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: BOULDER, CO **COOP ID: 050848**

Climate Division: CO 4 **NWS Call Sign:** **Elevation: 5,484 Feet** **Lat: 40˚00N** **Lon: 105˚16W**

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	45.7	19.2	32.5	72+	1982	26	41.8	1986	-22	1963	12	21.6	1979	1010	0	.0	.0	11.3	4.9	27.6	2.3
Feb	49.1	22.5	35.8	79	1954	8	41.7	1999	-24	1989	5	23.5	1989	818	0	.0	.0	14.4	3.2	23.3	1.2
Mar	55.8	27.7	41.8	80	1997	20	48.2	1986	-3+	1960	3	37.9	1980	722	0	.0	.0	21.6	1.2	21.6	.2
Apr	62.7	33.9	48.3	88	1989	21	55.8	1981	-3	1975	2	42.6	1973	501	0	.0	.0	25.5	.2	11.9	@
May	71.7	42.0	56.9	95+	2000	29	61.3	2000	22	1954	2	51.2	1995	265	13	.0	.4	30.2	.0	1.4	.0
Jun	82.2	50.5	66.4	104	1954	23	70.8	1980	30	1951	2	61.4	1982	68	109	.1	5.9	29.9	.0	.0	.0
Jul	87.2	55.9	71.6	104	1954	11	74.4	2000	42	1972	5	67.7	1992	3	206	.2	11.9	31.0	.0	.0	.0
Aug	85.0	55.0	70.0	101+	1979	6	74.6	1983	42	1992	27	65.8	1992	19	174	@	7.0	31.0	.0	.0	.0
Sep	77.4	46.8	62.1	100	1983	2	67.1	1998	15	1985	30	58.2	1985	136	49	@	2.1	29.6	.0	1.1	.0
Oct	66.7	37.1	51.9	90	1953	1	55.5	1979	5	1991	31	46.2	1984	406	1	.0	.0	28.8	.2	7.3	.0
Nov	52.6	26.8	39.7	79	1952	4	47.9	1999	-8	1993	25	30.4	1985	758	0	.0	.0	18.4	1.9	21.6	.2
Dec	46.1	20.6	33.4	76	1980	17	43.1	1980	-24	1990	22	21.5	1983	981	0	.0	.0	12.3	3.7	26.7	1.4
Ann	65.2	36.5	50.9	104+	Jul 1954	11	74.6	Aug 1983	-24+	Dec 1990	22	21.5	Dec 1983	5687	552	.3	27.3	284.0	15.3	142.5	5.3

\+ 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

Issue Date: February 2004

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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	.70	.66	1.04	1998	6	2.19	1996	.02	1982
Feb	.75	.68	1.03	1957	28	2.44	1987	.00	1992
Mar	1.78	1.33	2.02	1998	18	5.17	1992	.43	1991
Apr	2.88	2.56	3.56	1986	3	6.01	1971	.33	1982
May	3.05	2.17	3.51	1995	17	9.59	1995	.00	1974
Jun	1.99	1.80	3.40	1949	4	6.04	1987	.32	1980
Jul	1.88	1.65	2.18	1977	21	4.75	1977	.00	1979
Aug	1.63	1.38	3.06	1951	3	5.54	1999	.03	1985
Sep	1.79	1.65	1.64	1971	17	4.36	1982	.02	1992
Oct	1.28	1.02	1.90	1978	22	4.25	1984	.03	1988
Nov	1.42	1.38	1.19	1994	14	3.46	1983	.01	1984
Dec	.78	.67	1.14	1982	24	2.16	1988	.01	1991
Ann	19.93	19.06	3.56	Apr 1986	3	9.59	May 1995	.00+	Feb 1992

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	4.7	2.1	.2	@
Feb	5.7	2.6	.2	.0
Mar	7.5	4.3	1.0	.2
Apr	9.5	5.3	1.9	.6
May	12.1	6.4	1.4	.6
Jun	9.5	4.2	1.0	.3
Jul	11.5	4.7	1.0	.3
Aug	10.3	3.9	.7	.3
Sep	8.2	4.5	1.1	.2
Oct	6.4	3.2	.6	.2
Nov	5.5	3.2	.9	.1
Dec	5.6	2.4	.3	@
Ann	96.5	46.8	10.3	2.8

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	.07	.13	.22	.32	.42	.54	.68	.85	1.09	1.48	1.86
Feb	.05	.13	.25	.36	.48	.60	.75	.93	1.17	1.56	1.94
Mar	.40	.56	.83	1.06	1.30	1.54	1.83	2.16	2.60	3.31	3.97
Apr	.75	1.03	1.44	1.81	2.17	2.55	2.97	3.47	4.13	5.16	6.12
May	.38	.76	1.28	1.71	2.15	2.61	3.13	3.75	4.58	5.89	7.13
Jun	.33	.51	.80	1.07	1.35	1.66	2.01	2.43	3.00	3.92	4.80
Jul	.34	.60	.92	1.17	1.42	1.68	1.96	2.30	2.74	3.42	4.05
Aug	.17	.29	.51	.74	.98	1.26	1.58	1.99	2.54	3.45	4.35
Sep	.20	.33	.58	.83	1.10	1.40	1.75	2.19	2.78	3.76	4.72
Oct	.17	.27	.46	.63	.82	1.03	1.27	1.56	1.96	2.61	3.24
Nov	.15	.25	.45	.65	.86	1.10	1.38	1.73	2.21	3.00	3.78
Dec	.11	.17	.28	.39	.50	.63	.77	.95	1.19	1.59	1.97
Ann	13.65	14.84	16.39	17.56	18.61	19.63	20.69	21.86	23.28	25.35	27.15

