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: CARTHAGE 5 S, MO **COOP ID: 231356**

Climate Division: MO 4 **NWS Call Sign:** **Elevation: 1,050 Feet** **Lat: 37˚06N** **Lon: 94˚19W**

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	41.6	22.0	31.8	78	1950	24	41.9	1990	-15	1985	20	18.6	1979	1029	0	.0	.0	8.4	6.1	26.8	1.4
Feb	48.0	27.3	37.7	85	1996	23	46.3	1999	-11	1979	2	25.1	1978	765	0	.0	.0	13.7	3.6	21.9	.8
Mar	58.1	36.3	47.2	88	1995	23	52.1	1973	1	1960	4	40.1	1975	552	0	.0	.0	23.3	.6	12.1	.0
Apr	68.1	45.4	56.8	94	1987	21	62.3	1981	11	1957	13	49.6	1983	264	16	.0	.4	28.6	.0	2.8	.0
May	75.4	54.1	64.8	93	1980	27	70.7	1998	27	1963	1	60.2	1976	110	101	.0	.5	31.0	.0	.1	.0
Jun	84.0	63.2	73.6	103	1953	12	77.3	1980	41	1950	4	67.9	1982	10	268	.2	6.9	30.0	.0	.0	.0
Jul	90.0	68.7	79.4	115	1954	14	87.3	1980	48+	1971	31	75.4	1971	0	445	2.0	19.1	31.0	.0	.0	.0
Aug	89.5	66.3	77.9	108	1963	27	83.6	1983	43	1967	27	71.9	1992	2	402	2.4	17.8	31.0	.0	.0	.0
Sep	80.8	58.1	69.5	103+	2000	3	77.0	1998	30+	1995	23	62.4	1974	45	179	.3	6.0	30.0	.0	.1	.0
Oct	70.4	46.9	58.7	95	1953	1	63.5	1971	18	1952	29	51.4	1976	223	26	.0	.3	30.4	.0	2.1	.0
Nov	56.5	36.0	46.3	86	1980	9	54.7	1999	5	1986	13	38.8	1972	562	0	.0	.0	21.5	.5	11.8	.0
Dec	45.5	26.9	36.2	80	1948	13	42.8	1984	-12	1983	26	19.7	1983	892	0	.0	.0	11.7	2.6	23.2	.6
Ann	67.3	45.9	56.7	115	Jul 1954	14	87.3	Jul 1980	-15	Jan 1985	20	18.6	Jan 1979	4454	1437	4.9	51.0	290.6	13.4	100.9	2.8

\+ 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

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	1.52	1.11	2.45	2001	29	4.59	1973	.00	1986
Feb	1.60	1.51	5.65	1985	23	3.56	1985	.09	1999
Mar	3.21	2.95	2.79	1959	5	10.37	1973	.61	1996
Apr	4.34	4.29	3.68	1970	30	10.13	1994	.22	1989
May	4.54	4.56	2.82	1963	6	8.35	1990	1.28	1988
Jun	5.20	4.24	4.50	1981	11	13.08	1977	.89	1972
Jul	3.32	2.84	4.42	1976	3	7.93	1989	.20	1986
Aug	3.70	3.24	4.10	1985	23	10.53	1985	.36	2000
Sep	5.23	4.22	5.50	1986	29	15.53	1986	1.17	1980
Oct	3.63	3.34	4.93	1969	12	10.22	1983	.52	1995
Nov	4.19	3.90	4.81	1979	21	13.33	1985	.16	1989
Dec	2.20	1.56	2.61	1997	22	5.52	1987	.00	1998
Ann	42.68	42.95	5.65	Feb 1985	23	15.53	Sep 1986	.00+	Dec 1998

