

# Climatology of the United States

No. 20

1971-2000

Station: LEOLA, SD

COOP ID: 394891

Climate Division: SD 3

NWS Call Sign:

Elevation: 1,580 Feet Lat: 45° 43N

Lon: 98° 57W

## 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	21.3	1.5	11.4	62	1987	12	25.2	1990	-33	1972	15	-3.3	1982	1661	0	.0	.0	.4	22.8	30.9	14.9
Feb	28.4	9.0	18.7	64	1992	29	30.2	1987	-31+	1996	2	1.9	1979	1296	0	.0	.0	2.3	16.2	27.7	8.7
Mar	39.8	19.9	29.9	81	1963	31	37.3	1973	-23	1962	1	21.9	1996	1089	0	.0	.0	7.4	8.6	28.0	2.7
Apr	57.2	32.1	44.7	97	1980	21	52.2	1987	-5	1968	4	36.6	1975	613	2	.0	.2	21.8	.8	16.3	.1
May	70.5	44.0	57.3	103	1969	28	64.3	1977	18	1961	1	51.5	1979	266	26	.0	.8	30.3	.0	2.6	.0
Jun	78.9	53.2	66.1	107	1988	24	74.7	1988	33+	1969	20	61.1	1982	78	111	.1	2.9	30.0	.0	.0	.0
Jul	84.9	58.2	71.6	109+	1989	5	76.3	1988	39	1962	30	63.8	1992	24	227	1.0	8.4	31.0	.0	.0	.0
Aug	83.9	56.3	70.1	107+	1976	17	76.0	1983	35	1958	31	64.1	1992	38	195	1.1	7.3	31.0	.0	.0	.0
Sep	73.5	45.8	59.7	105	1983	2	65.5	1998	18	1965	26	53.9	1985	199	38	.3	2.1	29.5	.0	1.9	.0
Oct	59.4	34.1	46.8	93	1975	7	51.5	1973	-1	1984	30	41.5	1976	567	0	.0	.1	24.8	.3	13.5	@
Nov	38.4	19.4	28.9	75	1975	5	40.4	1999	-22	1964	30	15.1	1985	1084	0	.0	.0	6.7	10.8	27.4	1.7
Dec	25.4	6.7	16.1	62+	1998	1	27.0	1997	-35	1967	31	1.1	1983	1518	0	.0	.0	1.1	20.7	30.7	10.0
Ann	55.1	31.7	43.4	109+	Jul 1989	5	76.3	Jul 1988	-35	Dec 1967	31	-3.3	Jan 1982	8433	599	2.5	21.8	216.3	80.2	179.0	38.1

+ 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/normal/usnormals.html](http://www.ncdc.noaa.gov/oa/climate/normal/usnormals.html)

Issue Date: February 2004

(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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**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: LEOLA, SD**

