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, TN **COOP ID: 401480**

Climate Division: TN 3 **NWS Call Sign:** **Elevation: 515 Feet** **Lat: 36˚15N** **Lon: 85˚57W**

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	45.5	25.2	35.4	78+	1950	25	44.4	1974	-17	1985	21	20.9	1977	920	0	.0	.0	11.4	4.5	22.3	.7
Feb	50.5	27.6	39.1	82	1996	24	47.2	1990	-8	1996	5	28.2	1978	727	0	.0	.0	15.2	2.6	18.4	.3
Mar	60.0	35.6	47.8	88	1982	20	53.6	1973	7	1960	5	41.3	1971	534	1	.0	.0	25.0	.2	11.1	@
Apr	69.1	43.6	56.4	90+	1963	21	62.9	1981	24+	1973	11	50.9	1983	270	11	.0	@	29.0	.0	2.6	.0
May	76.7	52.9	64.8	98+	1962	16	70.7	1987	31	1971	3	59.6	1994	106	100	.0	.4	30.9	.0	.1	.0
Jun	84.4	62.0	73.2	103	1954	27	76.3	1981	40	1966	1	69.5	1974	5	251	.1	6.0	30.0	.0	.0	.0
Jul	88.3	66.7	77.5	106+	1952	27	81.4	1980	51+	1967	15	74.4	1984	0	389	.4	13.8	31.0	.0	.0	.0
Aug	87.4	65.6	76.5	104+	1954	16	81.2	1980	49	1986	29	72.5	1992	0	357	.4	11.3	31.0	.0	.0	.0
Sep	82.0	58.6	70.3	107	1954	5	75.1	1980	33	1967	30	65.8	1974	26	184	@	3.5	30.0	.0	@	.0
Oct	72.0	44.8	58.4	94	1953	1	64.6	1984	23	1952	30	51.7	1987	238	33	.0	.1	30.7	.0	2.2	.0
Nov	60.2	36.2	48.2	85+	1958	17	55.0	1985	0	1950	25	40.3	1976	505	1	.0	.0	23.7	.1	11.1	.0
Dec	49.9	28.8	39.4	77+	1982	3	47.5	1984	-9+	1989	22	28.1	1989	796	0	.0	.0	16.1	2.4	20.2	.2
Ann	68.8	45.6	57.3	107	Sep 1954	5	81.4	Jul 1980	-17	Jan 1985	21	20.9	Jan 1977	4127	1327	.9	35.1	304.0	9.8	88.0	1.2

\+ 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	4.60	4.78	2.79	1957	29	7.78	1974	.34	1986
Feb	4.07	3.73	3.44	1962	27	8.87	1989	1.08	1978
Mar	5.46	5.05	4.57	1963	12	11.76	1975	2.02	1987
Apr	4.00	3.79	2.47	1998	16	8.37	1998	.71	1976
May	5.38	5.11	4.20	1995	14	11.00	1995	1.32	1988
Jun	4.40	3.97	4.72	1949	16	14.78	1998	.31	1988
Jul	4.96	4.54	3.34	1999	2	11.50	1998	.56	1997
Aug	3.90	3.43	5.80	1982	16	12.16	1982	1.47	1972
Sep	3.68	3.73	3.50	1971	7	7.25	1986	.15	1998
Oct	3.29	2.98	3.90	1995	5	9.05	1984	.17	2000
Nov	4.26	3.53	3.95	1986	9	9.16	1986	1.05	1998
Dec	5.47	4.81	3.35	1951	15	13.33	1990	1.57	1985
Ann	53.47	53.54	5.80	Aug 1982	16	14.78	Jun 1998	.15	Sep 1998

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	10.7	7.4	3.5	1.4
Feb	9.8	7.1	2.7	1.0
Mar	11.7	8.7	3.7	1.6
Apr	10.9	7.5	2.8	1.1
May	11.6	8.3	3.2	1.7
Jun	10.0	6.9	3.4	1.5
Jul	10.8	7.6	3.1	1.4
Aug	8.5	6.0	2.4	1.0
Sep	8.7	6.0	2.5	1.1
Oct	7.6	5.1	2.3	.9
Nov	9.5	6.6	3.4	1.3
Dec	10.6	7.4	3.6	1.7
Ann	120.4	84.6	36.6	15.7

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	1.60	2.03	2.66	3.20	3.71	4.23	4.80	5.47	6.32	7.65	8.86
Feb	1.50	1.88	2.43	2.89	3.32	3.77	4.25	4.82	5.53	6.63	7.64
Mar	1.95	2.46	3.21	3.83	4.43	5.04	5.70	6.48	7.47	9.00	10.40
Apr	1.21	1.59	2.16	2.65	3.12	3.61	4.16	4.79	5.62	6.90	8.10
May	1.96	2.47	3.19	3.80	4.39	4.98	5.63	6.38	7.34	8.82	10.18
Jun	.86	1.26	1.91	2.50	3.10	3.74	4.48	5.36	6.52	8.40	10.17
Jul	1.52	1.99	2.70	3.30	3.89	4.49	5.16	5.95	6.96	8.54	10.01
Aug	1.48	1.85	2.37	2.80	3.21	3.63	4.08	4.61	5.28	6.31	7.25
Sep	.66	.99	1.53	2.03	2.54	3.09	3.72	4.49	5.50	7.14	8.70
Oct	.73	1.03	1.51	1.95	2.39	2.85	3.37	4.00	4.82	6.13	7.37
Nov	1.47	1.87	2.46	2.95	3.43	3.92	4.45	5.07	5.87	7.10	8.24
Dec	1.86	2.38	3.13	3.77	4.38	5.01	5.70	6.51	7.54	9.14	10.61
Ann	41.07	43.54	46.67	49.02	51.08	53.07	55.10	57.34	60.03	63.89	67.21

