

Climatology of the United States

No. 20

Station: HELENA AP, MT

1971-2000

COOP ID: 244055

Climate Division: MT 4

NWS Call Sign: HLN

Elevation: 3,828 Feet Lat: 46° 36N

Lon: 111° 58W

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	30.5	9.9	20.2	63	1902	7	30.6	1983	-42+	1957	25	1.1	1979	1397	0	.0	.0	2.0	14.2	29.5	8.6
Feb	37.3	15.6	26.4	69+	1995	24	37.5	1991	-42	1996	2	6.1	1989	1093	0	.0	.0	5.1	8.1	26.7	4.5
Mar	46.8	23.5	35.1	77	1978	29	42.9	1986	-30	1955	25	25.7	1996	932	0	.0	.0	12.7	3.3	27.4	.9
Apr	56.9	31.2	44.1	86+	1992	29	50.2	1987	-10	1936	1	33.5	1975	634	0	.0	.0	22.0	.5	16.9	.0
May	65.9	39.8	52.9	95	1919	28	57.5	1992	17	1954	2	48.2	1996	384	3	.0	.2	28.9	.0	3.6	.0
Jun	75.0	47.5	61.2	102	1900	21	68.4	1988	30+	1999	10	55.1	1998	157	39	@	2.4	30.0	.0	.2	.0
Jul	83.4	52.3	67.8	102+	1981	5	75.0	1985	36+	1971	4	59.5	1993	42	122	.3	7.7	31.0	.0	.0	.0
Aug	82.5	50.8	66.7	105	1969	24	72.8	1991	28	1992	25	61.5	1993	56	100	.1	7.2	30.9	.0	@	.0
Sep	71.0	41.2	56.1	99	1967	5	63.6	1990	6	1926	24	49.6	1985	283	13	.0	1.2	28.5	.0	3.4	.0
Oct	58.4	31.2	44.8	87+	2001	1	50.3	1988	-8+	1991	30	39.8	1972	631	0	.0	.0	24.1	.6	16.9	.2
Nov	41.5	20.3	30.9	75	1999	12	39.2	1999	-39	1959	16	12.6	1985	1018	0	.0	.0	8.0	6.1	26.8	2.0
Dec	31.5	11.3	21.4	64+	1980	27	30.0	1993	-38	1964	17	5.5	1983	1348	0	.0	.0	2.5	14.5	29.6	6.3
Ann	56.7	31.2	44.0	105	Aug 1969	24	75.0	Jul 1985	-42+	Feb 1996	2	1.1	Jan 1979	7975	277	.4	18.7	225.7	47.3	181.0	22.5

+ 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/normal/usnormals.html

Issue Date: February 2004

(1) From the 1971-2000 Monthly Normals

(2) Derived from station's available digital record: 1893-2001

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

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1971-2000**

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, North Carolina 28801
www.ncdc.noaa.gov

