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: OAKES 2 S, ND **COOP ID: 326620**

Climate Division: ND 9 **NWS Call Sign:** **Elevation: 1,310 Feet** **Lat: 46˚07N** **Lon: 98˚05W**

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	17.7	-2.9	7.4	61	1987	13	22.5	1990	-39+	1989	11	-6.5	1982	1787	0	.0	.0	.2	25.0	31.0	18.6
Feb	25.0	4.6	14.8	68	1958	26	27.6	1987	-45	1994	9	-.9	1979	1407	0	.0	.0	1.1	18.2	28.1	11.9
Mar	37.0	17.6	27.3	79	1986	29	36.3	1973	-28+	1995	9	18.3	1996	1169	0	.0	.0	5.2	9.7	29.0	4.2
Apr	55.0	30.9	43.0	101	1980	22	51.2	1987	-2	1954	3	34.2	1975	664	1	@	.2	20.1	1.1	17.9	.1
May	70.3	43.1	56.7	98	1987	17	65.0	1977	19	1967	2	49.3	1979	289	31	.0	1.1	29.8	.0	3.2	.0
Jun	79.0	52.5	65.8	107	1988	21	75.1	1988	32	1951	2	60.3	1982	87	109	.2	3.5	30.0	.0	.0	.0
Jul	84.4	57.2	70.8	109	1988	6	75.7	1989	41+	1996	10	63.7	1992	27	206	1.0	8.4	31.0	.0	.0	.0
Aug	83.3	54.9	69.1	107+	1988	17	75.7	1983	34	1965	28	63.7	1992	45	173	.9	7.1	31.0	.0	.0	.0
Sep	72.2	44.1	58.2	103+	1983	3	64.1+	1998	19	1965	26	52.5	1993	234	27	.2	1.9	29.5	.0	2.5	.0
Oct	57.9	31.8	44.9	92	1976	1	50.3	1973	1	1976	27	39.9	1976	625	0	.0	.1	23.8	.4	16.5	.0
Nov	36.9	17.2	27.1	75+	1978	3	37.0	1999	-26	1964	30	15.1	1985	1140	0	.0	.0	6.0	10.9	28.1	2.9
Dec	23.6	3.8	13.7	61	1969	2	24.0	1999	-40	1967	31	-1.6	1983	1590	0	.0	.0	.7	22.0	31.0	12.9
Ann	53.5	29.6	41.6	109	Jul 1988	6	75.7+	Jul 1989	-45	Feb 1994	9	-6.5	Jan 1982	9064	547	2.3	22.3	208.4	87.3	187.3	50.6

+ 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: 1922-2001

(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	.60	.63	.75	1960	1	1.62	1975	.00+	1991
Feb	.44	.31	1.62	1977	24	1.62	1977	.00+	1997
Mar	1.04	.80	2.22	1966	3	3.09	1987	.13	1985
Apr	1.71	1.25	2.70	1998	25	7.52	1986	.00+	1987
May	2.45	2.20	2.25	1991	15	5.97	1972	.15	1990
Jun	3.25	2.54	3.80	1991	20	8.03	1984	.61	1994
Jul	2.76	2.08	2.85	1986	15	6.55	1994	.10	1976
Aug	2.04	1.82	6.35	1960	18	5.75	1989	.28	1982
Sep	2.26	1.47	3.20	1996	2	7.60	1999	.22+	1979
Oct	1.77	1.09	2.55	1998	4	7.24	1998	.00	1987
Nov	.82	.88	1.27	1977	8	2.03	1977	.00+	1990
Dec	.41	.31	.73	1950	26	1.63	1972	.00+	1991
Ann	19.55	19.77	6.35	Aug 1960	18	8.03	Jun 1984	.00+	Feb 1997

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	4.2	1.4	.1	.0
Feb	5.3	1.7	.1	@
Mar	5.8	3.0	.9	.2
Apr	5.8	3.8	1.5	.4
May	7.1	5.3	2.1	.5
Jun	7.3	6.2	2.3	.8
Jul	6.4	4.9	1.8	.7
Aug	5.2	4.0	1.5	.5
Sep	4.7	3.9	1.5	.6
Oct	3.9	3.1	1.2	.7
Nov	4.7	2.3	.5	.1
Dec	5.7	1.8	.0	.0
Ann	66.1	41.4	13.5	4.5

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	.00	.00	.15	.27	.38	.50	.62	.77	.97	1.27	1.56
Feb	.00	.06	.15	.22	.29	.36	.45	.55	.69	.91	1.13
Mar	.16	.25	.40	.54	.69	.85	1.04	1.27	1.57	2.06	2.54
Apr	.00	.12	.38	.64	.93	1.25	1.64	2.11	2.77	3.87	4.96
May	.45	.66	1.02	1.36	1.70	2.06	2.48	2.99	3.66	4.74	5.77
Jun	.59	.87	1.35	1.79	2.25	2.73	3.29	3.97	4.86	6.31	7.69
Jul	.31	.52	.90	1.28	1.70	2.16	2.70	3.37	4.28	5.79	7.26
Aug	.39	.57	.87	1.15	1.43	1.73	2.08	2.49	3.04	3.92	4.76
Sep	.28	.46	.78	1.09	1.43	1.80	2.23	2.76	3.48	4.66	5.81
Oct	.04	.16	.39	.64	.92	1.25	1.64	2.15	2.86	4.05	5.25
Nov	.00	.08	.23	.36	.49	.64	.81	1.02	1.30	1.76	2.21
Dec	.00	.00	.08	.16	.23	.32	.41	.53	.68	.93	1.18
Ann	11.12	12.61	14.60	16.15	17.57	18.97	20.44	22.10	24.15	27.19	29.88

