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DAILY SNOW DEPTH MEASUREMENTS FROM 195 STATIONS IN THE UNITED STATES

D. R. Easterling • P. Jamason • D. P. Bowman • P. Y. Hughes • E. H. Mason
National Climatic Data Center

Linda J. Allison, editor
Carbon Dioxide Information Analysis Center

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Contributed by

D. R. Easterling
P. Jamason
D. P. Bowman
P. Y. Hughes
E. H. Mason
National Oceanic and Atmospheric Administration
National Climatic Data Center
Asheville, North Carolina

Prepared by L. J. Allison
Carbon Dioxide Information Analysis Center
Oak Ridge National Laboratory
Oak Ridge, Tennessee

Environmental Sciences Division
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ABSTRACT

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This document describes a database containing daily measurements of snow depth at 195 National Weather Service (NWS) first-order climatological stations in the United States. The data have been assembled and made available by the National Climatic Data Center (NCDC) in Asheville, North Carolina. The 195 stations encompass 388 unique sampling locations in 48 of the 50 states; no observations from Delaware or Hawaii are included in the database. Station selection criteria emphasized the quality and length of station records while seeking to provide a network with good geographic coverage. Snow depth at the 388 locations was measured once per day on ground open to the sky. The daily snow depth is the total depth of the snow on the ground at measurement time. The time period covered by the database is 1893–1992; however, not all station records encompass the complete period. While a station record ideally should contain daily data for at least the seven *winter* months (January through April and October through December), not all stations have complete records. Each logical record in the snow depth database contains one station's daily data values for a period of one month, including data source, measurement, and quality flags. The snow depth data have undergone extensive manual and automated quality assurance checks by NCDC and the Carbon Dioxide Information Analysis Center (CDIAC). These reviews involved examining the data for completeness, reasonableness, and accuracy, and included comparison of some data records with records in NCDC's *Summary of the Day–First Order* online database. Since the snow depth measurements have been taken at NWS first-order stations that have long periods of record, they should prove useful in monitoring climate change.

These data are available free of charge as a numeric data package (NDP) from CDIAC. The NDP consists of this document and 12 data files that are available via CDIAC's anonymous file transfer protocol (FTP) service, via the World Wide Web, and on 8-mm tape or quarter-inch tape cartridge. The total size of the database is ~79,000 kB.

PART 1

INFORMATION ABOUT THE DATA PACKAGE

1. BACKGROUND INFORMATION

Daily snow depth records from 195 stations in the United States have been assembled into a database by the National Climatic Data Center (NCDC). Since the measurements have been taken at National Weather Service (NWS) principal climatological stations that have long periods of record, the snow depth data should prove useful in monitoring climate change. The continued accumulation of anthropogenic greenhouse gases in the atmosphere over the past century has commonly been linked to an increase in global mean temperature (IPCC 1996). This increase in temperature may be indicative of regional changes that could be reflected in changes in snowfall and in the depth, extent, and duration of snow cover. It has been observed that the annual snow cover extent over North America in the last 19 years has decreased relative to a 0.93°C increase in temperature in this region (Karl et al. 1993). Since 1988, the snow cover extent over the Northern Hemisphere has been consistently below the 21-year average for the period 1974–1994 (Nicholls et al. 1996). Other studies have examined the relationship between the snow cover extent in North America and United States winter temperatures (Leathers and Robinson 1993) and the trends and variability in snowfall and total precipitation across the United States and Canada for 1951–1990 (Groisman and Easterling 1994). The U.S. snow depth database should be useful in continuing to monitor such changes over the United States. It also enables analysis of snow cover changes for the period prior to the advent of accurate satellite-derived estimates, which began in 1972 (Leathers and Robinson 1993).

2. SOURCE AND SCOPE OF THE DATA

The 195 stations in the U.S. daily snow depth database are a subset of the NWS's principal climatological stations (often referred to as the "first-order" network). They overlap with many of the stations included in the U.S. historical sunshine and cloud cover database (Steurer and Karl 1991) and with the 223 U.S. primary stations included in the North American network used by Groisman and Easterling (1994) to study trends and variability in precipitation and snowfall for 1951–1990. These 195 stations encompass 388 unique sampling locations in 48 states; no observations from Delaware or Hawaii are included in the database. A map showing the locations of the 195 snow depth stations is presented in Fig. 1.

Station selection criteria emphasized the quality and length of station records while seeking to provide a network with good geographic coverage. Many sampling stations were relocated from a city to an airport or other remote location or changed elevation during the course of the data record, resulting in multiple locations for these stations. Measurements were often taken at both stations for a period of time to provide some overlap in the data record. Snow depth was measured once per day on ground open to the sky. The daily snow depth is the total depth of the snow (old and new) on the ground at measurement time. An inventory of the 195 snow depth stations—including the state abbreviation, station name, NCDC Cooperative Network Index station number, Weather Bureau Army Navy (WBAN) station number, latitude, longitude, elevation above sea level, period of station record, and a flag denoting the completeness of the station record—is given in Table 1. The multiple sampling locations associated with some of the stations are also listed in this table. The snow depth station inventory was compiled from several sources; its development is described in detail in Part 2 of this document.

The snow depth data were compiled by NCDC in two phases: data collected before 1948 were input from manuscript forms, while data recorded from 1948–1992 were extracted from digital tape archives. Initially, only months containing nonzero snow depth values were to be digitized; however, this created an ambiguity with months that were reported as "no snow" (zero snow depth) versus months missing from the data record. Thus, NCDC conducted a manual review of all the manuscript forms for the period before 1948 to resolve the issue of whether the data being digitized were indeed truly missing. Gaps in the station records in some cases result from missing manuscripts.

The time period covered by the snow depth database is 1893–1992. In general, snowfall occurs between October and April; however, several stations may receive snowfall as early as September or as late as July. Ideally, each full year of a station's record should contain at least seven months of "nonmissing" data (January through April and October through December, hereafter referred to as the *winter* months). However, many stations do not have all seven winter months in all years of the station record. In addition, only 72 stations span the 100-year recording period, and many of these station records are missing one or more months, or even years, of data (see Table 1). In order to characterize the completeness and usefulness of station records, close examination of the data was required. For example, some stations that have seven months of data in a given year often have one or more winter months missing (e.g., Station 132367, Dubuque, Iowa, has nine months of data in 1981 but is missing the winter months of November and December). Of the 388 sampling locations, 151 (38.9%) have complete records for October–April or are missing only one or two months of data in the station record. Seventy locations (18.0%) have several years in the data record that are missing one to three months of data, 92 locations (23.7%) have many years that are missing at least one and usually many months of data, and 70 locations (18.0%) are missing one or more years of data in the station record. Five stations have records of only one year in length; three of these records have fewer than seven winter months of data.

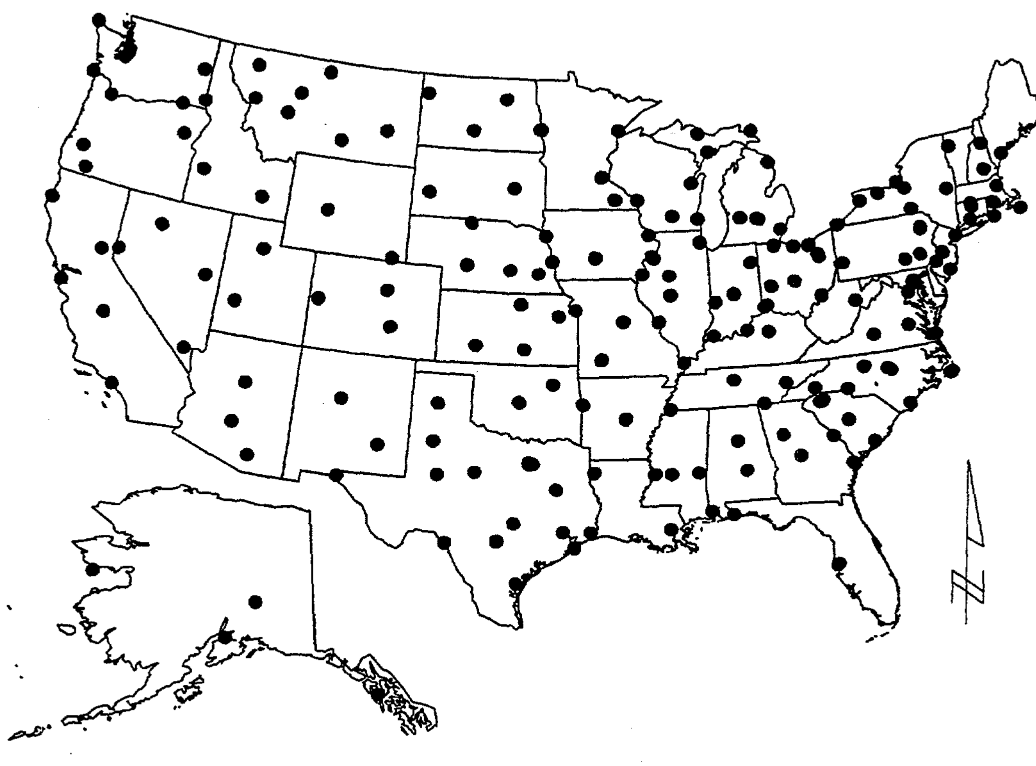

Fig. 1. Locations of the 195 stations in the U.S. daily snow depth database.

Table 1. Inventory of stations in the U.S. daily snow depth database.

State[a]	Station name	NCDC[b] station no.	WBAN[c] sta. no.	Lat.[d] (° N)	Long.[d] (° W)	Elev.[e] (m)	Period of Record	Record Completeness[f]
AK	Anchorage	50ANCC	99999	-99.99	-99.99	-99.99	1923–1943	E
		500285	26409	61.22	149.83	43.00	1943–1953	B
		500280	26451	61.17	150.02	35.00	1953–1992	B
	Fairbanks	50FAIC	99999	64.83	147.72	148.00	1929–1942	B
		502968	26411	64.82	147.87	133.00	1942–1992	B
	Juneau	504094	25324	58.30	134.40	24.00	1917–1921	A
		504094	25324	58.30	134.40	58.00	1922–1930	B
		504094	25324	58.30	134.40	40.00	1931–1943	B
		504100	25309	58.37	134.58	3.00	1943–1992	B
	Nome	50OMEV	99999	64.48	165.35	10.00	1930	G
		50OMEV	99999	64.48	165.40	4.00	1931–1945	B
		50OMEV	99999	64.50	165.42	5.00	1946	G
		506496	26617	64.50	165.43	4.00	1946–1992	B
AL	Birmingham	010836	93869	33.52	86.83	212.00	1904–1953	C
		010831	13876	33.57	86.75	189.00	1944–1992	A
	Mobile	015483	93855	30.68	88.03	36.00	1893–1965	C
		015478	13894	30.68	88.25	64.00	1948–1992	A
	Montgomery	015555	93856	32.38	86.30	61.00	1893–1954	C
		015550	13895	32.30	86.40	67.00	1948–1992	A
AR	Fort Smith	03FSMC	93946	35.37	94.40	137.00	1893–1945	D
		032574	13964	35.33	94.37	137.00	1945–1992	B
	Little Rock	03LITC	93930	34.75	92.27	99.00	1893–1942	C
		034248	13963	34.73	92.22	84.00	1940–1992	C
AZ	Flagstaff	023007	23166	35.20	111.67	2104.00	1899–1950	D
		023010	03103	35.13	111.67	2132.00	1950–1992	C
	Phoenix	026486	93140	33.45	112.07	335.00	1937–1968	B
		026481	23183	33.43	112.02	338.00	1948–1992	A
	Tucson	028815	23193	32.25	110.95	745.00	1928–1992	E
		028820	23160	32.13	110.93	788.00	1941–1992	A
CA	Blue Canyon	040897	23225	39.28	120.70	1610.00	1939–1990	E
	Eureka	042910	24213	40.80	124.17	18.00	1906–1992	C
	Fresno	04FATC	99999	36.73	119.78	87.00	1929–1939[g]	C
		043257	93193	36.77	119.72	100.00	1949–1992[g]	A
	Los Angeles	045115	93134	34.05	118.23	78.00	1930–1992	E
		045114	23174	33.93	118.38	30.00	1948–1992	A
	San Francisco	047772	23272	37.77	122.43	22.00	1932–1992	E
		047769	23234	37.62	122.38	2.00	1948–1992	A

Table 1 (continued)