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	5.5	3.9	.9	.3
Feb	5.2	3.4	1.4	.4
Mar	8.2	6.5	2.4	.7
Apr	8.6	6.4	2.6	1.2
May	10.0	8.1	3.2	1.4
Jun	9.6	7.5	3.4	1.6
Jul	6.2	4.8	2.1	1.0
Aug	6.6	5.1	2.3	.9
Sep	8.0	6.3	3.1	1.7
Oct	6.6	4.9	2.3	1.1
Nov	6.8	5.4	2.4	1.4
Dec	5.3	3.7	1.7	.5
Ann	86.6	66.0	27.8	12.2

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	.21	.44	.66	.90	1.16	1.48	1.87	2.40	3.28	4.14
Feb	.25	.38	.61	.83	1.06	1.31	1.60	1.95	2.42	3.19	3.93
Mar	.76	1.06	1.53	1.95	2.37	2.81	3.30	3.89	4.66	5.89	7.04
Apr	1.16	1.57	2.20	2.75	3.29	3.86	4.49	5.23	6.21	7.74	9.17
May	1.63	2.06	2.67	3.19	3.69	4.19	4.74	5.39	6.21	7.47	8.63
Jun	1.45	1.94	2.69	3.34	3.98	4.65	5.39	6.26	7.39	9.17	10.83
Jul	.40	.65	1.12	1.58	2.07	2.62	3.26	4.05	5.13	6.89	8.61
Aug	.66	.98	1.53	2.03	2.55	3.11	3.74	4.52	5.54	7.20	8.78
Sep	1.24	1.73	2.49	3.18	3.85	4.57	5.38	6.34	7.60	9.60	11.48
Oct	.86	1.20	1.73	2.20	2.68	3.18	3.74	4.40	5.28	6.66	7.97
Nov	.54	.88	1.47	2.05	2.67	3.35	4.14	5.11	6.43	8.59	10.69
Dec	.08	.25	.57	.89	1.24	1.63	2.10	2.69	3.51	4.87	6.21
Ann	30.89	33.19	36.12	38.34	40.31	42.21	44.17	46.33	48.95	52.74	56.01

\+ 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	2.0	.5	#	0
Feb	3.4	1.0	#	0
Mar	1.2	.0	#	0
Apr	.1	.0	0	0
May	.0	.0	0	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.0	.0	0	0
Oct	.0	.0	0	0
Nov	.9	.0	#	0
Dec	.4	.0	#	0
Ann	8.0	1.5	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	6.0	1977	10	11.0	1978	3+	1982	7	#+	1982
Feb	15.0	1980	8	15.0	1980	15	1980	9	2	1980
Mar	7.0	1975	10	11.0	1975	8	1975	10	#+	1999
Apr	1.0	1973	9	1.0	1973	0	0	0	0	0
May	.0	0	0	.0	0	0	0	0	0	0
Jun	.0	0	0	.0	0	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	.0	0	0	.0	0	0	0	0	0	0
Oct	.0	0	0	.0	0	0	0	0	0	0
Nov	5.0	1988	20	5.0+	1988	4	1972	19	#+	1975
Dec	3.0	1984	4	3.0	1984	15	2000	14	2	2000
Ann	15.0	Feb 1980	8	15.0	Feb 1980	15+	Dec 2000	14	2+	Dec 2000

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	1.1	1.0	.4	.1	.0
Feb	.9	.7	.2	.1	.1
Mar	.3	.2	.2	.1	.0
Apr	.1	.1	.0	.0	.0
May	.0	.0	.0	.0	.0
Jun	.0	.0	.0	.0	.0
Jul	.0	.0	.0	.0	.0
Aug	.0	.0	.0	.0	.0
Sep	.0	.0	.0	.0	.0
Oct	.0	.0	.0	.0	.0
Nov	.3	.3	.1	.1	.0
Dec	.2	.2	.1	.0	.0
Ann	2.9	2.5	1.0	.4	.1