**COOP ID: 394891**

**Climate Division: SD 3**

**NWS Call Sign:**

**Elevation: 1,580 Feet Lat: 45°43N**

**Lon: 98°57W**

Precipitation (inches)																								
	Precipitation Totals									Mean Number of Days (3)				Precipitation Probabilities (1) Probability that the monthly/annual precipitation will be equal to or less than the indicated amount										
	Means/ Medians(1)		Extremes							Daily Precipitation				Monthly/Annual Precipitation vs Probability Levels These values were determined from the incomplete gamma distribution										
Month	Mean	Med-ian	Highest Daily(2)	Year	Day	Highest Monthly(1)	Year	Lowest Monthly(1)	Year	>= 0.01	>= 0.10	>= 0.50	>= 1.00	.05	.10	.20	.30	.40	.50	.60	.70	.80	.90	.95
Jan	.53	.47	.70	1992	8	1.67	1997	.00	1974	4.6	2.0	.1	.0	.03	.08	.17	.24	.33	.42	.52	.65	.82	1.11	1.39
Feb	.53	.44	1.45	1958	27	1.69	1987	.01	1985	4.9	2.1	.1	.0	.07	.12	.19	.27	.34	.43	.53	.65	.81	1.07	1.32
Mar	1.37	1.00	1.60	2000	8	3.72	1977	.07	1971	6.0	3.5	.9	.2	.17	.28	.48	.67	.87	1.09	1.35	1.67	2.10	2.82	3.50
Apr	1.95	1.77	2.40	1989	28	6.66	1986	.03	1987	7.1	4.3	1.4	.2	.15	.28	.54	.81	1.10	1.45	1.85	2.37	3.08	4.27	5.45
May	2.73	2.29	3.50	1964	3	5.86	1995	.47	1976	8.9	5.9	1.7	.6	.77	1.03	1.42	1.76	2.10	2.45	2.83	3.29	3.88	4.81	5.68
Jun	3.16	2.66	3.75	1964	18	7.08	1975	.20	1974	9.2	6.4	2.1	.6	.67	.96	1.42	1.85	2.27	2.72	3.23	3.84	4.65	5.94	7.16
Jul	2.71	2.29	4.02	1994	7	9.16	1993	.12	1975	8.2	5.8	1.5	.5	.46	.70	1.09	1.46	1.84	2.26	2.73	3.30	4.07	5.31	6.50
Aug	2.11	2.01	3.45	1993	29	6.46	1998	.27+	1984	6.6	4.2	1.3	.4	.30	.47	.78	1.07	1.38	1.71	2.10	2.58	3.22	4.27	5.28
Sep	1.70	1.17	2.32	1999	3	7.04	1996	.01	1972	5.3	3.6	1.1	.4	.12	.22	.44	.67	.93	1.23	1.60	2.06	2.70	3.78	4.85
Oct	1.45	1.12	2.20	1982	9	6.20	1998	.11	1987	5.2	2.9	.9	.4	.10	.19	.37	.57	.79	1.05	1.36	1.76	2.31	3.24	4.17
Nov	.88	.84	1.14	1977	8	2.65	1977	.00	1980	5.4	2.2	.5	.1	.01	.04	.12	.23	.37	.54	.75	1.04	1.46	2.20	2.95
Dec	.39	.40	.99	1988	26	1.15	1988	.00+	1986	4.2	1.6	@	.0	.00	.03	.09	.15	.22	.29	.38	.48	.63	.88	1.12
Ann	19.51	18.69	4.02	Jul 1994	7	9.16	Jul 1993	.00+	Dec 1986	75.6	44.5	11.6	3.4	12.30	13.63	15.37	16.72	17.93	19.11	20.34	21.72	23.41	25.89	28.06

+ 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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Station: LEOLA, SD

COOP ID: 394891

Climate Division: SD 3

NWS Call Sign:

Elevation: 1,580 Feet

Lat: 45° 43N

Lon: 98° 57W

Snow (inches)																							
Snow Totals															Mean Number of Days (1)								
Means/Medians (1)					Extremes (2)										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	6.8	5.1	7	6	9.5	1996	18	22.4	1996	40	1997	10	31	1997	3.8	3.0	.9	.3	.0	-9.9	-9.9	-9.9	-9.9
Feb	8.8	8.0	6	2	9.0	1991	18	19.5	1987	28	1997	4	25	1997	3.8	3.2	.9	.2	.0	18.0	15.2	13.4	4.7
Mar	7.3	5.5	3	2	10.0	1975	23	21.5	1982	20	1997	13	14	1997	3.4	3.1	1.3	.5	@	9.6	6.9	3.5	.6
Apr	3.9	2.0	#	0	10.0	1997	6	21.5	1995	8	1995	12	1	1997	1.2	1.1	.5	.4	@	.5	.3	.1	.0
May	.1	.0	#	0	4.0	1991	3	4.0	1991	2	1991	3	#+	1996	@	@	@	.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	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Oct	.4	.0	0	0	4.0	1995	22	5.0	1995	0	0	0	0	0	.2	.2	.1	.0	.0	.0	.0	.0	.0
Nov	8.2	6.5	1	#	13.0	1993	24	36.5	1993	21	2000	30	8	2000	3.5	2.7	1.1	.7	@	7.3	4.7	2.5	.8
Dec	6.1	7.5	5	3	11.0	1988	26	12.0	1971	24+	2000	30	22	2000	3.7	2.5	.8	.1	@	14.6	14.0	9.5	4.4
Ann	41.6	34.6	N/A	N/A	13.0	Nov 1993	24	36.5	Nov 1993	40	Jan 1997	10	31	Jan 1997	19.6	15.8	5.6	2.2	@	-9.9	-9.9	-9.9	-9.9

+ 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

Complete documentation available from:

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**Elevation: 1,580 Feet**

**Lat: 45° 43N**

**Lon: 98° 57W**

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	5/30	5/26	5/22	5/20	5/17	5/15	5/12	5/09	5/04
32	5/21	5/16	5/13	5/10	5/07	5/04	5/01	4/28	4/23
28	5/14	5/09	5/06	5/03	4/30	4/28	4/25	4/21	4/17
24	5/09	5/03	4/28	4/25	4/21	4/18	4/14	4/10	4/04
20	4/19	4/15	4/12	4/09	4/07	4/05	4/02	3/30	3/26
16	4/11	4/07	4/04	4/01	3/30	3/27	3/25	3/22	3/18
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	9/07	9/10	9/13	9/15	9/17	9/19	9/21	9/23	9/27
32	9/15	9/19	9/21	9/23	9/25	9/27	9/29	10/02	10/05
28	9/20	9/24	9/28	10/01	10/04	10/06	10/09	10/13	10/17
24	9/26	10/02	10/06	10/09	10/13	10/16	10/19	10/23	10/29
20	10/05	10/11	10/15	10/19	10/22	10/26	10/29	11/03	11/09
16	10/20	10/25	10/29	11/01	11/04	11/07	11/10	11/13	11/18
Freeze Free Period									
Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	140	134	129	125	122	118	115	110	104
32	159	153	148	144	140	137	133	128	121
28	174	168	163	159	156	152	148	143	137
24	196	188	183	178	173	169	164	159	151
20	218	211	206	202	198	194	189	184	177
16	239	232	227	222	218	214	209	204	197

