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: TULSA INTL AP, OK **COOP ID: 348992**

Climate Division: OK 3 **NWS Call Sign: TUL** **Elevation: 650 Feet** **Lat: 36˚12N** **Lon: 95˚53W**

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	46.5	26.3	36.4	79	1950	24	46.1	1990	-6+	1949	30	23.4	1979	898	0	.0	.0	13.1	5.3	22.5	.4
Feb	52.9	31.1	42.0	90	1996	22	51.2	1976	-11	1996	4	29.5	1978	658	1	.0	@	16.9	2.6	15.2	.2
Mar	62.4	40.3	51.4	96	1974	31	55.5	1974	-3	1948	12	45.4	1996	437	10	.0	.1	26.1	.4	6.8	.0
Apr	72.1	49.5	60.8	102	1972	12	68.1	1981	22	1957	13	55.4	1983	179	50	@	.4	29.5	.0	.6	.0
May	79.6	59.0	69.3	96	1985	30	74.3	1987	35+	1960	1	63.1	1976	38	163	.0	2.1	31.0	.0	.0	.0
Jun	88.0	67.9	78.0	103	1953	20	82.7	1980	49	1954	4	74.2	1995	1	385	.2	12.7	30.0	.0	.0	.0
Jul	93.8	73.1	83.5	112	1954	14	91.6	1980	51	1971	31	79.3	1994	0	568	4.7	23.8	31.0	.0	.0	.0
Aug	93.2	71.2	82.2	110+	1964	5	89.4	1980	52+	1967	12	76.6	1992	0	524	5.5	22.4	31.0	.0	.0	.0
Sep	84.1	62.9	73.5	108	2000	1	80.8	1998	35	1984	30	65.1	1974	29	277	1.0	9.2	30.0	.0	.0	.0
Oct	74.0	51.1	62.6	98	1979	7	66.3	1979	18	1993	31	56.1	1993	152	64	.0	1.0	30.7	.0	.5	.0
Nov	60.0	39.3	49.7	85+	1978	3	57.7	1999	10	1976	29	43.4	1976	468	6	.0	.0	23.9	.2	7.7	.0
Dec	49.6	29.8	39.7	80+	1948	13	45.0	1984	-8	1989	23	27.1	1983	782	1	.0	.0	15.5	2.9	18.9	.3
Ann	71.4	50.1	60.8	112	Jul 1954	14	91.6	Jul 1980	-11	Feb 1996	4	23.4	Jan 1979	3642	2049	11.4	71.7	308.7	11.4	72.2	.9

\+ 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	1.60	1.31	2.13	1983	31	3.58	1982	.00	1986
Feb	1.95	1.45	2.99	1985	22	5.74	1985	.16	1996
Mar	3.57	3.07	2.72	1998	7	11.94	1973	.08	1971
Apr	3.95	3.99	4.40	1964	4	8.27	1976	.34	1989
May	6.11	6.65	6.95	1984	27	11.25	1984	1.17	1988
Jun	4.72	4.18	4.90	1974	8	9.90	1995	.58	1988
Jul	2.96	2.49	7.54	1963	27	11.41	1994	.09	1980
Aug	2.85	2.32	5.37	1989	20	7.89	1997	.01	2000
Sep	4.76	3.50	5.78	1971	16	18.81	1971	.13	1978
Oct	4.05	2.78	5.45	1959	2	9.33	1983	.95	1978
Nov	3.47	3.13	4.59	1979	20	7.30	1974	.15	1989
Dec	2.43	1.69	3.27	1984	31	8.70	1984	.10	1996
Ann	42.42	41.17	7.54	Jul 1963	27	18.81	Sep 1971	.00	Jan 1986

Mean Number of Days (3)

Month	Daily Precipitation >= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	6.5	3.4	.8	.3
Feb	6.5	4.0	1.1	.4
Mar	9.4	5.8	2.5	1.1
Apr	8.9	6.3	2.8	1.2
May	10.4	7.5	4.1	1.8
Jun	9.2	6.6	3.0	1.4
Jul	6.0	4.0	2.2	1.0
Aug	6.8	4.3	1.8	.9
Sep	8.2	5.7	3.1	1.6
Oct	7.3	4.4	2.6	1.4
Nov	7.0	4.8	2.2	1.1
Dec	6.4	3.7	1.6	.6
Ann	92.6	60.5	27.8	12.8

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	.12	.29	.55	.78	1.03	1.30	1.60	1.98	2.49	3.32	4.11
Feb	.25	.41	.69	.96	1.24	1.56	1.93	2.38	3.00	4.00	4.98
Mar	.52	.82	1.33	1.83	2.34	2.91	3.56	4.36	5.44	7.19	8.88
Apr	.88	1.24	1.82	2.34	2.86	3.42	4.04	4.79	5.77	7.34	8.81
May	1.98	2.56	3.41	4.14	4.84	5.57	6.37	7.30	8.50	10.36	12.09
Jun	1.17	1.61	2.30	2.91	3.52	4.15	4.87	5.71	6.82	8.57	10.22
Jul	.18	.36	.72	1.12	1.58	2.11	2.76	3.58	4.74	6.70	8.64
Aug	.30	.51	.91	1.31	1.73	2.21	2.78	3.48	4.44	6.03	7.58
Sep	.61	.99	1.67	2.33	3.03	3.81	4.71	5.82	7.32	9.78	12.16
Oct	.71	1.07	1.66	2.21	2.78	3.39	4.09	4.94	6.07	7.89	9.64
Nov	.47	.75	1.25	1.73	2.24	2.80	3.44	4.24	5.32	7.08	8.78
Dec	.18	.34	.65	.98	1.36	1.78	2.30	2.95	3.86	5.38	6.88
Ann	29.58	32.05	35.22	37.64	39.79	41.87	44.03	46.41	49.31	53.53	57.18

