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: MARTINSDALE 3 NNW, MT **COOP ID: 245387**

Climate Division: MT 4 **NWS Call Sign:** **Elevation: 4,800 Feet** **Lat: 46˚30N** **Lon: 110˚20W**

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	34.1	13.0	23.6	68	1981	22	34.4	1986	-38	1996	30	9.1	1979	1285	0	.0	.0	3.0	10.5	28.9	7.3
Feb	39.0	15.9	27.5	65+	1995	24	37.5	1991	-40	1989	4	12.4	1989	1051	0	.0	.0	6.7	6.0	25.7	4.4
Mar	44.9	21.0	33.0	76	1978	30	41.0	1986	-28	1951	8	26.5	1996	993	0	.0	.0	13.0	3.1	28.7	1.5
Apr	54.6	27.4	41.0	85	1987	28	47.4	1987	-7	1997	12	32.5	1975	720	0	.0	.0	21.6	.7	23.0	.1
May	62.8	35.0	48.9	88	1984	30	52.8	1987	6	1954	2	45.0	1996	499	0	.0	.0	28.7	.0	11.6	.0
Jun	70.9	42.1	56.5	97	1990	30	64.6	1988	19	1984	2	53.0	1998	264	10	.0	.8	29.9	.0	2.0	.0
Jul	77.6	46.1	61.9	100	1960	19	66.4	2000	26	1981	8	55.0	1993	143	44	.0	2.3	31.0	.0	.3	.0
Aug	78.0	44.6	61.3	100	1961	5	65.8	1971	22	1992	25	56.5	1975	159	45	.0	2.0	31.0	.0	.9	.0
Sep	68.5	36.8	52.7	96	1950	4	59.4	1998	8	1985	30	46.2	1985	378	8	.0	.4	28.8	@	9.7	.0
Oct	58.2	29.9	44.1	89	1953	10	48.9	1988	-16	1991	30	38.5	1984	650	0	.0	.0	24.9	.4	19.9	.2
Nov	41.6	20.9	31.3	76+	1999	7	41.5	1999	-30	1959	12	14.1	1985	1013	0	.0	.0	9.4	4.7	26.4	2.1
Dec	34.9	14.9	24.9	63	1979	4	32.8	1999	-42	1983	24	10.0	1983	1244	0	.0	.0	3.3	9.8	28.9	5.2
Ann	55.4	29.0	42.2	100+	Aug 1961	5	66.4	Jul 2000	-42	Dec 1983	24	9.1	Jan 1979	8399	107	.0	5.5	231.3	35.2	206.0	20.8

\+ 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

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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	.49	.34	.67	1993	22	1.40	1989	.00	1987
Feb	.32	.29	1.30	1959	7	1.41	1986	.00	1991
Mar	.71	.60	.64	1967	10	1.75	1989	.14	1973
Apr	1.20	1.08	2.38	1959	16	2.84	1994	.07	1977
May	2.20	1.96	3.00	1962	20	4.62	1991	.39	1973
Jun	2.25	2.07	2.23	1979	19	4.93	1997	.64	1974
Jul	1.86	1.60	1.18	1988	5	4.14	1982	.11	1996
Aug	1.56	1.42	1.64	1971	30	3.55	1974	.22	1994
Sep	1.21	1.07	1.45	1949	30	2.86	1986	.02	1979
Oct	.77	.77	1.02	1974	31	2.34	1975	.05	1987
Nov	.53	.51	.81	1996	19	1.51	1996	.01	1992
Dec	.49	.42	1.05	1955	23	2.21	1996	.00	1993
Ann	13.59	13.58	3.00	May 1962	20	4.93	Jun 1997	.00+	Dec 1993

Mean Number of Days (3)

Month	Daily Precipitation >= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	4.7	1.6	.2	.0
Feb	3.6	.9	.1	.0
Mar	6.1	2.4	.1	.0
Apr	7.2	3.7	.5	@
May	10.8	6.4	1.1	.1
Jun	10.4	5.9	.8	.4
Jul	9.0	4.6	.8	.1
Aug	8.1	4.4	.8	.1
Sep	6.2	3.5	.6	.0
Oct	4.8	2.5	.2	@
Nov	4.5	2.1	.1	.0
Dec	4.5	1.7	.1	@
Ann	79.9	39.7	5.4	.7

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	.02	.06	.13	.20	.28	.37	.47	.60	.77	1.07	1.36
Feb	.01	.03	.07	.11	.16	.22	.29	.38	.51	.73	.94
Mar	.16	.22	.33	.42	.51	.61	.73	.86	1.04	1.33	1.60
Apr	.17	.27	.45	.61	.78	.97	1.19	1.46	1.82	2.41	2.98
May	.65	.86	1.17	1.44	1.71	1.98	2.29	2.64	3.11	3.83	4.50
Jun	.70	.91	1.23	1.50	1.76	2.04	2.34	2.69	3.14	3.85	4.51
Jul	.31	.48	.75	1.00	1.26	1.55	1.87	2.27	2.79	3.65	4.46
Aug	.29	.43	.66	.87	1.08	1.32	1.58	1.90	2.32	3.00	3.65
Sep	.18	.28	.46	.62	.80	.99	1.21	1.48	1.84	2.43	2.99
Oct	.16	.23	.34	.45	.55	.66	.78	.93	1.13	1.45	1.75
Nov	.04	.08	.14	.22	.30	.39	.51	.65	.84	1.17	1.50
Dec	.02	.07	.14	.21	.29	.38	.48	.61	.78	1.07	1.35
Ann	9.25	10.07	11.14	11.95	12.67	13.38	14.10	14.91	15.90	17.33	18.58