\* 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

Complete documentation available from:

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**Climate Division: SD 3      NWS Call Sign:      Elevation: 1,580 Feet    Lat: 45° 43N      Lon: 98° 57W**

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	1661	1296	1089	613	266	78	24	38	199	567	1084	1518	8433
60	1506	1156	934	470	157	27	6	11	103	413	934	1363	7080
57	1413	1072	841	389	106	12	0	4	61	323	844	1270	6335
55	1351	1016	779	339	79	6	0	1	40	266	784	1208	5869
50	1197	888	630	226	32	0	0	0	10	146	644	1054	4827
32	682	452	195	18	0	0	0	0	0	4	221	551	2123

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	44	79	129	397	784	1022	1226	1180	829	460	127	57	6334
55	0	0	0	27	150	339	513	469	179	10	0	0	1687
57	0	0	0	18	115	285	451	409	140	4	0	0	1422
60	0	0	0	9	72	209	364	323	92	1	0	0	1070
65	0	0	0	2	26	111	227	195	38	0	0	0	599
70	0	0	0	0	6	45	123	101	12	0	0	0	287

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	1	27	202	542	788	988	941	597	254	27	0	0	1	28	230	772	1560	2548	3489	4086	4340	4367	4367
45	0	0	6	115	393	638	833	786	452	147	10	0	0	0	6	121	514	1152	1985	2771	3223	3370	3380	3380
50	0	0	0	58	262	488	678	631	314	72	1	0	0	0	0	58	320	808	1486	2117	2431	2503	2504	2504
55	0	0	0	23	149	342	523	476	198	29	0	0	0	0	0	23	172	514	1037	1513	1711	1740	1740	1740
60	0	0	0	7	69	209	370	325	104	9	0	0	0	0	0	7	76	285	655	980	1084	1093	1093	1093
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	0	2	23	151	343	497	640	601	376	179	25	0	0	2	25	176	519	1016	1656	2257	2633	2812	2837	2837

(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:  
[www.ncdc.noaa.gov/oa/climate/normal/usnormals.html](http://www.ncdc.noaa.gov/oa/climate/normal/usnormals.html)

## 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.  
Complete documentation for the 1971-2000 Normals is available on the internet from:  
[www.ncdc.noaa.gov/oa/climate/normal/usnormals.html](http://www.ncdc.noaa.gov/oa/climate/normal/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 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.

- |   |   |
|---|---|
| <ol style="list-style-type: none"><li>a. Temperature/ Precipitation Tables<ol style="list-style-type: none"><li>1. 1971-2000 Monthly Normals</li><li>2. Cooperative Summary of the Day</li><li>3. National Weather Service station records</li><li>4. 1971-2000 serially complete daily data</li></ol></li><li>b. Degree Day Table<ol style="list-style-type: none"><li>1. Monthly and Annual Heating and Cooling Degree Days Normals to Selected Bases derived from 1971-2000 Monthly Normals</li><li>2. Daily Normal Growing Degree Units to Selected Base Temperatures derived from 1971-2000 serially complete daily data</li></ol></li></ol> | <ol style="list-style-type: none"><li>c. Snow Tables<ol style="list-style-type: none"><li>1. Snow Climatology</li><li>2. Cooperative Summary of the Day</li></ol></li><li>d. Freeze Data Table<br/>1971-2000 serially complete daily data</li></ol> |
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## References

U.S. Climate Normals 1971-2000, [www.ncdc.noaa.gov/normal.html](http://www.ncdc.noaa.gov/normal.html)  
U.S. Climate Normals 1971-2000-Products Clim20, [www.ncdc.noaa.gov/oa/climate/normal/usnormalsprods.html](http://www.ncdc.noaa.gov/oa/climate/normal/usnormalsprods.html)  
Snow Climatology Project Description, [www.ncdc.noaa.gov/oa/climate/monitoring/snowclim/mainpage.html](http://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](http://www1.ncdc.noaa.gov/pub/data/special/serialcomplete_jam_0900.pdf)