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: MOCCASIN EXPERIMENT STN, MT **COOP ID: 245761**

Climate Division: MT 4 **NWS Call Sign:** **Elevation: 4,300 Feet** **Lat: 47˚03N** **Lon: 109˚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	34.4	12.4	23.4	72	1943	13	35.8	1986	-42	1929	27	8.9	1979	1290	0	.0	.0	4.2	11.5	28.9	8.1
Feb	38.4	16.3	27.4	74	1943	18	39.8	1991	-48	1936	16	12.0	1989	1055	0	.0	.0	6.8	8.2	25.9	5.4
Mar	44.5	22.5	33.5	75	1914	14	43.4	1986	-29	1932	7	23.9	1996	977	0	.0	.0	10.9	5.8	27.5	1.7
Apr	53.6	30.6	42.1	87	1946	26	49.6	1987	-18+	1940	10	30.6	1975	687	0	.0	.0	18.4	1.8	19.3	.1
May	63.0	39.2	51.1	93	1919	28	56.6	1985	2	1954	2	45.5	1996	434	2	.0	.0	26.7	.1	6.4	.0
Jun	71.5	46.8	59.2	101	1936	27	69.1	1988	24+	1969	13	54.1	1998	209	33	.0	.7	29.7	.0	.3	.0
Jul	79.7	51.4	65.6	102+	1937	4	71.1	1985	31+	1999	16	56.8	1993	92	110	.0	3.5	31.0	.0	.1	.0
Aug	80.3	51.1	65.7	103	1961	6	73.5	1971	27	1910	24	59.6	1974	114	137	@	4.2	30.8	.0	.2	.0
Sep	69.0	42.1	55.6	98	1955	1	63.0	1998	4	1926	23	47.5	1985	314	30	.0	.9	27.4	.2	4.1	.0
Oct	58.1	33.0	45.6	90	1992	1	50.8	1988	-19	1925	27	41.2	1984	604	0	.0	@	22.6	1.3	15.6	.2
Nov	43.4	22.4	32.9	79	1999	8	43.1	1999	-32	1955	13	14.3	1985	964	0	.0	.0	10.2	6.0	24.9	2.2
Dec	36.3	15.1	25.7	72	1943	3	34.8	1999	-41	1968	29	7.2	1983	1218	0	.0	.0	5.1	9.9	28.4	5.8
Ann	56.0	31.9	44.0	103	Aug 1961	6	73.5	Aug 1971	-48	Feb 1936	16	7.2	Dec 1983	7958	312	@	9.3	223.8	44.8	181.6	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: 1909-2001

(3) Derived from 1971-2000 serially complete daily data

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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	.60	.48	.70	1917	11	2.28	1978	.02	1987
Feb	.44	.29	.83	1914	21	1.23	1978	.05+	1997
Mar	.90	.84	.92	1916	27	1.64	1984	.26	1994
Apr	1.32	1.19	1.90	1920	15	2.64	1989	.54	1974
May	2.74	2.43	1.77	1994	27	6.60	1981	.58	1984
Jun	2.81	2.62	3.01	1979	19	5.15	1975	.90	1990
Jul	2.07	1.92	2.14	1926	7	5.74	1993	.26	1984
Aug	1.97	1.83	3.02	1985	3	5.33	1985	.11	1994
Sep	1.46	1.29	1.55	1978	12	4.69	1985	.00	1990
Oct	.94	.85	1.09	1994	15	2.48	1994	.06	1987
Nov	.59	.50	.83	1927	4	1.47	1998	.04	1988
Dec	.58	.46	.98	1917	13	1.76	1977	.11	1999
Ann	16.42	16.12	3.02	Aug 1985	3	6.60	May 1981	.00	Sep 1990

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	7.4	2.1	.0	.0
Feb	5.9	1.7	@	.0
Mar	8.9	3.1	.1	.0
Apr	9.1	4.0	.6	.1
May	12.4	6.6	1.5	.4
Jun	13.4	7.1	1.5	.3
Jul	9.4	5.2	1.2	.3
Aug	10.1	4.8	1.1	.3
Sep	8.3	4.3	.6	.1
Oct	6.0	2.7	.5	.1
Nov	6.2	2.0	.1	.0
Dec	7.3	1.8	.1	.0
Ann	104.4	45.4	7.3	1.6

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	.08	.13	.21	.30	.38	.48	.59	.73	.91	1.21	1.50
Feb	.05	.09	.15	.21	.27	.35	.43	.54	.68	.91	1.14
Mar	.34	.42	.54	.64	.74	.83	.94	1.06	1.22	1.46	1.68
Apr	.45	.57	.75	.91	1.06	1.21	1.38	1.57	1.82	2.21	2.57
May	.90	1.16	1.54	1.87	2.18	2.50	2.85	3.26	3.79	4.61	5.37
Jun	1.16	1.42	1.78	2.08	2.35	2.64	2.94	3.29	3.74	4.42	5.03
Jul	.33	.50	.80	1.09	1.38	1.71	2.08	2.53	3.13	4.11	5.05
Aug	.32	.49	.78	1.05	1.33	1.63	1.98	2.40	2.97	3.88	4.75
Sep	.18	.37	.61	.82	1.03	1.25	1.50	1.80	2.19	2.82	3.42
Oct	.11	.18	.31	.44	.58	.74	.92	1.15	1.45	1.96	2.45
Nov	.09	.15	.23	.31	.40	.49	.59	.72	.89	1.16	1.43
Dec	.10	.15	.23	.31	.39	.48	.58	.70	.86	1.13	1.38
Ann	10.88	11.92	13.26	14.30	15.22	16.12	17.06	18.09	19.36	21.22	22.83

