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: EAST LANSING 4 S, MI **COOP ID: 202395**

Climate Division: MI 9 **NWS Call Sign:** **Elevation: 880 Feet** **Lat: 42˚40N** **Lon: 84˚29W**

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	28.7	13.3	21.0	61+	1973	18	31.6	1990	-20	1994	19	8.8	1977	1365	0	.0	.0	1.2	19.1	29.6	4.3
Feb	32.0	14.9	23.5	64+	1976	27	34.1	1998	-19	1994	10	10.9	1978	1164	0	.0	.0	1.9	14.3	26.3	3.8
Mar	42.8	24.1	33.5	80+	1989	28	41.2	2000	-8	1962	2	24.1	1978	979	0	.0	.0	8.9	6.0	24.7	.6
Apr	55.6	34.8	45.2	86	1980	23	50.9	1985	3	1982	7	39.6	1975	593	0	.0	.0	21.0	.4	12.7	.0
May	68.4	45.6	57.0	91+	1991	30	64.4	1991	24	1978	1	49.0	1997	290	41	.0	.4	30.0	.0	1.7	.0
Jun	77.8	54.9	66.4	98	1988	26	70.0+	1991	33	1966	1	62.0	1980	60	100	.0	1.9	30.0	.0	.0	.0
Jul	81.8	58.9	70.4	101	1988	7	74.3	1988	39	2001	2	66.5	1992	10	176	.1	3.3	31.0	.0	.0	.0
Aug	79.7	57.0	68.4	100	1988	2	73.7	1995	33	1982	29	64.0	1992	37	142	@	1.9	31.0	.0	.0	.0
Sep	72.2	49.1	60.7	94	1960	8	65.3	1971	26+	1991	28	56.6	1975	157	26	.0	.8	29.9	.0	.6	.0
Oct	59.9	38.4	49.2	88+	1965	18	57.7	1971	19+	1960	25	42.9	1976	496	4	.0	.0	26.2	@	7.9	.0
Nov	45.7	29.5	37.6	75+	1975	6	43.5	1975	0	1958	30	29.1	1976	822	0	.0	.0	11.0	2.9	19.8	.0
Dec	33.7	19.5	26.6	67+	1982	3	35.0	1982	-14	1963	31	16.5	1989	1191	0	.0	.0	2.5	13.3	28.5	1.6
Ann	56.5	36.7	46.6	101	Jul 1988	7	74.3	Jul 1988	-20	Jan 1994	19	8.8	Jan 1977	7164	489	.1	8.3	224.6	56.0	151.8	10.3

+ 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: 1957-2001

(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	1.56	1.19	1.75	1978	26	4.68	1993	.27	1971
Feb	1.39	1.11	1.42	1982	1	3.58	1985	.08	1987
Mar	2.12	1.81	2.00	1973	17	4.43+	1976	.50	1996
Apr	3.27	3.21	4.18	1975	19	7.00	1999	.87	1971
May	2.68	2.69	3.10	2001	16	6.33	2000	.40	1977
Jun	3.08	3.05	2.87	1994	14	7.32	1994	.16	1988
Jul	3.00	2.74	2.70	1970	9	7.29	1992	1.16	1996
Aug	3.41	3.27	3.56	1980	20	7.62	1975	.49	1976
Sep	3.39	3.33	2.55	1997	10	7.99	1986	.00	1979
Oct	2.45	2.45	2.82	1981	1	4.98	1985	.34	1982
Nov	2.58	2.45	2.30	1973	15	5.78	1990	.86	1980
Dec	1.98	1.78	1.50	1971	30	4.43	1971	.54	1993
Ann	30.91	29.24	4.18	Apr 1975	19	7.99	Sep 1986	.00	Sep 1979

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	11.5	4.4	.6	.1
Feb	9.3	4.0	.6	.2
Mar	10.5	5.7	1.2	.2
Apr	12.7	7.7	1.7	.5
May	10.9	5.9	1.9	.4
Jun	9.5	6.2	1.7	.6
Jul	9.7	5.9	1.9	.6
Aug	9.7	6.3	2.4	.8
Sep	10.3	6.5	2.5	.9
Oct	11.0	5.7	1.4	.4
Nov	11.5	5.9	1.8	.3
Dec	12.7	5.4	.9	.2
Ann	129.3	69.6	18.6	5.2

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	.32	.46	.69	.90	1.11	1.33	1.59	1.89	2.29	2.94	3.55
Feb	.25	.38	.58	.77	.96	1.17	1.41	1.70	2.08	2.70	3.28
Mar	.61	.81	1.11	1.38	1.63	1.90	2.20	2.55	3.00	3.71	4.38
Apr	1.24	1.54	1.98	2.34	2.69	3.04	3.42	3.86	4.42	5.29	6.08
May	.73	.98	1.37	1.71	2.04	2.39	2.78	3.23	3.83	4.76	5.64
Jun	.65	.94	1.39	1.80	2.21	2.65	3.15	3.74	4.53	5.79	6.97
Jul	1.18	1.45	1.85	2.18	2.49	2.80	3.14	3.54	4.04	4.81	5.51
Aug	1.07	1.40	1.88	2.29	2.69	3.10	3.55	4.08	4.77	5.83	6.82
Sep	.86	1.34	1.90	2.33	2.74	3.15	3.60	4.12	4.78	5.80	6.74
Oct	.77	1.00	1.35	1.64	1.93	2.22	2.55	2.93	3.42	4.19	4.89
Nov	.76	1.00	1.37	1.69	2.00	2.32	2.68	3.10	3.64	4.49	5.29
Dec	.61	.80	1.08	1.32	1.56	1.80	2.06	2.38	2.78	3.41	3.99
Ann	23.95	25.34	27.10	28.42	29.59	30.70	31.84	33.10	34.60	36.77	38.62