State[a]	Station name	NCDC[b] station no.	WBAN[c] sta. no.	Lat.[d] (° N)	Long.[d] (° W)	Elev.[e] (m)	Period of Record	Record Completeness[f]
CO	Denver	052225	93002	39.75	105.00	1591.00	1893–1948	C
		052220	23062	39.77	104.87	1612.00	1945–1992	A
	Grand Junction	05GJCT	93031	39.07	108.57	1398.00	1899–1946	D
		053488	23066	39.10	108.55	1478.00	1946–1992	B
	Pueblo	05PUBC	93022	38.30	104.60	1423.00	1893–1940	D
		056738	23068	38.23	104.63	1463.00	1940–1954	D
		056740	93058	38.28	104.52	1420.00	1954–1992	B
CT	Hartford	063451	14752	41.73	72.65	5.00	1940–1954	C
		063456	14740	41.93	72.68	49.00	1954–1992	A
	New Haven	065266	94772	41.30	72.93	37.00	1893–1918	D
		065266	94772	41.30	72.93	23.00	1919–1943	D
		065273	14758	41.27	72.88	7.00	1939–1969	D
	Windsor Locks	06BDLC	94760	41.77	72.68	18.00	1904–1940	D
FL	Pensacola	087002	93859	30.42	87.22	4.00	1895–1963	C
		086997	13899	30.47	87.20	34.00	1943–1992	B
	Tampa	08TPAC	99999	27.95	82.45	6.00	1940	F
		088788	12842	27.97	82.53	6.00	1948–1992	A
GA	Atlanta	090456	93847	33.75	84.38	321.00	1896–1954	D
		090451	13874	33.65	84.43	308.00	1935–1992	C
	Augusta	090500	93848	33.47	81.97	41.00	1893–1949	D
		090495	13875	33.37	81.97	45.00	1948–1992	A
	Macon	095447	93853	32.83	83.63	101.00	1899–1948	E
		095443	03813	32.70	83.65	108.00	1948–1992	A
	Savannah	09SAVC	93860	32.08	81.08	12.00	1893–1945[g]	C
		097847	93802	32.13	81.20	14.00	1948–1992[g]	A
IA	Burlington	131063	14931	40.78	91.12	214.00	1942–1947	D
		131063	14931	40.78	91.12	213.00	1947–1979	C
	Davenport	132069	14932	41.52	90.58	189.00	1893–1896	D
		132069	14932	41.52	90.57	185.00	1897–1931	D
		132069	14932	41.52	90.57	202.00	1932–1933	C
		132069	14932	41.52	90.57	176.00	1934–1943	D
	Des Moines	132208	14967	41.58	93.62	246.00	1893–1973	E
		132203	14933	41.53	93.65	286.00	1938–1992	B
	Dubuque	132369	14934	42.50	90.67	195.00	1893–1951	D
		132367	94908	42.40	90.70	324.00	1951–1992	C
	Sioux City	13SIUC	14987	42.50	96.40	338.00	1893–1941	D
		137708	14943	42.40	96.38	336.00	1940–1992	C

Table 1 (continued)

State[a]	Station name	NCDC[b] station no.	WBAN[c] sta. no.	Lat.[d] (° N)	Long.[d] (° W)	Elev.[e] (m)	Period of Record	Record Completeness[f]
ID	Boise	10BOIC	99999	43.62	116.20	827.00	1898–1939	D
		101022	24131	43.57	116.22	865.00	1938–1992	C
	Lewiston	105236	94154	46.42	117.03	264.00	1900–1947	D
		105241	24149	46.38	117.02	438.00	1947–1992	B
	Pocatello	10PIHC	99999	42.87	112.48	1362.00	1899–1940	D
		107211	24156	42.92	112.60	1358.00	1938–1992	C
IL	Cairo	111166	93809	37.00	89.17	95.00	1893–1992	D
	Chicago	111582	14881	41.88	87.63	181.00	1893–1925	C
		111572	14892	41.78	87.60	181.00	1916–1948[g]	E
		111549	94846	41.98	87.90	205.00	1958–1992[g]	A
	Moline	115751	14923	41.45	90.50	177.00	1931–1992	D
	Peoria	11PIAC	14874	40.72	89.60	183.00	1905–1943	D
		116711	14842	40.67	89.68	198.00	1935–1992	B
	Springfield	118179	93822	39.85	89.68	181.00	1935–1992	B
		118184	93896	39.80	89.65	182.00	1893–1950	D
IN	Evansville	12EVVC	99999	37.97	87.55	118.00	1897–1940	D
		122738	93817	38.05	87.53	116.00	1941–1992	A
	Fort Wayne	123024	99999	41.08	85.17	237.00	1911–1946	D
		123037	14827	41.00	85.20	243.00	1942–1992	B
	Indianapolis	124264	93892	39.77	86.17	219.00	1893–1954	D
		124259	93819	39.73	86.27	241.00	1940–1992	B
	Terre Haute	12HUFC	99999	39.48	87.40	152.00	1912–1935	A
		12HUFC	99999	39.48	87.40	153.00	1935–1947	C
		128725	93823	39.45	87.30	177.00	1947–1948	B
		128725	93823	39.45	87.30	181.00	1948–1954	B
KS	Concordia	141769	99999	39.57	97.67	419.00	1893–1962	E
		141767	13984	39.55	97.65	448.00	1962–1992	A
	Dodge City	14DDCC	93016	37.75	100.02	769.00	1893–1942	D
		142164	13985	37.77	99.97	787.00	1942–1992	B
	Topeka	148172	93964	39.05	95.67	282.00	1899–1950	D
		148167	13996	39.07	95.63	267.00	1946–1992	B
	Wichita	14ICTC	93982	37.68	97.33	396.00	1893–1940	D
		148828	13998	37.63	97.27	418.00	1940–1953	D
		148830	03928	37.65	97.43	403.00	1953–1992	B
KY	Cincinnati/ Northern Kentucky	151855	93814	39.07	84.67	270.00	1948–1992	A
	Lexington	15LEXC	99999	38.03	84.55	306.00	1893–1944	D
		154746	93820	38.03	84.60	295.00	1944–1992	B

Table 1 (continued)

State[a]	Station name	NCDC[b] station no.	WBAN[c] sta. no.	Lat.[d] (° N)	Long.[d] (° W)	Elev.[e] (m)	Period of Record	Record Completeness[f]
KY	Louisville	154956	93893	38.25	85.77	139.00	1893–1954	D
		154951	13810	38.22	85.67	165.00	1938–1947	C
		154954	93821	38.18	85.73	145.00	1947–1992	A
LA	New Orleans	166659	12930	29.95	90.08	1.00	1897–1979	B
		166660	12916	29.98	90.25	1.00	1948–1992	A
	Shreveport	16SHVC	93936	32.50	93.67	60.00	1894–1941	D
		168440	13957	32.47	93.82	77.00	1942–1992	A
MA	Boston	190775	94701	42.35	71.07	6.00	1893–1947	D
		190770	14739	42.37	71.03	6.00	1942–1991	B
	Nantucket	19TUKC	94771	41.28	70.10	13.00	1893–1946	D
		195159	14756	41.25	70.07	15.00	1946–1948	C
		195159	14756	41.25	70.07	13.00	1948–1981	E
MD	Baltimore-Washington DC	180465	93721	39.18	76.67	60.00	1950–1992	A
	Baltimore	180470	13777	39.28	76.62	4.00	1893–1988	E
ME	Eastport	172426	14608	44.90	66.98	23.00	1893–1948	D
	Portland	17PWMC	94734	43.65	70.25	14.00	1893–1940	C
		176905	14764	43.65	70.32	17.00	1940–1992	B
MI	Alpena	200169	14814	45.07	83.43	79.00	1893–1958	E
		200164	94849	45.07	83.57	210.00	1959–1992	B
	Detroit	20DETC	14883	42.33	83.05	183.00	1893–1933	C
		202102	14822	42.40	83.00	189.00	1934–1966	D
		202103	94847	42.23	83.33	193.00	1958–1992	B
	East Lansing	202394	14884	42.73	84.48	261.00	1910–1958	E
	Escanaba	202626	14824	45.75	87.05	188.00	1898–1936	D
		202626	14824	45.75	87.05	184.00	1937	F
		202626	14824	45.75	87.05	188.00	1938–1963	E
	Grand Rapids	203332	14830	42.90	85.67	208.00	1939–1963	E
		203333	94860	42.88	85.52	216.00	1963–1992	B
		203337	14885	42.97	85.67	194.00	1903–1955	E
	Lansing	204641	14836	42.78	84.60	265.00	1948–1979	E
		204641	14836	42.77	84.60	265.00	1979–1992	A
	Marquette	205178	14838	46.57	87.40	206.00	1893–1978	E
		205184	94850	46.53	87.55	431.00	1979–1992	A
	Sault Ste Marie	20SSMC	99999	46.50	84.35	185.00	1893–1941	D
		207366	14847	46.47	84.37	221.00	1939–1992	B

Table 1 (continued)

State[a]	Station name	NCDC[b] station no.	WBAN[c] sta. no.	Lat.[d] (° N)	Long.[d] (° W)	Elev.[e] (m)	Period of Record	Record Completeness[f]
MN	Duluth	212253	14959	46.78	92.10	354.00	1893–1959	E
		212248	14913	46.83	92.18	435.00	1945–1992	B
	Minneapolis	21MSPC	14961	44.98	93.30	256.00	1899–1938	C
		215435	14922	44.88	93.22	254.00	1938–1992	B
	Moorhead	215589	99999	46.87	96.73	275.00	1893–1942	C
	Rochester	217004	14925	43.92	92.50	395.00	1939–1992	D
MO	Columbia	231795	93958	38.95	92.33	223.00	1893–1950	C
		231790	13983	38.97	92.37	237.00	1940–1969	E
		231791	03945	38.82	92.22	270.00	1969–1992	B
	Kansas City	23MKCC	93972	39.08	94.58	245.00	1893–1933	C
		234359	13988	39.12	94.60	226.00	1934–1972	C
		234358	03947	39.32	94.72	297.00	1972–1992	B
	Springfield	23SGFC	93981	37.20	93.30	396.00	1893–1940	D
		237976	13995	37.23	93.38	387.00	1940–1992	B
	St. Louis	237460	93963	38.63	90.20	142.00	1893–1968	D
		237455	13994	38.75	90.37	163.00	1939–1992	C
MS	Jackson	224462	99999	32.28	90.18	62.00	1915–1939	E
		224467	13956	32.33	90.22	93.00	1940–1963	B
		224472	03940	32.32	90.08	101.00	1963–1992	B
	Meridian	225772	13854	32.35	88.67	116.00	1893–1948	C
		225776	13865	32.33	88.75	88.00	1948–1992	A
	Vicksburg	229220	93917	32.35	90.88	75.00	1893–1936	E
		229220	93917	32.35	90.88	90.00	1937–1967	E
MT	Billings	240807	24033	45.80	108.53	1088.00	1939–1992	B
	Great Falls	243749	99999	47.52	111.30	1021.00	1938–1956	E
		243751	24143	47.48	111.37	1117.00	1942–1992	B
	Havre	243994	24035	48.57	109.67	758.00	1893–1961	D
		243996	94012	48.55	109.77	788.00	1961–1992	C
	Helena	244057	94104	46.58	112.03	1247.00	1893–1940	D
		244055	24144	46.58	112.00	1187.00	1940–1992	B
	Kalispell	244563	99999	48.20	114.30	906.00	1899–1949	D
		244558	24146	48.30	114.27	904.00	1949–1992	A
	Miles City	245685	99999	46.40	105.82	719.00	1893–1968	E
		245690	24037	46.43	105.87	802.00	1939–1990	C
	Missoula	24MSOC	94105	46.87	114.00	981.00	1935–1944	C
		245745	24153	46.92	114.08	973.00	1939–1992	B
NC	Asheville	310301	13872	35.60	82.53	683.00	1902–1964	D
		310300	03812	35.43	82.55	652.00	1964–1992	A
	Cape Hatteras	311458	93729	35.27	75.55	3.00	1957–1992	A

Table 1 (continued)

State[a]	Station name	NCDC[b] station no.	WBAN[c] sta. no.	Lat.[d] (° N)	Long.[d] (° W)	Elev.[e] (m)	Period of Record	Record Completeness[f]
NC	Charlotte	311695	93849	35.23	80.85	226.00	1893–1951	D
		311690	13881	35.22	80.93	213.00	1940–1992	E
	Greensboro	31GSOV	99999	36.07	79.82	257.00	1929–1946	D
		313630	13723	36.08	79.95	270.00	1942–1992	B
	Hatteras	313897	13745	35.22	75.68	1.00	1893–1988	D
	Raleigh/Durham	31RDUA	99999	35.78	78.63	122.00	1941–1944	D
	Raleigh	317079	13784	35.45	78.62	105.00	1893–1954	E
		317069	13722	35.87	78.78	115.00	1944–1992	B
	Wilmington	319462	99999	34.23	77.95	9.75	1894–1931	D
		319462	99999	34.23	77.95	2.44	1931–1951	C
		319457	13748	34.23	77.95	9.14	1951–1963	A
		319457	13748	34.23	77.95	8.53	1963–1979	A
		319457	13748	34.23	77.95	9.14	1979–1992	A
ND	Bismarck	320814	99999	46.80	100.80	509.00	1893–1953	E
		320819	24011	46.77	100.75	502.00	1939–1992	B
	Devils Lake	322158	14912	48.12	98.87	448.00	1904–1948	C
		322158	14912	48.12	98.87	446.00	1948–1963	E
	Fargo	322859	14914	46.90	96.80	274.00	1938–1992	A
	Williston	32ISNC	24014	48.15	103.62	572.00	1893–1962	C
		329425	94014	48.18	103.63	579.00	1962–1992	A
NE	Grand Island	253395	14935	40.97	98.30	561.00	1948–1992	A
	Lincoln	254815	14971	40.82	96.70	351.00	1897–1992	E
		254795	14939	40.85	96.75	363.00	1939–1992	E
	North Platte	256070	24055	41.13	100.75	855.00	1893–1949	D
		256065	24023	41.13	100.68	846.00	1948–1992	A
	Omaha	25OMAV	14983	41.27	95.93	311.00	1893–1935	C
		256255	14942	41.30	95.90	299.00	1935–1992	C
		256260	94918	41.37	96.02	399.00	1963–1992	C
	Valentine	25VINC	24032	42.88	100.55	787.00	1893–1955[g]	E
		258760	24032	42.87	100.55	789.00	1963–1992[g]	A
NH	Concord	27CONC	94756	43.20	71.53	82.00	1902–1941	D
		271683	14745	43.20	71.50	105.00	1941–1992	A
	Mt. Washington	275639	14755	44.27	71.30	1909.00	1937–1992	B
NJ	Atlantic City	280325	13724	39.38	74.43	3.00	1893–1992	E
		280311	93730	39.45	74.57	42.00	1958–1992	A
	Trenton	288883	14773	40.22	74.77	58.00	1913–1932	D
		288883	14773	40.22	74.77	42.00	1933–1948	D
		288883	14773	40.22	74.77	57.00	1948–1981	E