Station: HELENA AP, MT

COOP ID: 244055

Climate Division: MT 4

NWS Call Sign: HLN

Elevation: 3,828 Feet Lat: 46°36N

Lon: 111°58W

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	.52	.35	.90	1894	30	1.42	1989	.00	1987	7.5	1.7	@	.0	.06	.12	.21	.28	.36	.44	.53	.64	.79	1.02	1.25
Feb	.38	.29	.82	1895	2	1.20	1986	.02	1991	6.3	1.2	.0	.0	.03	.05	.10	.15	.21	.28	.36	.46	.60	.84	1.07
Mar	.63	.49	.78	1898	20	1.62	1982	.02	1999	8.1	2.2	@	.0	.09	.14	.23	.32	.41	.51	.63	.77	.96	1.28	1.58
Apr	.91	.74	1.09	1900	24	3.00	1975	.10	1977	8.6	3.1	.2	.0	.20	.28	.41	.54	.66	.79	.93	1.11	1.34	1.70	2.05
May	1.78	1.74	2.06	1964	3	6.09	1981	.29	1979	11.4	4.9	.8	.1	.46	.63	.88	1.11	1.33	1.57	1.83	2.14	2.55	3.19	3.79
Jun	1.82	1.53	2.16	1915	11	3.27	1991	.08	1985	10.4	5.1	1.0	.1	.37	.54	.81	1.05	1.30	1.56	1.86	2.22	2.69	3.45	4.16
Jul	1.34	.90	1.36	1975	30	4.70	1993	.08	1973	8.1	3.6	.5	.1	.09	.17	.34	.52	.73	.96	1.25	1.62	2.13	3.00	3.87
Aug	1.29	.95	1.89	1933	20	4.23	1974	.02	1988	7.7	3.6	.5	.1	.11	.20	.37	.55	.75	.97	1.23	1.57	2.02	2.79	3.54
Sep	1.05	.86	1.63	1893	30	2.74	1982	.08	1972	6.3	2.8	.5	.1	.08	.15	.28	.43	.59	.77	.99	1.27	1.66	2.31	2.95
Oct	.66	.53	1.16	1920	12	2.68	1975	.02	1978	5.7	2.2	.2	.0	.02	.05	.12	.21	.31	.43	.58	.79	1.08	1.58	2.09
Nov	.48	.36	1.30+	1922	29	1.19	1978	.06	1979	6.7	1.6	@	.0	.10	.14	.21	.28	.34	.41	.49	.58	.70	.90	1.09
Dec	.46	.41	.81	1901	6	1.48	1977	.01	1997	7.3	1.3	@	.0	.05	.09	.15	.22	.28	.36	.45	.57	.72	.97	1.22
Ann	11.32	10.42	2.16	Jun 1915	11	6.09	May 1981	.00	Jan 1987	94.1	33.3	3.7	.5	6.71	7.54	8.64	9.49	10.27	11.03	11.82	12.72	13.82	15.45	16.88

+ 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

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Climate Division: MT 4

NWS Call Sign: HLN

Elevation: 3,828 Feet

Lat: 46° 36N

Lon: 111° 58W

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	8.4	5.3	3	2	9.3	1971	9	23.0	1989	14	1971	11	8	1979	6.9	2.7	.7	.3	.0	17.7	11.0	7.9	1.3
Feb	5.3	4.0	2	1	6.9	1993	18	17.9	1993	16+	1993	22	9	1975	5.6	1.7	.4	.1	.0	11.6	7.3	5.1	1.3
Mar	6.8	4.9	1	1	6.6	1987	19	20.7	1989	13	1989	3	5	1989	5.6	2.1	.7	.2	.0	6.7	3.5	1.6	.3
Apr	4.6	3.1	#	1	7.2	1986	12	15.4	1975	8+	1986	13	2	1975	3.8	1.4	.4	.1	.0	1.4	.5	.3	.0
May	.9	.0	#	0	8.0	1983	9	9.9	1983	6	1983	10	#	1995	.7	.3	@	@	.0	.2	.1	@	.0
Jun	#	.0	#	0	#	1979	7	#	1979	0	0	0	#	1989	.0	.0	.0	.0	.0	.0	.0	.0	.0
Jul	#	.0	0	0	#	1972	18	#	1972	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Aug	.3	.0	#	0	3.1	1992	22	6.2	1992	3	1992	23	#	1992	.1	.1	.1	.0	.0	@	@	.0	.0
Sep	1.2	.0	#	0	5.1	1983	18	6.5	1982	4	1982	14	#	1988	.7	.4	.2	@	.0	.2	.1	.0	.0
Oct	3.0	1.5	#	0	7.2	1973	31	9.0	1984	7+	1991	29	1	1991	2.0	1.0	.3	.1	.0	1.1	.5	.3	.0
Nov	5.4	4.6	1	0	10.4	1978	18	22.1	1978	19	1978	20	5	1978	5.0	1.6	.4	.3	@	6.3	3.4	1.8	.3
Dec	7.7	7.2	2	1	9.8	1991	13	19.5	1977	14+	1985	14	7	1985	7.0	2.0	.6	.4	.0	13.9	8.2	5.2	.3
Ann	43.6	30.6	N/A	N/A	10.4	Nov 1978	18	23.0	Jan 1989	19	Nov 1978	20	9	Feb 1975	37.4	13.3	3.8	1.5	@	59.1	34.6	22.2	3.5

