0	19	70	46	6	0	0	0	141
70	0	0	0	0	0	4	20	10	0	0	0	0	34

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	6	29	99	281	538	748	711	412	166	31	3	2	8	37	136	417	955	1703	2414	2826	2992	3023	3026
45	0	1	6	44	163	390	593	556	279	81	9	0	0	1	7	51	214	604	1197	1753	2032	2113	2122	2122
50	0	0	0	15	82	255	439	401	170	30	0	0	0	0	0	15	97	352	791	1192	1362	1392	1392	1392
55	0	0	0	3	28	136	289	255	80	6	0	0	0	0	0	3	31	167	456	711	791	797	797	797
60	0	0	0	0	3	63	157	124	33	0	0	0	0	0	0	0	3	66	223	347	380	380	380	380
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	5	23	45	97	200	337	462	456	298	162	47	11	5	28	73	170	370	707	1169	1625	1923	2085	2132	2143

(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