

Climatography of the United States

No. 20

1971-2000

Station: BROADUS, MT

COOP ID: 241127

Climate Division: MT 7

NWS Call Sign: 4BQ

Elevation: 3,032 Feet Lat: 45° 27N

Lon: 105° 25W

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	32.8	8.6	20.7	69	1992	31	33.0	1981	-38	1949	25	3.4	1979	1374	0	.0	.0	2.8	12.6	30.5	9.9
Feb	39.7	14.9	27.3	75	1982	21	37.1	1991	-40	1971	7	13.2	1989	1057	0	.0	.0	7.1	8.1	27.1	5.6
Mar	49.1	22.6	35.9	81+	1978	30	43.5	1986	-30	1989	4	26.0	1996	904	0	.0	.0	15.7	3.9	28.1	1.8
Apr	60.3	31.7	46.0	93	1989	22	52.9	1987	-5	1997	11	39.1	1997	570	0	.0	.2	23.2	.6	17.0	@
May	70.4	41.5	56.0	101+	1988	29	62.1	1988	12	1954	3	51.0	1996	297	17	.1	1.1	30.0	.0	4.2	.0
Jun	80.1	50.7	65.4	108	1988	20	78.5	1988	31+	1982	1	59.0	1998	104	116	.5	4.6	30.0	.0	.2	.0
Jul	87.9	56.1	72.0	108	1988	14	77.2	1988	35	1971	30	65.0	1993	26	243	2.1	13.0	31.0	.0	.0	.0
Aug	87.1	54.5	70.8	106	1983	7	77.9	1983	28	1992	25	65.3	1974	36	215	1.0	12.5	31.0	.0	.1	.0
Sep	75.2	43.5	59.4	104+	1976	6	66.3	1998	16	1984	25	54.5	1984	207	38	.4	3.6	28.9	.0	4.1	.0
Oct	62.2	32.9	47.6	95+	1992	1	50.7	2000	-12	1991	30	42.8	1984	541	0	.0	.2	25.9	.4	17.3	.1
Nov	45.1	20.7	32.9	80	1999	7	43.6	1999	-28	1959	16	16.4	1985	963	0	.0	.0	11.6	5.5	27.9	2.0
Dec	35.2	11.2	23.2	68+	1995	1	33.2	1999	-47	1989	22	2.7	1983	1296	0	.0	.0	3.7	11.1	30.5	7.2
Ann	60.4	32.4	46.4	108+	Jul 1988	14	78.5	Jun 1988	-47	Dec 1989	22	2.7	Dec 1983	7375	629	4.1	35.2	240.9	42.2	187.0	26.6

+ 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/normal/usnormals.html

Issue Date: February 2004

(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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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: BROADUS, MT

