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: MENNO, SD **COOP ID: 395481**

Climate Division: SD 9 **NWS Call Sign:** **Elevation: 1,324 Feet** **Lat: 43˚14N** **Lon: 97˚34W**

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	27.9	6.9	17.4	68	1981	24	30.7	1990	-34	1966	29	3.2	1978	1475	0	.0	.0	1.4	18.0	30.9	10.4
Feb	34.7	14.0	24.4	75	1981	17	35.0	1987	-32	1988	11	9.1	1979	1138	0	.0	.0	4.7	12.1	26.6	5.5
Mar	46.7	24.8	35.8	89	1968	30	43.3	2000	-24	1960	4	27.2	1984	907	0	.0	.0	12.9	4.4	23.8	1.2
Apr	61.9	36.0	49.0	97	1962	25	56.7	1981	8	1975	3	42.6	1997	487	6	.0	.4	24.8	.4	11.1	.0
May	73.8	48.1	61.0	104	1967	25	67.1	1987	17	1967	3	55.5	1995	183	56	.0	1.1	30.8	.0	1.2	.0
Jun	83.6	57.4	70.5	107+	1988	22	77.9	1988	33	1956	1	65.4	1982	24	189	.4	6.9	30.0	.0	.0	.0
Jul	87.3	62.2	74.8	108	1976	9	78.9	1974	41	1971	30	66.2	1992	9	310	1.8	11.9	31.0	.0	.0	.0
Aug	85.0	60.1	72.6	107	1973	26	79.5	1983	35	1950	20	66.8	1992	21	256	.7	9.2	31.0	.0	.0	.0
Sep	77.2	49.9	63.6	105	1976	6	69.4	1998	20	1974	30	58.5	1993	119	75	.2	4.0	29.8	.0	1.2	.0
Oct	63.9	38.0	51.0	96	1997	2	54.8	1973	12+	1993	31	45.2	1976	436	1	.0	.2	27.5	.1	9.0	.0
Nov	43.6	23.6	33.6	82	1999	8	45.1	1999	-26	1959	14	22.3	1985	943	0	.0	.0	10.5	5.8	24.3	1.2
Dec	30.9	11.2	21.1	68+	1998	2	28.9	1979	-29+	1989	23	2.2	1983	1362	0	.0	.0	2.0	15.7	30.5	6.9
Ann	59.7	36.0	47.9	108	Jul 1976	9	79.5	Aug 1983	-34	Jan 1966	29	2.2	Dec 1983	7104	893	3.1	33.7	236.4	56.5	158.6	25.2

\+ 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	.42	.38	.94	1973	21	1.62	1975	.01	1981
Feb	.51	.38	1.10	1971	19	1.86	1971	.06+	1995
Mar	1.66	1.08	1.76	1995	27	5.12	1987	.13	1994
Apr	2.50	2.08	2.80	1995	18	7.80	1984	.24	1987
May	3.51	3.06	3.33	1972	1	9.84	1972	.89	1981
Jun	3.43	2.91	2.80	1968	25	10.70	1984	.76	1995
Jul	3.15	2.69	4.69	1963	27	9.40	1993	.86+	2000
Aug	2.44	2.30	3.80	1962	30	5.60	1975	.24	1983
Sep	2.32	2.09	4.01	1999	4	7.88	1986	.29	1980
Oct	1.72	1.51	1.75	1959	8	5.79	1998	.21	1999
Nov	1.23	1.14	1.73	2001	24	3.24	1982	.02	1980
Dec	.47	.35	1.20	1953	3	1.83	1982	.00	1986
Ann	23.36	23.15	4.69	Jul 1963	27	10.70	Jun 1984	.00	Dec 1986

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	4.7	1.2	.1	.0
Feb	4.6	1.7	.1	@
Mar	6.4	3.5	1.0	.3
Apr	8.7	5.7	1.5	.4
May	9.7	7.0	2.4	.8
Jun	9.1	6.1	2.4	.8
Jul	8.3	5.8	2.0	.9
Aug	7.4	4.7	1.5	.6
Sep	6.2	4.0	1.7	.6
Oct	5.7	3.7	1.2	.4
Nov	5.6	2.7	.6	.2
Dec	4.3	1.6	.1	.0
Ann	80.7	47.7	14.6	5.0

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	.06	.11	.17	.23	.31	.39	.50	.66	.91	1.17
Feb	.04	.08	.14	.21	.29	.38	.48	.62	.80	1.11	1.41
Mar	.19	.32	.55	.78	1.03	1.30	1.63	2.03	2.57	3.46	4.33
Apr	.44	.66	1.03	1.37	1.72	2.09	2.53	3.05	3.74	4.86	5.93
May	1.10	1.44	1.93	2.36	2.77	3.19	3.66	4.21	4.91	6.01	7.03
Jun	.94	1.27	1.76	2.19	2.62	3.06	3.55	4.13	4.89	6.07	7.18
Jul	.77	1.07	1.53	1.94	2.34	2.77	3.25	3.82	4.56	5.74	6.84
Aug	.62	.85	1.21	1.52	1.83	2.16	2.52	2.95	3.51	4.40	5.23
Sep	.34	.53	.86	1.18	1.52	1.89	2.31	2.83	3.54	4.68	5.78
Oct	.21	.34	.59	.82	1.08	1.36	1.69	2.10	2.65	3.56	4.44
Nov	.07	.13	.28	.44	.63	.86	1.13	1.48	1.97	2.81	3.65
Dec	.04	.09	.17	.24	.31	.39	.47	.58	.72	.95	1.17
Ann	14.06	15.74	17.96	19.69	21.26	22.79	24.40	26.20	28.41	31.68	34.56

