

# Climatography of the United States No. 20

National Climatic Data Center  
Federal Building  
151 Patton Avenue  
Asheville, North Carolina 28801  
www.ncdc.noaa.gov

Station: FREEDOM, MO

1971-2000

COOP ID: 233043

Climate Division: MO 2

NWS Call Sign:

Elevation: 745 Feet

Lat: 38°28N

Lon: 91°42W

## 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	39.3	17.8	28.6	77	1965	7	41.0	1990	-33	1963	13	15.8	1977	1130	0	.0	.0	7.8	9.1	26.7	2.9
Feb	45.7	22.6	34.2	84	1972	29	44.3	1976	-17	1988	12	20.8	1978	865	0	.0	.0	11.5	5.3	21.6	1.5
Mar	56.7	31.9	44.3	87	1985	28	49.2	1973	-6	1978	5	35.9	1984	642	0	.0	.0	22.1	.8	15.7	.1
Apr	66.5	41.6	54.1	94	1987	20	61.5	1981	17+	1989	11	47.6	1997	340	11	.0	.3	28.1	.0	4.4	.0
May	75.3	51.3	63.3	93	1987	21	69.0	1991	27	1989	6	57.8	1997	129	77	.0	.9	30.9	.0	.2	.0
Jun	83.5	60.4	72.0	106	1988	24	77.1	1984	38+	1988	11	66.5	1996	19	226	.3	6.8	30.0	.0	.0	.0
Jul	88.9	65.1	77.0	111	1980	30	86.3	1980	44	1967	14	68.8	1996	5	378	2.4	16.1	31.0	.0	.0	.0
Aug	88.0	63.2	75.6	109+	1984	29	82.8	1980	37	1986	29	69.2	1992	11	341	2.1	13.6	31.0	.0	.0	.0
Sep	79.9	54.6	67.3	103	1984	1	72.4	1978	28+	1989	24	61.3	1974	67	134	.1	5.3	30.0	.0	.2	.0
Oct	69.4	43.5	56.5	94	1963	10	63.0	1971	17	1981	24	50.3	1987	278	14	.0	.2	30.4	.0	5.0	.0
Nov	54.8	32.8	43.8	85+	1989	11	52.4	1990	2+	1991	8	36.2	1996	636	0	.0	.0	19.6	1.1	13.8	.0
Dec	43.2	22.6	32.9	77	1991	9	41.2	1982	-21	1989	23	17.5	1983	995	0	.0	.0	10.0	5.4	24.4	1.5
Ann	65.9	42.3	54.1	111	Jul 1980	30	86.3	Jul 1980	-33	Jan 1963	13	15.8	Jan 1977	5117	1181	4.9	43.2	282.4	21.7	112.0	6.0

+ 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/normal/usnormals.html](http://www.ncdc.noaa.gov/oa/climate/normal/usnormals.html)