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	.4	.2	.0	.0
Feb	1.2	.7	.5	.2
Mar	.2	.1	.1	.0
Apr	.0	.0	.0	.0
May	.0	.0	.0	.0
Jun	.0	.0	.0	.0
Jul	.0	.0	.0	.0
Aug	.0	.0	.0	.0
Sep	.0	.0	.0	.0
Oct	.0	.0	.0	.0
Nov	.4	.2	.0	.0
Dec	.4	.2	.0	.0
Ann	2.6	1.4	.6	.2

+ Also occurred on an earlier date(s) #Denotes trace amounts

(1) Derived from Snow Climatology and 1971-2000 daily data

@ Denotes mean number of days greater than 0 but less than .05

(2) Derived from 1971-2000 daily data

-9/-9.9 represents missing values

Annual statistics for Mean/Median snow depths are not appropriate

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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	5/08	5/03	4/29	4/26	4/24	4/21	4/18	4/14	4/09
32	4/24	4/20	4/17	4/14	4/11	4/09	4/06	4/03	3/30
28	4/14	4/08	4/03	3/30	3/26	3/22	3/18	3/14	3/07
24	4/03	3/26	3/20	3/15	3/10	3/06	3/01	2/23	2/15
20	3/26	3/17	3/11	3/05	2/28	2/23	2/18	2/11	2/02
16	3/20	3/08	2/27	2/20	2/13	2/06	1/30	1/21	1/10

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	9/24	9/29	10/02	10/05	10/08	10/10	10/13	10/16	10/21
32	10/05	10/11	10/16	10/20	10/24	10/27	10/31	11/05	11/12
28	10/20	10/26	10/30	11/02	11/05	11/09	11/12	11/16	11/22
24	10/30	11/05	11/10	11/14	11/17	11/21	11/25	11/29	12/06
20	11/10	11/16	11/20	11/24	11/28	12/01	12/05	12/09	12/15
16	11/16	11/24	11/30	12/05	12/09	12/14	12/18	12/24	1/01

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	187	180	175	170	166	162	158	153	145
32	220	212	205	200	195	189	184	177	169
28	245	238	232	228	223	219	214	209	202
24	281	271	264	257	251	246	239	232	222
20	305	294	285	278	272	265	258	249	238
16	337	322	312	304	296	289	281	273	260

***** 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	1029	765	552	264	110	10	0	2	45	223	562	892	4454
60	874	631	405	150	46	1	0	0	13	117	421	741	3399
57	783	553	321	98	24	0	0	0	5	71	341	654	2850
55	725	501	269	70	14	0	0	0	2	49	291	597	2518
50	581	379	162	23	3	0	0	0	0	14	185	459	1806
32	180	87	7	0	0	0	0	0	0	0	13	115	402

Base — Cooling Degree Days (1)

Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	174	246	478	742	1014	1249	1468	1423	1124	826	441	246	9431
55	6	16	27	122	315	559	755	710	436	161	29	15	3151
57	1	12	17	91	263	499	693	648	379	122	19	10	2754
60	0	6	8	53	193	410	600	555	297	74	10	4	2210
65	0	0	0	16	101	268	445	402	179	26	0	0	1437
70	0	0	0	3	40	148	295	258	92	5	0	0	841

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	44	111	270	515	798	1027	1225	1189	900	596	253	79	44	155	425	940	1738	2765	3990	5179	6079	6675	6928	7007
45	19	59	165	377	643	877	1070	1034	751	445	153	39	19	78	243	620	1263	2140	3210	4244	4995	5440	5593	5632
50	3	26	87	249	488	727	915	879	602	310	84	13	3	29	116	365	853	1580	2495	3374	3976	4286	4370	4383
55	0	9	39	144	338	577	760	724	454	183	40	3	0	9	48	192	530	1107	1867	2591	3045	3228	3268	3271
60	0	3	13	73	204	427	605	569	320	93	9	0	0	3	16	89	293	720	1325	1894	2214	2307	2316	2316
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	35	89	184	320	510	700	830	796	589	382	160	54	35	124	308	628	1138	1838	2668	3464	4053	4435	4595	4649

(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