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: MANKATO, KS **COOP ID: 144982**

Climate Division: KS 2 **NWS Call Sign:** **Elevation: 1,755 Feet** **Lat: 39˚47N** **Lon: 98˚13W**

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	35.9	12.3	24.1	76	1990	11	35.6	1986	-25	1982	10	10.0	1979	1268	0	.0	.0	5.7	12.4	30.2	5.7
Feb	42.2	16.7	29.5	80	1972	29	40.0	1991	-19	1981	11	14.6	1979	997	0	.0	.0	9.4	8.6	25.9	3.0
Mar	52.8	26.1	39.5	87+	1976	26	47.3	1986	-13	1978	4	31.2	1975	792	0	.0	.0	17.8	2.5	20.6	.5
Apr	63.9	36.2	50.1	99	1989	23	56.6	1981	12+	1994	7	44.7	1997	453	4	.0	.4	25.8	.2	7.8	.0
May	73.4	47.9	60.7	100+	2000	30	66.9	1977	24	1976	3	54.2	1995	197	64	.1	.8	30.8	.0	.7	.0
Jun	84.8	58.0	71.4	106	1988	22	77.7	1988	39+	1998	6	64.3	1982	29	220	1.0	8.5	30.0	.0	.0	.0
Jul	90.8	63.7	77.3	111	1964	5	82.8	1974	47+	1997	4	72.4	1992	2	381	4.2	16.9	31.0	.0	.0	.0
Aug	88.1	61.1	74.6	110+	1983	16	84.0	1983	46+	1992	30	68.5	1992	24	320	2.7	13.7	31.0	.0	.0	.0
Sep	79.5	50.9	65.2	108	2000	3	71.8	1998	22	1984	29	58.3	1982	101	107	.6	6.2	29.8	.0	.5	.0
Oct	67.4	39.1	53.3	96	1997	3	57.5	2000	10	1997	27	46.9	1982	370	5	.0	.5	28.6	.1	5.8	.0
Nov	50.6	25.7	38.2	84	1980	7	47.8	1999	-5	1976	29	31.1	1985	806	0	.0	.0	16.3	2.5	21.2	.2
Dec	39.1	16.2	27.7	78	1964	23	35.1	1988	-23	1989	22	9.6	1983	1158	0	.0	.0	7.0	9.1	29.6	2.8
Ann	64.0	37.8	51.0	111	Jul 1964	5	84.0	Aug 1983	-25	Jan 1982	10	9.6	Dec 1983	6197	1101	8.6	47.0	263.2	35.4	142.3	12.2

\+ 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: 1958-2001

(3) Derived from 1971-2000 serially complete daily data

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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	.76	.67	.97	1965	23	2.10	1995	.00	1986
Feb	.75	.66	1.21	1971	19	2.83	1971	.00+	1996
Mar	2.24	1.88	2.30	1990	7	7.38	1973	.00	1994
Apr	2.65	2.05	2.50	1960	1	6.05	1984	.25	1989
May	4.10	3.79	3.63	2001	5	11.47	1981	1.31	1994
Jun	3.29	3.14	2.81	1962	1	6.33	1979	.90	1996
Jul	3.67	3.58	3.03	1989	1	14.70	1993	.12	1984
Aug	3.38	3.11	3.65	1961	19	8.03	1977	.60	1976
Sep	2.63	1.81	4.08	1978	18	10.10	1973	.40	1974
Oct	1.94	1.95	3.70	1986	11	5.06	1986	.00	1999
Nov	1.63	1.27	3.15+	1996	16	6.20	1996	.00	1989
Dec	.91	.69	1.87	1984	16	3.56	1973	.00	1976
Ann	27.95	28.56	4.08	Sep 1978	18	14.70	Jul 1993	.00+	Oct 1999

Mean Number of Days (3)

Month	Daily Precipitation >= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	3.5	2.1	.3	.0
Feb	3.6	2.2	.3	.1
Mar	6.5	4.5	1.7	.5
Apr	8.2	5.3	1.7	.5
May	10.6	7.4	2.6	1.2
Jun	8.8	5.9	2.5	.8
Jul	8.1	5.9	2.5	1.1
Aug	8.2	5.6	2.2	1.0
Sep	7.0	4.7	1.8	.6
Oct	5.3	3.6	1.0	.4
Nov	5.1	3.3	.8	.3
Dec	3.5	2.5	.5	.1
Ann	78.4	53.0	17.9	6.6

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	.04	.11	.22	.34	.45	.59	.74	.94	1.20	1.64	2.06
Feb	.00	.00	.18	.31	.44	.58	.75	.95	1.21	1.66	2.09
Mar	.13	.34	.69	1.02	1.37	1.75	2.21	2.77	3.53	4.78	5.99
Apr	.60	.85	1.24	1.58	1.93	2.30	2.72	3.21	3.86	4.89	5.87
May	1.00	1.39	1.99	2.52	3.05	3.60	4.22	4.96	5.93	7.46	8.90
Jun	1.12	1.43	1.88	2.27	2.64	3.02	3.44	3.92	4.54	5.51	6.40
Jul	.35	.61	1.11	1.62	2.18	2.80	3.55	4.48	5.75	7.87	9.95
Aug	.80	1.11	1.61	2.05	2.49	2.95	3.47	4.09	4.91	6.20	7.41
Sep	.50	.74	1.12	1.48	1.84	2.23	2.67	3.20	3.91	5.04	6.12
Oct	.07	.22	.50	.78	1.09	1.44	1.86	2.38	3.10	4.31	5.49
Nov	.05	.17	.39	.62	.88	1.18	1.54	1.99	2.61	3.66	4.70
Dec	.01	.06	.17	.29	.44	.61	.82	1.09	1.48	2.14	2.81
Ann	16.46	18.52	21.25	23.39	25.32	27.22	29.21	31.45	34.21	38.29	41.89

