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: OPHEIM 10 N, MT **COOP ID: 246236**

Climate Division: MT 6 **NWS Call Sign:** **Elevation: 2,980 Feet** **Lat: 49˚00N** **Lon: 106˚23W**

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	19.4	-2.7	8.4	56	1981	23	22.6	1992	-50	1969	24	-8.1	1982	1757	0	.0	.0	.1	23.1	30.9	16.4
Feb	26.5	4.9	15.7	64+	1992	29	28.2	1998	-51	1962	28	-.3	1979	1380	0	.0	.0	.8	16.0	27.7	10.6
Mar	38.8	15.7	27.3	73	1993	23	37.1	1986	-35+	1996	8	16.5	1996	1171	0	.0	.0	7.0	9.2	29.5	4.3
Apr	55.3	26.5	40.9	91	1980	20	47.9	1987	-18	1975	1	31.2	1975	723	0	.0	@	20.6	1.4	22.2	.2
May	67.2	36.7	52.0	98	1988	29	57.8	1988	8	1984	8	46.0	1996	410	5	.0	.4	29.1	.0	9.3	.0
Jun	75.6	45.4	60.5	105+	1988	6	72.7	1988	20	1998	4	55.5	1985	183	48	.2	1.9	30.0	.0	1.1	.0
Jul	81.3	49.2	65.3	103	1975	27	70.0	1989	29	1967	2	58.7	1993	89	96	.1	4.9	31.0	.0	.1	.0
Aug	81.8	47.7	64.8	104	1983	6	71.3	1983	25+	1994	31	57.3	1977	126	119	.2	6.2	31.0	.0	.7	.0
Sep	69.5	37.1	53.3	98+	1983	1	60.3	1998	2	1995	21	46.9	1984	369	18	.0	1.2	28.1	@	8.5	.0
Oct	56.4	27.3	41.9	89	1992	1	45.3	1973	-19	1991	30	37.7	1976	718	0	.0	.0	22.7	1.3	21.0	.2
Nov	35.8	12.8	24.3	76	1999	7	35.5	1999	-33	1996	24	7.5	1985	1221	0	.0	.0	4.8	10.9	28.7	5.2
Dec	23.9	.9	12.4	55+	1980	27	23.9	1999	-47	1983	23	-5.3	1983	1631	0	.0	.0	.4	20.3	30.8	13.8
Ann	52.6	25.1	38.9	105+	Jun 1988	6	72.7	Jun 1988	-51	Feb 1962	28	-8.1	Jan 1982	9778	286	.5	14.6	205.6	82.2	210.5	50.7

\+ 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: 1956-2001

(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	.26	.15	.61	1994	25	1.13	1994	.00+	1997
Feb	.23	.15	.50	1965	22	1.24	1978	.00+	1996
Mar	.38	.31	1.64	1990	14	1.66	1990	.00+	1997
Apr	.63	.54	2.10	1997	21	2.60	1997	.00	1980
May	2.05	1.84	2.44	1988	7	5.87	1982	.55	1997
Jun	2.80	2.54	2.50	1993	16	6.08	2000	.33	1985
Jul	2.37	2.24	2.96	1993	4	6.99	1993	.08	1984
Aug	1.24	.97	1.88	1968	15	4.05	1975	.15	1971
Sep	1.26	.79	1.50	1996	18	5.64	1986	.16	1974
Oct	.67	.54	.90	1998	3	2.54	1998	.00	1992
Nov	.28	.26	.46	1981	18	.74	1975	.00+	1987
Dec	.31	.28	.35	1973	7	1.07	1973	.00+	1997
Ann	12.48	12.73	2.96	Jul 1993	4	6.99	Jul 1993	.00+	Dec 1997

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	4.1	.7	.1	.0
Feb	3.6	.7	.0	.0
Mar	3.5	1.0	.1	@
Apr	5.0	2.1	.1	@
May	9.2	5.7	1.0	.3
Jun	10.3	6.5	1.8	.5
Jul	8.1	5.3	1.5	.5
Aug	6.3	3.5	.6	.1
Sep	6.0	3.1	.8	.2
Oct	4.3	2.0	.3	.0
Nov	4.1	1.0	.0	.0
Dec	4.4	1.1	.0	.0
Ann	68.9	32.7	6.3	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	.00	.01	.05	.09	.13	.19	.25	.32	.43	.61	.79
Feb	.00	.00	.01	.06	.10	.15	.21	.29	.40	.58	.76
Mar	.00	.00	.06	.12	.18	.26	.35	.47	.63	.91	1.18
Apr	.02	.06	.14	.23	.33	.45	.59	.77	1.01	1.42	1.83
May	.47	.66	.96	1.23	1.50	1.78	2.10	2.48	2.98	3.77	4.52
Jun	.64	.90	1.31	1.68	2.05	2.44	2.88	3.40	4.08	5.17	6.20
Jul	.38	.58	.92	1.25	1.59	1.96	2.38	2.90	3.59	4.71	5.78
Aug	.16	.26	.43	.61	.79	.99	1.23	1.52	1.91	2.56	3.18
Sep	.14	.24	.42	.59	.78	.99	1.23	1.54	1.95	2.64	3.30
Oct	.02	.06	.15	.25	.36	.48	.63	.82	1.09	1.53	1.97
Nov	.00	.00	.06	.11	.16	.21	.27	.35	.45	.62	.78
Dec	.00	.06	.12	.17	.22	.27	.32	.39	.48	.62	.76
Ann	7.36	8.28	9.50	10.45	11.32	12.16	13.05	14.05	15.28	17.10	18.71