\+ 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	5.8	4.3	4	4
Feb	5.1	3.9	3	2
Mar	6.0	5.5	1	1
Apr	2.7	1.5	#	#
May	#	.0	0	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	#	.0	#	0
Oct	1.1	.0	#	0
Nov	6.2	4.0	1	#
Dec	6.5	6.3	3	2
Ann	33.4	25.5	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	10.5	1988	19	18.5	1975	18	1984	1	9	1983
Feb	8.2	1984	18	15.0	1972	16	1978	20	12	1978
Mar	8.0	1998	31	22.5	1998	13	1977	4	5	1979
Apr	8.0	1992	21	9.5	1994	7	1994	28	1	1995
May	#	1989	30	#	1989	0	0	0	0	0
Jun	.0	0	0	.0	0	0	0	0	0	0
Jul	.0	0	0	.0	0	0	0	0	0	0
Aug	.0	0	0	.0	0	0	0	0	0	0
Sep	#	1985	30	#+	1985	#	1986	19	#	1986
Oct	8.0	1995	23	10.0	1995	4	1995	23	#+	1999
Nov	11.0	1975	20	21.5	1983	14+	2000	17	6	2000
Dec	9.0	1971	30	15.8	1971	21	1983	27	17	1983
Ann	11.0	Nov 1975	20	22.5	Mar 1998	21	Dec 1983	27	17	Dec 1983

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	4.6	2.1	.4	.1	.1
Feb	4.0	2.2	.5	.2	.0
Mar	3.5	2.3	.7	.3	.0
Apr	1.6	1.1	.3	.1	.0
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	3.6	2.2	.8	.2	.1
Dec	4.5	2.4	.9	.2	.0
Ann	22.2	12.6	3.7	1.2	.2

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	19.8	13.5	9.8	2.1
Feb	14.1	8.9	6.5	2.5
Mar	6.3	3.8	2.5	.6
Apr	.7	.3	.1	.0
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	.3	.1	.0	.0
Nov	5.3	3.1	2.0	.9
Dec	16.1	9.1	4.9	.7
Ann	62.6	38.8	25.8	6.8

+ 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	5/25	5/19	5/15	5/11	5/08	5/05	5/01	4/27	4/22
32	5/15	5/11	5/07	5/05	5/02	4/29	4/26	4/23	4/18
28	5/06	5/01	4/28	4/25	4/22	4/19	4/16	4/13	4/08
24	4/27	4/21	4/18	4/14	4/11	4/08	4/05	4/02	3/27
20	4/20	4/14	4/09	4/06	4/02	3/29	3/25	3/21	3/14
16	4/08	4/03	3/30	3/26	3/23	3/20	3/16	3/12	3/07

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	9/09	9/13	9/15	9/17	9/19	9/21	9/23	9/25	9/29
32	9/15	9/20	9/23	9/26	9/28	10/01	10/03	10/07	10/11
28	9/22	9/27	10/01	10/04	10/07	10/10	10/13	10/17	10/22
24	9/29	10/05	10/10	10/13	10/17	10/20	10/24	10/28	11/03
20	10/12	10/18	10/22	10/25	10/28	10/31	11/03	11/07	11/12
16	10/20	10/26	10/30	11/03	11/07	11/10	11/14	11/18	11/24

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	152	145	141	137	133	129	125	120	114
32	167	161	156	152	149	145	141	136	130
28	186	179	175	171	167	164	160	155	149
24	208	201	196	192	188	183	179	174	167
20	234	225	219	213	208	203	198	191	183
16	253	244	238	233	228	223	218	211	203

***** 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	1475	1138	907	487	183	24	9	21	119	436	943	1362	7104
60	1320	998	752	351	97	4	0	4	49	289	793	1207	5864
57	1227	919	661	278	61	1	0	1	24	211	704	1114	5201
55	1166	868	603	233	42	0	0	0	14	165	648	1052	4791
50	1017	737	460	140	14	0	0	0	2	80	510	901	3861
32	523	336	104	5	0	0	0	0	0	1	144	415	1528

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	71	122	220	513	897	1155	1324	1258	945	589	192	75	7361
55	0	10	5	51	226	465	611	545	269	40	5	0	2227
57	0	5	1	36	182	406	549	484	219	24	1	0	1907
60	0	0	0	19	126	319	456	394	155	8	0	0	1477
65	0	0	0	6	56	189	310	256	75	1	0	0	893
70	0	0	0	1	19	91	181	144	28	0	0	0	464

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	19	89	308	657	921	1086	1024	721	369	61	2	0	19	108	416	1073	1994	3080	4104	4825	5194	5255	5257
45	0	3	43	192	503	771	931	869	574	246	23	0	0	3	46	238	741	1512	2443	3312	3886	4132	4155	4155
50	0	0	16	114	354	621	776	714	430	141	8	0	0	0	16	130	484	1105	1881	2595	3025	3166	3174	3174
55	0	0	4	58	227	473	621	559	296	64	1	0	0	0	4	62	289	762	1383	1942	2238	2302	2303	2303
60	0	0	0	28	124	328	467	405	181	26	0	0	0	0	0	28	152	480	947	1352	1533	1559	1559	1559
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	1	20	73	210	412	603	722	681	466	244	48	2	1	21	94	304	716	1319	2041	2722	3188	3432	3480	3482

(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