\+ 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)

Extremes (2)

Mean Number of Days (1)

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	3.0	1.0	#	0	8.6	1988	6	12.7	1979	11+	1988	8	2+	1988	2.2	1.0	.2	.1	.0	3.5	1.3	.6	.1
Feb	2.1	1.2	#	0	5.0	1996	1	6.5	1971	5+	1996	2	1+	1993	1.6	.7	.2	@	.0	2.2	.9	.1	.0
Mar	1.4	.0	#	0	12.9	1994	9	14.1	1994	9+	1994	9	1	1989	.5	.3	.1	.1	@	.4	.2	.2	.0
Apr	.0	.0	0	0	.3	1973	9	.3	1973	#	1993	24	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
May	.0	.0	#	0	.0	0	0	.0	0	0	0	0	#	2000	.0	.0	.0	.0	.0	.0	.0	.0	.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	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Oct	.0	.0	0	0	.3	1993	30	.3	1993	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Nov	.6	.0	#	0	4.0	1972	18	5.6	1972	2+	1995	10	#	1995	.4	.3	.1	.0	.0	.1	.0	.0	.0
Dec	2.0	.6	#	0	5.0	1987	14	11.4	2000	7	2000	14	1+	2000	1.5	.8	.2	@	.0	1.8	.3	.1	.0
Ann	9.1	2.8	N/A	N/A	12.9	Mar 1994	9	14.1	Mar 1994	11+	Jan 1988	8	2+	Jan 1988	6.2	3.1	.8	.2	@	8.0	2.7	1.0	.1

+ 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	4/19	4/15	4/12	4/09	4/07	4/04	4/02	3/29	3/25
32	4/08	4/04	4/01	3/29	3/27	3/24	3/21	3/18	3/14
28	4/02	3/26	3/22	3/18	3/14	3/10	3/06	3/01	2/23
24	3/21	3/13	3/07	3/02	2/25	2/21	2/16	2/10	2/01
20	3/13	3/04	2/26	2/21	2/16	2/11	2/06	1/31	1/23
16	3/13	3/01	2/20	2/13	2/06	1/30	1/22	1/13	1/01

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	10/11	10/16	10/19	10/23	10/25	10/28	10/31	11/04	11/09
32	10/23	10/28	11/01	11/04	11/07	11/10	11/13	11/17	11/22
28	10/30	11/05	11/10	11/14	11/17	11/21	11/25	11/29	12/05
24	11/09	11/15	11/20	11/25	11/29	12/03	12/07	12/12	12/18
20	11/17	11/24	11/29	12/03	12/07	12/11	12/15	12/20	12/27
16	11/18	11/28	12/06	12/12	12/18	12/25	12/31	1/08	1/18

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	222	215	210	205	201	197	193	188	180
32	243	236	232	228	225	221	217	213	206
28	274	265	259	253	248	242	237	230	221
24	309	297	289	282	276	269	262	254	242
20	325	314	306	299	293	286	280	272	261
16	>365	342	327	317	309	301	293	284	271

***** 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)

Heating Degree Days (1)

Base Below	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
65	898	658	437	179	38	1	0	0	29	152	468	782	3642
60	735	519	286	80	11	0	0	0	8	57	332	633	2661
57	649	444	213	45	4	0	0	0	3	30	261	547	2196
55	590	397	171	28	2	0	0	0	0	17	218	490	1913
50	450	291	90	6	0	0	0	0	0	4	132	356	1329
32	104	53	2	0	0	0	0	0	0	0	6	56	221

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	218	323	605	860	1150	1371	1589	1552	1241	939	526	282	10656
55	4	19	79	210	439	681	876	839	553	256	57	9	4022
57	2	12	58	167	378	621	814	777	495	208	41	5	3578
60	1	5	34	113	292	531	721	684	410	146	23	2	2962
65	0	1	10	50	163	385	568	524	277	64	6	1	2049
70	0	0	2	16	73	239	412	375	168	23	0	0	1308

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	89	181	384	626	912	1139	1350	1313	1009	699	315	121	89	270	654	1280	2192	3331	4681	5994	7003	7702	8017	8138
45	43	103	257	480	757	989	1195	1158	859	546	204	60	43	146	403	883	1640	2629	3824	4982	5841	6387	6591	6651
50	14	55	157	341	602	839	1040	1003	709	398	123	24	14	69	226	567	1169	2008	3048	4051	4760	5158	5281	5305
55	2	23	84	220	449	689	885	848	559	262	64	6	2	25	109	329	778	1467	2352	3200	3759	4021	4085	4091
60	0	5	38	119	301	539	730	693	420	150	25	0	0	5	43	162	463	1002	1732	2425	2845	2995	3020	3020
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	64	118	233	385	601	787	919	888	675	436	188	75	64	182	415	800	1401	2188	3107	3995	4670	5106	5294	5369

(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