Table 1 (continued)

State[a]	Station name	NCDC[b] station no.	WBAN[c] sta. no.	Lat.[d] (° N)	Long.[d] (° W)	Elev.[e] (m)	Period of Record	Record Completeness[f]
NM	Albuquerque	29ABQC	23073	35.08	106.65	1512.00	1919–1932	D
		290234	23050	35.05	106.62	1619.00	1933–1992	C
	Roswell	29ROWC	99999	33.40	104.53	1086.00	1904–1947	D
		297609	23043	33.40	104.53	1101.00	1947–1972	B
		297610	23009	33.30	104.53	1119.00	1973–1992	A
NV	Ely	262631	23154	39.28	114.85	1909.00	1938–1992	C
	Las Vegas	264434	23173	36.23	115.03	573.00	1939–1948	B
		264436	23169	36.08	115.17	659.00	1949–1992	A
	Reno	26RNOC	99999	39.53	119.82	1369.00	1905–1942	D
		266779	23185	39.50	119.78	1343.00	1939–1992	B
	Winnemucca	26WMCC	24129	40.97	117.72	1307.00	1893–1949	D
		269171	24128	40.90	117.80	1310.00	1949–1992	A
NY	Albany	300047	14796	42.65	73.75	6.00	1893–1942	C
		300042	14735	42.75	73.80	84.00	1938–1992	B
	Binghamton	300691	14798	42.10	75.92	262.00	1896–1968	E
		300686	14738	42.08	76.10	252.00	1942–1951	C
		300687	04725	42.22	75.98	488.00	1951–1992	B
	Buffalo	30BUFC	94753	42.88	78.88	184.00	1893–1943	B
		301012	14733	42.93	78.73	215.00	1943–1992	B
	NYC	305816	94706	40.77	73.98	21.00	1893–1948	C
		305811	14732	40.77	73.90	3.00	1947–1992	A
	Oswego	306314	14759	43.45	76.52	102.00	1893–1948	D
	Rochester	30ROCC	94777	43.15	77.62	151.00	1893–1940	C
		307167	14768	43.12	77.67	167.00	1940–1992	B
	Syracuse	30SYRC	94781	43.05	76.15	122.00	1902–1940	C
		308383	14771	43.12	76.12	128.00	1940–1992	B
OH	Akron	330063	14813	41.03	81.45	318.00	1944–1951	D
	Akron/Canton	330058	14895	40.92	81.43	368.00	1948–1992	A
	Cincinnati	331581	03871	39.10	84.52	169.00	1893–1970	E
		331561	93890	39.15	84.52	232.00	1915–1980	E
	Cleveland	331662	14882	41.50	81.70	198.00	1893–1941	C
		331657	14820	41.42	81.87	237.00	1941–1992	B
	Columbus	331788	93891	39.97	83.00	221.00	1893–1973	D
		331786	14821	40.00	82.88	247.00	1939–1992	E
	Dayton	33DAYC	99999	39.77	84.20	226.00	1911–1943	C
		338598	99999	39.90	84.20	305.00	1942–1950	C
		332075	93815	39.90	84.20	306.00	1950–1992	A
	Sandusky	337447	14846	41.45	82.72	192.00	1893–1963	E

Table 1 (continued)

State[a]	Station name	NCDC[b] station no.	WBAN[c] sta. no.	Lat.[d] (° N)	Long.[d] (° W)	Elev.[e] (m)	Period of Record	Record Completeness[f]
OH	Toledo	338366	14889	41.65	83.53	180.00	1893–1943	C
		338356	14849	41.57	83.47	190.00	1939–1954	B
		338357	94830	41.58	83.80	204.00	1955–1992	A
OK	Oklahoma City	346656	93954	35.48	97.53	382.00	1893–1948	A
		346661	13967	35.40	97.60	390.00	1948–1992	A
	Tulsa	348992	13968	36.18	95.90	204.00	1938–1992	E
OR	Baker	350417	24199	44.77	117.85	1057.00	1893–1939	E
		350412	24130	44.83	117.82	1028.00	1939–1948	D
		350412	24130	44.83	117.82	1026.00	1948–1953	C
	Medford	35MFRC	99999	42.33	122.85	420.00	1929	G
		355429	24225	42.38	122.88	396.00	1930–1992	C
	Portland	356761	27274	45.53	122.67	9.00	1893–1973	D
		356751	24229	45.60	122.60	6.00	1940–1992	B
	Roseberg	357326	24231	43.23	123.37	155.00	1893–1952	E
		357326	24231	43.23	123.37	154.00	1953–1964	A
PA	Erie	362677	14893	42.12	80.08	200.00	1893–1952	D
		362682	14860	42.08	80.18	223.00	1946–1992	E
	Harrisburg	363710	94718	40.27	76.88	102.00	1893–1942	D
		363699	14751	40.22	76.85	104.00	1939–1991	C
	Philadelphia	366909	13779	39.95	75.15	11.00	1893–1964	E
		366889	13739	39.88	75.23	3.00	1940–1992	C
	Pittsburgh	366997	14861	40.45	80.00	228.00	1893–1978	E
		366992	14762	40.35	79.93	382.00	1939–1952	B
		366993	94823	40.50	80.22	351.00	1952–1992	B
	Reading	367318	14767	40.33	75.97	98.00	1912–1932	D
		367318	14767	40.33	75.97	157.00	1933–1939	D
		367318	14767	40.33	75.97	88.00	1940–1969	E
	Scranton	367902	14769	41.42	75.67	227.00	1900–1954	E
	Wilkes–Barre	367905	14777	41.33	75.73	283.00	1955–1992	A
RI	Block Island	37BIDC	14799	41.17	71.57	11.00	1893–1950[g]	D
		370896	94793	41.17	71.58	34.00	1962–1992[g]	E
	Providence	376703	94707	41.83	71.42	4.00	1904–1953	D
		376698	14765	41.73	71.43	16.00	1942–1992	E
SC	Charleston	381549	13782	32.78	79.93	3.00	1893–1992	E
		381544	13880	32.9	80.03	13.00	1948–1992	A
	Columbia	381944	93851	34.00	81.05	101.00	1899–1954	D
		381939	13883	33.95	81.12	65.00	1948–1992	A

Table 1 (continued)

State[a]	Station name	NCDC[b] station no.	WBAN[c] sta. no.	Lat.[d] (° N)	Long.[d] (° W)	Elev.[e] (m)	Period of Record	Record Completeness[f]
SC	Greenville/ Spartanburg	383747	03870	34.90	82.22	297.00	1962–1992	B
	Greenville	383742	13886	34.85	82.35	310.00	1942–1962	B
	Greer	38GSPC	99999	34.83	82.40	296.00	1917–1941	C
SD	Huron	39HONC	14968	44.37	98.22	389.00	1893–1941	C
		394127	14936	44.38	98.22	391.00	1933–1992	A
	Rapid City	396947	24056	44.07	103.20	988.00	1906–1942	C
		396937	24026	44.05	103.07	964.00	1939–1992	B
TN	Chattanooga	40CHAC	99999	35.07	85.23	225.00	1893–1940[g]	D
		401656	13882	35.03	85.20	211.00	1942–1992[g]	B
	Knoxville	40TYSC	99999	35.97	83.92	281.00	1893–1942	C
		404950	13891	35.80	84.00	289.00	1938–1992	B
	Memphis	405964	93916	35.15	90.05	83.00	1893–1965	D
		405954	13893	35.05	90.00	87.00	1940–1992	B
	Nashville	406407	93858	36.17	86.78	152.00	1893–1950	D
		406402	13897	36.12	86.68	177.00	1940–1992	C
TX	Abilene	41ABIC	93922	32.45	99.73	526.00	1893–1944	D
		410016	13962	32.42	99.68	544.00	1944–1992	B
	Amarillo	41AMAC	23075	35.22	101.83	1115.00	1893–1941	D
		410211	23047	35.23	101.70	1095.00	1939–1992	C
	Austin	41AUSC	93923	30.28	97.73	151.00	1928–1942[g]	B
		410428	13958	30.30	97.70	182.00	1944–1992[g]	A
	Big Spring	410786	23041	32.23	101.50	773.00	1932–1949	E
		410786	23041	32.23	101.50	784.00	1950–1953	B
	Corpus Christi	412014	12940	27.80	97.40	5.00	1895–1948	E
		412015	12924	27.77	97.50	13.00	1948–1992	A
	Dallas- Fort Worth	412242	03927	32.90	97.03	168.00	1974–1992	B
	Dallas	41DALC	93928	32.77	96.78	132.00	1915–1940[g]	D
		412244	13960	32.85	96.85	145.00	1942–1992[g]	E
	Del Rio	412357	22004	29.37	100.90	287.00	1909–1963	E
		412360	22010	29.37	100.92	314.00	1963–1992	A
	El Paso	41EPLC	23080	31.78	106.50	1131.00	1893–1942	D
		412797	23044	31.80	106.40	1195.00	1943–1992	B
	Fort Worth	413285	99999	32.75	97.33	188.00	1898–1939	D
		413284	13961	32.82	97.35	210.00	1940–1992	E
		413283	99999	32.83	97.05	164.00	1953–1974	A
	Galveston	413430	12944	29.30	94.80	2.00	1895–1992	E

Table 1 (continued)

State[a]	Station name	NCDC[b] station no.	WBAN[c] sta. no.	Lat.[d] (° N)	Long.[d] (° W)	Elev.[e] (m)	Period of Record	Record Completeness[f]
TX	Houston	414305	12945	25.77	95.37	12.00	1909–1988	E
		414307	12918	29.65	95.28	15.00	1948–1969	B
		414300	12960	29.97	95.35	29.00	1969–1992	A
	Lubbock	415411	23042	33.65	101.82	992.00	1938–1992	E
	Palestine	416757	93914	31.75	95.67	158.00	1893–1952	E
	Port Arthur	417173	12943	29.87	93.93	1.52	1918–1953	C
		417174	12917	29.95	94.02	4.00	1948–1992	A
	San Antonio	41SATC	12938	29.45	98.47	199.00	1895–1940	C
		417945	12921	29.53	98.47	242.00	1940–1992	B
UT	Milford	425654	23176	38.43	113.02	1533.00	1938–1992	D
	Salt Lake City	427603	24175	40.77	111.90	1298.00	1893–1954	E
		427598	24127	40.78	111.95	1287.00	1935–1992	C
VA	Cape Henry	441362	13727	36.93	76.00	2.00	1899–1901	D
		441362	13727	36.93	76.00	13.00	1902–1948	E
	Washington, DC	448904	93725	38.90	77.05	22.00	1893–1951	D
		448906	13743	38.85	77.03	3.00	1945–1992	B
	Lynchburg	44LYHC	93708	37.42	79.15	187.00	1893–1944	D
		445120	13733	37.33	79.20	280.00	1944–1992	B
	Norfolk	446144	13778	36.87	76.28	3.00	1893–1965	D
		446139	13737	36.90	76.20	7.00	1941–1992	B
	Richmond	447206	13780	37.53	77.42	49.00	1898–1953	D
		447201	13740	37.50	77.33	50.00	1925–1992	B
VT	Burlington	43BTVC	94712	44.48	73.18	121.00	1906–1943	C
		431081	14742	44.47	73.15	101.00	1943–1992	B
WA	North Head	455932	24226	46.30	124.08	64.00	1903–1953	E
	Seattle/Tacoma	457473	24233	47.45	122.30	137.00	1944–1992	B
	Seattle	457488	99999	47.60	122.33	4.00	1894–1972	D
		457458	24281	47.65	122.30	6.00	1973–1992	A
	Spokane	45SKAC	99999	47.67	117.42	578.00	1893–1940	C
		457938	24157	47.63	117.53	718.00	1939–1992	C
	Tacoma	458286	24239	47.25	122.43	65.00	1897–1922	D
		458286	24239	47.25	122.43	77.00	1923–1948	E
		458286	24239	47.25	122.43	82.00	1948–1953	E
	Tatoosh Island	458332	24240	48.38	124.73	35.00	1893–1966	E
	Walla Walla	458931	94103	46.03	118.33	289.00	1893–1988	E
WI	Green Bay	47GRBC	14831	44.52	87.98	181.00	1893–1949	C
		473269	14898	44.48	88.13	208.00	1949–1992	A

