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: KENNEBEC, SD **COOP ID: 394516**

Climate Division: SD 6 **NWS Call Sign:** **Elevation: 1,700 Feet** **Lat: 43˚54N** **Lon: 99˚52W**

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	30.4	7.1	18.8	70	1974	16	32.5	1990	-37	1988	6	3.2	1978	1435	0	.0	.0	2.8	15.8	30.4	10.4
Feb	37.1	13.5	25.3	75+	2000	21	36.5	1999	-38	1994	9	9.0	1979	1111	0	.0	.0	6.7	10.6	26.9	5.6
Mar	48.3	23.3	35.8	89+	1988	27	42.8	1986	-28	1960	4	26.1	1996	904	0	.0	.0	14.3	4.4	25.2	1.5
Apr	62.4	34.0	48.2	99+	1992	30	54.8	1981	-5	1975	3	40.4	1995	507	3	.0	.5	24.7	.5	13.6	@
May	74.0	46.1	60.1	102+	1969	27	67.0	1977	15	1981	10	55.4	1996	202	47	.0	1.6	30.7	.0	2.3	.0
Jun	83.8	56.0	69.9	111	1988	24	78.4	1988	28	1969	2	64.5	1982	44	192	1.1	7.4	30.0	.0	.0	.0
Jul	90.8	61.5	76.2	113	1966	10	81.1	1974	35	1971	30	67.2	1992	11	356	5.2	16.9	31.0	.0	.0	.0
Aug	89.6	59.9	74.8	114	1965	13	81.5	1983	34	1950	20	68.2	1992	14	315	3.5	15.6	31.0	.0	.0	.0
Sep	80.0	48.9	64.5	108	1983	2	71.0	1998	20+	1984	30	59.7	1993	112	95	1.0	6.7	29.8	.0	1.7	.0
Oct	65.2	36.4	50.8	99	1963	5	54.2	1973	5	1991	30	47.4	1976	442	0	.0	.6	27.5	.3	11.1	.0
Nov	44.5	22.0	33.3	89	1999	8	43.2	1999	-23	1959	14	19.6	1985	952	0	.0	.0	11.3	5.6	26.0	1.3
Dec	33.3	10.8	22.1	74	1998	1	31.8	1979	-31	1983	23	4.0	1983	1333	0	.0	.0	3.8	13.7	30.6	6.9
Ann	61.6	35.0	48.3	114	Aug 1965	13	81.5	Aug 1983	-38	Feb 1994	9	3.2	Jan 1978	7067	1008	10.8	49.3	243.6	50.9	167.8	25.7

\+ 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: 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	.33	.20	.90	1997	4	2.24	1997	.00	1981
Feb	.43	.27	1.04	1977	23	1.59	1987	.00+	1983
Mar	1.24	1.13	1.80	1977	12	5.08	1977	.00	1978
Apr	2.06	1.63	2.33	1964	26	4.90	1995	.17	1981
May	3.02	2.51	4.00	1986	8	7.69	1982	.63	1989
Jun	2.98	2.97	3.22	1997	3	5.90	1993	.17	1976
Jul	2.78	2.70	2.70	1976	26	6.48	1998	.41	1991
Aug	2.02	1.94	3.73	1999	30	6.31	1999	.17	1976
Sep	1.43	1.19	2.10	1950	20	5.50	1996	.09	1972
Oct	1.48	.95	2.18	1980	16	5.68	1998	.06	1992
Nov	.61	.53	1.83	1952	17	2.34	1993	.00	1990
Dec	.33	.27	.74	1951	6	1.07	1996	.00	1986
Ann	18.71	17.98	4.00	May 1986	8	7.69	May 1982	.00+	Nov 1990

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	3.6	1.0	.1	.0
Feb	3.4	1.4	.2	@
Mar	5.6	3.2	.6	.3
Apr	8.2	4.8	1.3	.3
May	9.2	5.8	1.9	.7
Jun	8.6	5.7	2.1	.5
Jul	8.0	5.6	2.0	.6
Aug	6.0	4.0	1.3	.5
Sep	5.0	3.4	1.0	.2
Oct	5.1	2.9	.9	.4
Nov	4.6	2.0	.2	.1
Dec	3.9	1.2	.0	.0
Ann	71.2	41.0	11.6	3.6

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	.00	.01	.04	.08	.13	.20	.28	.38	.54	.81	1.09
Feb	.00	.01	.06	.11	.18	.27	.37	.51	.71	1.05	1.39
Mar	.05	.16	.34	.52	.72	.94	1.20	1.52	1.97	2.70	3.42
Apr	.30	.47	.77	1.06	1.36	1.68	2.06	2.52	3.14	4.15	5.12
May	.66	.94	1.38	1.78	2.18	2.61	3.09	3.67	4.43	5.64	6.78
Jun	.74	1.02	1.45	1.84	2.22	2.62	3.07	3.61	4.31	5.41	6.45
Jul	.68	.94	1.35	1.71	2.06	2.44	2.86	3.36	4.01	5.04	6.01
Aug	.37	.55	.85	1.12	1.40	1.70	2.05	2.46	3.01	3.90	4.75
Sep	.15	.25	.45	.65	.86	1.11	1.39	1.75	2.23	3.04	3.83
Oct	.08	.17	.35	.55	.77	1.04	1.37	1.78	2.37	3.37	4.36
Nov	.01	.05	.12	.21	.30	.42	.56	.74	.99	1.42	1.85
Dec	.01	.04	.09	.13	.19	.25	.32	.41	.53	.74	.94
Ann	11.50	12.81	14.54	15.88	17.09	18.28	19.52	20.90	22.61	25.11	27.32

