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: ATWOOD 2 SW, KS **COOP ID: 140439**

Climate Division: KS 1 **NWS Call Sign:** **Elevation: 2,862 Feet** **Lat: 39˚47N** **Lon: 101˚05W**

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	40.2	11.4	25.8	76	1943	22	35.8	1986	-25+	1984	18	13.3	1979	1216	0	.0	.0	8.3	9.3	30.7	4.5
Feb	46.3	15.6	31.0	83	1970	17	38.4	1992	-23	1996	4	18.9	1978	954	0	.0	.0	12.2	6.1	27.1	2.7
Mar	55.3	23.4	39.4	92+	1946	31	45.8	1986	-22	1948	11	33.6	1996	796	0	.0	.0	19.2	2.4	24.3	.6
Apr	65.8	33.2	49.5	96+	1989	23	55.9	1981	7	1949	1	43.5	1984	468	2	.0	.5	25.7	.2	12.7	.0
May	75.6	45.0	60.3	104	2000	30	65.1	1977	23+	1989	2	51.7	1995	190	43	.1	1.7	30.2	.0	2.0	.0
Jun	87.5	54.7	71.1	111	1946	15	76.5	1988	31	1950	4	65.8	1982	25	208	1.8	10.9	30.0	.0	@	.0
Jul	93.4	60.5	77.0	114	1940	25	81.3	1980	40	1990	13	71.5	1994	0	372	4.9	19.5	31.0	.0	.0	.0
Aug	90.5	57.9	74.2	110	1943	23	81.2	1983	38	1964	30	69.1	1992	10	294	2.0	16.2	31.0	.0	.0	.0
Sep	81.4	47.2	64.3	107+	1947	3	70.1	1998	21	1984	30	58.0	1993	107	86	.5	7.2	29.6	.0	1.7	.0
Oct	68.5	33.3	50.9	101	1947	5	53.8	1979	8	1997	27	45.8	1976	437	0	.0	.6	28.4	.3	11.9	.0
Nov	51.4	20.9	36.2	86+	1980	6	43.4	1999	-17	1952	28	27.9	1985	866	0	.0	.0	16.2	3.1	26.5	.5
Dec	42.5	13.5	28.0	80+	1964	23	34.1	1980	-34+	1989	23	11.6	1983	1147	0	.0	.0	9.4	6.7	30.5	2.5
Ann	66.5	34.7	50.6	114	Jul 1940	25	81.3	Jul 1980	-34+	Dec 1989	23	11.6	Dec 1983	6216	1005	9.3	56.6	271.2	28.1	167.4	10.8

\+ 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: 1939-2001

(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	.60	.31	1.72	1994	27	1.99	1994	.00	1986
Feb	.66	.41	1.70	1971	19	2.29	1971	.00+	1974
Mar	1.70	1.11	2.20	1977	11	5.50	1977	.00	1997
Apr	2.17	1.89	2.58	1971	23	6.45	1971	.07	1992
May	3.74	3.36	3.37	2001	29	9.25	1981	.38	2000
Jun	3.21	3.28	3.40	1958	19	6.20	1975	.50	1976
Jul	3.50	2.99	3.36	1998	30	9.24	1993	.79	1984
Aug	2.78	2.16	4.25	1996	7	9.20	1996	.50	1983
Sep	1.59	1.25	4.11	1977	2	6.00	1973	.02	1979
Oct	1.30	1.05	2.59	2000	29	5.82	1984	.00+	1999
Nov	1.01	.76	2.20	1983	28	3.04	1975	.00	1989
Dec	.49	.28	1.70	1984	14	3.03	1982	.00+	1995
Ann	22.75	22.59	4.25	Aug 1996	7	9.25	May 1981	.00+	Oct 1999

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	2.7	1.5	.4	.1
Feb	3.2	1.8	.3	.1
Mar	6.4	4.1	1.0	.3
Apr	6.8	4.6	1.3	.6
May	9.6	6.9	2.8	.8
Jun	7.8	5.6	2.1	.9
Jul	8.4	6.1	2.4	.8
Aug	6.7	4.9	1.9	.7
Sep	5.0	3.1	.8	.3
Oct	4.4	2.6	.9	.4
Nov	4.0	2.5	.6	.2
Dec	2.6	1.2	.2	.1
Ann	67.6	44.9	14.7	5.3

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	.02	.06	.14	.22	.32	.43	.56	.73	.96	1.36	1.75
Feb	.00	.03	.11	.21	.31	.44	.60	.80	1.09	1.58	2.07
Mar	.06	.20	.44	.69	.96	1.27	1.63	2.09	2.72	3.77	4.80
Apr	.34	.53	.84	1.14	1.45	1.79	2.17	2.64	3.28	4.30	5.28
May	.81	1.16	1.71	2.20	2.70	3.23	3.83	4.54	5.49	6.99	8.41
Jun	.80	1.10	1.57	1.99	2.39	2.83	3.31	3.88	4.63	5.81	6.92
Jul	.94	1.27	1.78	2.22	2.66	3.11	3.62	4.22	5.01	6.23	7.38
Aug	.52	.76	1.17	1.55	1.93	2.35	2.82	3.38	4.14	5.36	6.51
Sep	.08	.17	.36	.57	.82	1.11	1.46	1.91	2.55	3.63	4.72
Oct	.00	.03	.18	.35	.56	.82	1.14	1.56	2.16	3.20	4.26
Nov	.05	.14	.29	.44	.60	.78	.99	1.25	1.60	2.20	2.77
Dec	.00	.01	.07	.13	.21	.31	.43	.58	.81	1.20	1.59
Ann	14.77	16.26	18.20	19.69	21.02	22.33	23.69	25.20	27.04	29.75	32.11

