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: MARION LAKE, KS **COOP ID: 145039**

Climate Division: KS 5 **NWS Call Sign:** **Elevation: 1,369 Feet** **Lat: 38˚23N** **Lon: 97˚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	37.4	16.5	27.0	75	1990	11	37.9	1990	-16	1979	31	11.9	1979	1179	0	.0	.0	6.3	10.9	29.7	3.1
Feb	44.1	20.8	32.5	78	1972	29	42.3	1999	-19	1979	1	18.1	1979	912	0	.0	.0	10.5	6.7	24.0	2.2
Mar	54.8	31.2	43.0	88	1967	30	48.5	1986	-5	1978	4	36.6	1998	682	0	.0	.0	19.7	1.6	16.3	.2
Apr	65.5	41.4	53.5	95	1989	27	61.6	1981	11	1975	3	45.7	1983	359	11	.0	.3	27.3	.1	4.2	.0
May	74.6	52.8	63.7	98	1998	31	68.8	1987	26	1967	2	58.3	1995	125	85	.0	.9	30.8	.0	.1	.0
Jun	84.9	62.6	73.8	105+	1990	30	78.4	1980	42	1982	1	67.4	1982	14	276	.6	8.5	30.0	.0	.0	.0
Jul	91.1	67.3	79.2	109	1980	13	88.3	1980	48	1972	5	75.4	1972	0	441	3.5	19.3	31.0	.0	.0	.0
Aug	89.7	64.2	77.0	109	1984	29	85.5	2000	47	1967	27	71.3	1992	8	379	2.7	16.9	31.0	.0	.0	.0
Sep	81.1	54.3	67.7	107	2000	3	75.3	1998	28	1984	30	59.3	1974	72	153	.7	6.8	29.9	.0	.2	.0
Oct	69.3	42.3	55.8	93+	1976	2	60.5	2000	14	1993	31	50.0	1976	293	9	.0	.4	29.6	.0	3.3	.0
Nov	53.3	30.0	41.7	83	1980	9	51.8	1999	4	1986	13	35.1	1976	701	0	.0	.0	18.6	1.2	16.7	.0
Dec	41.1	20.9	31.0	71+	1970	3	36.9	1991	-24+	1989	24	14.0	1983	1054	0	.0	.0	8.1	6.9	28.1	1.4
Ann	65.6	42.0	53.8	109+	Aug 1984	29	88.3	Jul 1980	-24+	Dec 1989	24	11.9	Jan 1979	5399	1354	7.5	53.1	272.8	27.4	122.6	6.9

\+ 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: 1966-2001

(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	.74	.64	1.35	1999	30	2.87	1999	.00	1986
Feb	.88	.81	1.93	2001	24	2.67	1997	.00	1991
Mar	2.53	2.13	2.31	1973	4	10.26	1973	.00	1997
Apr	2.99	2.99	2.60	1976	28	6.98	1976	.24	1982
May	4.70	4.38	4.10	1989	22	11.46	1993	.14	1994
Jun	4.42	4.55	2.90	1993	24	9.24	1989	1.12	1980
Jul	4.01	3.00	4.42	1986	7	12.61	1993	.00	1984
Aug	3.94	3.92	4.40	1975	14	8.73	1996	.09	2000
Sep	3.25	2.54	4.68	1998	24	9.15	1998	.35	1980
Oct	2.55	1.79	3.95	1985	10	6.15	1979	.00	1999
Nov	2.12	1.77	3.52	1998	1	6.50	1992	.00	1989
Dec	1.10	.83	1.51	1984	15	3.31	1984	.02	1976
Ann	33.23	33.57	4.68	Sep 1998	24	12.61	Jul 1993	.00+	Oct 1999

Mean Number of Days (3)

Month	Daily Precipitation >= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	3.9	1.9	.4	.1
Feb	3.8	1.9	.6	.1
Mar	7.0	4.7	1.8	.7
Apr	8.0	5.3	2.2	.8
May	10.2	7.2	3.1	1.4
Jun	8.4	6.2	2.9	1.4
Jul	7.5	5.3	2.4	1.2
Aug	7.3	5.4	2.3	1.2
Sep	6.9	4.9	2.1	.9
Oct	6.1	4.1	1.8	.5
Nov	5.6	3.5	1.1	.6
Dec	4.4	2.5	.7	.2
Ann	79.1	52.9	21.4	9.1

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	.07	.17	.28	.40	.53	.70	.91	1.20	1.69	2.17
Feb	.02	.06	.17	.29	.43	.60	.80	1.07	1.44	2.08	2.71
Mar	.17	.42	.82	1.19	1.58	2.01	2.51	3.12	3.95	5.30	6.61
Apr	.50	.76	1.19	1.61	2.03	2.49	3.01	3.65	4.51	5.89	7.21
May	1.03	1.47	2.16	2.78	3.40	4.06	4.81	5.70	6.87	8.75	10.51
Jun	1.28	1.70	2.33	2.88	3.41	3.97	4.59	5.32	6.26	7.73	9.10
Jul	.09	.33	.84	1.40	2.04	2.79	3.70	4.87	6.51	9.29	12.07
Aug	.34	.61	1.13	1.68	2.28	2.96	3.78	4.80	6.21	8.56	10.88
Sep	.52	.80	1.27	1.72	2.18	2.69	3.27	3.97	4.92	6.45	7.92
Oct	.17	.43	.83	1.21	1.60	2.03	2.53	3.14	3.97	5.32	6.62
Nov	.06	.21	.49	.80	1.13	1.52	1.99	2.59	3.41	4.80	6.18
Dec	.08	.15	.29	.44	.61	.80	1.04	1.34	1.75	2.45	3.15
Ann	21.09	23.34	26.27	28.54	30.58	32.57	34.65	36.97	39.81	43.97	47.63

