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: GRUNDY CENTER, IA **COOP ID: 133487**

Climate Division: IA 5 **NWS Call Sign:** **Elevation: 1,020 Feet** **Lat: 42˚21N** **Lon: 92˚46W**

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	25.1	6.1	15.6	60	1981	25	27.9	1990	-31	1966	29	3.9	1979	1531	0	.0	.0	.4	21.4	30.8	10.9
Feb	31.1	12.4	21.8	67	1981	18	32.7	1998	-29+	1996	2	8.2	1979	1211	0	.0	.0	2.0	15.5	26.8	6.4
Mar	43.8	24.1	34.0	87	1986	30	42.0	1973	-28	1962	1	22.8	1975	964	0	.0	.0	9.5	6.0	23.8	1.0
Apr	58.2	35.1	46.7	96	1980	23	53.4	1977	-1	1975	4	40.6	1975	553	1	.0	.1	21.9	.5	10.8	.1
May	70.8	47.3	59.1	93	1967	26	66.3	1977	22	1966	10	52.2	1997	235	49	.0	.3	30.3	.0	.9	.0
Jun	80.3	57.7	69.0	101	1988	22	73.8	1971	36	1993	1	63.7	1982	33	153	.1	2.7	30.0	.0	.0	.0
Jul	83.9	61.7	72.8	100+	1948	6	77.7	1999	42	1975	13	67.7	1992	8	249	.0	5.1	31.0	.0	.0	.0
Aug	81.6	59.1	70.4	102	1988	18	76.5	1983	37	1950	20	65.3	1992	30	194	.2	2.7	31.0	.0	.0	.0
Sep	74.3	49.6	62.0	98	1955	9	67.0	1998	26+	1961	28	56.3	1993	140	48	.0	1.0	29.9	.0	.7	.0
Oct	62.1	37.6	49.9	94	1997	4	56.3	1971	12	1988	30	44.4	1976	471	1	.0	.1	27.0	.0	10.0	.0
Nov	44.3	24.9	34.6	80	1999	14	42.9	1999	-14	1977	26	26.8	1996	913	0	.0	.0	10.2	5.5	22.7	.5
Dec	29.5	11.9	20.7	66	2001	6	27.3	1987	-26+	1962	26	7.1	1983	1373	0	.0	.0	1.3	17.4	30.2	6.7
Ann	57.1	35.6	46.4	102	Aug 1988	18	77.7	Jul 1999	-31	Jan 1966	29	3.9	Jan 1979	7462	695	.3	12.0	224.5	66.3	156.7	25.6

\+ 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: 1948-2001

(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	.88	.81	1.34	1967	25	2.33	1982	.06	1976
Feb	.99	.98	1.41	1961	18	3.07	1971	.01	1987
Mar	2.26	1.76	1.75	1993	31	6.36	1991	.14	1994
Apr	3.24	3.01	2.77	1976	18	8.02	1991	1.02	1971
May	4.49	4.72	2.98	1957	30	8.24	1983	1.04	1988
Jun	5.23	4.61	3.69	1974	9	11.91	1998	1.88	1988
Jul	4.17	3.71	6.25	2000	10	9.17	1993	.72	1991
Aug	3.89	3.29	5.00	1966	21	10.14	1993	.25	1984
Sep	2.99	2.87	4.37	1950	21	7.51	1978	.64	1979
Oct	2.54	2.28	3.65	1970	9	5.71	1998	.21	1975
Nov	2.24	2.02	2.44	1992	2	6.34	1992	.00	1976
Dec	1.23	1.26	1.33	1982	28	3.74	1982	.18+	1998
Ann	34.15	33.50	6.25	Jul 2000	10	11.91	Jun 1998	.00	Nov 1976

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	7.0	3.0	.2	.0
Feb	5.9	2.7	.5	.1
Mar	8.6	5.0	1.4	.5
Apr	10.6	6.8	2.0	.7
May	12.3	7.7	2.8	1.1
Jun	11.0	7.5	3.8	1.9
Jul	10.1	6.7	2.8	1.0
Aug	9.5	6.2	2.7	1.2
Sep	9.0	5.9	2.1	.6
Oct	8.5	5.1	1.6	.5
Nov	8.3	4.7	1.4	.4
Dec	7.1	3.3	.7	.1
Ann	107.9	64.6	22.0	8.1

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	.18	.26	.39	.51	.63	.76	.90	1.07	1.30	1.66	2.01
Feb	.07	.14	.26	.40	.55	.73	.94	1.21	1.58	2.20	2.82
Mar	.33	.52	.84	1.16	1.48	1.84	2.26	2.76	3.45	4.56	5.63
Apr	1.12	1.43	1.87	2.25	2.61	2.98	3.38	3.85	4.46	5.39	6.25
May	1.43	1.85	2.48	3.02	3.54	4.08	4.67	5.37	6.26	7.65	8.93
Jun	1.77	2.27	2.99	3.60	4.19	4.79	5.46	6.23	7.22	8.75	10.16
Jul	.96	1.35	1.96	2.51	3.05	3.63	4.28	5.05	6.07	7.69	9.21
Aug	.89	1.26	1.82	2.34	2.85	3.39	3.99	4.72	5.67	7.18	8.60
Sep	.89	1.18	1.60	1.97	2.33	2.70	3.11	3.59	4.21	5.18	6.08
Oct	.42	.63	1.00	1.35	1.72	2.11	2.56	3.10	3.83	5.02	6.16
Nov	.35	.65	1.03	1.34	1.65	1.97	2.33	2.75	3.31	4.18	5.00
Dec	.22	.33	.51	.68	.85	1.03	1.25	1.50	1.84	2.39	2.91
Ann	22.20	24.44	27.34	29.58	31.58	33.53	35.57	37.83	40.60	44.65	48.19