\+ 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

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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	11.5	11.5	2	2
Feb	10.1	8.8	1	1
Mar	15.3	15.5	1	1
Apr	12.6	11.4	1	#
May	1.1	.0	#	0
Jun	#	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	2.0	.0	#	0
Oct	4.6	1.8	#	#
Nov	16.1	15.1	1	1
Dec	11.4	10.3	2	1
Ann	84.7	74.4	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	10.4	1978	24	29.1	1996	11+	1988	6	6	1988
Feb	8.0	1971	20	28.8	1997	12	1971	21	4	1994
Mar	16.9	1998	18	42.9	1998	15	1998	18	3	1983
Apr	16.4	1997	24	38.6	1997	16	1997	24	2	1997
May	14.0	1978	6	23.0	1978	4	1973	1	#+	1997
Jun	#	1998	5	#	1998	0	0	0	0	0
Jul	.0	0	0	.0	0	0	0	0	0	0
Aug	.0	0	0	.0	0	0	0	0	0	0
Sep	18.0	1971	17	21.0	1971	18	1971	17	1	1985
Oct	22.1	1997	25	30.1	1997	25	1997	25	2	1997
Nov	22.0	1979	20	44.7	1992	22	1992	24	5	1992
Dec	18.0	1982	24	31.5	1988	19	1987	27	5	1992
Ann	22.1	Oct 1997	25	44.7	Nov 1992	25	Oct 1997	25	6	Jan 1988

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	4.6	2.8	1.5	.4	.1
Feb	5.3	3.2	1.1	.5	.0
Mar	5.8	3.9	1.9	.9	.2
Apr	3.9	2.5	1.5	.9	.3
May	.3	.1	.1	.1	@
Jun	.0	.0	.0	.0	.0
Jul	.0	.0	.0	.0	.0
Aug	.0	.0	.0	.0	.0
Sep	.6	.5	.2	.1	@
Oct	1.5	.9	.5	.3	@
Nov	4.7	3.5	2.0	1.1	.3
Dec	5.0	2.9	1.4	.5	.2
Ann	31.7	20.3	10.2	4.8	1.1

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	12.9	8.2	3.6	.4
Feb	7.5	3.9	1.7	.2
Mar	5.8	3.1	1.5	.3
Apr	3.2	2.0	1.3	.4
May	@	@	.0	.0
Jun	.0	.0	.0	.0
Jul	.0	.0	.0	.0
Aug	.0	.0	.0	.0
Sep	.4	.4	.2	.1
Oct	1.3	.9	.5	.1
Nov	8.9	4.8	2.8	.6
Dec	13.4	7.8	4.3	.7
Ann	53.4	31.1	15.9	2.8

+ 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	5/31	5/26	5/22	5/19	5/16	5/14	5/10	5/07	5/02
32	5/14	5/10	5/08	5/06	5/04	5/02	4/30	4/27	4/24
28	5/07	5/02	4/28	4/25	4/22	4/20	4/17	4/13	4/08
24	4/26	4/21	4/17	4/13	4/10	4/07	4/03	3/30	3/25
20	4/19	4/13	4/08	4/05	4/01	3/29	3/25	3/21	3/14
16	4/13	4/05	3/30	3/25	3/21	3/16	3/11	3/05	2/25

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	9/14	9/18	9/21	9/23	9/26	9/28	10/01	10/04	10/08
32	9/18	9/23	9/26	9/29	10/02	10/05	10/08	10/11	10/16
28	9/23	9/29	10/04	10/08	10/11	10/15	10/19	10/23	10/30
24	10/03	10/10	10/15	10/20	10/24	10/28	11/02	11/07	11/14
20	10/15	10/22	10/26	10/30	11/03	11/06	11/10	11/15	11/21
16	10/20	10/29	11/04	11/09	11/14	11/19	11/24	11/30	12/08

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	151	144	140	136	132	128	124	119	113
32	170	163	159	154	151	147	143	138	131
28	193	186	180	176	171	167	162	157	149
24	223	214	207	202	196	191	186	179	170
20	242	233	226	220	215	210	204	197	188
16	271	259	251	244	237	231	224	215	204

***** 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	1010	818	722	501	265	68	3	19	136	406	758	981	5687
60	855	678	567	359	146	21	0	3	57	258	608	826	4378
57	762	594	474	278	92	9	0	1	28	181	525	733	3677
55	700	538	413	229	64	5	0	0	15	136	470	672	3242
50	554	407	270	128	20	0	0	0	2	57	338	526	2302
32	140	70	9	0	0	0	0	0	0	0	51	123	393

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	153	176	310	489	771	1032	1225	1178	903	617	283	164	7301
55	0	0	1	28	122	346	512	465	228	40	11	1	1754
57	0	0	0	17	88	290	450	404	180	23	7	0	1459
60	0	0	0	8	49	213	357	313	119	7	0	0	1066
65	0	0	0	0	13	109	206	174	49	1	0	0	552
70	0	0	0	0	2	41	81	70	13	0	0	0	207

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	46	77	150	290	543	813	1000	955	678	396	121	53	46	123	273	563	1106	1919	2919	3874	4552	4948	5069	5122
45	15	30	73	178	391	664	845	800	529	261	58	25	15	45	118	296	687	1351	2196	2996	3525	3786	3844	3869
50	0	6	28	92	255	515	690	645	382	143	24	4	0	6	34	126	381	896	1586	2231	2613	2756	2780	2784
55	0	0	3	38	140	369	536	490	254	65	3	0	0	0	3	41	181	550	1086	1576	1830	1895	1898	1898
60	0	0	0	10	58	233	382	336	137	19	0	0	0	0	0	10	68	301	683	1019	1156	1175	1175	1175
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	41	67	127	208	344	513	647	617	430	271	94	49	41	108	235	443	787	1300	1947	2564	2994	3265	3359	3408

(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