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: LEAD, SD **COOP ID: 394834**

Climate Division: SD 4 **NWS Call Sign:** **Elevation: 5,350 Feet** **Lat: 44˚21N** **Lon: 103˚46W**

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	32.5	14.0	23.3	69	1981	23	33.8	1986	-27	1950	3	10.8	1979	1294	0	.0	.0	3.2	12.7	28.3	5.8
Feb	36.1	17.4	26.8	66	1992	1	34.8	1992	-32	1989	3	12.7	1989	1071	0	.0	.0	5.3	8.6	25.4	3.4
Mar	41.7	22.4	32.1	74	1972	10	39.6	1986	-17	1955	25	24.6	1996	1022	0	.0	.0	10.2	6.6	26.0	1.3
Apr	50.1	30.0	40.1	84	1980	21	47.4	1987	-1	1997	8	33.2	1983	749	0	.0	.0	17.0	2.3	18.4	@
May	60.3	39.5	49.9	88+	1969	27	55.5	1985	9	1954	3	45.4	1983	469	2	.0	.0	26.5	.0	5.2	.0
Jun	70.2	48.3	59.3	95+	1988	20	68.9	1988	24	1951	2	53.3	1998	206	35	.0	.5	29.5	.0	.4	.0
Jul	77.0	54.4	65.7	99	1954	12	69.1	1983	36	1972	4	59.2	1993	85	106	.0	2.3	31.0	.0	.0	.0
Aug	76.5	53.4	65.0	98	1949	7	71.3	1983	33	1966	22	59.5	1987	107	106	.0	1.3	30.9	.0	.0	.0
Sep	67.1	44.1	55.6	96	1978	6	63.1	1998	15	1985	30	49.9	1993	308	25	.0	.4	28.0	.2	2.7	.0
Oct	54.9	33.7	44.3	84+	1963	4	48.2	1999	-5	1991	30	40.4	1971	641	0	.0	.0	22.2	1.3	12.4	@
Nov	40.6	22.4	31.5	74	1999	7	45.6	1999	-16	1959	16	17.0	1985	1006	0	.0	.0	8.7	6.9	23.6	1.1
Dec	34.1	15.6	24.9	65	1990	10	31.6	1979	-33	1983	24	10.4	1983	1245	0	.0	.0	4.4	11.6	28.2	3.8
Ann	53.4	32.9	43.2	99	Jul 1954	12	71.3	Aug 1983	-33	Dec 1983	24	10.4	Dec 1983	8203	274	.0	4.5	216.9	50.2	170.6	15.4

\+ 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	1.34	1.22	1.58	1949	4	3.38	1994	.37	1989
Feb	1.44	1.27	1.27	1997	3	3.93	1998	.33	1983
Mar	2.62	2.19	5.65	1973	14	7.59	1973	.18	1981
Apr	3.78	4.02	2.70	1955	4	6.90	1986	.62	1981
May	4.30	3.88	5.08	1965	14	12.26	1982	1.42	1977
Jun	3.79	2.97	5.58	1976	14	11.88	1976	1.03	1987
Jul	2.73	2.38	2.97	1958	2	8.29	1997	.74+	1985
Aug	2.07	1.64	4.04	1964	21	5.56	1998	.29	1985
Sep	1.66	1.35	3.39	1971	5	5.38	1971	.32	1975
Oct	2.74	1.78	5.14	1994	6	9.30	1994	.41	1999
Nov	1.85	1.74	3.30	2000	1	5.17	2000	.62	1972
Dec	1.53	1.39	1.05	1963	7	3.90	1993	.12	1986
Ann	29.85	30.72	5.65	Mar 1973	14	12.26	May 1982	.12	Dec 1986

