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: ROLLA UNI OF MISSOURI, MO **COOP ID: 237263**

Climate Division: MO 5 **NWS Call Sign:** **Elevation: 1,167 Feet** **Lat: 37˚57N** **Lon: 91˚47W**

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	38.6	19.7	29.2	78	1943	24	40.8	1990	-21	1918	12	15.6	1977	1111	0	.0	.0	7.0	10.1	26.2	2.4
Feb	45.4	24.8	35.1	81+	1982	24	49.3	1976	-14	1996	4	21.9	1978	837	0	.0	.0	10.5	5.9	20.4	1.1
Mar	55.3	34.2	44.8	91	1929	24	50.4	1976	-3	1960	5	37.5	1984	627	0	.0	.0	19.9	1.3	14.3	.1
Apr	66.5	44.6	55.6	93	1987	21	62.9	1981	13	1920	5	48.8	1983	298	15	.0	.3	27.2	.0	2.9	.0
May	75.3	54.6	65.0	97	1956	31	70.6	1991	31+	1966	10	59.8	1981	111	109	.0	.7	30.9	.0	@	.0
Jun	83.6	63.4	73.5	104	1952	30	77.3	1971	41	1945	4	68.5	1982	7	262	.1	5.9	30.0	.0	.0	.0
Jul	89.0	68.2	78.6	113	1954	15	86.2	1980	49	1947	23	75.3	1996	0	422	1.6	16.1	31.0	.0	.0	.0
Aug	87.7	66.1	76.9	108	1934	8	83.2	1983	45+	1950	22	71.9	1992	4	373	1.3	13.7	31.0	.0	.0	.0
Sep	79.4	57.6	68.5	104+	1954	5	74.6	1998	32	1942	28	62.9	1974	48	152	.1	4.4	30.0	.0	.0	.0
Oct	68.6	46.3	57.5	94+	1954	4	63.5	1971	19	1925	28	50.9	1976	258	25	.0	.2	29.9	.0	2.0	.0
Nov	54.5	35.4	45.0	85+	1950	1	54.5	1999	3+	1964	30	36.7	1976	603	1	.0	.0	18.5	1.0	11.8	.0
Dec	42.8	24.5	33.7	79	1928	28	40.9	1971	-19+	1989	23	18.6	1983	972	0	.0	.0	9.6	6.2	23.9	1.1
Ann	65.6	45.0	55.3	113	Jul 1954	15	86.2	Jul 1980	-21	Jan 1918	12	15.6	Jan 1977	4876	1359	3.1	41.3	275.5	24.5	101.5	4.7

\+ 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: 1918-2001

(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	2.21	1.82	2.75	1950	4	4.89	1995	.07	1986
Feb	2.29	1.77	2.24	1988	1	5.84	1985	.44	1983
Mar	3.77	3.31	2.66	1920	11	7.31	1998	1.40	1971
Apr	4.18	3.64	5.08	1953	24	11.95	1994	.96	2000
May	4.81	4.38	3.87	1997	18	11.06	1990	1.55	1972
Jun	3.97	3.34	4.96	1958	11	15.44	1985	.15+	1988
Jul	4.40	3.73	7.90	1998	26	15.66	1998	.80	1997
Aug	4.01	3.89	4.93	1975	26	12.18	1982	.63	1971
Sep	3.78	3.10	4.60	1970	23	14.65	1993	.94	1985
Oct	3.50	2.99	4.91	1919	26	8.39	1986	.73	1999
Nov	4.35	3.63	3.41	1927	29	11.75	1985	.75	1999
Dec	3.22	2.44	6.54	1982	3	11.36	1982	.58	1976
Ann	44.49	43.81	7.90	Jul 1998	26	15.66	Jul 1998	.07	Jan 1986

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	8.6	4.7	1.2	.5
Feb	8.2	4.6	1.4	.4
Mar	11.0	7.4	2.5	.8
Apr	11.1	7.4	2.9	1.2
May	11.6	7.8	3.5	1.2
Jun	9.9	6.8	2.9	1.1
Jul	8.8	6.0	2.9	1.4
Aug	8.4	5.5	2.5	1.3
Sep	8.0	5.5	2.6	1.2
Oct	8.9	5.8	2.5	.9
Nov	10.1	6.6	2.9	1.4
Dec	8.8	5.3	2.0	.9
Ann	113.4	73.4	29.8	12.3

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	.27	.44	.75	1.06	1.39	1.75	2.18	2.70	3.41	4.58	5.72
Feb	.53	.74	1.08	1.38	1.68	1.99	2.35	2.78	3.33	4.22	5.06
Mar	1.48	1.83	2.33	2.74	3.13	3.52	3.95	4.45	5.08	6.04	6.92
Apr	1.19	1.58	2.18	2.70	3.21	3.74	4.33	5.02	5.92	7.33	8.65
May	1.72	2.17	2.83	3.38	3.90	4.44	5.02	5.70	6.57	7.92	9.15
Jun	.57	.89	1.46	2.02	2.59	3.22	3.95	4.85	6.06	8.02	9.92
Jul	.79	1.18	1.82	2.42	3.04	3.70	4.45	5.37	6.59	8.55	10.42
Aug	1.00	1.37	1.96	2.48	2.99	3.53	4.14	4.85	5.79	7.28	8.67
Sep	.97	1.33	1.88	2.36	2.84	3.34	3.90	4.57	5.44	6.81	8.09
Oct	1.05	1.38	1.88	2.30	2.72	3.16	3.63	4.20	4.92	6.06	7.11
Nov	.84	1.24	1.87	2.46	3.06	3.70	4.43	5.30	6.46	8.33	10.10
Dec	.60	.88	1.35	1.79	2.24	2.72	3.26	3.92	4.79	6.20	7.55
Ann	28.63	31.58	35.43	38.39	41.05	43.65	46.35	49.37	53.06	58.47	63.20