COOP ID: 241127

Climate Division: MT 7

NWS Call Sign: 4BQ

Elevation: 3,032 Feet Lat: 45°27N

Lon: 105°25W

Precipitation (inches)																								
	Precipitation Totals									Mean Number of Days (3)				Precipitation Probabilities (1) Probability that the monthly/annual precipitation will be equal to or less than the indicated amount										
	Means/ Medians(1)		Extremes							Daily Precipitation				Monthly/Annual Precipitation vs Probability Levels These values were determined from the incomplete gamma distribution										
Month	Mean	Med-ian	Highest Daily(2)	Year	Day	Highest Monthly(1)	Year	Lowest Monthly(1)	Year	>= 0.01	>= 0.10	>= 0.50	>= 1.00	.05	.10	.20	.30	.40	.50	.60	.70	.80	.90	.95
Jan	.49	.41	.69	1971	30	1.65	1975	.12+	2000	7.7	1.5	.1	.0	.10	.15	.22	.29	.35	.42	.50	.60	.72	.93	1.12
Feb	.41	.30	.60	1978	11	1.26	1978	.00	1999	6.0	1.4	.1	.0	.03	.08	.15	.21	.27	.33	.41	.50	.62	.82	1.01
Mar	.87	.75	2.06	1977	29	3.05	1977	.00	1994	7.2	2.7	.2	@	.09	.19	.33	.46	.59	.73	.88	1.08	1.33	1.74	2.13
Apr	1.56	1.33	1.85	1967	30	3.20	1976	.11	1981	9.0	4.5	.7	.2	.29	.43	.65	.86	1.08	1.31	1.58	1.90	2.32	3.01	3.66
May	2.30	1.88	1.70	1978	17	7.10	1978	.69	1988	10.3	5.5	1.3	.3	.58	.80	1.13	1.43	1.72	2.03	2.37	2.78	3.31	4.15	4.93
Jun	2.17	1.99	2.56	1972	9	4.27	1977	.68	1974	9.7	5.3	1.2	.3	.70	.90	1.21	1.47	1.72	1.98	2.26	2.60	3.03	3.69	4.31
Jul	1.52	1.26	2.43	1974	3	5.99	1993	.08	1973	8.0	3.8	.9	.2	.11	.20	.39	.60	.83	1.10	1.43	1.84	2.42	3.39	4.35
Aug	.90	.72	2.30	1976	5	2.58	1976	.20	1994	6.7	2.6	.3	.1	.13	.20	.33	.46	.59	.73	.90	1.10	1.37	1.82	2.25
Sep	1.04	.82	1.57	1986	24	3.93	1986	.06	1975	5.7	2.9	.6	.1	.11	.19	.34	.48	.64	.81	1.01	1.27	1.62	2.19	2.75
Oct	1.24	.94	2.18	1971	2	5.86	1971	.00	1978	6.2	2.9	.8	.1	.06	.18	.36	.55	.74	.96	1.21	1.52	1.95	2.65	3.34
Nov	.59	.52	1.14	1978	9	2.01	1978	.07	1972	6.4	2.0	.1	@	.11	.16	.25	.33	.41	.50	.60	.72	.89	1.15	1.40
Dec	.50	.44	.64	1984	23	1.25	1989	.00+	2000	7.1	1.8	.1	.0	.00	.05	.13	.21	.29	.38	.49	.62	.80	1.09	1.37
Ann	13.59	13.36	2.56	Jun 1972	9	7.10	May 1978	.00+	Dec 2000	90.0	36.9	6.4	1.3	8.98	9.85	10.97	11.83	12.60	13.35	14.13	15.00	16.05	17.60	18.95

+ 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:
www.ncdc.noaa.gov/oa/climate/normals/usnormals.html

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Station: BROADUS, MT

COOP ID: 241127

Climate Division: MT 7

NWS Call Sign: 4BQ

Elevation: 3,032 Feet

Lat: 45° 27N

Lon: 105° 25W

Snow (inches)																							
Snow Totals															Mean Number of Days (1)								
Means/Medians (1)					Extremes (2)										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	7.8	5.7	4	3	9.0	1971	30	22.1	1971	19	1985	1	13	1979	5.8	2.2	.6	.3	.0	20.7	16.2	11.4	4.0
Feb	6.1	4.1	3	1	9.3	1979	14	23.6	1979	28	1979	24	20	1979	4.7	1.7	.4	.1	.0	14.4	10.5	7.3	3.7
Mar	9.3	8.0	2	1	16.0	1977	29	28.9	1977	25	1979	3	10	1979	4.7	2.7	.8	.4	@	7.6	4.8	3.2	1.6
Apr	5.2	3.2	#	#	12.0	1994	26	29.9	1984	20	1984	27	3	1997	2.1	1.1	.5	.3	.1	1.1	.7	.4	.2
May	1.3	.0	#	0	11.9	1983	11	17.3	1983	6	1983	11	#+	1984	.3	.2	.2	.1	@	.2	.1	.1	.0
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	9.8	1984	23	13.8	1984	10	1984	23	1	1984	.2	.2	.1	@	.0	.3	.1	.1	@
Oct	2.5	.2	#	0	10.0	1971	2	17.1	1971	4+	1991	31	1	1991	1.1	.8	.3	.1	@	.8	.2	.0	.0
Nov	6.1	5.0	1	#	7.0	1978	9	21.1	1985	15	1977	22	6	1985	4.5	2.2	.7	.2	.0	6.9	4.3	3.0	.5
Dec	8.6	6.9	3	1	14.2	1984	23	24.7	1984	21	1984	24	14	1983	6.2	2.5	.8	.1	@	17.6	11.4	7.5	2.5
Ann	47.7	33.1	N/A	N/A	16.0	Mar 1977	29	29.9	Apr 1984	28	Feb 1979	24	20	Feb 1979	29.6	13.6	4.4	1.6	.1	69.6	48.3	33.0	12.5

