National Climatic Data Center

DATA DOCUMENTATION

FOR

DATA SET 3285 (DSI-3285)

ASOS Surface 1 Minute Data

March 19, 2003

National Climatic Data Center
151 Patton Ave.
Asheville, NC 28801-5001 USA

Table of Contents

1. Abstract: This is a new data set, expected to replace autographic charts. The data are expected to support the same types of uses, including quality control of lower resolution data, climatological research, litigation, insurance investigations, hydrological research and engineering designs. The stations are located worldwide and are operated by the National Weather Service (NWS) and the Federal Aviation Administration (FAA). The NWS and FAA sites are located in the contiguous U.S., Alaska, Puerto Rico, Hawaii and other Pacific Islands.

The Automated Surface Observations System is designed to collect data continuously. One-minute reports (30-second reports for cloud data) are computed from data accumulations over the following time periods prior to the report:

Cloud Height	30 seconds
Cloud Layer Thickness	30 seconds
Visibility	1 minute
Present Weather	10 minutes
Freezing Rain	15 minutes
Temperature/Dew Point	1 minute
Wind	2 minutes
Pressure	1 minute
Precipitation Accumulation	1 minute

Station Observation Schedule: Historically, the time of observation (hour) archived is that of the record observation, taken within 10 minutes prior to the hour (e.g., 1355 keyed 1400). It must be noted that NCDC has the observations from the time the station opened, but the NWS has the current data. Official surface weather observation standards can be found in the Federal Meteorological Handbook.

2. Element Names and Definitions:

RECORD-TYPE

The type of data stored in this record. The value is "01M". Each record contains up to 60 one-minute values (one hour).

STATION-ID

This 8-character alphanumeric station identifier is assigned by the National Climatic Data Center. The first three characters are not used. The last five characters are the station ID number. The station ID number is the Weather Bureau, Army, Navy (WBAN) number.

METEOROLOGICAL ELEMENT-TYPE

The type of meteorological elements stored in this record structure. The element codes and range of values are listed below:

C1H1

The first laser ceilometer cloud height in feet of the first cloud layer detected. Flag 1 (FL1) is set to '1' or '2' to identify the first or second thirty-second measurement, respectively. The thirty-second ceilometer data and instrument status codes are available in TD6404.

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C1T1

The first laser ceilometer cloud thickness in feet of the first cloud layer detected. Flag 1 (FL1) is set to '1' or '2' to identify the first or second thirty-second measurement, respectively. The thirty-second ceilometer data and instrument status codes are available in DSI-6404.

C1H2

The first laser ceilometer cloud height in feet of the second cloud layer detected. Flag 1 (FL1) is set to '1' or '2' to identify the first or second thirty-second measurement, respectively. The thirty-second ceilometer data and instrument status codes are available in TD6404.

C1T2

The first laser ceilometer cloud thickness in feet of the second cloud layer detected. Flag 1 (FL1) is set to '1' or '2' to identify the first or second thirty-second measurement, respectively. The thirty-second ceilometer data and instrument status codes are available in TD6404.

C2H1

The second laser ceilometer (some stations operate two ceilometers) cloud height in feet of the first cloud layer detected. Flag 1 (FL1) is set to '1' or '2' to identify the first or second thirty-second measurement, respectively. The thirty-second ceilometer data and instrument status codes are available in DSI-6404.

C2T1

The second laser ceilometer cloud thickness in feet of the first cloud layer detected. Flag 1 (FL1) is set to '1' or '2' to identify the first or second thirty-second measurement, respectively. The thirty-second ceilometer data and instrument status codes are available in DSI-6404.

C2H2

The second laser ceilometer (some stations operate two ceilometers) cloud height in feet of the second cloud layer detected. Flag 1 (FL1) is set to '1' or '2' to identify the first or second thirty-second measurement, respectively. The thirty-second ceilometer data and instrument status codes are available in DSI-6404.

C2T2

The second laser ceilometer cloud thickness in feet of the second cloud layer detected. Flag 1 (FL1) is set to '1' or '2' to identify the first or second thirty-second measurement, respectively. The thirty-second ceilometer data and instrument status codes are available in DSI-6404.

C3H1

The third laser ceilometer (some stations operate three ceilometers) cloud height in feet of the first cloud layer detected. Flag 1 (FL1) is set to '1' or '2' to identify the first or second thirty-second

measurement, respectively. The thirty-second ceilometer data and instrument status codes are available in DSI-6404.

C3T1

The third laser ceilometer cloud thickness in feet of the first cloud layer detected. Flag 1 (FL1) is set to '1' or '2' to identify the first or second thirty-second measurement, respectively. The thirty-second ceilometer data and instrument status codes are available in DSI-6404.

C3H2

The third laser ceilometer (some stations operate three ceilometers) cloud height in feet of the second cloud layer detected. Flag 1 (FL1) is set to '1' or '2' to identify the first or second thirty-second measurement, respectively. The thirty-second ceilometer data and instrument status codes are available in DSI-6404.

C3T2

The third laser ceilometer cloud thickness in feet of the second cloud layer detected. Flag 1 (FL1) is set to '1' or '2' to identify the first or second thirty-second measurement, respectively. The thirty-second ceilometer data and instrument status codes are available in DSI-6404.