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	11.6	4.6	.3	.0
Feb	9.7	4.4	.6	.2
Mar	11.9	6.3	1.2	.3
Apr	12.4	7.9	2.3	.8
May	12.7	7.8	2.5	.9
Jun	13.5	7.8	2.4	.7
Jul	11.5	6.0	1.7	.4
Aug	8.7	4.7	1.3	.4
Sep	7.6	4.0	.7	.2
Oct	8.1	5.2	1.4	.6
Nov	9.7	5.1	1.0	.1
Dec	11.3	5.4	.5	.0
Ann	128.7	69.2	15.9	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	.44	.56	.75	.91	1.06	1.22	1.39	1.60	1.86	2.26	2.63
Feb	.42	.56	.76	.94	1.11	1.30	1.50	1.73	2.04	2.52	2.96
Mar	.55	.79	1.18	1.53	1.88	2.25	2.67	3.18	3.85	4.91	5.92
Apr	1.07	1.43	1.97	2.44	2.90	3.39	3.92	4.55	5.36	6.65	7.84
May	1.33	1.74	2.35	2.87	3.37	3.90	4.47	5.14	6.01	7.37	8.63
Jun	.87	1.22	1.77	2.27	2.77	3.29	3.89	4.59	5.52	6.99	8.38
Jul	.65	.91	1.31	1.66	2.02	2.39	2.81	3.30	3.96	4.99	5.96
Aug	.31	.49	.79	1.07	1.37	1.70	2.07	2.53	3.14	4.14	5.09
Sep	.31	.46	.71	.93	1.16	1.41	1.69	2.02	2.47	3.19	3.87
Oct	.36	.59	.98	1.36	1.76	2.20	2.71	3.35	4.20	5.59	6.94
Nov	.70	.87	1.12	1.32	1.52	1.72	1.94	2.19	2.51	3.00	3.45
Dec	.31	.44	.67	.88	1.08	1.31	1.56	1.87	2.27	2.92	3.53
Ann	20.04	21.90	24.29	26.13	27.77	29.37	31.02	32.86	35.11	38.38	41.23

\+ 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: 1948-2001
(3) Derived from 1971-2000 serially complete daily data

Complete documentation available from:
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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	22.9	20.6	7	5
Feb	22.3	22.1	5	4
Mar	32.1	28.6	5	2
Apr	33.7	30.3	3	2
May	6.3	2.7	#	#
Jun	1.0	.0	#	0
Jul	.0	.0	#	0
Aug	.0	.0	#	0
Sep	2.5	.6	#	0
Oct	17.8	11.6	1	#
Nov	24.8	23.1	4	3
Dec	23.6	21.3	6	4
Ann	187.0	160.9	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	24.6	1994	29	80.1	1994	42	1994	30	27	1994
Feb	20.3	2000	26	40.9	1991	50	1998	28	31	1994
Mar	27.0	1977	30	93.5	1977	67	1998	2	33	1998
Apr	35.2	1994	26	86.7	1984	45	1984	27	14	1997
May	16.0	1978	8	30.0	1978	26	1984	1	5	1984
Jun	11.2	1995	9	13.0	1998	2	1998	3	#+	1999
Jul	.0	0	0	.0	0	#+	1998	15	#+	1998
Aug	.0	0	0	.0	0	#	1998	20	#	1998
Sep	7.6	1996	25	15.4	1985	6	1996	25	#+	2000
Oct	38.9	1996	26	70.2	1995	44	1982	10	11	1982
Nov	31.9	2000	1	62.9	2000	32	1993	26	18	2000
Dec	17.8	1993	23	59.5	1996	38	1993	24	20	1993
Ann	38.9	Oct 1996	26	93.5	Mar 1977	67	Mar 1998	2	33	Mar 1998

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	11.2	6.7	2.5	1.2	.2
Feb	9.1	5.8	2.4	1.2	.3
Mar	11.0	7.3	3.6	1.9	.6
Apr	8.9	6.2	3.6	2.0	.7
May	2.1	1.3	.7	.5	.2
Jun	.3	.2	.1	.1	@
Jul	.0	.0	.0	.0	.0
Aug	.0	.0	.0	.0	.0
Sep	1.2	.8	.3	.1	.0
Oct	5.2	3.1	1.5	1.0	.4
Nov	8.8	5.8	2.7	1.4	.5
Dec	10.6	7.1	3.0	1.5	.3
Ann	68.4	44.3	20.4	10.9	3.2