\+ 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	4.7	2.7	2	1
Feb	4.9	3.4	2	1
Mar	7.6	5.5	1	1
Apr	3.3	.0	#	0
May	.0	.0	#	0
Jun	#	.0	#	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.1	.0	0	0
Oct	.9	.0	#	0
Nov	4.7	2.0	1	0
Dec	5.1	4.5	2	1
Ann	31.3	18.1	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	10.0	1985	16	19.7	1996	19+	1997	17	14	1997
Feb	8.0	1987	24	15.0	1991	15	1991	18	7	1978
Mar	12.0	1987	17	29.0	1987	22	1985	4	5	1985
Apr	23.0	1995	18	45.5	1995	18+	1995	18	4	1995
May	1.0	1979	10	1.0	1979	0	0	0	#	2000
Jun	#	1998	3	#	1998	#	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	2.0	1985	28	2.0	1985	0	0	0	0	0
Oct	7.0	1995	23	7.0	1995	3	1980	27	#	1995
Nov	8.0	1985	8	23.0	1985	15	1985	30	7	1985
Dec	7.0	1996	22	19.0	1987	23+	1996	30	11	1996
Ann	23.0	Apr 1995	18	45.5	Apr 1995	23+	Dec 1996	30	14	Jan 1997

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	2.5	1.8	.5	.1	@
Feb	2.6	1.6	.9	.4	.0
Mar	2.5	2.4	1.1	.5	.1
Apr	.9	.8	.4	.2	.1
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	.4	.3	.1	.1	.0
Nov	2.6	1.9	.6	.2	.0
Dec	3.0	1.9	.7	.3	.0
Ann	14.5	10.7	4.3	1.8	.2

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	12.8	8.3	4.6	2.0
Feb	9.3	6.5	4.0	.8
Mar	5.8	3.5	1.5	.5
Apr	1.1	.8	.6	.2
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	@	.0	.0
Nov	4.5	2.6	2.2	.2
Dec	10.4	6.7	4.8	1.8
Ann	44.3	28.4	17.7	5.5

+ 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	6/15	6/07	6/01	5/27	5/22	5/17	5/12	5/06	4/28
32	5/21	5/17	5/14	5/11	5/09	5/07	5/04	5/01	4/27
28	5/15	5/10	5/07	5/04	5/01	4/28	4/25	4/21	4/16
24	5/05	4/29	4/25	4/22	4/19	4/16	4/13	4/09	4/04
20	4/27	4/21	4/17	4/13	4/10	4/06	4/03	3/29	3/23
16	4/19	4/13	4/09	4/05	4/02	3/29	3/26	3/22	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	9/07	9/10	9/13	9/15	9/17	9/18	9/21	9/23	9/26
32	9/13	9/17	9/19	9/21	9/24	9/26	9/28	10/01	10/04
28	9/20	9/25	9/29	10/02	10/05	10/07	10/10	10/14	10/19
24	9/26	10/01	10/05	10/09	10/12	10/15	10/18	10/22	10/28
20	10/07	10/12	10/16	10/19	10/22	10/25	10/28	11/01	11/06
16	10/15	10/21	10/26	10/29	11/02	11/06	11/10	11/14	11/21

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	144	134	128	122	117	112	106	99	90
32	156	149	145	141	137	133	129	124	118
28	178	170	165	160	156	152	147	142	135
24	195	188	183	179	175	171	167	162	155
20	217	209	204	199	194	190	185	180	172
16	242	232	225	219	214	208	202	195	186

***** 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	1435	1111	904	507	202	44	11	14	112	442	952	1333	7067
60	1280	971	749	367	109	14	1	2	46	292	802	1178	5811
57	1188	896	656	290	69	5	0	0	23	209	712	1085	5133
55	1128	844	596	244	48	2	0	0	13	161	656	1023	4715
50	983	713	451	145	16	0	0	0	2	72	517	875	3774
32	498	323	88	4	0	0	0	0	0	1	146	396	1456

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	86	137	207	490	868	1138	1368	1324	973	582	184	87	7444
55	3	13	2	40	203	450	655	611	296	30	4	0	2307
57	1	9	0	27	162	394	593	550	246	16	0	0	1998
60	0	0	0	13	109	312	500	459	180	5	0	0	1578
65	0	0	0	3	47	192	356	315	95	0	0	0	1008
70	0	0	0	0	15	103	225	190	42	0	0	0	575

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	20	85	286	625	901	1125	1083	745	369	59	3	2	22	107	393	1018	1919	3044	4127	4872	5241	5300	5303
45	0	4	39	176	472	751	970	928	596	243	21	0	0	4	43	219	691	1442	2412	3340	3936	4179	4200	4200
50	0	0	13	99	327	601	815	773	454	139	7	0	0	0	13	112	439	1040	1855	2628	3082	3221	3228	3228
55	0	0	2	51	204	454	660	618	317	69	1	0	0	0	2	53	257	711	1371	1989	2306	2375	2376	2376
60	0	0	0	22	111	314	505	465	205	27	0	0	0	0	0	22	133	447	952	1417	1622	1649	1649	1649
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	6	31	83	213	404	583	723	698	484	257	57	11	6	37	120	333	737	1320	2043	2741	3225	3482	3539	3550

(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