\+ 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: 1966-2001
(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	3.0	-99.9	#	0
Feb	1.3	.0	#	0
Mar	.8	.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	.4	.0	0	0
Dec	1.3	-99.9	#	0
Ann	6.8	-9.9	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	1975	2	6.0	1975	6+	2000	4	3	1975
Feb	8.0	1975	17	8.0	1975	2	1976	5	#+	1997
Mar	7.0	1975	10	7.7	1975	7	1998	9	2	1995
Apr	.2	1975	2	.2	1975	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	1975	26	5.0	1975	0	0	0	0	0
Dec	6.0	2000	13	6.5	1995	2+	1997	24	#+	1998
Ann	8.0	Feb 1975	17	8.0	Feb 1975	7	Mar 1998	9	3	Jan 1975

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	.4	.4	.2	.1	.0
Mar	.1	.1	.1	.1	.0
Apr	.1	.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	.2	.1	.1	.1	.0
Dec	.7	.4	.2	.1	.0
Ann	2.2	1.5	.8	.6	.0

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	.0	.0	.0	.0
Feb	.1	.0	.0	.0
Mar	.0	.0	.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	.0	.0	.0	.0
Ann	.1	.0	.0	.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	5/13	5/08	5/04	5/01	4/28	4/25	4/22	4/18	4/13
32	4/26	4/22	4/18	4/16	4/13	4/10	4/07	4/04	3/30
28	4/15	4/11	4/08	4/05	4/03	3/31	3/29	3/26	3/22
24	4/10	4/05	4/01	3/29	3/26	3/23	3/20	3/16	3/11
20	4/04	3/27	3/21	3/17	3/12	3/08	3/03	2/26	2/18
16	3/28	3/20	3/14	3/09	3/04	2/28	2/23	2/17	2/09

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	9/21	9/26	9/30	10/03	10/06	10/09	10/12	10/16	10/21
32	9/28	10/04	10/09	10/13	10/16	10/20	10/23	10/28	11/03
28	10/12	10/18	10/22	10/26	10/30	11/02	11/06	11/10	11/16
24	10/25	10/31	11/04	11/08	11/12	11/15	11/19	11/23	11/29
20	11/05	11/11	11/16	11/19	11/23	11/27	11/30	12/05	12/11
16	11/08	11/15	11/20	11/25	11/29	12/03	12/07	12/13	12/20

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	183	175	170	165	160	156	151	146	138
32	207	200	194	190	186	181	177	171	164
28	230	223	218	213	209	205	200	195	188
24	256	247	241	235	230	225	219	213	204
20	284	274	267	261	255	249	243	236	226
16	303	291	283	276	269	262	255	246	235

***** 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	1179	912	682	359	125	14	0	8	72	293	701	1054	5399
60	1024	779	529	233	57	3	0	1	26	168	552	899	4271
57	932	701	442	171	31	0	0	0	13	108	468	806	3672
55	871	649	385	135	19	0	0	0	7	76	413	746	3301
50	726	523	255	65	5	0	0	0	0	27	285	602	2488
32	278	188	24	0	0	0	0	0	0	0	34	188	712

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	123	200	365	643	982	1252	1464	1394	1070	739	323	158	8713
55	3	17	13	88	288	562	751	681	387	102	12	2	2906
57	1	13	8	64	238	502	689	619	333	72	7	0	2546
60	0	8	2	36	171	415	596	528	257	39	1	0	2053
65	0	0	0	11	85	276	441	379	153	9	0	0	1354
70	0	0	0	2	32	160	293	244	78	2	0	0	811

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	17	72	200	436	742	1018	1226	1174	863	527	166	34	17	89	289	725	1467	2485	3711	4885	5748	6275	6441	6475
45	1	29	113	301	589	868	1071	1019	713	383	91	7	1	30	143	444	1033	1901	2972	3991	4704	5087	5178	5185
50	0	8	58	190	439	718	916	864	566	249	41	3	0	8	66	256	695	1413	2329	3193	3759	4008	4049	4052
55	0	2	22	108	294	569	761	709	424	144	15	0	0	2	24	132	426	995	1756	2465	2889	3033	3048	3048
60	0	0	4	50	171	422	606	554	296	68	3	0	0	0	4	54	225	647	1253	1807	2103	2171	2174	2174
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	19	64	138	264	459	684	823	779	560	332	110	29	19	83	221	485	944	1628	2451	3230	3790	4122	4232	4261

(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