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: RALEIGH DURHAM AP, NC **COOP ID: 317069**

Climate Division: NC 4 **NWS Call Sign: RDU** **Elevation: 416 Feet** **Lat: 35˚52N** **Lon: 78˚47W**

Temperature (˚F)

Month	Mean (1)			Extremes										Degree Days (1) Base Temp 65		Mean Number of Days (3)					
	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	49.8	29.6	39.7	79	1952	2	49.3	1974	-9	1985	21	26.6	1977	783	0	.0	.0	15.5	1.9	19.1	.1
Feb	54.0	31.9	43.0	84	1977	26	51.0	1990	0	1996	5	33.1	1978	627	1	.0	.0	17.6	.9	15.8	@
Mar	62.5	38.9	50.7	90	1990	12	56.2	1976	11+	1980	2	45.1	1971	456	9	.0	@	27.1	.1	8.8	.0
Apr	71.8	46.4	59.1	95	1980	23	63.6	1994	23+	1985	10	55.1	1983	214	38	.0	.4	29.6	.0	2.1	.0
May	78.7	55.3	67.0	97	1953	31	72.3	1991	29	1963	2	63.2	1992	61	119	.0	1.7	31.0	.0	@	.0
Jun	85.5	63.8	74.7	104	1954	27	78.9	1981	38	1977	8	69.8	1979	5	293	.1	8.4	30.0	.0	.0	.0
Jul	89.1	68.5	78.8	105	1952	23	82.5	1993	48	1975	2	74.9	1984	0	429	.5	14.4	31.0	.0	.0	.0
Aug	87.2	67.2	77.2	105	1988	18	80.6	1995	46	1965	30	74.1	1992	1	379	.4	11.0	31.0	.0	.0	.0
Sep	81.3	61.0	71.2	104	1954	6	74.9	1980	37+	1983	23	67.5	1984	20	206	.0	3.2	30.0	.0	.0	.0
Oct	71.8	48.2	60.0	98	1954	6	66.3	1984	19	1962	27	54.4	1988	194	39	.0	.2	30.8	.0	1.2	.0
Nov	62.4	39.5	51.0	88	1950	1	58.4	1985	11	1970	25	42.5	1976	425	6	.0	.0	26.7	@	8.8	.0
Dec	53.3	32.6	43.0	80+	1998	7	50.3	1971	4+	1983	25	34.6	1989	679	2	.0	.0	19.2	.8	16.9	.0
Ann	70.6	48.6	59.6	105+	Aug 1988	18	82.5	Jul 1993	-9	Jan 1985	21	26.6	Jan 1977	3465	1521	1.0	39.3	319.5	3.7	72.7	.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

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	4.02	3.96	3.01	1984	10	7.49	1998	.87	1981
Feb	3.47	2.96	3.22	1973	2	6.42	1989	.69	1991
Mar	4.03	3.55	3.17	1983	18	7.78	1983	1.03	1985
Apr	2.80	2.61	3.37	1978	26	6.10	1978	.23	1976
May	3.79	3.90	4.33	1957	11	7.67	1974	.58	1999
Jun	3.42	2.98	3.35	1980	25	9.38	1973	.33	1993
Jul	4.29	3.98	4.18	1997	24	10.27	1991	.89	1977
Aug	3.78	3.56	4.18	1986	20	12.18	1986	1.01	1997
Sep	4.26	3.33	4.96	1996	6	21.79	1999	.23	1985
Oct	3.18	3.11	4.05	1995	4	9.10	1995	.00	2000
Nov	2.97	2.61	4.55	1963	6	7.61	1985	.61	1973
Dec	3.04	2.98	2.99	1958	28	6.65	1983	.81	1985
Ann	43.05	42.53	4.96	Sep 1996	6	21.79	Sep 1999	.00	Oct 2000

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	10.5	6.9	2.8	1.3
Feb	9.5	6.2	2.4	1.0
Mar	10.2	7.2	3.0	.9
Apr	9.1	5.6	1.8	.6
May	10.1	6.9	3.1	.8
Jun	9.8	6.2	2.2	.8
Jul	11.2	7.5	3.1	1.0
Aug	9.6	5.8	2.5	1.1
Sep	8.2	5.1	2.7	1.3
Oct	6.8	4.7	2.0	1.1
Nov	8.4	5.2	2.1	.7
Dec	9.7	6.1	2.1	.6
Ann	113.1	73.4	29.8	11.2

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	1.48	1.86	2.40	2.85	3.29	3.73	4.21	4.76	5.47	6.56	7.56
Feb	1.16	1.49	1.97	2.38	2.77	3.18	3.62	4.13	4.80	5.82	6.77
Mar	1.57	1.95	2.48	2.92	3.34	3.76	4.22	4.75	5.43	6.47	7.41
Apr	.58	.83	1.25	1.62	2.00	2.40	2.86	3.41	4.13	5.29	6.39
May	1.36	1.71	2.23	2.66	3.08	3.50	3.96	4.50	5.18	6.24	7.21
Jun	.63	.93	1.43	1.90	2.37	2.88	3.46	4.17	5.10	6.60	8.03
Jul	1.07	1.48	2.10	2.65	3.20	3.78	4.42	5.19	6.18	7.77	9.25
Aug	.96	1.31	1.86	2.35	2.83	3.33	3.90	4.57	5.44	6.83	8.12
Sep	.41	.71	1.29	1.88	2.53	3.25	4.12	5.19	6.67	9.13	11.54
Oct	.45	.87	1.41	1.85	2.30	2.77	3.29	3.91	4.73	6.03	7.25
Nov	.75	1.03	1.47	1.85	2.22	2.62	3.06	3.58	4.27	5.35	6.36
Dec	.98	1.27	1.70	2.06	2.41	2.77	3.17	3.63	4.23	5.16	6.01
Ann	32.94	34.95	37.50	39.41	41.10	42.72	44.38	46.20	48.40	51.56	54.27

