

Climatology of the United States

No. 20

1971-2000

Station: MIDDLETON, MA

COOP ID: 194744

Climate Division: MA 3

NWS Call Sign:

Elevation: 90 Feet

Lat: 42°36N

Lon: 71°01W

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	37.8	17.3	27.6	67	2000	3	34.7	1990	-22	1984	22	20.0	1981	1161	0	.0	.0	3.6	10.1	28.9	3.0
Feb	40.3	19.2	29.8	69	1997	22	37.0	1984	-15+	1961	2	21.1	1979	987	0	.0	.0	4.0	6.5	25.1	1.5
Mar	47.9	27.4	37.7	86	1998	31	43.1	2000	-6	1967	19	31.8	1984	848	0	.0	.0	11.3	1.1	22.6	.1
Apr	58.1	36.9	47.5	90+	1976	18	52.0	1976	8	1982	7	43.1	1972	526	0	.0	.1	23.9	@	9.9	.0
May	69.2	47.0	58.1	95	1977	22	61.1	1975	28+	1964	2	54.0	1974	223	9	.0	.5	30.5	.0	.6	.0
Jun	78.1	56.2	67.2	96	1962	11	71.1	1999	35	1964	6	60.6	1982	46	110	.0	1.5	30.0	.0	.0	.0
Jul	83.3	62.0	72.7	100	1977	21	75.8	1988	42	1962	4	69.3	2000	2	238	@	3.5	31.0	.0	.0	.0
Aug	81.7	60.5	71.1	102+	1975	2	74.7	1988	33	1965	31	68.4	1982	4	194	.1	2.3	31.0	.0	.0	.0
Sep	74.6	52.8	63.7	95	1999	3	67.5	1983	27	1962	22	60.7	1978	83	43	.0	.4	30.0	.0	.1	.0
Oct	64.4	42.4	53.4	88	1963	7	58.6	1971	19	1966	31	49.3	1981	362	2	.0	.0	29.9	.0	5.7	.0
Nov	53.1	34.4	43.8	80	1994	5	49.7	1999	-3	1989	24	39.4	1996	637	0	.0	.0	17.8	.1	14.9	@
Dec	42.4	23.7	33.1	74	2001	6	38.9	1990	-16	1963	31	19.0	1989	989	0	.0	.0	6.0	5.0	26.2	.9
Ann	60.9	40.0	50.5	102+	Aug 1975	2	75.8	Jul 1988	-22	Jan 1984	22	19.0	Dec 1989	5868	596	.1	8.3	249.0	22.8	134.0	5.5

+ 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

Issue Date: February 2004

(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

017-A

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: MIDDLETON, MA

COOP ID: 194744

Climate Division: MA 3

NWS Call Sign:

Elevation: 90 Feet

Lat: 42°36N

Lon: 71°01W

Precipitation (inches)

