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: AUBURN 5 ESE, NE **COOP ID: 250435**

Climate Division: NE 9 **NWS Call Sign:** **Elevation: 930 Feet** **Lat: 40˚22N** **Lon: 95˚45W**

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	33.8	13.9	23.9	70	1981	24	34.9	1989	-22	1974	12	9.3	1979	1276	0	.0	.0	4.1	14.3	30.0	5.7
Feb	40.4	19.6	30.0	81	1972	29	39.0	1976	-23	1996	3	14.6	1979	979	0	.0	.0	8.1	9.3	24.3	3.3
Mar	52.8	29.9	41.4	91	1986	29	47.3	1977	-21	1998	12	34.5+	1978	733	0	.0	@	17.8	2.6	19.2	.4
Apr	65.3	40.9	53.1	99	1989	22	60.6	1981	7	1975	3	46.6	1983	366	10	.0	.8	26.8	.1	6.7	.0
May	75.7	52.2	64.0	102	2000	11	69.7	1977	26	1976	3	58.7	1995	129	96	.1	1.7	30.9	.0	.5	.0
Jun	85.8	62.0	73.9	109	1980	27	78.8	1988	39	1951	4	68.6	1982	8	274	.6	9.4	30.0	.0	.0	.0
Jul	89.6	66.4	78.0	110	1980	14	83.8	1980	43	1972	5	73.3	1994	0	403	2.1	14.7	31.0	.0	.0	.0
Aug	87.9	64.0	76.0	109	1983	17	84.3	1983	38	1988	28	69.5	1992	8	347	1.4	12.5	31.0	.0	.0	.0
Sep	80.4	54.7	67.6	107	2000	2	74.1	1998	23	1984	29	61.4	1993	65	142	.4	5.8	30.0	.0	.5	.0
Oct	68.1	42.9	55.5	98	1997	3	59.8	1973	13	1972	19	49.9	1976	304	9	.0	.6	29.1	.1	5.6	.0
Nov	50.4	29.8	40.1	84+	1999	13	48.9	1999	-5	1964	30	32.2	1991	748	0	.0	.0	16.0	3.0	18.8	.2
Dec	37.4	18.3	27.9	78	1964	23	33.8	1979	-27	1989	23	10.9	1983	1152	0	.0	.0	5.4	10.1	29.3	3.5
Ann	64.0	41.2	52.6	110	Jul 1980	14	84.3	Aug 1983	-27	Dec 1989	23	9.3	Jan 1979	5768	1281	4.6	45.5	260.2	39.5	134.9	13.1

\+ 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

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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	.84	.81	1.33	1960	13	2.68	1973	.00	1986
Feb	1.09	1.09	2.18	1976	21	2.78	1976	.08	1977
Mar	2.46	2.36	2.96	1998	30	7.44	1973	.02	1994
Apr	2.93	2.28	2.62	1999	27	7.57	1999	.52	1989
May	4.27	3.52	4.14	1962	29	14.23	1996	.52	2000
Jun	3.73	3.35	3.70	1961	15	9.32	2000	.22	1988
Jul	4.41	4.10	6.44	1951	6	19.58	1993	.07	1983
Aug	3.49	2.77	4.56	1989	28	11.97	1977	.49	1992
Sep	3.54	2.72	4.33	1958	4	11.01	1973	.52	1990
Oct	2.49	2.24	3.79	1968	17	5.47+	1994	.01	1975
Nov	2.02	1.87	2.32	1952	17	4.93	1992	.01+	1989
Dec	1.09	.81	1.54	1986	1	3.38	1973	.05	1976
Ann	32.36	30.11	6.44	Jul 1951	6	19.58	Jul 1993	.00	Jan 1986

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	4.9	2.3	.4	.0
Feb	5.2	2.8	.5	.2
Mar	7.7	5.0	1.7	.5
Apr	9.1	5.7	1.7	.7
May	10.5	7.2	2.8	1.2
Jun	8.2	5.9	2.3	1.2
Jul	8.5	6.4	3.0	1.5
Aug	7.6	5.2	2.3	1.0
Sep	7.3	5.4	2.5	1.1
Oct	6.2	4.4	1.4	.8
Nov	5.9	3.9	1.4	.5
Dec	6.0	3.0	.6	.1
Ann	87.1	57.2	20.6	8.8

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	.07	.17	.31	.43	.56	.69	.85	1.04	1.30	1.71	2.11
Feb	.15	.24	.39	.54	.70	.88	1.08	1.33	1.67	2.21	2.74
Mar	.17	.33	.64	.98	1.36	1.79	2.32	2.98	3.91	5.48	7.03
Apr	.67	.94	1.37	1.76	2.14	2.55	3.01	3.55	4.27	5.42	6.49
May	.88	1.27	1.90	2.47	3.05	3.66	4.35	5.19	6.29	8.05	9.72
Jun	.94	1.29	1.83	2.31	2.79	3.29	3.85	4.52	5.38	6.76	8.05
Jul	.44	.75	1.36	1.97	2.63	3.38	4.27	5.37	6.89	9.41	11.87
Aug	.39	.66	1.14	1.63	2.15	2.74	3.42	4.27	5.42	7.33	9.18
Sep	.75	1.08	1.60	2.07	2.54	3.05	3.62	4.30	5.20	6.64	8.00
Oct	.23	.41	.74	1.09	1.47	1.89	2.40	3.03	3.90	5.35	6.78
Nov	.13	.25	.50	.78	1.09	1.45	1.89	2.45	3.23	4.55	5.86
Dec	.12	.20	.35	.50	.67	.85	1.06	1.33	1.69	2.28	2.87
Ann	19.81	22.10	25.11	27.44	29.55	31.62	33.78	36.20	39.17	43.55	47.40