\+ 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)

Month	Snow Fall Mean	Snow Fall Median	Snow Depth Mean	Snow Depth Median
Jan	2.2	.2	#	0
Feb	2.9	.6	#	0
Mar	1.2	.0	#	0
Apr	.1	.0	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	.0	.0	0	0
Nov	.2	.0	#	0
Dec	.6	.0	#	0
Ann	7.2	.8	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	17.9	2000	25	25.8	2000	20	2000	26	3	2000
Feb	10.3	1979	18	17.2	1979	10	1979	19	2	1979
Mar	9.0	1980	2	11.1	1980	11	1980	3	1	1980
Apr	1.8	1983	18	1.8	1983	0	0	0	0	0
May	.0	0	0	.0	0	0	0	0	#	2000
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	.0	0	0	.0	0	0	0	0	0	0
Nov	2.6	1975	23	2.6	1975	2	2000	20	#	2000
Dec	3.6	1971	3	4.2	1980	4	1971	4	#	1993
Ann	17.9	Jan 2000	25	25.8	Jan 2000	20	Jan 2000	26	3	Jan 2000

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	.9	.6	.2	.1	@
Feb	1.4	.7	.3	.2	@
Mar	.5	.2	.1	.1	.0
Apr	.1	.0	.0	.0	.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	.0	.0	.0	.0	.0
Nov	.1	.1	.0	.0	.0
Dec	.5	.2	.1	.0	.0
Ann	3.5	1.8	.7	.4	@

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	1.8	1.1	.5	.1
Feb	1.8	.6	.4	@
Mar	.4	.1	.1	@
Apr	.0	.0	.0	.0
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	.0	.0	.0	.0
Nov	.1	.0	.0	.0
Dec	.4	.2	.0	.0
Ann	4.5	2.0	1.0	.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

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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	5/08	5/03	4/29	4/26	4/23	4/20	4/16	4/13	4/07
32	4/25	4/20	4/16	4/13	4/10	4/07	4/03	3/30	3/25
28	4/12	4/06	4/02	3/30	3/26	3/23	3/19	3/15	3/10
24	3/28	3/21	3/16	3/11	3/07	3/03	2/26	2/21	2/14
20	3/12	3/04	2/27	2/23	2/19	2/14	2/10	2/05	1/28
16	3/01	2/20	2/13	2/07	2/01	1/26	1/20	1/11	12/27

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	10/06	10/11	10/14	10/17	10/19	10/22	10/25	10/28	11/01
32	10/14	10/19	10/22	10/25	10/28	10/30	11/02	11/05	11/10
28	10/27	11/01	11/05	11/09	11/12	11/15	11/18	11/22	11/27
24	11/11	11/17	11/22	11/25	11/29	12/02	12/06	12/10	12/16
20	11/20	11/28	12/03	12/08	12/12	12/16	12/21	12/27	1/03
16	12/02	12/14	12/22	12/29	1/05	1/12	1/20	1/29	2/17

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	201	193	188	183	179	174	170	164	157
32	224	216	210	205	200	195	190	184	176
28	254	245	240	234	230	225	220	214	206
24	291	283	276	271	266	261	256	249	241
20	320	312	306	301	296	291	286	280	272
16	>365	>365	353	339	329	321	313	304	292

***** 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	783	627	456	214	61	5	0	1	20	194	425	679	3465
60	637	479	305	93	12	0	0	0	2	104	290	536	2458
57	549	401	228	51	4	0	0	0	0	65	217	448	1963
55	493	349	184	32	1	0	0	0	0	45	175	392	1671
50	360	231	97	7	0	0	0	0	0	14	92	265	1066
32	61	17	1	0	0	0	0	0	0	0	0	24	103

Base — Cooling Degree Days (1)

Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	280	326	581	813	1084	1280	1450	1400	1174	868	569	356	10181
55	9	18	67	177	375	590	737	687	485	195	65	21	3426
57	6	12	49	140	317	530	675	625	425	153	46	14	2992
60	3	5	29	94	236	441	582	532	339	100	25	7	2393
65	0	1	9	38	119	293	429	379	206	39	6	2	1521
70	0	0	2	8	45	162	274	228	98	10	1	0	828

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	123	175	355	583	846	1050	1211	1164	943	632	351	173	123	298	653	1236	2082	3132	4343	5507	6450	7082	7433	7606
45	62	102	233	436	691	900	1056	1009	793	478	229	102	62	164	397	833	1524	2424	3480	4489	5282	5760	5989	6091
50	31	49	137	297	536	750	901	854	643	328	136	52	31	80	217	514	1050	1800	2701	3555	4198	4526	4662	4714
55	9	18	71	184	384	600	746	699	493	203	72	23	9	27	98	282	666	1266	2012	2711	3204	3407	3479	3502
60	0	5	31	101	241	450	591	544	345	105	27	4	0	5	36	137	378	828	1419	1963	2308	2413	2440	2444
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	77	113	224	368	549	717	838	806	636	392	215	107	77	190	414	782	1331	2048	2886	3692	4328	4720	4935	5042

(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