Table 1 (continued)

State[a]	Station name	NCDC[b] station no.	WBAN[c] sta. no.	Lat.[d] (° N)	Long.[d] (° W)	Elev.[e] (m)	Period of Record	Record Completeness[f]
WI	La Crosse	474375	14960	43.82	91.25	205.00	1893–1951	D
		474370	14920	43.87	91.25	200.00	1939–1992	B
	Madison	474966	14887	43.08	89.40	286.00	1904–1963	E
		474961	14837	43.13	89.33	262.00	1939–1992	B
	Milwaukee	475484	14888	43.03	87.90	189.00	1893–1953	D
		475479	14839	42.95	87.90	205.00	1939–1992	B
WV	Elkins	46EKNC	99999	38.93	79.85	587.00	1899–1944	C
		462718	13729	38.87	79.85	600.00	1944–1992	E
	Parkersburg	466859	13867	39.27	81.57	187.00	1893–1919	D
		466859	13867	39.27	81.57	205.00	1919–1948	D
		466859	13867	39.27	81.57	201.00	1948–1982	E
WY	Cheyenne	48CYSC	24068	41.13	104.80	1852.00	1893–1935	B
		481675	24018	41.15	104.82	1866.00	1935–1992	B
	Lander	48LNDC	24075	42.83	108.73	1631.00	1893–1946	C
		485390	24021	42.82	108.73	1637.00	1946–1992	B
	Sheridan	48SHRC	24058	44.80	106.95	1150.00	1907–1940	B
		488155	24029	44.70	7106.97	1209.00	1940–1992	B

[a]See Appendix A for a list of the state codes, state abbreviations, and state names.

[b]National Climatic Data Center.

[c]Weather Bureau Army Navy station number. "99999" indicates no WBAN number assigned.

[d]Values for latitude and longitude are in decimal degrees. The value "–99.99" indicates a missing coordinate.

[e]Values for elevation are in meters above sea level. The value "–99.99" indicates a missing elevation.

[f]The Record Completeness categories grossly characterize the usefulness of the data as follows:
A = There are seven or more months of data in every year of the particular station number's record;
B = The first year or two of the record is missing one or two months of data, or one or two years in the middle or at the end of the record is missing one month of data, but the remaining years in the station record have seven or more months of data;
C = Several years are missing one to three months of data;
D = Many years are missing at least one and usually many months of data;
E = One or more years are missing in the station record;
F = The one-year station record has seven months of winter season data; and
G = The one-year station record has less than seven months of winter season data.

[g]Station move(s) resulted in the historical record for this general location being discontinuous.

3. QUALITY ASSURANCE OF THE U.S. DAILY SNOW DEPTH DATABASE

An important part of the numeric data packaging process at the Carbon Dioxide Information Analysis Center (CDIAC) involves the quality assurance (QA) of data before distribution. Data received by CDIAC are rarely in a condition that would permit immediate distribution, regardless of their source. To guarantee data of the highest possible quality, CDIAC performs extensive QA reviews that involve examining the data for completeness, reasonableness, and accuracy. NCDC conducted extensive manual and automated QA assessments of the snow depth data before sending the data to CDIAC. Although the data sent by NCDC were in excellent condition, CDIAC still conducted QA checks on the data and found a few minor discrepancies. The following summarizes the QA work performed by NCDC and CDIAC, respectively.

NCDC QA CHECKS AND ADJUSTMENTS

1. NCDC performed a manual review of
   - snow depths that were 40 or more in. greater than the previous day's depth and
   - snow depths from months whose total increase in snow depth (plus an additional 10 in.) over the previous month's snow depth was less than the reported *snowfall* total for the month.

2. Differences between daily snow depth values were computed and summed. This represented a quasi-snowfall total for the month, which was compared to an independent data set containing actual total monthly snowfall. Whenever the *computed* snowfall (estimated from snow depth differences) exceeded the actual total, a manual review was performed. Instances of "carryover" of snow depth between months were taken into account.

3. During the manual review process by NCDC, numerous instances were detected where the suspicious snow depth amounts were determined to include either drifted snow or sleet. In some cases, the editor could substitute an estimate which excluded the extra amount; this estimated value was assigned a data measurement flag of "E." If it was not possible to substitute an estimated value, the snow depth value was flagged with an "L" to reflect the inclusion of sleet. No uniform method of detecting drifts or sleet was used, as additional parameters (e.g., temperature and present weather) would have been needed to conduct a comprehensive determination.

CDIAC QA CHECKS AND MODIFICATIONS

1. The logical record length of the snow depth data files was decreased from 402 to 270 characters. This was accomplished mainly by compressing the width of each daily data field so that it contained fewer blank characters.

2. Because each record in the snow depth database contains 31 daily data elements (to allow for 31 days in a month), elements pertaining to nonexistent dates were checked for missing data indicators with blank flag spaces (the prescribed conventions).

3. A few data measurement and data quality flags were found that were not included in the documentation provided by NCDC. Close examination of the records in question revealed

that these undocumented flag values were likely the result of data entry errors. The records containing these flags were corrected and the information forwarded to NCDC for corroboration.

4. All data records were checked to ensure that the number of days in the month (specified in each record) was correct for the year and month of each record.

5. Records of stations with data for only seven months per year were examined to confirm that the seven months were the winter months. If not, the records were flagged with the appropriate record completeness flag (see Table 1).

6. Snow depths of 20 or more in. greater than the previous day's depth were examined for reasonableness, usually by checking the daily values for several days in sequence. In addition, values were often compared with daily snow depths from stations at nearby locations (where possible) for the period in question to look for a similar pattern in daily snow depths.

7. Snow depths of greater than 100 in. were checked to make sure these values were possible for the particular station location and date and were consistent with depths reported on earlier and later days for that station.

8. Questionable records, such as the few records with possible input errors, were compared with records in NCDC's *Summary of the Day–First Order* online database (NCDC Tape Deck 3210) (http://www.ncdc.noaa.gov/pub/data/fsod/).

9. In general, it was noted that most snow depth records from 1948 to the present have at least the seven winter months of data per year.

4. HOW TO OBTAIN THE DATA PACKAGE

The U.S. daily snow depth database is available free of charge from CDIAC. The files are available on 8–mm tape or quarter-inch tape cartridge, via CDIAC's anonymous file transfer protocol (FTP) service, or via the World Wide Web. (Users are asked to contact CDIAC for assistance if these mediums are not suited to their particular computing environment.) A sampling of commands used to obtain the station inventory file (INVENT.DAT) from this database via FTP follows. CDIAC FTP server responses are shown in italics; user entries are bolded. For a full description of commands, contact CDIAC.

>ftp cdiac.esd.ornl.gov or **>ftp 128.219.24.39**
Name: **anonymous**
Password: **YOU@your internet address**
Guest login ok, access restrictions apply.
ftp> **cd /pub/ndp059**
ftp> **dir**
ftp> **get invent.dat**
ftp> **quit**
ftp> Goodbye

The database can also be obtained via the World Wide Web. The uniform resource locator (URL) for CDIAC's homepage is **http://cdiac.esd.ornl.gov**.

For non-Internet data acquisitions, users may request data from CDIAC using the following information:

Address: Carbon Dioxide Information Analysis Center
Oak Ridge National Laboratory
Post Office Box 2008
Oak Ridge, Tennessee 37831-6335, U.S.A.

Telephone: 423-574-3645 (Voice)
423-574-2232 (Fax)

Electronic Mail: Internet: cdiac@ornl.gov

5. REFERENCES

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Karl, T. R., P. Y. Groisman, R. W. Knight, and R. R. Heim, Jr. 1993. Recent variations of snow cover and snowfall in North America and their relation to precipitation and temperature variations. J. Climate 6:1327–44.

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Nicholls, N., G. V. Gruza, J. Jouzel, T. R. Karl, L. A. Ogallo, and D. E. Parker. 1996. Observed climate variability and change. pp. 133–92. In J. T. Houghton, L. G. Meira Filho, B. A. Callander, N. Harris, A. Kattenberg, and K. Maskell (eds.), IPCC, Climate Change 1995: The Science of Climate Change. Cambridge University Press, Cambridge, U.K.

Steurer, P. M., and T. R. Karl. 1991. Historical sunshine and cloud data in the United States. ORNL/CDIAC-43, NDP-021/R1. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

PART 2

CONTENT AND FORMAT OF DATA FILES

6. FILE DESCRIPTIONS

This section describes the content and format of each of the 13 files that comprise this numeric data package (NDP) (Table 2). File names and numbers and brief descriptions of the files follow.

- **NDP059.DOC** (File 1) describes the details of the database. It contains the text from Sects. 1–7 of this document.
- **INVENT.FOR** (File 2) contains a FORTRAN 77 program for reading **INVENT.DAT** (File 6).
- **DATA.FOR** (File 3) contains a FORTRAN 77 program for reading any of the snow depth data files: **SNOWDPTH.DAT, WEST.DAT, HPLAINS.DAT, SOUTH.DAT, MIDWEST.DAT, SEAST.DAT**, and **NEAST.DAT** (Files 7–13).
- **INVENT.SAS** (File 4) contains a SAS® program for reading **INVENT.DAT** (File 6).
- **DATA.SAS** (File 5) contains a SAS® program for reading any of the snow depth data files.
- **INVENT.DAT** (File 6) contains the state abbreviation, station name, NCDC station number, WBAN station number, latitude, longitude, elevation, beginning year of record, ending year of record, and a data completeness flag for each station record.
- **SNOWDPTH.DAT** (File 7) contains daily snow depth data for 388 unique sampling sites (195 NWS "first-order" stations). For the user's convenience, we have also divided the complete snow depth data set into six regional data sets that are listed as follows. These geographic groupings parallel regions associated with the NWS's six Regional Climate Centers (RCCs),[1] which were established to meet local and regional needs for climate information (see Fig. 2). The extended file descriptions given later in this section provide detailed descriptions of the regions.
- **WEST.DAT** (File 8) contains daily snow depth data for 41 NWS first order-stations in the Western RCC.
- **HPLAINS.DAT** (File 9) contains daily snow depth data for 21 NWS first order-stations in the High Plains RCC.
- **SOUTH.DAT** (File 10) contains daily snow depth data for 29 NWS first order-stations in the Southern RCC.
- **MIDWEST.DAT** (File 11) contains daily snow depth data for 45 NWS first order-stations in the Midwestern RCC.
- **SEAST.DAT** (File 12) contains daily snow depth data for 27 NWS first order-stations in the Southeast RCC.
- **NEAST.DAT** (File 13) contains daily snow depth data for 32 NWS first order-stations in the Northeast RCC.

[1]On the World Wide Web, see the URL http://nic.fb4.noaa.gov/products/regional_climate/index.html

Table 2. Size and format information for the NDP files

File number and description[a]	File size[b] (kB)	Logical records	Record length
1. **NDP059.DOC**: Electronic version of Sects. 1–7 of this document. Describes the database.	66.56	1485	80
2. **INVENT.FOR**: FORTRAN 77 program for reading **INVENT.DAT**.	0.74	28	80
3. **DATA.FOR**: FORTRAN 77 program for reading any of the snow depth data files.	1.86	54	80
4. **INVENT.SAS**: SAS® program for reading **INVENT.DAT**.	0.29	12	80
5. **DATA.SAS**: SAS® program for reading any of the snow depth data files.	1.31	41	80
6. **INVENT.DAT**: Contains station location data and period of record information for each of the 195 NWS first-order stations (388 unique sampling sites).	27.16	388	69
7. **SNOWDPTH.DAT**: Contains daily snow depth data for all stations in the database: 195 NWS first-order stations (388 unique sampling sites).	39,770	146,752	270
8. **WEST.DAT**: Contains daily snow depth data for 41 first-order stations (81 unique sampling sites) in the Western RCC.	8,015	29,577	270
9. **HPLAINS.DAT**: Contains daily snow depth data for 21 first-order stations (43 unique sampling sites) in the High Plains RCC.	4,906	18,105	270

Table 2 (continued)

File number and description[a]	File size[b] (kB)	Logical records	Record length
10. **SOUTH.DAT**: Contains daily snow depth data for 29 first-order stations (56 unique sampling sites) in the Southern RCC.	5,920	21,844	270
11. **MIDWEST.DAT**: Contains daily snow depth data for 45 first-order stations (94 unique sampling sites) in the Midwestern RCC.	9,358	34,532	270
12. **SEAST.DAT**: Contains daily snow depth data for 27 first-order stations (51 unique sampling sites) in the Southeast RCC.	5,592	20,633	270
13. **NEAST.DAT**: Contains daily snow depth data for 32 first-order stations (63 unique sampling sites) in the Northeast RCC.	5,979	22,061	270

[a]RCC = Regional Climate Center

[b]Approximate size of files in noncompressed form. Files in CDIAC's anonymous ftp area are compressed and are ~6% this size.