\+ 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: 1957-2001
(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	10.3	7.8	4	3
Feb	7.6	5.5	4	2
Mar	5.4	5.0	1	1
Apr	1.6	.5	#	#
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	.0	#	0
Nov	2.3	1.5	#	#
Dec	8.9	8.7	2	1
Ann	36.3	29.0	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	17.0	1978	26	30.8	1978	23	1978	27	10	1981
Feb	5.5	1991	15	24.0	1985	24	1985	16	17	1978
Mar	14.0	1973	17	14.0	1973	17	1982	10	8	1978
Apr	10.0	1975	3	13.0	1975	13	1975	3	2	1975
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	4.0	1997	27	4.0	1997	4	1997	27	#	1997
Nov	3.8	1985	22	6.6	1997	6	1972	15	3	1979
Dec	8.0	1973	13	20.5	1973	13+	2000	14	10	2000
Ann	17.0	Jan 1978	26	30.8	Jan 1978	24	Feb 1985	16	17	Feb 1978

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	8.8	3.9	.9	.2	@
Feb	6.6	2.6	.7	.1	.0
Mar	4.1	2.0	.3	.1	@
Apr	1.2	.4	.1	.1	@
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	.1	.1	@	.0	.0
Nov	2.1	.8	.2	.0	.0
Dec	7.8	3.1	.8	.3	.0
Ann	30.7	12.9	3.0	.8	@

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	21.6	16.6	10.1	2.4
Feb	17.4	12.6	8.9	4.8
Mar	6.5	3.0	2.0	.7
Apr	1.0	.4	.3	.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	.1	.1	.0	.0
Nov	2.0	.6	.0	.0
Dec	14.3	6.2	2.8	.7
Ann	62.9	39.5	24.1	8.7

+ 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	6/09	6/03	5/29	5/25	5/21	5/18	5/14	5/09	5/03
32	5/20	5/14	5/11	5/07	5/04	5/01	4/28	4/25	4/19
28	5/08	5/03	4/30	4/27	4/25	4/22	4/19	4/16	4/11
24	4/22	4/18	4/15	4/13	4/11	4/08	4/06	4/03	3/30
20	4/13	4/09	4/06	4/04	4/01	3/30	3/27	3/24	3/20
16	4/08	4/04	3/31	3/28	3/25	3/23	3/20	3/16	3/11

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	9/10	9/15	9/18	9/20	9/23	9/25	9/28	10/01	10/06
32	9/21	9/26	9/29	10/02	10/05	10/08	10/11	10/14	10/19
28	9/30	10/06	10/10	10/14	10/17	10/21	10/25	10/29	11/04
24	10/16	10/22	10/26	10/29	11/01	11/05	11/08	11/12	11/18
20	10/26	11/02	11/06	11/10	11/14	11/17	11/21	11/26	12/02
16	11/11	11/17	11/21	11/24	11/27	11/30	12/04	12/08	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	144	137	132	128	124	120	115	110	103
32	171	165	160	156	153	149	145	141	135
28	198	190	185	180	175	171	166	160	152
24	224	217	212	208	204	200	196	191	184
20	250	241	235	230	226	221	216	210	202
16	269	261	255	251	246	242	237	231	223

***** 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	1365	1164	979	593	290	60	10	37	157	496	822	1191	7164
60	1210	1024	824	446	185	19	0	8	67	353	672	1036	5844
57	1117	940	731	360	134	8	0	2	35	276	583	943	5129
55	1055	884	669	306	105	4	0	0	21	229	523	881	4677
50	900	744	524	186	50	1	0	0	4	133	382	729	3653
32	388	298	125	4	0	0	0	0	0	3	48	263	1129

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	47	58	169	401	774	1030	1189	1128	860	534	216	95	6501
55	0	0	0	13	167	345	476	415	190	47	1	0	1654
57	0	0	0	7	134	288	414	355	144	31	0	0	1373
60	0	0	0	3	92	209	321	268	86	16	0	0	995
65	0	0	0	0	41	100	176	142	26	4	0	0	489
70	0	0	0	0	15	31	70	59	4	0	0	0	179

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	1	7	69	230	548	809	955	895	637	319	94	17	1	8	77	307	855	1664	2619	3514	4151	4470	4564	4581
45	0	0	37	134	401	659	800	740	488	197	45	4	0	0	37	171	572	1231	2031	2771	3259	3456	3501	3505
50	0	0	16	72	265	510	645	585	344	110	18	1	0	0	16	88	353	863	1508	2093	2437	2547	2565	2566
55	0	0	4	38	159	364	490	430	221	51	5	0	0	0	4	42	201	565	1055	1485	1706	1757	1762	1762
60	0	0	0	13	82	230	338	281	123	17	0	0	0	0	0	13	95	325	663	944	1067	1084	1084	1084
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	0	5	48	140	334	521	639	584	394	187	52	4	0	5	53	193	527	1048	1687	2271	2665	2852	2904	2908

(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