\+ 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: 1918-2001
(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	6.3	4.1	1	#
Feb	4.7	3.0	1	#
Mar	3.0	1.9	#	#
Apr	.6	.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
Nov	1.7	.1	#	#
Dec	4.1	2.8	1	#
Ann	20.4	11.9	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	9.8	1982	31	19.7	1979	10+	1996	3	4	1979
Feb	9.5	1989	27	13.1	1993	12	1982	9	5	1982
Mar	10.5	1989	6	14.0	1989	12	1989	6	2	1989
Apr	6.5	1980	14	8.0	1980	4	1980	15	#+	2000
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	.3	1993	31	.3+	1993	1	1993	30	#	1993
Nov	8.2	1972	19	10.2	1972	10	1975	27	1	1988
Dec	6.7	1987	15	19.6	1973	12	1973	20	4	2000
Ann	10.5	Mar 1989	6	19.7	Jan 1979	12+	Mar 1989	6	5	Feb 1982

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	4.1	1.9	.7	.2	.0
Feb	3.7	1.4	.4	.2	.0
Mar	2.3	1.0	.2	.1	@
Apr	.4	.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	.0
Nov	1.0	.5	.2	.1	.0
Dec	3.3	1.4	.6	.1	.0
Ann	14.8	6.4	2.2	.8	@

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	8.7	4.6	1.9	.1
Feb	4.7	2.7	1.8	.0
Mar	2.0	.9	.3	.1
Apr	.2	.1	.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	1.0	.5	.2	.0
Dec	4.8	2.9	1.1	@
Ann	21.4	11.7	5.3	.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	4/30	4/26	4/23	4/20	4/17	4/15	4/12	4/09	4/05
32	4/19	4/15	4/12	4/10	4/08	4/05	4/03	3/31	3/27
28	4/09	4/05	4/02	3/30	3/27	3/25	3/22	3/19	3/14
24	4/04	3/30	3/26	3/23	3/20	3/17	3/14	3/10	3/05
20	3/22	3/16	3/11	3/07	3/04	2/28	2/24	2/19	2/13
16	3/14	3/06	3/01	2/25	2/20	2/16	2/12	2/06	1/30

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	9/28	10/03	10/06	10/09	10/12	10/15	10/18	10/22	10/27
32	10/15	10/19	10/22	10/24	10/27	10/29	11/01	11/03	11/08
28	10/20	10/26	10/31	11/04	11/07	11/11	11/14	11/19	11/25
24	10/30	11/06	11/10	11/14	11/18	11/22	11/26	11/30	12/07
20	11/07	11/14	11/19	11/23	11/26	11/30	12/04	12/09	12/15
16	11/17	11/24	11/29	12/04	12/08	12/12	12/16	12/21	12/29

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	196	189	185	181	177	173	169	165	158
32	218	212	208	205	201	198	195	191	185
28	244	237	232	228	224	220	216	211	204
24	268	259	253	247	242	237	231	225	216
20	294	285	278	272	267	261	256	249	240
16	319	309	302	295	290	284	278	271	261

***** 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	1111	837	627	298	111	7	0	4	48	258	603	972	4876
60	956	703	481	180	49	1	0	0	13	148	463	819	3813
57	864	625	395	124	26	0	0	0	5	99	382	732	3252
55	803	573	341	93	16	0	0	0	2	73	331	674	2906
50	660	449	224	37	4	0	0	0	0	28	222	533	2157
32	234	132	20	0	0	0	0	0	0	0	21	160	567

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	146	219	415	706	1020	1245	1445	1393	1095	790	409	210	9093
55	3	16	24	109	324	555	732	680	407	150	29	12	3041
57	1	12	16	80	272	495	670	618	350	114	20	7	2655
60	0	6	8	47	202	406	577	525	268	70	11	2	2122
65	0	0	0	15	109	262	422	373	152	25	1	0	1359
70	0	0	0	3	46	138	273	234	70	5	0	0	769

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	43	105	244	492	786	1013	1205	1158	868	557	232	70	43	148	392	884	1670	2683	3888	5046	5914	6471	6703	6773
45	16	56	153	357	632	863	1050	1003	718	412	144	35	16	72	225	582	1214	2077	3127	4130	4848	5260	5404	5439
50	4	24	90	237	479	713	895	848	571	283	82	16	4	28	118	355	834	1547	2442	3290	3861	4144	4226	4242
55	0	9	44	143	331	563	740	693	425	172	38	2	0	9	53	196	527	1090	1830	2523	2948	3120	3158	3160
60	0	1	18	74	199	413	586	538	293	92	14	0	0	1	19	93	292	705	1291	1829	2122	2214	2228	2228
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	29	68	154	292	492	693	824	787	565	341	136	44	29	97	251	543	1035	1728	2552	3339	3904	4245	4381	4425

(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

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