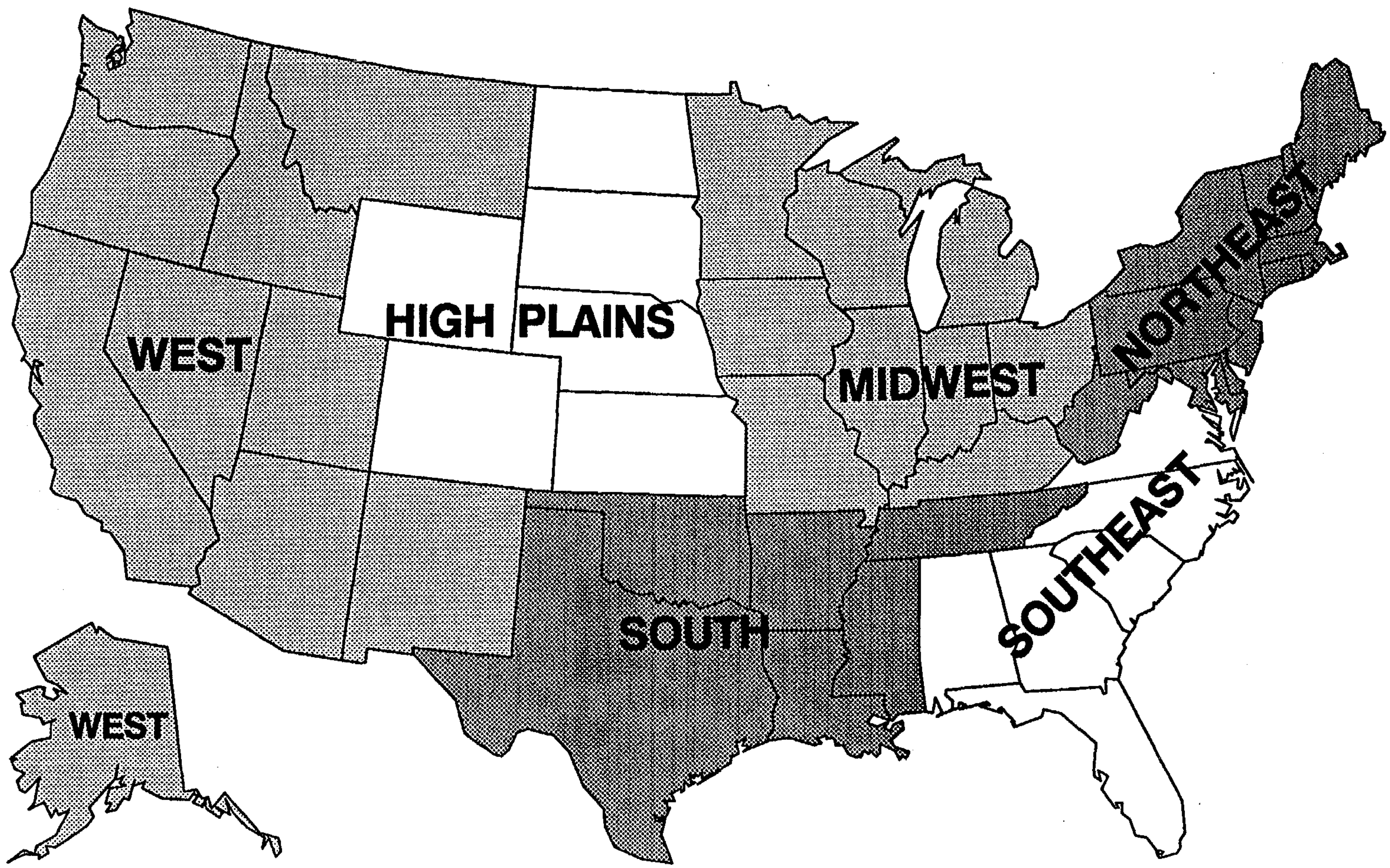

Fig. 2. States included in each of the six regional snow depth data files.

NDP059.DOC (FILE 1)

This file provides a detailed description of the database. It is an electronic version of Sects. 1–7 of this document (figures excluded).

INVENT.FOR (FILE 2)

This file contains the FORTRAN 77 program to read **INVENT.DAT** (File 6). The following is a listing of the program.

```
C *** FORTRAN CODE TO READ AND WRITE THE CONTENTS
C *** OF THE NDP059 INVENTORY OF SNOW DEPTH STATIONS
C
      INTEGER YRBEG,YREND
      REAL LAT, LON, ELEV
      CHARACTER*2 STATE
      CHARACTER*14 STA_NAME
      CHARACTER*6 STAID
      CHARACTER*5 WBAN
      CHARACTER*1 FLAG
C
C *** OPEN THE STATION INVENTORY FILE
      OPEN (UNIT=5, FILE='INVENT.DAT')
C *** OPEN THE OUTPUT FILE
      OPEN (UNIT=7, FILE='INVENT.OUT')
C
    1 CONTINUE
      READ(5,100,END=99)STATE,STA_NAME,STAID,WBAN,LAT,LON,ELEV,
     + YRBEG,YREND,FLAG
  100 FORMAT(A2,1X,A14,1X,A6,1X,A5,3X,F6.2,2(2X,F7.2),2(1X,I4),1X,A1)
C
      WRITE(7,100) STATE,STA_NAME,STAID,WBAN,LAT,LON,ELEV,
     + YRBEG,YREND,FLAG
C
      GO TO 1
   99 CONTINUE
      STOP
      END
```

DATA.FOR (FILE 3)

This file contains the FORTRAN 77 program to read any of the snow depth data files: **SNOWDPTH.DAT, WEST.DAT, HPLAINS.DAT, SOUTH.DAT, MIDWEST.DAT, SEAST.DAT,** and **NEAST.DAT.** The following is a listing of the program.

```
C *** FORTRAN CODE TO READ IN AND SELECTIVELY WRITE OUT DATA FROM
C *** ANY OF THE NDP059 SNOW DEPTH DATA FILES.
C
      INTEGER YEAR,MON,NUMDAYS,SNOWD(31)
      CHARACTER*1 SF(31),QCF1(31),QCF2(31)
      CHARACTER*2 UNITS
      CHARACTER*4 DATTYP
      CHARACTER*6 STAID
      CHARACTER*2 STCODE
C
C *** OPEN THE INPUT FILE (EXACT FILE NAME REQUIRES SPECIFICATION
C *** BY THE USER)
      OPEN (UNIT=5, FILE='SNOWDPTH.DAT')
```

```
C *** OPEN THE OUTPUT FILE (EXACT FILE NAME REQUIRES SPECIFICATION
C *** BY THE USER)
      OPEN (UNIT=7, FILE='SNOWDPTH.OUT')
C
    1 CONTINUE
      READ(5,100,END=99) STAID,DATTYP,UNITS,YEAR,MON,NUMDAYS,
     +                   (SF(I),SNOWD(I),QCF1(I),QCF2(I),I=1,31)
  100 FORMAT(A6,1X,A4,A2,I4,I2,1X,I2,31(1X,A1,I4,2A1))
C
C *** IF INDIVIDUAL STATE OR STATION DATA ARE REQUIRED, REMOVE COMMENTS
C     FROM THE EXECUTABLE STATEMENTS IN THE BLOCK OF CODE BELOW AND
C     SPECIFY THE PARTICULAR 2-CHARACTER STATE CODE OR 6-CHARACTER
C     STATION NUMBER (REMOVING THE Xs) IN THE APPROPRIATE "IF"
C     STATEMENT, AS REQUIRED, LEAVING THE OTHER "IF" STATEMENT COMMENTED
C     OUT.  IF SELECTING A SPECIFIC STATE OR STATION, DON'T FORGET TO
C     REMOVE THE COMMENT FROM THE "GO TO 1" STATEMENT.
C *******************************************************************
C
C *** STRIP OFF THE 2-CHARACTER STATE CODE FROM THE STATION NUMBER
C     STCODE=STAID(1:2)
C
C *** ONLY GO TO WRITE OUT THE DATA IF THE SELECTED STATE OR STATION
C *** IS FOUND
C     IF(STCODE.EQ.'XX') GO TO 2
C     IF(STAID.EQ.'XXXXXX') GO TO 2
C
C     GO TO 1
C ********************************************************************
    2 CONTINUE
C
      WRITE(7,200) STAID,DATTYP,UNITS,YEAR,MON,NUMDAYS,
     +             (SF(I),SNOWD(I),QCF1(I),QCF2(I),I=1,31)
  200 FORMAT(A6,1X,A4,A2,I4,I2.2,1X,I2.2,31(1X,A1,I4,2A1))
C
      GO TO 1
   99 CONTINUE
      STOP
      END
```

INVENT.SAS (FILE 4)

This file contains the SAS® program to read **INVENT.DAT** (File 6). The following is a listing of the program.

```
***SAS CODE TO READ AND PRINT THE NDP059 STATION INVENTORY FILE;
FILENAME OUT 'INVENT.OUT';
DATA INVENT;
INFILE 'INVENT.DAT';
*;
INPUT STATE $ 1-2 STA_NAME $ 4-17 STAID $ 19-24 WBAN 26-30
      LAT 34-39 LON 42-48 ELEV 51-57 YRBEG 59-62 YREND 64-67 FLAG $ 69;
*;
FILE OUT;
PUT _INFILE_;
RUN;
```

DATA.SAS (FILE 5)

This file contains the SAS® program to read the snow depth data sets. The following is a listing of the program.

```
***SAS CODE TO READ AND PRINT ANY OF THE NDP059
***SNOW DEPTH DATA FILES (FILES 7-13 OF NDP059).
***THE USER NEEDS TO SPECIFY THE DESIRED FILE NAME IN
***THE "FILENAME" AND "INFILE" STATEMENTS BELOW;
*;
*SET UP AN OUTPUT FILE;
FILENAME OUT 'WEST.OUT';
*;
DATA SNOW;
*SPECIFY THE INPUT FILE;
INFILE 'WEST.DAT' LRECL=270;
*;
ARRAY DATFIELD {31} $ FIELD1-FIELD31;
ARRAY SF{31} SF1-SF31;
ARRAY DMF {31} $ DMF1-DMF31;
ARRAY DQF {31} $ DQF1-DQF31;
ARRAY CHSNOW {31} $ 4 CHSNOW1-CHSNOW31;
ARRAY SNOWD  {31} SNOWD1-SNOWD31;
*;
INPUT @1 STAID $ 1-6 DATTYP $ 8-11 UNITS $ 12-13 YEAR 14-17
      MON 18-19 NUMDAYS 21-22 @23 (FIELD1-FIELD31) ($CHAR8.);
*;
*STATEMENTS IN THE LOOP BELOW EXTRACT CHARACTER
 VALUES OF SNOW DEPTH AND DATA FLAGS AND CONVERT
 THE CHARACTER SNOW DEPTH VALUE TO INTEGER;
DO I=1 TO 31;
  SF{I}=SUBSTR(DATFIELD{I},2,1);
  CHSNOW{I}=SUBSTR(DATFIELD{I},3,4);
*MAKE AN INTEGER VALUE OF SNOW DEPTH FROM THE CHARACTER VALUE;
  SNOWD{I}=INPUT(CHSNOW{I},4.);
  DMF{I}=SUBSTR(DATFIELD{I},7,1);
  DQF{I}=SUBSTR(DATFIELD{I},8,1);
END;
*;
*PRINT EACH LINE OF INPUT DATA (YIELDING 5 OUTPUT LINES), IF DESIRED;
FILE OUT;
PUT STAID 1-6 DATTYP 8-11 UNITS 12-13 YEAR 14-17 MON 18-19
    NUMDAYS 21-22 / @1  (FIELD1-FIELD10) ($CHAR8.) /
    @1 (FIELD11-FIELD20) ($CHAR8.) /
    @1 (FIELD21-FIELD30) ($CHAR8.) / @1 FIELD31 $CHAR8.;
RUN;
```

INVENT.DAT (FILE 6)

The station inventory file was developed by CDIAC from several sources. The NCDC station number was extracted from the snow depth database, and the WBAN number, state abbreviation, and station name were manually entered from the documentation provided by NCDC. The file was then merged with files from Steurer and Karl (1991) in order to add latitude and longitude information. Period of record data were determined through examination of snow depth records. Record completeness flags were defined after a close examination of the number of years and months in each station's record. Elevation data for some stations were added from NCDC's U.S. Historical Climatology Network (U.S. HCN) database (Easterling et al. 1996). A list of stations with missing latitude, longitude, and elevation data was sent to NCDC for their input. After these data were received and manually entered into the database, latitude and longitude values were converted from degrees and minutes to decimal degrees, and elevation values were converted to meters. A final list of stations with missing or questionable values was sent to NCDC; the data returned were then entered into the station inventory file.

The station inventory file contains the state abbreviation, station name, NCDC station number, WBAN station number, latitude, longitude, elevation above sea level, beginning year of record, ending year of record, and a flag denoting the completeness of the station record for all 388 unique snow depth sampling locations. Stated in tabular form, the contents of the station inventory file include the following.