+ 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

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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	6/22	6/16	6/12	6/08	6/05	6/01	5/29	5/24	5/19
32	6/04	5/30	5/26	5/22	5/19	5/16	5/12	5/08	5/03
28	5/15	5/10	5/06	5/03	4/30	4/28	4/24	4/21	4/16
24	5/03	4/28	4/25	4/21	4/19	4/16	4/13	4/09	4/04
20	4/25	4/19	4/15	4/11	4/08	4/04	3/31	3/27	3/21
16	4/14	4/06	4/01	3/28	3/24	3/20	3/15	3/10	3/03
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	8/26	8/31	9/03	9/06	9/08	9/11	9/13	9/16	9/21
32	9/06	9/10	9/13	9/16	9/18	9/20	9/23	9/25	9/29
28	9/12	9/18	9/22	9/25	9/28	10/02	10/05	10/09	10/15
24	9/23	9/28	10/02	10/05	10/08	10/11	10/14	10/17	10/22
20	9/30	10/06	10/11	10/14	10/18	10/21	10/25	10/30	11/05
16	10/19	10/24	10/28	11/01	11/04	11/07	11/10	11/14	11/20
Freeze Free Period									
Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	118	110	104	99	95	90	85	79	71
32	140	134	129	125	121	117	113	109	102
28	174	166	160	155	150	146	141	135	127
24	197	188	182	176	172	167	161	155	146
20	219	210	203	198	193	187	182	175	166
16	250	241	235	229	224	219	214	207	198

* 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	1397	1093	932	634	384	157	42	56	283	631	1018	1348	7975
60	1234	940	770	480	235	80	23	28	182	472	873	1196	6513
57	1141	859	677	396	163	45	11	14	128	380	783	1103	5700
55	1080	808	616	341	122	28	6	7	97	319	729	1041	5194
50	930	677	471	218	48	7	0	1	41	182	589	889	4053
32	444	285	94	11	0	0	0	0	0	4	196	402	1436

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	38	68	175	368	645	873	1107	1070	720	406	116	39	5625
55	0	0	0	8	60	204	396	361	116	10	0	0	1155
57	0	0	0	4	39	158	336	303	84	5	0	0	929
60	0	0	0	1	18	102	250	220	46	2	0	0	639
65	0	0	0	0	3	39	122	100	13	0	0	0	277
70	0	0	0	0	0	9	41	28	2	0	0	0	80

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	2	12	50	173	409	642	869	832	492	202	31	4	2	14	64	237	646	1288	2157	2989	3481	3683	3714	3718
45	0	0	12	86	263	492	714	677	353	102	8	0	0	0	12	98	361	853	1567	2244	2597	2699	2707	2707
50	0	0	1	32	143	345	560	524	227	39	1	0	0	0	1	33	176	521	1081	1605	1832	1871	1872	1872
55	0	0	0	8	64	213	406	372	120	11	0	0	0	0	0	8	72	285	691	1063	1183	1194	1194	1194
60	0	0	0	0	20	107	261	227	49	1	0	0	0	0	0	0	20	127	388	615	664	665	665	665
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	0	10	52	134	259	388	545	521	322	160	26	2	0	10	62	196	455	843	1388	1909	2231	2391	2417	2419

(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.

- | | |
|---|---|
| <ol style="list-style-type: none">a. Temperature/ Precipitation Tables<ol style="list-style-type: none">1. 1971-2000 Monthly Normals2. Cooperative Summary of the Day3. National Weather Service station records4. 1971-2000 serially complete daily datab. Degree Day Table<ol style="list-style-type: none">1. Monthly and Annual Heating and Cooling Degree Days Normals to Selected Bases derived from 1971-2000 Monthly Normals2. Daily Normal Growing Degree Units to Selected Base Temperatures derived from 1971-2000 serially complete daily data | <ol style="list-style-type: none">c. Snow Tables<ol style="list-style-type: none">1. Snow Climatology2. Cooperative Summary of the Dayd. 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