\+ 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: 1948-2001
(3) Derived from 1971-2000 serially complete daily data

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Snow (inches)

Snow Totals

Means/Medians (1)

Extremes (2)

Mean Number of Days (1)

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	9.1	8.9	5	3	14.5	1971	4	26.8	1979	22	1979	29	13+	1999	6.6	3.2	1.0	.3	@	23.2	16.6	12.0	4.4
Feb	7.7	6.5	5	4	8.5	1997	4	18.8	1972	22	1979	3	19	1979	4.6	2.4	1.0	.4	.0	20.2	15.5	11.9	5.4
Mar	5.9	5.4	2	1	8.0	1983	27	21.9	1984	16	1993	1	9	1979	3.2	1.9	.7	.5	.0	9.5	6.7	4.7	1.2
Apr	2.7	1.0	#	#	11.0	1973	10	20.5	1973	19	1973	10	3	1973	1.4	.9	.3	.1	@	1.3	.7	.4	.1
May	#	.0	#	0	#	1997	1	#+	1997	#+	1997	1	#+	1997	.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	.3	.0	#	0	5.5	1997	27	6.0	1997	4	1997	27	#+	1997	.2	@	@	@	.0	.1	.1	.0	.0
Nov	4.0	2.7	1	#	9.0	1972	14	14.3	1986	11	1986	20	3	1991	2.6	1.2	.4	.2	.0	4.0	1.9	1.2	.1
Dec	9.2	8.0	3	3	11.0	1994	7	31.5	2000	26	2000	31	12+	2000	5.8	2.8	1.0	.4	@	18.6	11.6	6.5	2.4
Ann	38.9	32.5	N/A	N/A	14.5	Jan 1971	4	31.5	Dec 2000	26	Dec 2000	31	19	Feb 1979	24.4	12.4	4.4	1.9	@	76.9	53.1	36.7	13.6

+ 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	5/22	5/18	5/15	5/12	5/10	5/08	5/05	5/02	4/28
32	5/12	5/08	5/04	5/02	4/29	4/26	4/24	4/20	4/16
28	5/01	4/26	4/22	4/19	4/16	4/13	4/10	4/06	4/01
24	4/19	4/15	4/12	4/10	4/07	4/05	4/03	3/31	3/27
20	4/14	4/09	4/05	4/02	3/31	3/28	3/25	3/21	3/16
16	4/09	4/03	3/29	3/26	3/22	3/19	3/15	3/11	3/05

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	9/13	9/16	9/19	9/21	9/23	9/25	9/27	9/30	10/03
32	9/23	9/27	9/29	10/01	10/03	10/05	10/07	10/10	10/13
28	9/28	10/03	10/06	10/09	10/12	10/14	10/17	10/21	10/25
24	10/07	10/13	10/17	10/20	10/24	10/27	10/30	11/03	11/09
20	10/17	10/22	10/26	10/30	11/02	11/05	11/09	11/13	11/18
16	10/30	11/04	11/08	11/11	11/14	11/17	11/20	11/23	11/28

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	152	146	142	139	135	132	128	124	119
32	171	166	162	159	156	153	150	147	142
28	198	191	186	182	178	174	170	165	158
24	218	211	206	202	198	195	191	186	179
20	235	228	224	220	216	212	208	203	197
16	263	253	247	241	236	231	225	218	209

***** 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	1531	1211	964	553	235	33	8	30	140	471	913	1373	7462
60	1376	1071	809	409	138	8	0	7	60	326	763	1218	6185
57	1283	987	716	328	94	3	0	2	31	248	674	1125	5491
55	1221	931	658	278	70	1	0	0	18	202	616	1063	5058
50	1066	798	515	170	29	0	0	0	3	108	476	908	4073
32	546	365	137	6	0	0	0	0	0	2	113	407	1576

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	38	77	196	444	837	1110	1264	1188	899	555	190	57	6855
55	0	0	4	26	195	421	551	475	226	42	3	0	1943
57	0	0	0	17	157	363	489	414	179	26	1	0	1646
60	0	0	0	7	108	278	396	326	118	11	0	0	1244
65	0	0	0	1	49	153	249	194	48	1	0	0	695
70	0	0	0	0	17	64	124	97	13	0	0	0	315

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	0	7	69	251	595	871	1016	946	664	335	69	2	0	7	76	327	922	1793	2809	3755	4419	4754	4823	4825
45	0	0	31	150	444	721	861	791	518	213	29	0	0	0	31	181	625	1346	2207	2998	3516	3729	3758	3758
50	0	0	11	80	303	571	706	636	376	125	11	0	0	0	11	91	394	965	1671	2307	2683	2808	2819	2819
55	0	0	4	37	184	423	551	481	246	59	2	0	0	0	4	41	225	648	1199	1680	1926	1985	1987	1987
60	0	0	0	17	100	281	398	329	142	22	0	0	0	0	0	17	117	398	796	1125	1267	1289	1289	1289
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	2	50	159	362	570	689	624	420	213	48	2	0	2	52	211	573	1143	1832	2456	2876	3089	3137	3139

(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