Variable	Variable type	Variable width	Starting column	Ending column
STATE	Character	2	1	2
STA_NAME	Character	14	4	17
STAID	Alphanumeric	6	19	24
WBAN	Character	5	26	30
LAT	Numeric	6	34	39
LON	Numeric	7	42	48
ELEV	Numeric	7	51	57
YRBEG	Numeric	4	59	62
YREND	Numeric	4	64	67
FLAG	Character	1	69	69

The variables are defined as follows:

STATE is the two-letter state abbreviation (See Appendix A for a listing of the state abbreviations, their associated two-digit NCDC state code, and the state name.);

STA_NAME is the station name, usually a city;

STAID is the unique NCDC station code formed by combining the two-digit NCDC state number with the four-digit Cooperative Network Index number assigned by NCDC. The code is defined as alphanumeric to allow for character station codes (e.g., 50OMEV for Nome, Alaska) as well as to preserve leading zeros upon output;

WBAN is the Weather Bureau Army Navy Network index, defined as character to allow for preserving leading zeros upon output (missing values are represented by 99999);

LAT is the latitude of the station in decimal degrees north (missing values are represented by –99.99);

LON — is the longitude of the station in decimal degrees west (missing values are represented by –99.99);

ELEV — is the elevation of the station above sea level in meters (missing values are represented by –99.99). Values range from 1.00 to 2132.00;

YRBEG — is the beginning year of the station's period of record. Values range from 1893 to 1979;

YREND — is the ending year of the station's period of record. Values range from 1896 to 1992;

FLAG — is the record-completeness flag that grossly characterizes the completeness of the data. Possible values of FLAG are:

A = There are seven or more months of data in every year of the particular station number's record.
B = The first year or two of the record is missing one or two months of data, or one or two years in the middle or at the end of the record is missing one month of data; the remaining years in the station record have seven or more months of data.
C = Several years are missing one to three months of data.
D = Many years are missing at least one and usually many months of data.
E = One or more years are missing in the station record.
F = The one-year station record has seven months of winter season data.
G = The one-year station record has less than seven months of winter season data.

SNOWDPTH.DAT (FILE 7)

This file contains daily snow depth data for 195 NWS first-order stations (388 unique sampling sites) in 48 states; no observations from Delaware or Hawaii are included in the database. The file is sorted by the six-digit NCDC station number, year, and month. Each data record contains one month's worth of daily snow depth values and includes the NCDC station number, data type, units, year, month, number of days in the month, and 31 daily snow depth data values with their respective flags. Stated in tabular form, the contents include the following variables.

Variable	Variable type	Variable width	Starting column[a]	Ending column[a]
STAID	Alphanumeric	6	1	6
DATTYP	Character	4	8	11
UNITS	Character	2	12	13
YEAR	Numeric	4	14	17
MON	Numeric	2	18	19
NUMDAYS	Numeric	2	21	22
SF(1)	Alphanumeric	1	24	24
SNOWD(1)	Numeric	4	25	28
DMF(1)	Alphanumeric	1	29	29
DQF(1)	Alphanumeric	1	30	30
SF(2–31)	Alphanumeric	1	*	*
SNOWD(2–31)	Numeric	4	*	*
DMF(2–31)	Alphanumeric	1	*	*
DQF(2–31)	Alphanumeric	1	*	*

[a]Values for entries filled with an asterisk may be obtained using: COL(N) = COL(1) + (N × 8) – 8, where COL(N) is the starting/ending column for SF(N), SNOWD(N), DMF(N), or DQF(N); COL(1) is the starting/ending column for SF(1), SNOWD(1), DMF(1), or DQF(1); and N is the day of the month (2–31).

The variables are defined as follows:

STAID — is the unique NCDC station code formed by combining the two-digit NCDC state number with the four-digit Cooperative Network Index number assigned by NCDC. The code is defined as alphanumeric to allow for character station codes (e.g., 50OMEV for Nome, Alaska) as well as to preserve leading zeros upon output;

DATTYP — is the data type (SNWD = snow depth);

UNITS — is the units of the snow depth data (TI = tenths of inches);

YEAR — is the year of the data record;

MON — is the month of the data record;

NUMDAYS — is the number of days in the month;

SF(1–31) — are the source flags for the daily data values;

SNOWD(1–31) — are daily snow depth data values at observation time: 00:30 GMT prior to July 1952; 12:30 GMT for July 1, 1952, to May 31, 1957; and 12:00 GMT for June 1, 1957, to present. Missing values are coded as –999. Hail is included with snowfall from July 1948 to December 1955 and from May 1989 to the present, as described in the on-line documentation of NCDC's *Summary of the Day–First Order* database (NCDC Tape Deck 3210) (http://www.ncdc.noaa.gov/pub/data/fsod/fsod.README);

DMF(1–31) — are the data measurement flags for the daily data values; and

DQF(1–31) are the data quality flags for the daily data values.

Flag codes for the SNOW DEPTH data

SF is a code indicating the source of the daily data value. The codes and their meanings are as follows:

- 0 = NCDC Tape Deck 3210, *Summary of the Day–First Order,* element digital file;
- 3 = Manuscript–original records, National Climatic Data Center;
- 7 = *Local Climatological Data* (LCD) (monthly NCDC publication);
- Blank = Not applicable [used for nonexistent days of the month (e.g., 30 February)].

DMF is the data measurement flag, which describes how the daily value was measured. The codes and their meanings are as follows:

- A = Accumulated amount. This value is the amount of snow accumulated since the last measurement;
- E = Estimated value;
- L = Reflects sleet;
- T = Trace (data value = 0000 for a trace); and
- Blank = Valid original data (no flag needed).

DQF is the data quality flag. In January 1982, NCDC instituted a computer algorithm for automated validation of digital data archives. The system checks the internal consistency of a station's data and compares each station's observations to prescribed climatological limits and observations from surrounding stations. Numeric DQF codes apply only to NCDC's digital data, i.e., where the source flag (SF) is equal to "0" for a particular value. Alphabetic codes describe the particular manual or automated NCDC procedure employed to correct or estimate a data value. The codes and their meanings are as follows:

- 0 = Valid data (observed data have passed all internal consistency checks);
- 1 = Validity indeterminable (used primarily for pre–1984 data);
- 3 = Data beginning January 1, 1984: observed data have failed an internal consistency check, for example, the snow depth value is inconsistent with the water equivalent precipitation observation. No edited value follows, or value may have been set equal to zero. Data prior to January 1, 1984: observed data failed a climatological limits check. In other words, the value was physically impossible. No edited value follows, or value may have been set equal to zero.;
- 4 = Observed data value invalid, for example, negative or extremely large value. No edited value follows, or value may have been set equal to zero;
- E = Edited data value passes all system's checks (no observed value present);

S = Manually edited value passes all system's checks; and
Blank = Flag not needed.

For the user's convenience, the complete snow depth data set (**SNOWDPTH.DAT**) has been divided into six regional data sets that are listed below. These geographic groupings parallel regions associated with the National Weather Service's six Regional Climate Centers, which were established to meet local and regional needs for climate information. The file descriptions include the states as well as the number of stations within each region.

WEST.DAT (FILE 8)

This file contains daily snow depth data for 41 NWS first-order stations (81 unique sampling locations) in the Western RCC. States included in this region are Washington, Oregon, Idaho, Montana, California, Nevada, Utah, Arizona, New Mexico, and Alaska.

HPLAINS.DAT (FILE 9)

This file contains daily snow depth data for 21 NWS first-order stations (43 unique sampling locations) in the High Plains RCC. States included in this region are North Dakota, South Dakota, Nebraska, Kansas, Wyoming, and Colorado.

SOUTH.DAT (FILE 10)

This file contains daily snow depth data for 29 NWS first order-stations (56 unique sampling locations) in the Southern RCC. States included in this region are Tennessee, Mississippi, Arkansas, Louisiana, Oklahoma, and Texas.

MIDWEST.DAT (FILE 11)

This file contains daily snow depth data for 45 NWS first order-stations (94 unique sampling locations) in the Midwestern RCC. States included in this region are Minnesota, Wisconsin, Michigan, Iowa, Missouri, Illinois, Indiana, Ohio, and Kentucky.

SEAST.DAT (FILE 12)

This file contains daily snow depth data for 27 NWS first order-stations (51 unique sampling locations) in the Southeast RCC. States included in this region are Virginia, North Carolina, South Carolina, Georgia, Alabama, and Florida.

NEAST.DAT (FILE 13)

This file contains daily snow depth data for 32 NWS first order-stations (63 unique sampling locations) in the Northeast RCC. States included in this region are Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, Pennsylvania, New Jersey, Maryland, and West Virginia. No snow depth observations are included from Delaware.

REFERENCE

Easterling, D. R., T. R. Karl, E. H. Mason, P. Y. Hughes, and D. P. Bowman. 1996. United States Historical Climatology Network (U. S. HCN) Monthly Temperature and Precipitation Data. R. C. Daniels and T. A. Boden (eds). ORNL/CDIAC-87, NDP-019/R3. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

7. VERIFICATION OF DATA TRANSPORT

The data files contained in this NDP can be read by using the FORTRAN 77 and SAS® programs provided. Users should verify that the data have been correctly transported to their systems by visually examining each data file, where practical. To facilitate the visual inspection process, partial listings of each data file are provided in Tables 3 and 4. Each of these tables contains the first five and last five records of the data file.

Table 3. Partial listing of the file invent.dat (File 6)

First five records of the file:

```
AK Anchorage       50ANCC 99999    -99.99    -99.99     -99.99 1923 1943 E
AK Anchorage       500285 26409     61.22   -149.83      43.00 1943 1953 B
AK Anchorage       500280 26451     61.17   -150.02      35.00 1953 1992 B
AK Fairbanks       50FAIC 99999     64.83   -147.72     148.00 1929 1942 B
AK Fairbanks       502968 26411     64.82   -147.87     133.00 1942 1992 B
```

Last five records of the file:

```
WY Cheyenne        481675 24018     41.15   -104.82    1866.00 1935 1992 B
WY Lander          48LNDC 24075     42.83   -108.73    1631.00 1893 1946 C
WY Lander          485390 24021     42.82   -108.73    1637.00 1946 1992 B
WY Sheridan        48SHRC 24058     44.80   -106.95    1150.00 1907 1940 B
WY Sheridan        488155 24029     44.77   -106.97    1209.00 1940 1992 B
```

Table 4. Partial listings of the snow depth files (Files 7–13)

SNOWDPTH.DAT (FILE 7):

First five records of the file:

```
010831 SNWDTI194401 31 30000  30000  30000  30000  30000  30000  30000  30000  30000T 30000  30000  30000  30000  30000  30000  30000
30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000
010831 SNWDTI194402 29 70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000
70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  -999   -999
010831 SNWDTI194403 31 70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000
70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000
010831 SNWDTI194404 30 70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000
70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  -999
010831 SNWDTI194410 31 70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000
70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000
```

Last five records of the file:

```
50OMEV SNWDTI194511 30 30075  30075  30075  30099  30050  30076  30045  30037  30045  30045  30045  30044  30044  30043  30042  30040
30040  30040  30040  30047  30066  30068  30069  30069  30068  30067  30067  30066  30066  30067  -999
50OMEV SNWDTI194512 31 30067  30067  30067  30067  30067  30067  30067  30067  30066  30068  30071  30104  30106  30106  30106  30104
30109  30115  30115  30114  30110  30108  30108  30107  30107  30107  30106  30106  30106  30106  30106
50OMEV SNWDTI194601 31 30122AS 30121AS 30121AS 30124 30127  30127  30128  30128  30128  30128  30130  30129  30140  30164  30168  30168
30169  30174  30180  30178  30176  30174  30178  30226  30241  30241  30240  30250  30258  30264  30277
50OMEV SNWDTI194602 28 30280  30280  30280  30279  30279  30279  30279  30279  30279  30283  30295  30333  30351  30351  30361  30368
30377  30378  30378  30377  30376  30375  30372  30368  30366  30366  30366  30375  -999   -999   -999
50OMEV SNWDTI194603 31 30376  30403  30425  30422  30430  30427  30422  30417  30414  30413  30413  30412  30410  30400  30390  30380
30370  30357  30353  30350  30340  30340  30340  30342  30341  30346  30346  30345  30345  30355  30355
```

WEST.DAT (FILE 8):

First five records of the file:

```
023007 SNWDTI189905 31 30000T 30004  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000
30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000
023007 SNWDTI189910 31 70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000
70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000
023007 SNWDTI189911 30 30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000T 30000T
30000  30000  30000  30000  30000  30094  30000  30000  30000  30000  30000  30000  30000  30000  -999
023007 SNWDTI189912 31 30000  30000  30000  30000  30000  30000T 30000  30000  30000T 30000  30000  30000  30000  30000  30000  30000
30030  30094  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000T 30000
023007 SNWDTI190001 31 30000  30000  30000T 30000T 30000  30000  30000  30000T 30002  30000  30000  30000  30000  30000  30000  30000
30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000
```