\+ 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: 1956-2001
(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	3.0	3.0	3	3
Feb	3.8	2.2	3	2
Mar	4.4	2.0	1	#
Apr	1.6	.5	#	0
May	.7	.0	#	0
Jun	#	.0	#	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.1	.0	#	0
Oct	.6	.2	#	0
Nov	1.8	2.0	#	#
Dec	2.7	2.9	2	1
Ann	18.7	12.8	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	6.0	1977	27	8.1	1999	13	1986	7	9	1994
Feb	4.0	1986	21	9.0+	1999	19	1982	24	15	1982
Mar	6.0	1975	23	17.2	1975	16	1990	13	9	1979
Apr	5.0	1975	8	8.3	1975	7	1982	9	1	1982
May	10.0	1979	7	10.0	1979	6	1983	12	#+	1999
Jun	#	1998	2	#	1998	#	1998	2	#	1998
Jul	.0	0	0	.0	0	0	0	0	0	0
Aug	.0	0	0	.0	0	0	0	0	0	0
Sep	1.0	1984	23	1.0	1984	1+	1983	30	#+	1983
Oct	2.0	1998	11	3.0	1998	4	1984	27	#+	2000
Nov	4.0	1975	25	4.8	1976	8	1996	23	2+	2000
Dec	5.0	1989	15	5.1	2000	18	1990	18	8	1985
Ann	10.0	May 1979	7	17.2	Mar 1975	19	Feb 1982	24	15	Feb 1982

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	1.8	1.2	.3	.1	.0
Feb	1.7	1.2	.2	.0	.0
Mar	1.5	1.2	.2	.2	.0
Apr	.7	.5	.2	.1	.0
May	.1	.1	.1	@	@
Jun	.0	.0	.0	.0	.0
Jul	.0	.0	.0	.0	.0
Aug	.0	.0	.0	.0	.0
Sep	@	@	.0	.0	.0
Oct	.4	.4	.0	.0	.0
Nov	1.4	1.0	.1	.0	.0
Dec	2.4	1.5	.3	.1	.0
Ann	10.0	7.1	1.4	.5	@

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	-9.9	-9.9	-9.9	-9.9
Feb	-9.9	-9.9	-9.9	-9.9
Mar	-9.9	-9.9	-9.9	-9.9
Apr	.0	.0	.0	.0
May	.1	.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	.0	.0	.0
Nov	-9.9	-9.9	-9.9	-9.9
Dec	-9.9	-9.9	-9.9	-9.9
Ann	-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

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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	7/24	7/15	7/09	7/04	6/29	6/24	6/19	6/13	6/05
32	6/27	6/20	6/14	6/10	6/06	6/01	5/28	5/22	5/15
28	6/01	5/27	5/24	5/21	5/18	5/15	5/12	5/09	5/04
24	5/25	5/20	5/16	5/13	5/09	5/06	5/03	4/29	4/24
20	5/20	5/13	5/08	5/05	5/01	4/27	4/23	4/18	4/12
16	5/02	4/26	4/22	4/18	4/15	4/12	4/08	4/04	3/29

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	8/14	8/18	8/21	8/25	8/29	9/02	9/09
32	8/13	8/19	8/23	8/27	8/30	9/03	9/07	9/11	9/17
28	8/27	9/02	9/05	9/09	9/12	9/15	9/18	9/22	9/28
24	9/09	9/15	9/18	9/22	9/25	9/28	10/01	10/05	10/10
20	9/15	9/21	9/26	9/30	10/03	10/07	10/11	10/15	10/22
16	9/25	10/01	10/06	10/10	10/14	10/18	10/22	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	87	75	66	59	52	46	38	30	18
32	116	105	98	91	85	79	72	65	54
28	137	130	125	120	116	112	108	103	96
24	160	152	147	142	138	133	128	123	115
20	178	170	164	159	155	150	145	139	131
16	205	197	191	186	181	176	171	166	157

***** 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	1757	1380	1171	723	410	183	89	126	369	718	1221	1631	9778
60	1602	1240	1016	574	272	98	29	60	246	563	1071	1476	8247
57	1509	1156	923	488	201	59	13	35	183	470	981	1383	7401
55	1447	1100	861	432	160	40	7	24	145	409	921	1321	6867
50	1293	972	715	302	79	13	0	7	71	259	777	1166	5654
32	777	526	264	34	0	0	0	0	0	13	323	647	2584

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	43	70	116	301	619	855	1029	1016	638	317	92	39	5135
55	0	0	0	9	65	205	324	327	93	1	0	0	1024
57	0	0	0	5	44	164	267	276	71	0	0	0	827
60	0	0	0	1	23	113	191	209	44	0	0	0	581
65	0	0	0	0	5	48	96	119	18	0	0	0	286
70	0	0	0	0	1	15	33	54	6	0	0	0	109

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	2	19	140	400	632	801	783	424	164	12	0	0	2	21	161	561	1193	1994	2777	3201	3365	3377	3377
45	0	1	0	68	262	483	646	628	293	83	2	0	0	1	1	69	331	814	1460	2088	2381	2464	2466	2466
50	0	0	0	22	151	334	491	474	177	33	0	0	0	0	0	22	173	507	998	1472	1649	1682	1682	1682
55	0	0	0	7	74	202	339	322	93	8	0	0	0	0	0	7	81	283	622	944	1037	1045	1045	1045
60	0	0	0	0	30	99	196	192	37	1	0	0	0	0	0	0	30	129	325	517	554	555	555	555
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	1	24	129	284	403	513	505	305	145	14	0	0	1	25	154	438	841	1354	1859	2164	2309	2323	2323

(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