\+ 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: 1939-2001
(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	7.8	4.5	1	#
Feb	4.5	3.0	#	#
Mar	5.2	4.5	#	#
Apr	3.2	.0	#	0
May	.0	.0	0	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.3	.0	#	0
Oct	1.0	.0	#	0
Nov	4.1	3.5	#	#
Dec	3.7	1.0	#	#
Ann	29.8	16.5	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	15.0	1990	20	20.3	1993	17	1993	10	10	1993
Feb	11.0	1980	8	16.0	1993	10	1993	16	3	1993
Mar	9.0	1980	28	12.5	1999	8	1999	13	4	1993
Apr	8.0	1988	2	22.5	1994	6	1995	10	1	1995
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	7.0	1995	21	7.0	1995	4	1995	21	#	1995
Oct	13.0	1997	26	14.0	1997	13	1997	26	1	1997
Nov	16.0	1983	28	16.0	1983	11	2000	12	2	2000
Dec	10.0	1982	25	19.0	1982	9	1972	13	2	1972
Ann	16.0	Nov 1983	28	22.5	Apr 1994	17	Jan 1993	10	10	Jan 1993

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	2.4	2.2	1.0	.5	.1
Feb	1.6	1.4	.6	.3	@
Mar	1.8	1.6	.8	.3	.0
Apr	1.0	.9	.4	.2	.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	.1	@	@	@	.0
Oct	.3	.3	.1	@	@
Nov	1.5	1.3	.5	.2	.1
Dec	1.4	1.1	.3	.2	@
Ann	10.1	8.8	3.7	1.7	.2

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	3.7	1.6	.4	.0
Feb	2.1	.8	.5	.0
Mar	1.7	.5	.2	.0
Apr	.8	.5	.1	.0
May	.0	.0	.0	.0
Jun	.0	.0	.0	.0
Jul	.0	.0	.0	.0
Aug	.0	.0	.0	.0
Sep	.1	.1	.0	.0
Oct	.3	.2	.2	.1
Nov	2.4	1.5	.5	.1
Dec	2.5	1.3	.7	.0
Ann	13.6	6.5	2.6	.2

+ 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	6/01	5/27	5/23	5/19	5/16	5/13	5/10	5/06	4/30
32	5/23	5/17	5/14	5/10	5/07	5/04	5/01	4/27	4/22
28	5/12	5/06	5/02	4/29	4/25	4/22	4/19	4/15	4/09
24	5/02	4/25	4/21	4/17	4/14	4/10	4/06	4/02	3/27
20	4/16	4/11	4/08	4/05	4/02	3/30	3/27	3/23	3/19
16	4/09	4/02	3/28	3/24	3/21	3/17	3/13	3/08	3/02

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	9/12	9/16	9/18	9/21	9/23	9/25	9/27	9/30	10/04
32	9/16	9/20	9/23	9/26	9/28	9/30	10/03	10/06	10/10
28	9/26	10/01	10/05	10/08	10/11	10/14	10/17	10/20	10/25
24	10/02	10/07	10/11	10/14	10/17	10/20	10/23	10/27	11/01
20	10/12	10/18	10/22	10/25	10/28	10/31	11/04	11/08	11/13
16	10/23	10/28	11/01	11/05	11/08	11/11	11/14	11/18	11/24

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	148	141	137	133	129	125	121	116	110
32	159	154	150	146	143	140	136	132	126
28	190	182	177	172	168	163	159	153	146
24	209	201	195	190	185	181	175	169	161
20	230	223	218	213	209	204	200	195	187
16	256	247	241	236	231	226	221	215	207

***** 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	1216	954	796	468	190	25	0	10	107	437	866	1147	6216
60	1061	814	641	328	97	5	0	1	42	287	716	992	4984
57	968	730	548	251	59	2	0	0	20	204	626	899	4307
55	906	676	487	205	40	0	0	0	11	155	566	837	3883
50	752	546	340	110	12	0	0	0	1	65	427	685	2938
32	269	172	28	0	0	0	0	0	0	0	80	223	772

Base — Cooling Degree Days (1)

Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	76	143	255	524	876	1174	1394	1308	968	586	203	99	7606
55	0	2	0	39	203	484	681	595	289	28	0	0	2321
57	0	0	0	25	160	425	619	533	238	15	0	0	2015
60	0	0	0	12	105	339	526	441	171	5	0	0	1599
65	0	0	0	2	43	208	372	294	86	0	0	0	1005
70	0	0	0	0	12	107	227	168	34	0	0	0	548

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	11	43	131	322	621	917	1130	1061	744	379	83	18	11	54	185	507	1128	2045	3175	4236	4980	5359	5442	5460
45	0	12	67	207	471	767	975	906	597	248	30	0	0	12	79	286	757	1524	2499	3405	4002	4250	4280	4280
50	0	0	28	113	327	619	820	751	452	140	9	0	0	0	28	141	468	1087	1907	2658	3110	3250	3259	3259
55	0	0	6	54	198	472	665	596	319	62	0	0	0	0	6	60	258	730	1395	1991	2310	2372	2372	2372
60	0	0	1	24	108	327	510	444	201	18	0	0	0	0	1	25	133	460	970	1414	1615	1633	1633	1633
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	31	69	139	248	393	584	715	676	479	294	94	41	31	100	239	487	880	1464	2179	2855	3334	3628	3722	3763

(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