Last five records of the file:

```
50OMEV SNWDTI194511 30 30075  30075  30075  30099  30050  30076  30045  30037  30045  30045  30045  30044  30044  30043  30042  30040
30040  30040  30040  30047  30066  30068  30069  30069  30068  30067  30067  30066  30066  30067  -999
50OMEV SNWDTI194512 31 30067  30067  30067  30067  30067  30067  30067  30067  30066  30068  30071  30104  30106  30106  30106  30104
30109  30115  30115  30114  30110  30108  30108  30107  30107  30107  30106  30106  30106  30106  30106
50OMEV SNWDTI194601 31 30122AS 30121AS 30121AS 30124 30127  30127  30128  30128  30128  30128  30130  30129  30140  30164  30168  30168
30169  30174  30180  30178  30176  30174  30178  30226  30241  30241  30240  30250  30258  30264  30277
50OMEV SNWDTI194602 28 30280  30280  30280  30279  30279  30279  30279  30279  30279  30283  30295  30333  30351  30351  30361  30368
30377  30378  30378  30377  30376  30375  30372  30368  30366  30366  30366  30375  -999   -999   -999
50OMEV SNWDTI194603 31 30376  30403  30425  30422  30430  30427  30422  30417  30414  30413  30413  30412  30410  30400  30390  30380
30370  30357  30353  30350  30340  30340  30340  30342  30341  30346  30346  30345  30345  30355  30355
```

Table 4 (continued)

HPLAINS.DAT (FILE 9):

First five records of the file:

```
052220 SNWDTI194509 30 30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000
30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000T 30000T 30000  30000  -999
052220 SNWDTI194510 31 30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000
30000  30000  30000  30000  30000T 30000  30000T 30000  30000  30000  30000  30000  30000  30000  30000
052220 SNWDTI194511 30 30000  30000  30000  30000  30000  30000  30000  30000T 30000T 30000  30000  30000  30000  30000  30000  30000
30000  30000  30000  30004  30004  30003  30000  30000  30000  30000  30000  30000  30000  30000  -999
052220 SNWDTI194512 31 30000T 30000  30000  30000  30000  30000  30000  30000  30004  30000T 30000T 30000T 30000T 30000  30000  30000
30000  30001  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000
052220 SNWDTI194601 31 30000  30000  30000  30000  30000T 30000  30000  30000T 30020  30000  30034  30025  30015  30003  30000T 30000T
30000T 30000  30000  30000T 30000  30000  30000  30000  30001  30036  30015  30005  30002  30000  30000
```

Last five records of the file:

```
48SHRC SNWDTI193912 31 30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000
30000  30000  30000  30000  30000T 30000T 30006  30005  30010  30013  30014  30013  30012  30000T 30000T
48SHRC SNWDTI194001 31 30006  30000T 30000T 30007  30011  30030  30060  30050  30040  30029  30040  30040  30036  30035  30030  30024
30070  30068  30066  30060  30058  30054  30056  30056  30054  30050  30046  30030  30024  30018  30016
48SHRC SNWDTI194002 29 30024  30023  30018  30016  30010  30006  30005  30004  30002  30000T 30018  30016  30010  30006  30050  30040
30034  30042  30040  30032  30030  30028  30027  30030  30024  30020  30010  30004  30000T -999   -999
48SHRC SNWDTI194003 31 30000T 30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000
30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000
48SHRC SNWDTI194004 30 30000  30030  30000  30000  30000  30000  30000  30000  30000  30006  30010  30000  30000  30000  30020  30020
30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  -999
```

SOUTH.DAT (FILE 10):

First five records of the file:

```
032574 SNWDTI194510 31 70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000
70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000
032574 SNWDTI194511 30 70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000
70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  -999
032574 SNWDTI194512 31 30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000
30000T 30005  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000  30000
032574 SNWDTI194601 31 70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000
70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000
032574 SNWDTI194603 31 70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000
70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000
```

Last five records of the file:

```
41SATC SNWDTI194003 31 70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000
70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000
41SATC SNWDTI194004 30 70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000
70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  -999
41SATC SNWDTI194010 31 70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000
70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000
41SATC SNWDTI194011 30 70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000
70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  -999
41SATC SNWDTI194012 31 70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000
70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000  70000
```

Table 4 (continued)

MIDWEST.DAT (FILE 11):

First five records of the file:

```
111166 SNWDTI189301 31 30002   30005   30000T 30000   30000   30000   30001   30000   30000   30000   30000   30000   30000   30000   30000   30000T
30000   30030   30010   30005   30001   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000
111166 SNWDTI189302 28 30002   30000   30000   30000   30000   30000T 30000   30000   30000   30039   30016   30002   30000   30000   30000   30000
30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   -999    -999    -999
111166 SNWDTI189303 31 30000   30000   30015   30005   30000T 30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000
30000   30000T 30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000
111166 SNWDTI189304 30 30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30003   30000   30000
30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   -999
111166 SNWDTI189310 31 70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000
70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000
```

Last five records of the file:

```
47GRBC SNWDTI194904 30 00030 1 00010 1 00000T1 00000T1 00000T1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00020 1 00000T1
00000T1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1  -999
47GRBC SNWDTI194905 31 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1
00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1
47GRBC SNWDTI194906 30 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1
00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1  -999
47GRBC SNWDTI194907 31 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1
00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1
47GRBC SNWDTI194908 31 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1 00000 1  -999
-999    -999    -999    -999    -999    -999    -999    -999    -999    -999    -999    -999    -999    -999    -999
```

SEAST.DAT (FILE 12):

First five records of the file:

```
010831 SNWDTI194401 31 30000   30000   30000   30000   30000   30000   30000   30000   30000T 30000   30000   30000   30000   30000   30000   30000
30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000
010831 SNWDTI194402 29 70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000
70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   -999    -999
010831 SNWDTI194403 31 70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000
70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000
010831 SNWDTI194404 30 70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000
70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   -999
010831 SNWDTI194410 31 70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000
70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000
```

Last five records of the file:

```
44LYHC SNWDTI194312 31 30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000
30000   30000   30000   30000   30000   30000   30000   30000   30000T 30000   30000   30000   30017   30012   30001
44LYHC SNWDTI194401 31 30000T 30000T 30000T 30000   30000   30000   30000   30004   30001   30000T 30000T 30000T 30000T 30000   30000T 30004
30001   30000T 30000T 30000T 30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000
44LYHC SNWDTI194402 29 30000   30000   30000   30000   30000   30000   30000   30000   30010   30000T 30000T 30000T 30000T 30018   30000T 30000T
30000T 30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   -999    -999
44LYHC SNWDTI194403 31 30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000
30000   30000   30012   30013   30000T 30000T 30000   30000   30000   30000   30000   30000   30000   30000   30000
44LYHC SNWDTI194404 30 70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000
70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   -999
```

Table 4 (continued)

NEAST.DAT (FILE 13):

First five records of the file:

```
063451 SNWDTI194003 31  -999    -999    -999    -999    -999    -999    -999    -999    -999    -999    -999    -999    -999    -999    -999    -999
-999    -999    -999    -999    30000   30000T  30000   30000   30000   30000   30003   30000   30000   30000   30000
063451 SNWDTI194010 31 70000    70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000
70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000   70000
063451 SNWDTI194011 30 30000    30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000
30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30045   30044   30044   30042   -999
063451 SNWDTI194012 31 30015    30013   30009   30007   30045   30040   30005   30000T  30000T  30000   30000   30000   30000   30000   30000   30000
30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000
063451 SNWDTI194101 31 30000    30001   30018   30028   30024   30022   30021   30020   30020   30018   30017   30012   30010   30009   30008   30025
30024   30022   30019   30018   30017   30014   30002   30016   30040   30040   30043   30040   30040   30038   30037
```

Last five records of the file:

```
46EKNC SNWDTI194312 31 30000    30000   30000   30000   30000   30000   30000   30000   30000   30000T  30000   30000   30011   30006   30005   30002
30000T  30000T  30000T  30000T  30000   30000   30000   30000   30002   30000   30000   30000   30012   30009   30009
46EKNC SNWDTI194401 31 30000T   30000T  30000   30000   30000   30002   30000T  30012   30009   30003   30001   30000T  30000   30000   30018   30068
30056   30054   30018   30011   30002   30000T  30000   30000   30000   30000   30000   30000   30000   30000   30000T
46EKNC SNWDTI194402 29 30000    30000T  30000   30000   30000   30006   30000   30000   30000   30000   30000   30012   30008   30000   30007   30000T
30000   30000T  30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30027   -999    -999
46EKNC SNWDTI194403 31 30017    30000T  30000   30000   30000T  30000   30000   30017   30022   30000T  30000   30000   30000   30000   30000   30000
30000   30000T  30003   30000T  30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000
46EKNC SNWDTI194404 30 30000    30000   30000   30000T  30021   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000
30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   30000   -999
```

APPENDIX A

LIST OF STATE ABBREVIATIONS, NCDC STATE CODES, AND STATE NAMES

STATE ABBREVIATION	NCDC STATE CODE	STATE NAME
AK	50	Alaska
AL	01	Alabama
AR	03	Arkansas
AZ	02	Arizona
CA	04	California
CO	05	Colorado
CT	06	Connecticut
FL	08	Florida
GA	09	Georgia
IA	13	Iowa
ID	10	Idaho
IL	11	Illinois
IN	12	Indiana
KS	14	Kansas
KY	15	Kentucky
LA	16	Louisiana
MA	19	Massachusetts
MD	18	Maryland
ME	17	Maine
MI	20	Michigan
MN	21	Minnesota
MO	23	Missouri
MS	22	Mississippi
MT	24	Montana
NC	31	North Carolina
ND	32	North Dakota
NE	25	Nebraska
NH	27	New Hampshire
NJ	28	New Jersey
NM	29	New Mexico
NV	26	Nevada
NY	30	New York
OH	33	Ohio
OK	34	Oklahoma
OR	35	Oregon
PA	36	Pennsylvania
RI	37	Rhode Island
SC	38	South Carolina
SD	39	South Dakota
TN	40	Tennessee
TX	41	Texas
UT	42	Utah
VA	44	Virginia
VT	43	Vermont
WA	45	Washington
WI	47	Wisconsin
WV	46	West Virginia
WY	48	Wyoming

APPENDIX B

REPRINT OF PERTINENT LITERATURE

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3. R. M. Cushman
4. S. V. Jennings
5. S. B. Jones
6. D. P. Kaiser
7. P. Kanciruk
8. A. W. King
9. T. E. Myrick
10. D. E. Shepherd
11. D. S. Shriner
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13. Central Research Library
14-17. ESD Library
18-19. Laboratory Records Department ORNL- RC
20. Laboratory Records Department
21. Y-12 Technical Library

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23. Joe H. Allen, WDC-A for Solar Terrestrial Physics, National Geophysical Data Center, National Oceanic and Atmospheric Administration, E/GC2, 325 Broadway, Boulder, CO 80303

24. William E. Asher, University of Washington, Joint Institute for the Study of the Atmosphere and the Ocean, Box 354235, Seattle, WA 98195

25. David C. Bader, Pacific Northwest National Laboratory, 901 D Street, SW, Suite 900, Washington, DC 20024

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27. Marion F. Baumgardner, Purdue University, Department of Agronomy, 1220 Potter Drive, Lafayette, IN 47907

28. Robert Bidigare, University of Hawaii, Department of Oceanography, 1000 Pope Road, Honolulu, HI 96822

29. C. Boelcke, P.S.S., UNEP, P.O. Box 30552, Nairobi, Kenya

30. D. P. Bowman, National Oceanic and Atmospheric Administration, National Climatic Data Center, 151 Patton Avenue, Suite 120, Asheville, NC 28801

31. Francis P. Bretherton, University of Wisconsin, Space Science and Engineering Center, 1225 West Dayton Street, Madison, WI 53706

32. Peter G. Brewer, Monterey Bay Aquarium Research Institute, P.O. Box 628, 7700 Sandholt Rd., Moss Landing, CA 95039

33. Michelle Broido, Department of Energy, Office of Health and Environmental Research, Environmental Sciences Division, ER-74, 19901 Germantown Road, Germantown, MD 20874

34. D. A. Bruns, Wilkes University, Department of Earth and Environmental Sciences, Wilkes-Barre, PA 18766

35. Robert H. Byrne, University of South Florida, Department of Marine Science, 140 Seventh Avenue, Saint Petersburg, FL 33701

36. D. Changnon, Northern Illinois University, Department of Geography, DeKalb, IL 60115-2854

37. Patrick A. Crowley, Department of Energy, Office of Health and Environmental Research, Environmental Sciences Division, ER-74, 19901 Germantown Road, Germantown, MD 20874

38. H. Croze, P.S.S., UNEP, P.O. Box 30552, Nairobi, Kenya

39. E. G. Cumesty, ORNL Site Manager, Department of Energy, Oak Ridge National Laboratory, P.O. Box 2008, Oak Ridge, TN 37831-6269

40. Roger C. Dahlman, Department of Energy, Office of Health and Environmental Research, Environmental Sciences Division, ER-74, 19901 Germantown Road, Germantown, MD 20874

41. Giovanni Daneri, CEA Universidad del Mar, Department de Oceanografia y Biologia Pesquera, Amunategui 1838, Vina Del Mar, Chile