\+ 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: 1909-2001
(3) Derived from 1971-2000 serially complete daily data

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Snow (inches)

Snow Totals

Means/Medians (1)

Extremes (2)

Mean Number of Days (1)

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	8.9	6.0	4	2	7.0	1972	2	22.0	1989	39	1978	31	18	1979	6.3	4.0	1.1	.4	.0	16.1	9.1	6.7	2.2
Feb	7.1	4.6	4	1	8.5	1982	22	18.5	1978	41	1978	2	30	1978	4.3	2.8	.8	.1	.0	10.4	6.4	2.7	.0
Mar	12.4	13.3	2	1	11.0	1980	31	26.8	1975	25	1978	1	12	1978	6.3	4.4	1.5	.5	.1	11.1	6.6	3.9	1.1
Apr	8.2	7.7	1	1	13.0	1995	9	25.0	1975	29	1975	9	10	1975	3.6	2.8	1.0	.4	.1	5.3	2.9	1.6	.7
May	2.9	1.0	#	#	19.0	1982	29	29.4	1982	12	1983	13	2	1983	.9	.7	.3	.2	@	1.2	.5	.4	.1
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	.8	.0	#	0	3.5	1984	27	6.5	1984	5+	1984	27	#+	2000	.4	.3	.1	.0	.0	.5	.1	@	.0
Oct	5.2	2.8	#	#	12.0	1985	7	22.3	1975	16	1985	9	3	1980	1.6	1.3	.5	.2	.1	2.4	1.3	.9	.3
Nov	7.6	7.7	1	1	7.0	1975	25	17.1	1978	14	1978	21	4	1985	4.6	3.1	.7	.3	.0	8.7	3.8	2.0	.3
Dec	10.6	6.6	3	1	12.0	1984	23	31.0	1977	20	1984	24	12	1978	6.1	4.0	.9	.4	.1	13.5	8.2	5.4	2.7
Ann	63.7	49.7	N/A	N/A	19.0	May 1982	29	31.0	Dec 1977	41	Feb 1978	2	30	Feb 1978	34.1	23.4	6.9	2.5	.4	69.2	38.9	23.6	7.4

+ 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	7/03	6/27	6/23	6/19	6/16	6/12	6/09	6/04	5/29
32	6/16	6/09	6/04	5/31	5/26	5/22	5/18	5/13	5/06
28	5/21	5/18	5/15	5/13	5/11	5/09	5/07	5/05	5/01
24	5/08	5/04	5/01	4/28	4/26	4/23	4/21	4/17	4/13
20	4/28	4/23	4/19	4/16	4/13	4/09	4/06	4/02	3/28
16	4/22	4/16	4/12	4/09	4/05	4/02	3/30	3/25	3/20

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	8/25	8/29	9/02	9/05	9/08	9/10	9/13	9/17	9/22
32	9/05	9/10	9/13	9/16	9/18	9/21	9/24	9/27	10/02
28	9/16	9/20	9/23	9/26	9/29	10/01	10/04	10/07	10/11
24	9/22	9/28	10/02	10/06	10/09	10/12	10/16	10/20	10/26
20	10/01	10/06	10/10	10/14	10/17	10/20	10/24	10/28	11/03
16	10/08	10/15	10/19	10/23	10/27	10/31	11/04	11/09	11/15

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	107	99	93	88	83	79	74	68	59
32	139	130	124	119	114	109	104	98	90
28	157	151	147	143	140	136	132	128	122
24	188	180	175	170	166	162	157	152	144
20	207	200	195	191	187	183	178	173	166
16	224	217	212	208	204	200	196	191	184

***** 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	1290	1055	977	687	434	209	92	114	314	604	964	1218	7958
60	1135	915	822	540	292	114	33	53	203	449	816	1063	6435
57	1044	837	729	456	216	71	16	31	147	358	734	972	5611
55	988	785	668	401	172	48	9	21	116	299	678	915	5100
50	843	654	522	275	87	15	0	6	54	170	541	771	3938
32	389	269	124	26	0	0	0	0	0	5	178	329	1320

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	123	139	169	330	592	814	1041	1045	707	424	204	134	5722
55	8	10	0	14	51	172	337	353	132	6	13	7	1103
57	3	7	0	9	33	134	281	301	104	2	10	2	886
60	0	0	0	4	15	87	206	230	69	1	2	0	614
65	0	0	0	0	2	33	110	137	30	0	0	0	312
70	0	0	0	0	0	9	43	66	11	0	0	0	129

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	13	23	46	145	346	567	786	790	474	230	57	17	13	36	82	227	573	1140	1926	2716	3190	3420	3477	3494
45	0	3	18	75	217	417	631	636	339	138	23	2	0	3	21	96	313	730	1361	1997	2336	2474	2497	2499
50	0	0	0	32	120	276	478	485	220	72	10	0	0	0	0	32	152	428	906	1391	1611	1683	1693	1693
55	0	0	0	9	50	160	329	337	123	28	1	0	0	0	0	9	59	219	548	885	1008	1036	1037	1037
60	0	0	0	0	19	75	194	204	55	6	0	0	0	0	0	0	19	94	288	492	547	553	553	553
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	12	22	45	106	221	335	490	498	303	164	40	12	12	34	79	185	406	741	1231	1729	2032	2196	2236	2248

(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