Issue Date: February 2004

(1) From the 1971-2000 Monthly Normals

(2) Derived from station's available digital record: 1962-2001

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

035-A

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**NWS Call Sign:**

**Elevation: 745 Feet**

**Lat: 38°28N**

**Lon: 91°42W**

Precipitation (inches)																								
	Precipitation Totals									Mean Number of Days (3)				Precipitation Probabilities (1) Probability that the monthly/annual precipitation will be equal to or less than the indicated amount										
	Means/ Medians(1)		Extremes							Daily Precipitation				Monthly/Annual Precipitation vs Probability Levels These values were determined from the incomplete gamma distribution										
Month	Mean	Med- ian	Highest Daily(2)	Year	Day	Highest Monthly(1)	Year	Lowest Monthly(1)	Year	>= 0.01	>= 0.10	>= 0.50	>= 1.00	.05	.10	.20	.30	.40	.50	.60	.70	.80	.90	.95
Jan	1.71	1.43	1.83	1975	10	5.30	1995	.05	1986	5.4	3.9	1.1	.4	.15	.26	.49	.73	.99	1.28	1.64	2.08	2.70	3.72	4.73
Feb	2.02	1.61	3.00	1985	23	5.85	1985	.10	1991	5.8	4.1	1.3	.5	.32	.49	.79	1.06	1.35	1.67	2.03	2.47	3.05	4.01	4.92
Mar	3.29	2.84	3.25+	1988	29	8.10	1973	1.16	1994	7.7	6.1	2.4	.7	1.17	1.48	1.93	2.30	2.66	3.03	3.43	3.90	4.50	5.42	6.26
Apr	3.59	3.12	3.65	1979	12	10.38	1994	.72	1971	8.9	7.0	2.4	.7	.99	1.33	1.84	2.30	2.74	3.20	3.71	4.32	5.11	6.35	7.51
May	4.82	4.40	3.38	1995	18	11.93	1981	1.60	1972	10.5	7.7	3.3	1.4	1.42	1.87	2.56	3.16	3.74	4.34	5.00	5.79	6.80	8.39	9.86
Jun	4.27	3.55	3.40	1985	17	11.32	1993	.23	1980	8.4	6.7	3.3	1.2	.55	.89	1.50	2.10	2.72	3.42	4.23	5.22	6.57	8.77	10.91
Jul	3.28	2.65	6.72	1993	7	13.91	1993	.24	1976	7.2	5.7	2.1	.8	.52	.80	1.28	1.73	2.19	2.70	3.29	4.00	4.96	6.51	8.00
Aug	3.72	3.34	6.92	1993	12	11.03	1993	.68	1971	6.2	5.3	2.6	1.1	.68	1.01	1.56	2.06	2.58	3.13	3.77	4.53	5.55	7.19	8.76
Sep	3.90	3.47	5.13	1993	23	12.84	1993	.70	1976	7.4	5.7	2.5	1.4	.81	1.17	1.74	2.26	2.79	3.35	3.98	4.74	5.74	7.34	8.86
Oct	3.41	2.95	5.40	1969	12	7.41	1983	.70	1992	7.6	5.9	3.0	.9	1.12	1.44	1.92	2.32	2.71	3.11	3.55	4.06	4.72	5.75	6.70
Nov	3.69	3.56	3.25	1972	1	9.46	1992	.10	1989	7.8	6.3	2.6	1.1	.51	.82	1.34	1.86	2.39	2.99	3.67	4.51	5.64	7.49	9.28
Dec	2.75	2.12	4.80	1982	3	10.53	1982	.53	1976	6.5	4.6	1.8	.8	.45	.69	1.09	1.47	1.85	2.28	2.76	3.35	4.14	5.42	6.64
Ann	40.45	39.37	6.92	Aug 1993	12	13.91	Jul 1993	.05	Jan 1986	89.4	69.0	28.4	11.0	24.58	27.47	31.26	34.21	36.88	39.49	42.22	45.29	49.05	54.61	59.49

+ 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: 1962-2001

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

Complete documentation available from:  
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Station: FREEDOM, MO

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Climate Division: MO 2

NWS Call Sign:

Elevation: 745 Feet

Lat: 38°28N

Lon: 91°42W

Snow (inches)																							
Snow Totals															Mean Number of Days (1)								
Means/Medians (1)					Extremes (2)										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	2.9	2.3	#	0	12.0	1982	31	12.0	1995	12	1982	31	2	1977	1.1	1.1	.4	.2	@	.5	.1	.1	.1
Feb	4.0	1.5	#	0	12.0	1975	24	16.5	1993	12	1975	24	3	1988	.9	.9	.5	.3	@	1.1	.7	.4	.1
Mar	1.5	.0	#	0	11.5	1989	6	11.5	1989	6+	2000	11	4	1978	.2	.2	.1	.1	@	.1	.0	.0	.0
Apr	.1	.0	0	0	1.0	1973	9	1.0+	1994	0	0	0	0	0	.1	.1	.0	.0	.0	.0	.0	.0	.0
May	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.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	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Nov	1.5	.0	#	0	9.0	1975	26	9.0	1975	9	1975	26	#+	1996	.4	.4	.2	.1	.0	.5	.2	.1	.0
Dec	2.9	1.0	#	0	12.0	1973	19	18.0	1973	12	1973	19	2	1973	.6	.6	.3	.2	@	.6	.5	.4	.1
Ann	12.9	4.8	N/A	N/A	12.0+	Jan 1982	31	18.0	Dec 1973	12+	Jan 1982	31	4	Mar 1978	3.3	3.3	1.5	.9	@	2.8	1.5	1.0	.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

Complete documentation available from:

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**Climate Division: MO 2**

**NWS Call Sign:**

**Elevation: 745 Feet**

**Lat: 38°28N**

**Lon: 91°42W**

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	5/18	5/12	5/08	5/05	5/02	4/29	4/25	4/21	4/16
32	4/30	4/25	4/21	4/17	4/14	4/11	4/08	4/04	3/29
28	4/22	4/17	4/13	4/10	4/07	4/04	4/01	3/28	3/23
24	4/13	4/07	4/02	3/30	3/26	3/23	3/19	3/15	3/09
20	4/04	3/28	3/23	3/19	3/15	3/12	3/08	3/03	2/24
16	3/23	3/15	3/10	3/05	2/28	2/24	2/19	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	9/18	9/24	9/27	9/30	10/03	10/06	10/10	10/13	10/18
32	9/26	10/01	10/04	10/07	10/10	10/13	10/16	10/19	10/24
28	10/02	10/09	10/13	10/18	10/21	10/25	10/29	11/03	11/10
24	10/18	10/25	10/30	11/03	11/08	11/12	11/16	11/21	11/28
20	10/25	11/02	11/08	11/12	11/17	11/21	11/26	12/02	12/09
16	11/07	11/13	11/18	11/22	11/26	11/29	12/03	12/08	12/15
Freeze Free Period									
Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	175	168	163	158	154	150	145	140	133
32	200	192	187	182	178	174	169	164	156
28	225	215	208	202	197	191	185	178	169
24	256	245	238	231	225	219	213	205	195
20	276	266	258	252	246	240	233	225	215
16	303	291	283	276	270	263	256	248	236