42. Database Section, National Institute for Environmental Studies, Center for Global Environmental Research, 16-2 Onogawa, Tsukuba, Ibaraki 305, Japan

43. Kenneth D. Davidson, National Climatic Data Center, 151 Patton Avenue, Suite 120, Asheville, NC 28801

44. William C. Draeger, WDC-A for Remotely Sensed Land Data, U.S. Geological Survey, EROS Data Center, Sioux Falls, SD 57198

45. Hugh W. Ducklow, College of William and Mary, Virginia Institute of Marine Sciences, P.O. Box 1346, Gloucester Point, VA 23062

46-50. D. R. Easterling, National Oceanic and Atmospheric Administration, National Climatic Data Center, 151 Patton Avenue, Suite 120, Asheville, NC 28801

51. Jerry W. Elwood, Department of Energy, Office of Energy Research, ER-74, 19901 Germantown Road, Germantown, MD 20874

52. Lawrence M. Enomoto, National Oceanic and Atmospheric Administration, NESDIS, Federal Building 4, Room 0110, Washington, DC 20233

53. Gerd Esser, Justus-Liebig-University, Institute for Plant Ecology, Heinrich-Buff-Ring 38, D-35392, Giessen, Germany

54. Jay S. Fein, National Science Foundation, Atmospheric Science Division, 4201 Wilson Boulevard, Room 775, Arlington, VA 22230

55. Wanda Ferrell, Department of Energy, Office of Health and Environmental Research, Environmental Sciences Division, ER-74, 19901 Germantown Road, Germantown, MD 20874

56. B. F. Findlay, Environment Canada, Atmospheric Environment Service, Climate Research Branch, Downsview, Ontario Canada M3H5T4

57. Richard H. Gammon, University of Washington, Chemistry Department, Box 351700, Seattle, WA 98195

58. Wilford Gardner, Texas A & M University, Department of Oceanography, College Station, TX 77843

59. Jean-Pierre Gattuso, Observatoire Oceanologique Europeen, Avenue Saint-Martin, MC-98000, Monaco

60. P. Ya. Groisman, National Oceanic and Atmospheric Administration, National Climatic Data Center, 151 Patton Avenue, Suite 120, Asheville, NC 28801

61. D. W. Gullett, Environment Canada, Atmospheric Environment Service, Climate Research Branch, Downsview, Ontario Canada M3H5T4

62. Kenneth D. Hadeen, National Climatic Data Center, 151 Patton Avenue, Suite 120, Asheville, NC 28801

63. David O. Hall, University of London, Division of Biosphere Sciences, King's College London, Campden Hill Road, London W8 7AH, United Kingdom

64. Mark Hein, Freshwater Biological Laboratory, Helsingoersgade 51, DK-3400 Hilleroed, Denmark

65. A. Hittelman, WDC-A for Solid Earth Geophysics, National Oceanic and Atmospheric Administration Code E/GC1, 325 Broadway, Boulder, CO 80303

66. H. Hodgson, British Library, Boston Spa, DSC, Special Acquisitions, Wetherby, West Yorkshire, LS23 7BQ, United Kingdom

67. Huasheng Hong, Xiamen University, Environmental Science Research Center, Post Code 361005, Mail Box 1085, Xiamen, Fujian, Peoples Republic China

68. Carroll A. Hood, GCRIO, 2250 Pierce Road, Bay City, MI 48710

69. John C. Houghton, Department of Energy, Office of Health and Environmental Research, Environmental Sciences Division, ER-74, 19901 Germantown Road, Germantown, MD 20874

70. Malcolm K. Hughes, University of Arizona, Laboratory of Tree-Ring Research, Building 58, 1105 W. Stadium, Tucson, AZ 85721

71. P. Y. Hughes, National Ocean and Atmospheric Administration, National Climatic Data Center, 151 Patton Avenue, Suite 120, Asheville, NC 28801

72. M. Hulme, Climatic Research Unit, School of Environmental Sciences, University of East Anglia, Norwich NR47TJ, United Kingdom

73. P. Jamason, National Oceanic and Atmospheric Administration, National Climatic Data Center, 151 Patton Avenue, Suite 120, Asheville, NC 28801

74. R. Jenne, National Center for Atmospheric Research, P.O. Box 3000, 1850 Table Mesa Drive, Boulder, CO 80307-3000

75. P. D. Jones, Climatic Research Unit, School of Environmental Sciences, University of East Anglia, Norwich NR47TJ, United Kingdom

76. Thomas R. Karl, National Climatic Data Center, 151 Patton Avenue, Federal Building, Room 516E, Asheville, NC 28801

77. Charles D. Keeling, Scripps Institute of Oceanography, University of California, San Diego, Mail Code 0220, 9500 Gilman Drive, 2314 Ritter Hall, La Jolla, CA 92093

78. Stephan Kempe, Schnittspahnstr. 9, D-64287 Darmstadt, Germany

79. R. M. Key, Princeton University, Geology Department, Princeton, NJ 08544

80. K.-R. Kim, Seoul National University, Department of Oceanology, Seoul 151-7442, Korea

81. Takashi Kimoto, Research Institute of Oceano-Chemistry, Osaka Office, 3-1 Fumahashi-cho, Tennoji-ku, Osaka 543, Japan

82. Bert Klein, University Laval, GIROQ, Pav. Vachon, Quebec, PQ, G1K 7P4, Canada

83. John C. Klink, Miami University, Department of Geography, 217 Shideler Hall, Oxford, OH 45056

84. R. W. Knight, National Oceanic and Atmospheric Administration, National Climatic Data Center, 151 Patton Avenue, Suite 120, Asheville, NC 28801

85. Werner A. Kurz, Environmental and Social Systems Analysts Limited, 3rd Floor, 1765 W 8th Avenue, Vancouver, B.C. V6J 5C6, Canada

86. Donald T. Lauer, EROS Data Center, U.S. Geological Survey, Sioux Falls, SD 57198

87. J. D. Laver, Climate Prediction Center, National Oceanic and Atmospheric Administration, National Weather Service, 5200 Auth Road, Room 800, Camp Springs, MD 20746

88. Sydney Levitus, National Oceanographic Data Center, National Oceanic and Atmospheric Administration, E/OC5, 1315 East West Highway, Room 4362, Silver Spring, MD 20910

89. Jonathan J. Lloyd, Australian National University, Research School of Biological Sciences, GPO Box 475, Canberra, ACT 2601, Australia

90. Peter Lunn, Department of Energy, Office of Health and Environmental Research, Environmental Sciences Division, ER-74, 19901 Germantown Road, Germantown, MD 20874

91. Thomas H. Mace, U.S. Environmental Protection Agency, National Data Processing Division, MD-34, 79 TW Alexander Drive, Building 4201, Durham, NC 27711

92. E. H. Mason, National Oceanic and Atmospheric Administration, National Climatic Data Center, 151 Patton Avenue, Suite 120, Asheville, NC 28801

93. Elaine Matthews, National Aeronautics and Space Administration, Goddard Institute for Space Studies, 2880 Broadway, New York, NY 10025

94. James J. McCarthy, Harvard University, Museum of Comparative Zoology, 26 Oxford Street, Cambridge, MA 02138

95. Michael C. McCracken, Director, Office of the U.S. Global Change Research Program, Code YS-1, 300 E. Street, SW, Washington, DC 20546

96. Frank J. Millero, University of Miami, RSMAS, 4600 Rickenbacker Causeway, Miami, FL 33149

97. R. E. Munn, University of Toronto, Institute for Environmental Studies, Haultain Building 170 College Street, Toronto, Ontario M5S 1A4, Canada

98. Shohei Murayama, National Institute for Resources and Environment, Environmental Assessment Department, 16-3 Onogawa, Tsukuba, Ibaraki 305, Japan

99. Shuzo Nishioka, National Institute for Environmental Studies, Global Environment Research Division, 16-2 Onogawa, Tsukuba, Ibaraki 305, Japan

100. Jao Ryoung Oh, Korea Ocean Research and Development Institute, Chemical Oceanography Division, An San P.O. Box 29, Seoul 4325-600, Korea

101. C. Oudot, Centre ORSTOM de Cayenne, B.P. 165-97323, Cayene Cedex, Guyana

102. Bobbi Parra, Department of Energy, Office of Health and Environmental Research, Environmental Sciences Division, ER-74, 19901 Germantown Road, Germantown, MD 20874

103. William Parton, Colorado State University, Natural Resource Ecology Laboratory, Fort Collins, CO 80523

104. Ari Patrinos, Department of Energy, Office of Health and Environmental Research, Environmental Sciences Division, ER-74, 19901 Germantown Road, Germantown, MD 20874

105. Tsung-Hung Peng, National Oceanographic and Atmospheric Administration, Atlantic Oceanographic Marine Laboratory, Ocean Chemistry Division, 4301 Rickenbacker Causeway, Miami, FL 33149

106. Fiz F. Perez, Instituto Investigacions Marinas, Eduardo Cabello 6, 36206 Vigo, Spain

107. B. Preselin, University of California, Department of Biological Sciences, Santa Barbara, CA 93106

108. Paul D. Quay, University of Washington, School of Oceanography, Box 357940, Seattle, WA 98195

109. Roberta Y. Rand, USDA, Global Change Data and Information Management, 10301 Baltimore Boulevard, Beltsville, MD 20705

110. S. Ichtiaque Rasool, 52, Boulevard de Sebastopol, 5th Floor, 75003 Paris, France

111. Joachim Ribbe, University of Washington, Joint Institute for the Study of the Atmosphere and Oceans, Box # 35425, Seattle, WA 98195

112. Michael R. Riches, Department of Energy, Office of Health and Environmental Research, Environmental Sciences Division, ER-74, 19901 Germantown Road, Germantown, MD 20874

113. Aida F. Rios, Institute de Investigaciones Marinas, Consejo Superior de Invest. Cientificas, c/Eduardo Cabello, 6, 36208 Vigo, Spain

114. D. Robinson, Lucy Stone Hall, Department of Geography, Kilmer Campus, New Brunswick, NJ 08903

115. A. Robock, University of Maryland, Department of Meteorology, College Park, MD 20742

116. Jorge L. Sarmiento, Princeton University, Atmospheric and Oceanic Sciences Program, P.O. Box CN710, Sayre Hall, Princeton, NJ 08544

117. C. L. Schelske, University of Florida, Department of Fisheries and Aquaculture, 7922 W. 71st Street, Gainesville, FL 32606

118. Soroosh Sorooshian, University of Arizona, Department of Hydrology and Water Resources, Tucson, AZ 85721

119-218. Timothy W. Stamm, CDIAC, The University of Tennessee, EERC, 10521 Research Drive, Suite 100, Knoxville, TN 37923

219. Michel H. C. Stoll, Netherlands Institute for Sea Research, Department MCG, P. O. Box 59, 1790 Ab den Burg-Texel, Netherlands

220. Eric T. Sundquist, U.S. Geological Survey, Quissett Campus, Branch of Atlantic Marine Geology, Woods Hole, MA 02543

221. Taro Takahashi, Columbia University, Lamont-Doherty Earth Observatory, Climate/Environment/Ocean Division, Route 9W, Palisades, NY 10964

222. Lynne D. Talley, Scripps Institute of Oceanography, UCSD 0230, 9500 Gilman Drive, Solana Beach, CA 92075

223. John A. Taylor, Australian National University, CRES, GPO Box 4, Canberra, ACT 0200, Australia

224. John R. G. Townshend, University of Maryland, Department of Geography, 1113 Lefrak Hall, College Park, MD 20742

225. K. Vinnikov, University of Maryland, Department of Meteorology, College Park, MD 20742

226. Douglas W. R. Wallace, Brookhaven National Laboratory, Oceanographic and Atmospheric Sciences Division, P.O. Box 5000, Upton, NY 11973

227. Carol Watts, National Oceanic and Atmospheric Administration, Central Library, 1315 East-West Highway, 2nd Floor, SSMC 3, Silver Spring, MD 20910

228. Thompson Webb III, Brown University, Department of Geological Sciences, 324 Brook Street, Providence, RI 02912

229. Ferris Webster, University of Delaware, College of Marine Studies, Lewes, DE 19958

230. Amos Winter, University of Puerto Rico, Department of Marine Sciences, Puerto Rico State Climate Office, P.O. Box 5000, Mayaguez, PR 00681

231. Chi Shing Wong, Government of Canada, Institute of Ocean Sciences, P.O. Box 6000, 9860 West Saanich Road, Sidney, BC V8L 4B2, Canada

232. Yoshifumi Yosuoka, National Institute for Environmental Studies, Center Global Environment Research, 16-2 Onogawa, Tsukuba, Ibaraki 305, Japan

233. Energy Library (HR-832.1/GTN), Department of Energy, Office of Administration and Management, G-034, Washington, DC 20585

234. Energy Library (HR-832.2/WAS), Department of Energy, Office of Administration and Management, GA-138 Forrestal Building, Washington, DC 20585

235-236. Office of Scientific and Technical Information, P. O. Box 62, Oak Ridge, TN 37831

237. Office of Assistant Manager for Energy Research and Development, Department of Energy, Oak Ridge Operations, P. O. Box 2001, Oak Ridge, TN 37831-8600