+ 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

Complete documentation available from:

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NWS Call Sign: 4BQ

Elevation: 3,032 Feet

Lat: 45° 27N

Lon: 105° 25W

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	6/19	6/12	6/07	6/03	5/30	5/26	5/21	5/16	5/09
32	6/02	5/28	5/25	5/21	5/18	5/15	5/12	5/09	5/03
28	5/21	5/16	5/13	5/09	5/07	5/04	5/01	4/27	4/22
24	5/07	5/03	4/30	4/27	4/25	4/23	4/20	4/18	4/14
20	4/26	4/21	4/17	4/14	4/11	4/08	4/05	4/01	3/27
16	4/18	4/12	4/08	4/05	4/01	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	8/25	8/30	9/03	9/06	9/09	9/12	9/16	9/19	9/24
32	9/04	9/08	9/11	9/14	9/16	9/19	9/22	9/25	9/29
28	9/09	9/15	9/19	9/22	9/26	9/29	10/02	10/07	10/12
24	9/18	9/24	9/29	10/03	10/06	10/10	10/13	10/18	10/24
20	9/27	10/03	10/08	10/12	10/15	10/19	10/23	10/27	11/02
16	10/10	10/16	10/20	10/24	10/28	10/31	11/04	11/08	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	126	118	112	107	102	97	92	86	78
32	140	133	128	124	120	116	112	107	101
28	164	156	150	146	141	137	132	127	119
24	184	177	172	167	163	159	155	150	142
20	210	202	196	191	186	182	177	171	163
16	233	225	219	213	209	204	198	192	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

Complete documentation available from:

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Elevation: 3,032 Feet Lat: 45° 27N

Lon: 105° 25W

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	1374	1057	904	570	297	104	26	36	207	541	963	1296	7375
60	1219	920	749	424	177	45	8	11	109	387	813	1141	6003
57	1127	844	656	341	120	24	2	4	66	298	723	1048	5253
55	1067	791	596	289	89	15	0	2	45	244	670	988	4796
50	923	661	451	175	34	3	0	0	12	128	529	846	3762
32	447	285	88	5	0	0	0	0	0	3	155	382	1365

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	96	152	208	425	742	1002	1240	1202	821	485	182	109	6664
55	3	14	2	18	118	327	527	491	175	13	7	1	1696
57	1	11	1	11	88	276	466	431	137	5	0	0	1427
60	0	3	0	4	52	207	379	345	90	1	0	0	1081
65	0	0	0	0	17	116	243	215	38	0	0	0	629
70	0	0	0	0	4	53	137	117	12	0	0	0	323

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	1	16	62	215	483	749	975	936	561	250	42	3	1	17	79	294	777	1526	2501	3437	3998	4248	4290	4293
45	0	1	21	117	338	599	820	781	421	139	11	0	0	1	22	139	477	1076	1896	2677	3098	3237	3248	3248
50	0	0	4	56	212	454	665	626	283	58	2	0	0	0	4	60	272	726	1391	2017	2300	2358	2360	2360
55	0	0	0	18	105	309	510	471	172	16	0	0	0	0	0	18	123	432	942	1413	1585	1601	1601	1601
60	0	0	0	5	46	181	357	320	87	3	0	0	0	0	0	5	51	232	589	909	996	999	999	999
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	2	30	81	172	316	469	612	592	379	210	52	4	2	32	113	285	601	1070	1682	2274	2653	2863	2915	2919

(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:

www.ncdc.noaa.gov/oa/climate/normals/usnormals.html

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.
Complete documentation for the 1971-2000 Normals is available on the internet from:
www.ncdc.noaa.gov/oa/climate/normal/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 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/normal.html
U.S. Climate Normals 1971-2000-Products Clim20, www.ncdc.noaa.gov/oa/climate/normal/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