+ 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:
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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	6.8	7.0	3	2
Feb	6.3	5.2	2	1
Mar	5.5	4.0	1	#
Apr	1.9	.1	#	#
May	.0	.0	#	0
Jun	.0	.0	#	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.0	.0	#	0
Oct	.7	.0	#	0
Nov	2.7	1.1	#	#
Dec	6.0	4.3	1	#
Ann	29.9	21.7	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	12.0	1971	3	18.1	1979	14	1979	31	9	1982
Feb	11.0	1978	13	18.0	1978	15	1978	20	10	1979
Mar	12.0	1998	8	24.3	1984	15	1978	2	7	1978
Apr	9.0	1992	20	13.0	1992	10	1992	21	1+	1997
May	.0	0	0	.0	0	#	1995	8	#	1995
Jun	.0	0	0	.0	0	#	2000	23	#	2000
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	#	1992	5	#	1992
Oct	10.0	1996	22	10.0	1996	9	1996	22	#+	1997
Nov	8.0	1975	26	11.0	1991	8	1975	26	2	1991
Dec	8.0	1981	16	18.0	1983	14	1983	29	6+	2000
Ann	12.0+	Mar 1998	8	24.3	Mar 1984	15+	Mar 1978	2	10	Feb 1979

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	3.8	2.2	.7	.4	@
Feb	3.5	2.3	.7	.2	@
Mar	2.6	1.7	.7	.2	.1
Apr	1.0	.7	.2	.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	.2	.2	.1	@	@
Nov	1.7	1.1	.2	.1	.0
Dec	4.0	2.1	.7	.2	.0
Ann	16.8	10.3	3.3	1.2	.1

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	14.2	9.0	5.5	1.5
Feb	11.7	7.5	4.3	1.3
Mar	4.3	2.0	.9	.4
Apr	.6	.2	.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	.2	@	@	.0
Nov	2.4	.9	.3	.0
Dec	9.9	5.0	2.5	.4
Ann	43.3	24.6	13.6	3.6

+ 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	5/17	5/12	5/08	5/05	5/01	4/28	4/25	4/21	4/16
32	5/11	5/06	5/02	4/28	4/25	4/22	4/18	4/14	4/09
28	4/23	4/19	4/15	4/12	4/10	4/07	4/04	4/01	3/27
24	4/17	4/12	4/08	4/05	4/02	3/30	3/27	3/24	3/19
20	4/12	4/05	4/01	3/28	3/24	3/21	3/17	3/12	3/06
16	3/28	3/23	3/18	3/15	3/11	3/08	3/04	2/28	2/22

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

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	168	161	156	152	148	144	140	135	128
32	185	177	171	166	162	157	152	146	138
28	215	206	200	195	190	185	180	174	166
24	234	226	219	214	209	204	198	192	183
20	262	251	244	237	231	224	218	210	199
16	279	270	264	259	254	249	244	238	229

***** 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	1276	979	733	366	129	8	0	8	65	304	748	1152	5768
60	1121	845	581	240	62	1	0	1	22	178	600	997	4648
57	1029	767	495	176	35	0	0	0	9	118	515	904	4048
55	968	714	438	139	23	0	0	0	5	86	460	844	3677
50	823	587	307	68	7	0	0	0	0	34	331	699	2856
32	353	231	45	0	0	0	0	0	0	0	54	257	940

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	100	175	335	634	990	1256	1426	1362	1067	728	297	127	8497
55	2	15	15	83	300	566	713	649	382	102	12	1	2840
57	0	11	10	60	250	506	651	587	327	72	7	0	2481
60	0	6	3	34	184	417	558	495	249	39	2	0	1987
65	0	0	0	10	96	274	403	347	142	9	0	0	1281
70	0	0	0	2	40	152	259	215	68	1	0	0	737

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	8	50	172	416	747	1021	1175	1113	831	493	135	21	8	58	230	646	1393	2414	3589	4702	5533	6026	6161	6182
45	0	20	100	286	592	871	1020	958	681	353	70	5	0	20	120	406	998	1869	2889	3847	4528	4881	4951	4956
50	0	5	52	181	439	721	865	803	537	231	31	1	0	5	57	238	677	1398	2263	3066	3603	3834	3865	3866
55	0	1	22	99	299	571	710	648	393	130	10	0	0	1	23	122	421	992	1702	2350	2743	2873	2883	2883
60	0	0	4	50	176	422	555	493	264	63	3	0	0	0	4	54	230	652	1207	1700	1964	2027	2030	2030
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	9	44	121	260	469	682	797	748	540	313	90	21	9	53	174	434	903	1585	2382	3130	3670	3983	4073	4094

(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