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	3.80	3.55	2.94	1979	25	11.09	1979	.46	1980	9.5	7.0	2.7	1.1	.72	1.06	1.62	2.13	2.66	3.22	3.86	4.63	5.65	7.30	8.86
Feb	3.22	2.94	2.75	1978	7	7.44	1981	.33	1987	8.2	6.0	2.0	.8	.94	1.25	1.71	2.11	2.50	2.90	3.34	3.87	4.55	5.61	6.60
Mar	3.88	3.51	4.83	2001	22	10.27	1983	.86	1981	9.6	7.0	2.6	1.0	1.28	1.65	2.19	2.65	3.09	3.55	4.05	4.63	5.39	6.55	7.63
Apr	4.17	3.64	4.15	1987	5	11.77	1987	.63	1999	10.5	7.0	2.9	1.1	1.30	1.69	2.28	2.79	3.28	3.78	4.34	5.00	5.84	7.15	8.37
May	3.61	3.56	3.40	1954	9	8.69	1984	.91+	1993	11.4	7.8	2.3	.6	1.11	1.46	1.97	2.40	2.83	3.27	3.76	4.33	5.06	6.21	7.27
Jun	3.58	2.89	4.70	1998	13	12.41	1982	.20	1999	10.0	6.3	2.1	.9	.31	.56	1.03	1.53	2.07	2.70	3.43	4.36	5.64	7.77	9.87
Jul	3.50	3.43	3.90	1976	30	7.00	1981	.93	1983	9.7	6.5	2.2	.7	1.07	1.40	1.90	2.33	2.74	3.17	3.64	4.19	4.91	6.02	7.05
Aug	3.35	2.68	4.31	1955	20	7.43	1990	.98	1995	9.3	6.0	1.8	.7	.94	1.26	1.74	2.16	2.57	3.00	3.48	4.03	4.76	5.90	6.96
Sep	3.71	3.33	5.82	1954	12	9.34	1999	.70	1978	9.0	6.1	2.3	1.0	.73	1.07	1.62	2.12	2.62	3.17	3.78	4.52	5.50	7.07	8.57
Oct	4.12	3.53	8.64	1962	6	14.04	1996	.48	1994	9.5	6.4	2.6	1.2	1.23	1.63	2.21	2.72	3.21	3.72	4.28	4.95	5.80	7.14	8.38
Nov	4.48	4.32	3.10	1972	9	11.70	1983	.65	1976	10.2	7.0	3.1	1.3	1.32	1.75	2.39	2.94	3.48	4.04	4.66	5.38	6.33	7.80	9.17
Dec	3.96	3.83	3.44	1986	19	8.43	1986	.63	1982	9.9	6.6	2.8	1.1	.92	1.28	1.86	2.38	2.90	3.45	4.07	4.80	5.77	7.31	8.75
Ann	45.38	44.63	8.64	Oct 1962	6	14.04	Oct 1996	.20	Jun 1999	116.8	79.7	29.4	11.5	33.42	35.77	38.77	41.03	43.03	44.96	46.95	49.13	51.78	55.60	58.89

+ 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

Complete documentation available from:

www.ncdc.noaa.gov/oa/climate/normals/usnormals.html

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: MIDDLETON, MA

COOP ID: 194744

Climate Division: MA 3

NWS Call Sign:

Elevation: 90 Feet

Lat: 42°36N

Lon: 71°01W

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	11.3	10.8	4	2	19.1	1978	20	29.0	1987	29	1996	12	15	1977	3.9	3.0	1.4	.9	.2	7.1	5.3	3.9	1.2
Feb	10.5	8.5	4	3	28.0	1978	7	30.0	1983	31	1978	7	18	1978	3.4	2.6	1.3	.6	.2	9.0	6.1	4.3	1.3
Mar	6.7	3.3	1	#	10.6	1996	8	41.0	1993	22	1993	14	10	1993	1.9	1.6	1.0	.5	.1	4.7	3.4	2.0	.9
Apr	2.1	.0	#	0	22.5	1997	1	22.5	1997	23	1997	1	2	1997	.4	.2	.2	.1	@	.3	.3	.2	.1
May	.0	.0	0	0	1.0	1977	10	1.0	1977	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	.1	.0	#	0	2.8	1979	10	2.8	1979	#	2000	30	#	2000	@	@	.0	.0	.0	.0	.0	.0	.0
Nov	1.8	.0	#	0	6.7	1980	18	8.2	1986	7	1987	12	1	1980	.7	.6	.3	.1	.0	.9	.5	.1	.0
Dec	7.2	5.5	1	#	14.0	1981	6	21.5	1995	15	1992	13	9	1975	2.3	1.9	1.0	.5	.1	5.2	4.0	2.0	.6
Ann	39.7	28.1	N/A	N/A	28.0	Feb 1978	7	41.0	Mar 1993	31	Feb 1978	7	18	Feb 1978	12.6	9.9	5.2	2.7	.6	27.2	19.6	12.5	4.1