\+ 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: 1958-2001
(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	6.2	5.5	3	1
Feb	5.5	4.5	2	#
Mar	3.4	1.5	1	#
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	.4	.0	#	0
Nov	3.0	1.5	#	0
Dec	4.9	4.5	1	#
Ann	24.4	17.5	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	8.0	1979	13	17.5	1979	15	1993	21	12	1985
Feb	11.0	1980	8	15.0	1978	14	1983	5	13	1980
Mar	10.0	1998	8	16.0	1998	15	1998	12	7	1978
Apr	5.0	1997	11	12.0	1997	12	1997	13	1	1997
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	10.0	1997	26	10.0	1997	10	1997	27	1	1997
Nov	8.0	1991	1	12.0	1991	8	1991	4	2	1991
Dec	6.0	1972	12	15.2	1973	12	1983	28	9	1983
Ann	11.0	Feb 1980	8	17.5	Jan 1979	15+	Mar 1998	12	13	Feb 1980

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	2.5	2.1	.8	.2	.0
Feb	2.0	1.8	.7	.3	.1
Mar	1.2	1.0	.4	.1	@
Apr	.4	.4	.1	.1	.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	@	@	@	@	@
Nov	1.0	.9	.3	.2	.0
Dec	1.7	1.6	.6	.2	.0
Ann	8.8	7.8	2.9	1.1	.1

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	8.0	4.5	2.2	.4
Feb	3.8	1.9	.8	.3
Mar	1.9	1.1	.6	.3
Apr	.6	.2	.2	.1
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	.2	.2	.1	.1
Nov	1.8	1.2	.9	.0
Dec	5.6	3.5	2.2	.1
Ann	21.9	12.6	7.0	1.3

+ 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	5/19	5/13	5/09	5/06	5/03	4/30	4/26	4/22	4/16
32	5/11	5/05	5/01	4/28	4/25	4/22	4/18	4/14	4/09
28	5/03	4/27	4/22	4/19	4/15	4/12	4/08	4/04	3/29
24	4/20	4/14	4/11	4/08	4/05	4/02	3/29	3/26	3/20
20	4/09	4/04	3/31	3/27	3/24	3/21	3/18	3/14	3/08
16	4/03	3/27	3/21	3/17	3/13	3/08	3/04	2/26	2/19

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	9/15	9/19	9/22	9/25	9/28	9/30	10/03	10/06	10/11
32	9/23	9/29	10/03	10/06	10/09	10/13	10/16	10/20	10/25
28	10/05	10/11	10/15	10/18	10/21	10/25	10/28	11/01	11/07
24	10/12	10/18	10/23	10/27	10/30	11/03	11/07	11/11	11/18
20	10/21	10/27	11/01	11/04	11/08	11/11	11/15	11/19	11/25
16	10/30	11/06	11/11	11/15	11/19	11/22	11/26	12/01	12/08

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	168	161	156	151	147	143	139	133	126
32	191	183	177	172	167	162	157	151	143
28	216	207	200	194	188	183	177	170	160
24	234	225	219	213	208	203	197	191	182
20	254	245	239	233	228	223	217	211	202
16	283	271	263	257	250	244	237	229	218

***** 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	1268	997	792	453	197	29	2	24	101	370	806	1158	6197
60	1113	859	637	316	110	8	0	7	41	234	656	1003	4984
57	1021	782	552	242	71	3	0	3	20	166	570	910	4340
55	960	730	494	198	51	1	0	1	12	127	513	848	3935
50	813	601	358	109	18	0	0	0	1	57	378	696	3031
32	346	238	61	1	0	0	0	0	0	0	67	241	954

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	100	165	292	542	889	1181	1403	1320	996	658	250	107	7903
55	2	13	12	49	227	492	690	607	318	72	7	0	2489
57	0	10	8	33	185	434	628	547	266	49	3	0	2163
60	0	3	1	17	131	348	535	459	197	24	0	0	1715
65	0	0	0	4	64	220	381	320	107	5	0	0	1101
70	0	0	0	0	24	118	239	203	48	0	0	0	632

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	13	53	155	363	674	966	1173	1103	792	454	117	22	13	66	221	584	1258	2224	3397	4500	5292	5746	5863	5885
45	0	20	83	241	520	816	1018	948	643	314	59	5	0	20	103	344	864	1680	2698	3646	4289	4603	4662	4667
50	0	5	39	145	372	666	863	793	499	197	21	0	0	5	44	189	561	1227	2090	2883	3382	3579	3600	3600
55	0	1	13	77	238	516	708	638	363	105	7	0	0	1	14	91	329	845	1553	2191	2554	2659	2666	2666
60	0	0	2	33	129	370	553	483	238	45	0	0	0	0	2	35	164	534	1087	1570	1808	1853	1853	1853
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	19	56	119	236	410	631	771	722	503	296	94	27	19	75	194	430	840	1471	2242	2964	3467	3763	3857	3884

(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