\+ 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	1.3	.0	#	0
Feb	1.7	.0	#	0
Mar	.3	.0	#	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	#	.0	#	0
Dec	.1	.0	#	0
Ann	3.4	.0	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	9.0	1985	31	9.0	1985	7	1996	8	1	1996
Feb	5.0	1989	27	7.0	1971	5	1996	4	1	1996
Mar	2.0	1996	20	3.8	1996	3	1996	21	#	1996
Apr	.0	0	0	.0	0	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	#	1996	10	#+	1996	#	1996	10	#	1996
Dec	1.8	1997	30	1.8	1997	2	1997	31	#+	2000
Ann	9.0	Jan 1985	31	9.0	Jan 1985	7	Jan 1996	8	1+	Feb 1996

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	.7	.5	.2	.2	.0
Feb	.7	.5	.2	.1	.0
Mar	.2	.1	.0	.0	.0
Apr	.0	.0	.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	.0	.0	.0	.0	.0
Dec	.3	.2	.0	.0	.0
Ann	1.9	1.3	.4	.3	.0

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	.4	.1	.0	.0
Feb	.9	.5	.1	.0
Mar	.3	.1	.0	.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	.0	.0	.0	.0
Dec	.1	.0	.0	.0
Ann	1.7	.7	.1	.0

+ 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	5/09	5/02	4/27	4/23	4/19	4/16	4/11	4/07	3/31
32	4/25	4/20	4/16	4/13	4/10	4/07	4/04	4/01	3/27
28	4/11	4/06	4/02	3/30	3/28	3/25	3/22	3/18	3/13
24	3/29	3/23	3/18	3/14	3/10	3/06	3/02	2/25	2/19
20	3/15	3/09	3/04	3/01	2/25	2/22	2/18	2/14	2/08
16	3/10	3/02	2/24	2/19	2/14	2/09	2/04	1/29	1/21

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	10/01	10/05	10/09	10/12	10/14	10/17	10/20	10/23	10/28
32	10/06	10/13	10/18	10/22	10/26	10/30	11/03	11/08	11/15
28	10/25	10/30	11/03	11/06	11/10	11/13	11/16	11/20	11/25
24	11/04	11/09	11/14	11/17	11/20	11/24	11/27	12/01	12/07
20	11/11	11/21	11/27	12/03	12/09	12/14	12/20	12/27	1/05
16	11/28	12/08	12/16	12/23	12/29	1/04	1/11	1/18	1/29

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	200	192	186	182	177	173	168	162	155
32	222	213	208	203	198	193	188	182	174
28	247	240	235	230	226	222	218	212	205
24	278	270	264	259	255	250	245	239	231
20	314	305	298	291	286	280	274	267	257
16	355	338	328	320	314	307	300	292	281

***** 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	920	727	534	270	106	5	0	0	26	238	505	796	4127
60	772	587	389	151	44	0	0	0	6	135	364	645	3093
57	685	506	308	97	22	0	0	0	2	89	285	559	2553
55	627	455	258	68	13	0	0	0	1	65	237	501	2225
50	489	327	155	21	3	0	0	0	0	24	138	366	1523
32	139	45	5	0	0	0	0	0	0	0	3	64	256

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	242	242	495	731	1017	1236	1412	1380	1148	818	489	292	9502
55	17	8	35	109	317	546	699	667	459	170	33	15	3075
57	13	3	23	78	264	486	637	605	400	132	21	11	2673
60	7	0	11	42	193	397	544	512	314	85	10	4	2119
65	0	0	1	11	100	251	389	357	184	33	1	0	1327
70	0	0	0	1	39	123	235	212	85	9	0	0	704

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	90	137	306	523	800	1017	1178	1151	914	592	298	133	90	227	533	1056	1856	2873	4051	5202	6116	6708	7006	7139
45	40	72	197	379	645	867	1023	996	764	441	190	71	40	112	309	688	1333	2200	3223	4219	4983	5424	5614	5685
50	19	29	111	250	491	717	868	841	614	300	110	37	19	48	159	409	900	1617	2485	3326	3940	4240	4350	4387
55	5	8	51	141	340	567	713	686	466	179	55	9	5	13	64	205	545	1112	1825	2511	2977	3156	3211	3220
60	0	0	19	66	206	417	558	531	325	91	18	0	0	0	19	85	291	708	1266	1797	2122	2213	2231	2231
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	54	93	196	324	512	695	812	794	609	377	188	82	54	147	343	667	1179	1874	2686	3480	4089	4466	4654	4736

(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