+ 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:

www.ncdc.noaa.gov/oa/climate/normal/usnormals.html

Climatography of the United States

No. 20 1971-2000

Station: MIDDLETON, MA

COOP ID: 194744

Climate Division: MA 3

NWS Call Sign:

Elevation: 90 Feet

Lat: 42°36N

Lon: 71°01W

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	5/19	5/16	5/14	5/11	5/09	5/07	5/04	4/30
32	5/16	5/11	5/07	5/04	5/01	4/28	4/24	4/20	4/15
28	4/28	4/24	4/20	4/18	4/15	4/12	4/10	4/06	4/02
24	4/12	4/08	4/05	4/03	3/31	3/29	3/27	3/24	3/20
20	4/05	4/01	3/29	3/26	3/24	3/21	3/18	3/15	3/11
16	3/31	3/26	3/22	3/19	3/16	3/13	3/10	3/06	3/01
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	9/14	9/18	9/20	9/23	9/25	9/27	9/30	10/02	10/06
32	9/29	10/03	10/06	10/08	10/11	10/13	10/15	10/18	10/23
28	10/09	10/14	10/17	10/20	10/23	10/26	10/29	11/02	11/07
24	10/18	10/25	10/30	11/03	11/06	11/10	11/14	11/19	11/26
20	11/05	11/11	11/16	11/19	11/23	11/27	12/01	12/05	12/12
16	11/19	11/24	11/28	11/30	12/03	12/06	12/09	12/12	12/17
Freeze Free Period									
Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	149	144	141	138	136	133	131	128	123
32	182	175	170	166	162	158	154	149	142
28	215	206	200	195	191	186	181	175	166
24	243	235	229	224	219	215	210	204	196
20	267	259	253	248	244	239	235	229	221
16	284	276	271	266	261	257	252	246	239

* 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

**Climatography
of the United States
No. 20
1971-2000**

Station: MIDDLETON, MA

COOP ID: 194744

Climate Division: MA 3

NWS Call Sign:

Elevation: 90 Feet

Lat: 42°36N

Lon: 71°01W

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	1161	987	848	526	223	46	2	4	83	362	637	989	5868
60	1006	847	693	376	104	10	0	0	23	220	487	834	4600
57	913	763	600	291	54	3	0	0	8	149	398	741	3920
55	851	707	538	237	33	1	0	0	3	109	341	679	3499
50	696	567	386	124	5	0	0	0	0	41	211	532	2562
32	211	148	36	0	0	0	0	0	0	0	7	127	529

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	73	85	210	465	809	1054	1259	1213	950	663	360	161	7302
55	0	0	0	11	129	365	546	500	264	60	4	0	1879
57	0	0	0	5	89	307	484	438	208	37	1	0	1569
60	0	0	0	1	45	224	391	345	133	15	0	0	1154
65	0	0	0	0	9	110	238	194	43	2	0	0	596
70	0	0	0	0	1	38	104	74	6	0	0	0	223

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	13	16	73	230	557	810	1007	955	698	396	154	34	13	29	102	332	889	1699	2706	3661	4359	4755	4909	4943
45	1	1	31	125	404	660	852	800	548	256	79	7	1	2	33	158	562	1222	2074	2874	3422	3678	3757	3764
50	0	0	10	60	258	510	697	645	398	143	36	2	0	0	10	70	328	838	1535	2180	2578	2721	2757	2759
55	0	0	4	23	143	364	542	490	260	64	11	0	0	0	4	27	170	534	1076	1566	1826	1890	1901	1901
60	0	0	1	6	67	226	387	335	139	21	0	0	0	0	1	7	74	300	687	1022	1161	1182	1182	1182
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	7	11	44	136	319	515	685	640	432	235	80	20	7	18	62	198	517	1032	1717	2357	2789	3024	3104	3124

(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.
Complete documentation for the 1971-2000 Normals is available on the internet from:
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.

- 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/normal.html
U.S. Climate Normals 1971-2000-Products Clim20, www.ncdc.noaa.gov/oa/climate/normal/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