\+ 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	9.1	8.0	2	1
Feb	5.9	5.2	1	#
Mar	9.7	8.0	1	#
Apr	6.9	5.0	#	#
May	1.0	.0	#	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.4	.0	#	0
Oct	3.9	2.8	#	#
Nov	6.7	3.5	1	#
Dec	7.0	6.0	1	1
Ann	50.6	38.5	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	18.0	1975	26	28.3	1989	18	1975	26	10	1978
Feb	9.0	1986	15	23.3	1986	18	1978	13	12	1978
Mar	12.0	1975	5	33.7	1975	16	1989	3	6	1975
Apr	12.0	1976	27	27.0	1976	20	1976	27	2	1976
May	5.0	1981	11	5.0+	1989	2	1984	5	#+	2000
Jun	.0	0	0	.0	0	0	0	0	0	0
Jul	.0	0	0	.0	0	0	0	0	0	0
Aug	1.0	1992	23	1.0	1992	0	0	0	0	0
Sep	11.0	1983	19	11.0	1983	4	1973	14	#+	1988
Oct	11.0	1975	21	25.0	1975	12	1975	22	3	1975
Nov	9.2	1996	19	22.0	1973	14	1978	20	5	1978
Dec	13.5	1996	29	21.6	1971	22	1996	29	8	1978
Ann	18.0	Jan 1975	26	33.7	Mar 1975	22	Dec 1996	29	12	Feb 1978

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	3.9	3.0	1.2	.6	.1
Feb	2.9	2.3	.9	.3	.0
Mar	3.8	3.2	1.5	.6	.1
Apr	2.6	2.2	1.0	.3	.1
May	.4	.4	.2	@	.0
Jun	.0	.0	.0	.0	.0
Jul	.0	.0	.0	.0	.0
Aug	@	@	.0	.0	.0
Sep	.3	.2	.1	@	@
Oct	1.4	1.1	.5	.2	.1
Nov	3.0	2.2	.8	.3	.0
Dec	3.9	3.1	1.1	.2	.1
Ann	22.2	17.7	7.3	2.5	.5

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	7.1	4.1	2.1	.5
Feb	4.0	2.5	1.4	.4
Mar	4.7	3.0	1.6	.6
Apr	1.5	.9	.3	.1
May	.1	.0	.0	.0
Jun	.0	.0	.0	.0
Jul	.0	.0	.0	.0
Aug	.0	.0	.0	.0
Sep	.1	@	.0	.0
Oct	1.2	.8	.4	.2
Nov	4.7	3.3	2.0	.3
Dec	6.7	3.3	1.6	.1
Ann	30.1	17.9	9.4	2.2

+ 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	7/31	7/23	7/16	7/11	7/06	7/01	6/26	6/20	6/11
32	7/12	7/03	6/27	6/22	6/17	6/12	6/07	6/01	5/23
28	6/16	6/09	6/04	5/30	5/26	5/22	5/17	5/12	5/05
24	5/24	5/19	5/15	5/12	5/09	5/07	5/03	4/30	4/25
20	5/15	5/09	5/04	4/30	4/26	4/23	4/19	4/14	4/08
16	4/30	4/24	4/20	4/17	4/14	4/10	4/07	4/03	3/28

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	8/03	8/09	8/13	8/17	8/21	8/24	8/28	9/02	9/08
32	8/14	8/21	8/25	8/29	9/01	9/05	9/09	9/13	9/19
28	9/05	9/08	9/10	9/12	9/14	9/16	9/18	9/20	9/23
24	9/05	9/11	9/15	9/19	9/22	9/26	9/29	10/03	10/09
20	9/21	9/26	9/30	10/03	10/06	10/09	10/12	10/16	10/22
16	9/30	10/06	10/10	10/13	10/17	10/20	10/23	10/27	11/02

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	78	67	59	52	45	38	31	23	12
32	111	99	90	83	76	69	61	53	41
28	134	126	120	115	110	105	100	94	86
24	157	149	144	139	135	131	126	121	113
20	187	178	172	167	162	157	152	146	137
16	211	202	196	190	185	180	175	168	160

***** 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	1285	1051	993	720	499	264	143	159	378	650	1013	1244	8399
60	1130	911	838	570	345	145	61	75	247	495	863	1089	6769
57	1037	827	745	481	258	91	29	40	181	402	773	996	5860
55	975	771	683	425	203	62	16	25	142	341	713	934	5290
50	826	639	529	288	94	17	2	6	67	200	574	781	4023
32	350	228	106	20	0	0	0	0	0	5	174	307	1190

Base — Cooling Degree Days (1)

Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	88	101	136	289	524	736	925	908	621	378	151	86	4943
55	0	0	0	4	14	107	228	220	73	1	0	0	647
57	0	0	0	1	7	76	178	174	52	0	0	0	488
60	0	0	0	0	1	41	118	115	28	0	0	0	303
65	0	0	0	0	0	10	44	45	8	0	0	0	107
70	0	0	0	0	0	1	11	12	2	0	0	0	26

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	5	16	40	135	318	532	706	692	414	202	44	6	5	21	61	196	514	1046	1752	2444	2858	3060	3104	3110
45	0	3	8	60	189	386	551	538	278	107	14	0	0	3	11	71	260	646	1197	1735	2013	2120	2134	2134
50	0	0	0	21	89	242	396	384	160	43	1	0	0	0	0	21	110	352	748	1132	1292	1335	1336	1336
55	0	0	0	2	29	125	246	233	70	11	0	0	0	0	0	2	31	156	402	635	705	716	716	716
60	0	0	0	0	0	45	117	109	20	0	0	0	0	0	0	0	0	45	162	271	291	291	291	291
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	2	14	48	134	250	354	468	472	318	184	36	4	2	16	64	198	448	802	1270	1742	2060	2244	2280	2284

(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