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: GROVESPRING 3 N, MO **COOP ID: 233483**

Climate Division: MO 4 **NWS Call Sign:** **Elevation: 1,360 Feet** **Lat: 37˚26N** **Lon: 92˚36W**

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	40.8	20.7	30.8	77	1965	7	40.8	1990	-19	1985	20	18.0	1977	1062	0	.0	.0	8.3	8.5	27.7	2.6
Feb	46.9	25.5	36.2	79+	2000	25	46.4	1976	-15	1979	9	24.4	1978	806	0	.0	.0	11.8	5.3	21.0	1.5
Mar	57.0	35.0	46.0	85+	1995	23	52.3	1976	-5	1978	4	38.1	1996	590	0	.0	.0	21.7	1.0	14.7	.2
Apr	67.1	44.6	55.9	89+	2001	10	64.5	1981	18	1975	3	49.6	1983	289	15	.0	.0	27.9	.0	4.3	.0
May	74.9	53.1	64.0	90+	2001	17	69.7	1987	26	1976	3	59.2	1976	121	90	.0	.2	30.9	.0	.5	.0
Jun	83.2	61.7	72.5	97	1978	29	76.0	1971	36	1966	1	68.7	1974	10	235	.1	4.1	30.0	.0	.0	.0
Jul	89.2	66.2	77.7	106	1980	17	84.4	1980	42	1970	22	74.7	1994	0	394	.8	14.0	31.0	.0	.0	.0
Aug	89.0	64.5	76.8	104+	2000	31	83.8	1980	39	1967	28	69.7	1992	5	368	.8	13.5	31.0	.0	.0	.0
Sep	80.6	56.5	68.6	104	2000	1	75.0	1980	28	1967	29	62.2	1974	62	168	.1	4.1	30.0	.0	.3	.0
Oct	70.1	45.3	57.7	93	1963	10	63.0	1971	18+	1981	24	51.8	1976	247	20	.0	.1	30.0	.0	4.5	.0
Nov	55.8	35.3	45.6	82	1999	14	54.9	1999	3+	1991	8	37.7	1976	584	0	.0	.0	19.4	.9	13.9	.0
Dec	44.4	25.2	34.8	77	1991	9	43.3	1984	-15	1983	25	20.8	1983	936	0	.0	.0	10.2	5.4	24.4	1.1
Ann	66.6	44.5	55.6	106	Jul 1980	17	84.4	Jul 1980	-19	Jan 1985	20	18.0	Jan 1977	4712	1290	1.8	36.0	282.2	21.1	111.3	5.4

\+ 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: 1949-2001

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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	2.16	2.10	2.40	1982	31	5.22	1995	.03	1986
Feb	2.31	2.15	2.18	1985	23	4.95	1985	.47	1983
Mar	3.75	3.39	3.89	1984	21	9.35	1973	1.12	1972
Apr	4.27	3.66	3.52	1983	29	10.73	1994	.37	2000
May	4.60	4.65	4.40	1978	20	9.53	1990	1.35	1975
Jun	4.74	4.27	4.09	1985	4	15.91	1985	1.36	1988
Jul	3.33	3.36	4.85	1961	20	8.71	1979	1.00	1982
Aug	3.08	2.85	3.54	1971	22	7.70	1974	.36	2000
Sep	4.01	3.81	4.68	1993	25	13.25	1993	.31	1982
Oct	3.31	2.93	2.95	1949	22	6.65	1986	.93	1999
Nov	4.36	3.53	4.39	1993	14	9.40	1985	.28	1976
Dec	3.07	2.49	6.58	1982	3	11.09	1982	.62	1989
Ann	42.99	43.30	6.58	Dec 1982	3	15.91	Jun 1985	.03	Jan 1986

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	7.5	4.8	1.2	.5
Feb	6.9	4.4	1.6	.6
Mar	9.3	6.9	2.7	.9
Apr	10.5	7.0	2.9	1.3
May	11.9	7.7	2.9	1.1
Jun	10.1	7.4	3.3	1.5
Jul	8.5	5.9	2.1	.8
Aug	7.5	5.0	1.9	.7
Sep	8.3	5.5	2.7	1.1
Oct	8.1	5.6	2.4	1.0
Nov	8.8	6.1	2.9	1.1
Dec	7.6	5.0	2.2	1.0
Ann	105.0	71.3	28.8	11.6

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	.27	.44	.75	1.05	1.37	1.72	2.13	2.64	3.33	4.46	5.55
Feb	.57	.79	1.12	1.42	1.72	2.03	2.38	2.80	3.34	4.20	5.01
Mar	1.28	1.64	2.15	2.59	3.01	3.44	3.91	4.47	5.17	6.27	7.27
Apr	.98	1.37	2.00	2.56	3.12	3.71	4.38	5.18	6.23	7.89	9.46
May	1.65	2.08	2.71	3.24	3.74	4.25	4.81	5.46	6.29	7.57	8.75
Jun	1.40	1.85	2.53	3.11	3.68	4.27	4.92	5.69	6.68	8.23	9.67
Jul	.99	1.31	1.79	2.19	2.59	3.01	3.46	4.00	4.70	5.78	6.79
Aug	.82	1.11	1.56	1.95	2.33	2.74	3.18	3.71	4.40	5.48	6.50
Sep	.70	1.05	1.63	2.18	2.74	3.35	4.05	4.89	6.01	7.83	9.56
Oct	1.10	1.41	1.87	2.26	2.64	3.03	3.45	3.94	4.58	5.56	6.47
Nov	.74	1.12	1.76	2.36	2.97	3.64	4.40	5.32	6.56	8.55	10.46
Dec	.61	.89	1.34	1.76	2.18	2.62	3.13	3.74	4.55	5.84	7.07
Ann	29.10	31.74	35.15	37.76	40.08	42.34	44.69	47.29	50.46	55.08	59.10