\+ 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: 1922-2001
(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	11.6	8.9	3	#
Feb	5.2	4.0	3	0
Mar	8.3	4.0	2	0
Apr	2.8	.0	#	0
May	#	.0	0	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.0	.0	0	0
Oct	.5	.0	#	0
Nov	7.6	6.0	#	0
Dec	5.8	1.5	1	0
Ann	41.8	24.4	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	1989	6	33.0	1997	14	1972	25	12	1972
Feb	8.0	1996	27	14.0	1991	17	1972	29	16	1972
Mar	12.0	1989	14	24.0+	1995	19	1972	6	15	1972
Apr	14.0	1997	6	18.0	1997	1+	1973	24	#+	1973
May	#	1979	11	#	1979	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	1990	17	4.0	1990	3	1972	31	#+	1999
Nov	14.0	1977	19	26.0	1996	7+	1997	14	4	1979
Dec	12.0	1988	27	22.0	1988	10	1972	31	4	1972
Ann	14.0+	Apr 1997	6	33.0	Jan 1997	19	Mar 1972	6	16	Feb 1972

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	3.0	2.4	1.0	.5	.1
Feb	2.5	1.6	.6	.1	.0
Mar	1.7	1.5	.7	.2	.1
Apr	.7	.6	.4	.2	@
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	@	.0	.0
Nov	1.4	1.2	.7	.4	.1
Dec	2.1	1.9	.8	.2	.1
Ann	11.6	9.4	4.2	1.6	.4

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	-9.9	-9.9	-9.9	-9.9
Feb	-9.9	-9.9	-9.9	-9.9
Mar	-9.9	-9.9	-9.9	-9.9
Apr	-9.9	-9.9	-9.9	-9.9
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	.1	.0	.0
Nov	-9.9	-9.9	-9.9	-9.9
Dec	-9.9	-9.9	-9.9	-9.9
Ann	-9.9	-9.9	-9.9	-9.9

+ 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	5/30	5/26	5/23	5/20	5/18	5/15	5/13	5/10	5/06
32	5/22	5/18	5/14	5/12	5/09	5/07	5/04	5/01	4/27
28	5/17	5/12	5/09	5/05	5/03	4/30	4/27	4/23	4/18
24	5/04	4/28	4/24	4/20	4/17	4/14	4/10	4/06	3/31
20	4/20	4/15	4/12	4/10	4/08	4/05	4/03	3/31	3/27
16	4/14	4/09	4/05	4/02	3/30	3/26	3/23	3/19	3/14

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	9/04	9/07	9/10	9/12	9/14	9/16	9/18	9/21	9/24
32	9/12	9/16	9/19	9/22	9/24	9/26	9/29	10/02	10/06
28	9/20	9/25	9/28	10/01	10/04	10/06	10/09	10/12	10/17
24	9/25	10/01	10/05	10/08	10/11	10/14	10/18	10/22	10/27
20	10/06	10/11	10/15	10/19	10/22	10/25	10/28	11/01	11/07
16	10/17	10/22	10/26	10/29	11/01	11/04	11/07	11/11	11/16

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	136	130	126	122	119	115	111	107	101
32	158	151	146	141	137	133	128	123	116
28	171	165	161	157	153	150	146	141	135
24	201	193	187	181	176	172	166	160	152
20	217	210	205	200	197	193	188	183	176
16	241	232	226	221	216	211	206	199	191

***** 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	1787	1407	1169	664	289	87	27	45	234	625	1140	1590	9064
60	1632	1267	1014	520	181	33	7	13	128	471	990	1435	7691
57	1539	1183	921	438	129	16	1	5	80	380	900	1342	6934
55	1477	1127	859	386	100	9	0	2	56	321	840	1280	6457
50	1322	987	708	268	46	1	0	0	17	192	693	1125	5359
32	792	534	257	31	0	0	0	0	0	8	251	606	2479

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	28	51	111	358	765	1012	1202	1151	784	406	102	39	6009
55	0	0	0	23	152	331	489	440	150	6	0	0	1591
57	0	0	0	15	119	278	428	381	114	3	0	0	1338
60	0	0	0	7	78	205	341	296	72	1	0	0	1000
65	0	0	0	1	31	109	206	173	27	0	0	0	547
70	0	0	0	0	10	44	107	85	8	0	0	0	254

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	1	17	173	536	788	969	915	558	215	21	0	0	1	18	191	727	1515	2484	3399	3957	4172	4193	4193
45	0	0	4	96	392	638	814	760	412	115	7	0	0	0	4	100	492	1130	1944	2704	3116	3231	3238	3238
50	0	0	0	49	261	489	659	605	278	55	0	0	0	0	0	49	310	799	1458	2063	2341	2396	2396	2396
55	0	0	0	21	151	342	504	451	170	19	0	0	0	0	0	21	172	514	1018	1469	1639	1658	1658	1658
60	0	0	0	8	77	214	351	300	90	5	0	0	0	0	0	8	85	299	650	950	1040	1045	1045	1045
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	0	18	133	344	492	626	585	358	162	21	0	0	0	18	151	495	987	1613	2198	2556	2718	2739	2739

(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