\* 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

Complete documentation available from:  
[www.ncdc.noaa.gov/oa/climate/normal/usnormals.html](http://www.ncdc.noaa.gov/oa/climate/normal/usnormals.html)

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**NWS Call Sign:**

**Elevation: 745 Feet    Lat: 38°28N    Lon: 91°42W**

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	1130	865	642	340	129	19	5	11	67	278	636	995	5117
60	975	725	494	216	58	3	0	1	22	159	493	840	3986
57	882	648	408	155	31	1	0	0	9	104	410	752	3400
55	821	596	353	120	19	0	0	0	5	75	358	694	3041
50	677	468	234	55	4	0	0	0	0	28	242	552	2260
32	237	135	20	0	0	0	0	0	0	0	25	168	585

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	130	194	401	661	971	1198	1396	1352	1057	758	379	196	8693
55	1	11	22	91	276	508	683	639	372	121	22	9	2755
57	0	7	14	66	226	448	621	577	316	87	14	5	2381
60	0	0	8	36	160	361	528	486	239	50	7	0	1875
65	0	0	0	11	77	226	378	341	134	14	0	0	1181
70	0	0	0	2	27	120	237	212	62	2	0	0	662

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	40	99	255	474	751	983	1169	1117	843	534	226	63	40	139	394	868	1619	2602	3771	4888	5731	6265	6491	6554
45	11	54	158	343	596	833	1014	962	693	388	139	33	11	65	223	566	1162	1995	3009	3971	4664	5052	5191	5224
50	2	26	90	223	444	683	859	807	543	260	75	12	2	28	118	341	785	1468	2327	3134	3677	3937	4012	4024
55	0	7	45	129	299	533	704	652	400	153	34	2	0	7	52	181	480	1013	1717	2369	2769	2922	2956	2958
60	0	1	19	68	172	386	549	497	271	78	12	0	0	1	20	88	260	646	1195	1692	1963	2041	2053	2053
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	35	74	172	307	478	660	782	745	546	345	142	48	35	109	281	588	1066	1726	2508	3253	3799	4144	4286	4334

(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:  
[www.ncdc.noaa.gov/oa/climate/normals/usnormals.html](http://www.ncdc.noaa.gov/oa/climate/normals/usnormals.html)

## 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.  
Complete documentation for the 1971-2000 Normals is available on the internet from:  
[www.ncdc.noaa.gov/oa/climate/normal/usnormals.html](http://www.ncdc.noaa.gov/oa/climate/normal/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 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.

- |   |   |
|---|---|
| <ol style="list-style-type: none"><li>a. Temperature/ Precipitation Tables<ol style="list-style-type: none"><li>1. 1971-2000 Monthly Normals</li><li>2. Cooperative Summary of the Day</li><li>3. National Weather Service station records</li><li>4. 1971-2000 serially complete daily data</li></ol></li><li>b. Degree Day Table<ol style="list-style-type: none"><li>1. Monthly and Annual Heating and Cooling Degree Days Normals to Selected Bases derived from 1971-2000 Monthly Normals</li><li>2. Daily Normal Growing Degree Units to Selected Base Temperatures derived from 1971-2000 serially complete daily data</li></ol></li></ol> | <ol style="list-style-type: none"><li>c. Snow Tables<ol style="list-style-type: none"><li>1. Snow Climatology</li><li>2. Cooperative Summary of the Day</li></ol></li><li>d. Freeze Data Table<br/>1971-2000 serially complete daily data</li></ol> |
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## References

U.S. Climate Normals 1971-2000, [www.ncdc.noaa.gov/normal.html](http://www.ncdc.noaa.gov/normal.html)  
U.S. Climate Normals 1971-2000-Products Clim20, [www.ncdc.noaa.gov/oa/climate/normal/usnormalsprods.html](http://www.ncdc.noaa.gov/oa/climate/normal/usnormalsprods.html)  
Snow Climatology Project Description, [www.ncdc.noaa.gov/oa/climate/monitoring/snowclim/mainpage.html](http://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](http://www1.ncdc.noaa.gov/pub/data/special/serialcomplete_jam_0900.pdf)