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	24.7	19.8	14.0	5.9
Feb	20.0	14.9	11.2	3.5
Mar	15.1	10.5	7.4	3.3
Apr	8.4	5.5	4.2	2.2
May	1.4	1.0	.7	.4
Jun	.1	.0	.0	.0
Jul	.0	.0	.0	.0
Aug	.0	.0	.0	.0
Sep	.5	.1	@	.0
Oct	4.3	2.6	2.2	1.1
Nov	14.2	10.6	8.2	3.5
Dec	20.5	15.6	12.2	5.5
Ann	109.2	80.6	60.1	25.4

+ 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	6/22	6/15	6/10	6/06	6/02	5/29	5/25	5/20	5/14
32	6/14	6/07	6/02	5/29	5/25	5/21	5/17	5/12	5/06
28	5/19	5/15	5/12	5/09	5/07	5/04	5/02	4/29	4/24
24	5/08	5/03	4/30	4/27	4/25	4/22	4/19	4/16	4/12
20	5/07	4/30	4/24	4/20	4/16	4/12	4/08	4/02	3/26
16	4/26	4/19	4/14	4/10	4/06	4/02	3/28	3/23	3/16

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	9/02	9/06	9/08	9/11	9/13	9/15	9/17	9/20	9/23
32	9/11	9/14	9/16	9/18	9/20	9/22	9/24	9/26	9/30
28	9/16	9/22	9/26	9/29	10/03	10/06	10/09	10/14	10/19
24	9/23	9/29	10/04	10/08	10/12	10/15	10/19	10/24	10/31
20	10/04	10/10	10/15	10/20	10/24	10/27	11/01	11/06	11/12
16	10/12	10/18	10/23	10/26	10/30	11/02	11/06	11/11	11/17

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	125	117	111	106	102	97	92	86	78
32	140	132	127	122	117	113	108	102	95
28	170	163	157	153	148	144	139	134	126
24	194	185	179	174	169	164	159	153	145
20	219	209	202	196	190	184	178	171	161
16	232	223	217	212	207	202	196	190	181

***** 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	1294	1071	1022	749	469	206	85	107	308	641	1006	1245	8203
60	1139	931	867	599	324	111	28	45	195	486	856	1090	6671
57	1046	847	774	511	245	69	13	24	139	394	766	997	5825
55	984	791	712	454	198	47	7	15	107	334	706	935	5290
50	830	651	557	318	103	15	0	3	47	196	568	781	4069
32	346	229	117	29	1	0	0	0	0	5	171	298	1196

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	75	83	118	270	556	818	1044	1022	707	387	154	75	5309
55	0	0	0	5	40	175	338	324	125	3	0	0	1010
57	0	0	0	2	25	137	282	270	96	1	0	0	813
60	0	0	0	0	11	90	204	199	62	0	0	0	566
65	0	0	0	0	2	35	106	106	25	0	0	0	274
70	0	0	0	0	0	10	39	42	8	0	0	0	99

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	12	23	50	148	361	622	843	824	520	244	61	19	12	35	85	233	594	1216	2059	2883	3403	3647	3708	3727
45	0	3	19	78	230	473	688	670	386	144	26	2	0	3	22	100	330	803	1491	2161	2547	2691	2717	2719
50	0	0	4	33	129	337	533	516	260	70	9	0	0	0	4	37	166	503	1036	1552	1812	1882	1891	1891
55	0	0	0	12	64	206	386	362	156	29	0	0	0	0	0	12	76	282	668	1030	1186	1215	1215	1215
60	0	0	0	4	24	110	244	223	77	5	0	0	0	0	0	4	28	138	382	605	682	687	687	687
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	1	11	41	97	212	376	539	525	317	148	36	9	1	12	53	150	362	738	1277	1802	2119	2267	2303	2312

(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