\+ 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: 1949-2001
(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	4.5	1	1
Feb	4.1	1.8	1	#
Mar	2.5	.8	#	#
Apr	.8	.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	.1	.0	#	0
Nov	1.7	.0	#	#
Dec	2.4	1.3	#	#
Ann	17.8	8.4	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	6.8	1995	19	18.0	1979	11	1978	21	7	1977
Feb	16.0	1980	8	20.5	1980	16	1980	11	5	1980
Mar	9.0	1975	10	13.0	1999	9	1975	10	2	1975
Apr	8.5	1980	14	8.5	1980	8	1980	14	#+	1994
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	1.5	1993	30	1.5	1993	1	1993	30	#	1993
Nov	6.5	1972	19	8.0+	1975	8	1975	28	1	1980
Dec	16.0	2000	13	16.0	2000	10	2000	14	3	2000
Ann	16.0+	Dec 2000	13	20.5	Feb 1980	16	Feb 1980	11	7	Jan 1977

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	2.8	2.2	.8	.3	.0
Feb	1.5	1.1	.4	.2	.1
Mar	1.2	.8	.4	.2	.0
Apr	.2	.2	.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	@	@	.0	.0	.0
Nov	.8	.6	.2	.1	.0
Dec	1.8	1.3	.4	.2	@
Ann	8.3	6.2	2.3	1.1	.1

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	8.2	4.8	2.3	.4
Feb	6.1	4.2	2.8	.4
Mar	1.6	.9	.3	.0
Apr	.2	.1	@	.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
Nov	1.0	.5	.2	.0
Dec	2.9	2.0	1.0	.1
Ann	20.0	12.5	6.6	.9

+ 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	5/23	5/17	5/13	5/09	5/06	5/03	4/29	4/25	4/20
32	5/07	5/01	4/27	4/23	4/20	4/16	4/13	4/08	4/02
28	4/24	4/18	4/14	4/11	4/08	4/05	4/01	3/28	3/23
24	4/13	4/08	4/04	4/01	3/29	3/27	3/24	3/20	3/15
20	3/31	3/25	3/21	3/17	3/14	3/11	3/07	3/03	2/25
16	3/24	3/16	3/10	3/05	3/01	2/24	2/20	2/14	2/06

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	9/20	9/23	9/26	9/29	10/02	10/05	10/08	10/13
32	9/26	10/01	10/04	10/07	10/09	10/12	10/14	10/18	10/22
28	10/06	10/13	10/18	10/22	10/26	10/29	11/03	11/07	11/14
24	10/20	10/27	10/31	11/04	11/07	11/11	11/15	11/19	11/25
20	10/29	11/05	11/09	11/13	11/17	11/21	11/25	11/29	12/06
16	11/07	11/13	11/18	11/22	11/25	11/29	12/03	12/07	12/13

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	160	154	150	145	140	136	130	122
32	195	187	181	176	172	167	162	156	148
28	227	218	211	205	200	195	189	182	173
24	243	236	231	226	222	218	214	209	202
20	272	263	257	252	248	243	238	232	223
16	300	289	282	275	269	262	256	248	237

***** 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	1062	806	590	289	121	10	0	5	62	247	584	936	4712
60	907	670	445	173	54	2	0	1	22	134	444	783	3635
57	814	592	361	118	28	0	0	0	10	84	364	695	3066
55	754	540	309	88	17	0	0	0	6	59	313	638	2724
50	610	416	199	34	4	0	0	0	0	19	206	497	1985
32	194	107	14	0	0	0	0	0	0	0	17	133	465

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	155	226	448	716	992	1214	1417	1386	1096	797	423	220	9090
55	2	14	30	114	297	524	704	673	412	142	29	11	2952
57	0	10	20	84	246	464	642	611	356	105	20	7	2565
60	0	5	10	49	178	376	549	519	278	63	10	2	2039
65	0	0	0	15	90	235	394	368	168	20	0	0	1290
70	0	0	0	3	34	118	246	231	88	4	0	0	724

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	38	100	245	473	725	959	1147	1111	831	529	218	67	38	138	383	856	1581	2540	3687	4798	5629	6158	6376	6443
45	14	52	153	337	570	809	992	956	681	385	134	34	14	66	219	556	1126	1935	2927	3883	4564	4949	5083	5117
50	3	21	83	218	419	659	837	801	532	256	70	13	3	24	107	325	744	1403	2240	3041	3573	3829	3899	3912
55	0	6	40	126	279	510	682	646	393	151	29	1	0	6	46	172	451	961	1643	2289	2682	2833	2862	2863
60	0	1	14	62	162	361	527	492	266	70	7	0	0	1	15	77	239	600	1127	1619	1885	1955	1962	1962
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	34	73	164	299	463	645	775	745	548	340	138	48	34	107	271	570	1033	1678	2453	3198	3746	4086	4224	4272

(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