D360

Direction from which the wind is blowing of the 2-minute average wind (updated each minute by averaging the 5-second averages for the previous two-minute period), recorded to the nearest degree, 0 - 360, where 0 indicates calm.

DPTP

Dew-point temperature (updated each minute by averaging the previous two thirty-second samples) in whole degrees Fahrenheit.

M2SP

Two-minute wind speed (updated each minute by averaging the 5-second averages from the previous two-minute period) recorded in whole knots.

MXD5

The direction from which the wind is blowing of the maximum (5-second average) wind that occurred during the previous minute and recorded to the nearest degree, 0 - 360, where 0 indicates calm.

MXS5

The speed in whole knots of the maximum (5-second average) wind that occurred during the previous minute.

PCPN

The amount of liquid precipitation (water-equivalent) accumulated over the previous one-minute period recorded to 0.01 inches.

PRS1

The average one-minute (average of 10-second samples) pressure value from the first (PRS1) pressure sensor recorded to .001 inches of mercury (Hg).

PRS2

The average one-minute (average of 10-second samples) pressure value from the second (PRS2) pressure sensor recorded to .001 inches of mercury (Hg).

PRS3

The average one-minute (average of 10-second samples) pressure value from the third (PRS3) pressure sensor recorded to .001 inches of mercury (Hg).

PWTH

The present weather occurring at the time of the observation. This document follows the codes and storage conventions used for this element (PWTH) in the DSI-3280 (SURFACE AIRWAYS HOURLY) documentation. The main differences between the two descriptions are that the 1-minute data will provide only one weather type each minute and not all weather types indicated in DSI-3280 are currently available from ASOS.

Present weather codes are two characters in length. The first character indicates the general class of the present weather while the second character is a qualifier. The two-digit code is stored in the second and third positions of the DATA-VALUE. The first, fourth and fifth digits of DATA-VALUE are set to 0. If there is no occurrence of present weather the DATA-VALUE will contain "00000".

As of this writing, ASOS sensors are capable of observing rain, freezing rain, snow, fog and haze. As other sensors are developed, additional weather elements may be reported.

00 No present weather reported

2X Rain, Freezing rain

where: X = 0 light rain
1 moderate rain
2 heavy rain
6 light freezing rain
7 moderate freezing rain
9 unknown, When the ASOS sensor cannot determine the primary type in mixed precipitation events, the system records a P-. X will be set to 9 in such cases.

Light = Trace (<.005 inches) to .10 inches per hour
Moderate = .11 to .30 inches per hour
Heavy = > .30 inches per hour

4X Snow

where: X = 0 light snow
1 moderate snow
2 heavy snow

75 Fog

81 Haze

TMPD

Ambient air temperature (Dry-bulb), in whole degrees Fahrenheit. The temperature value is the average of the previous two thirty-second samples.

VCF1

The visibility extinction coefficient from the first visibility sensor. The ASOS sensor samples visibility once every 30 seconds, derives an extinction coefficient calibrated to daytime or nighttime, and computes a 1-minute harmonic mean derived from the running average of the previous ten minutes. The FLAG1 character will be set to "D" for daytime or "N" for nighttime. The coefficient can be converted to a visibility value in miles from the following relationships:

Daytime: $V = 3/c$

Nighttime: $0.00336 = [e^{(-c*V)}]/V$
where e = 2.718
c = the extinction coefficient
V = the visibility in miles

VCF2

The visibility extinction coefficient from the second visibility sensor. Some sites may have more than one visibility sensor. See VCF1.

VCF3

The visibility extinction coefficient from the third visibility sensor. Some sites may have more than one visibility sensor. See VCF1.

VSB1

Visibility in statute miles derived from the visibility coefficient (VCF1, the first visibility sensor) and reduced to the nearest reportable increment. Reportable increments are <1/4, 1/4, 1/2, 3/4, 1, 11/4, 11/2, 13/4, 2, 21/2, 3, 31/2, 4, 5, 7, and 10+ miles.

VSB2

Visibility in statute miles derived from the visibility coefficient (VCF2, the second visibility sensor, if in operation)

and reduced to the nearest reportable increment. See VSB1.

VSB3

Visibility in statute miles derived from the visibility coefficient (VCF3, the third visibility sensor, if in operation) and reduced to the nearest reportable increment. See VSB1.

METEOROLOGICAL ELEMENT MEASUREMENT UNITS CODE

The units and decimal position (precision) of the DATA-VALUE for this record.

DD	Wind direction in whole degrees, 360 is north, 0 indicates calm.
F	Whole degrees Fahrenheit
FT	Feet
IT	Thousandths of inches
IH	Hundredths of inches
K	Whole knots
NA	Units not applicable (non-dimensional)
N3	Units not applicable - element to thousandths

YEAR

The year of the record. The range of values is 1992 through the current year processed (LST).

MONTH

The month of the record, 01 - 12 (LST).

DAY

The day of the record, 01 - 31 (LST).

HOUR OF OBSERVATION

The hour of the record, 00 - 23 (LST).

NUMBER OF DATA PORTIONS THAT FOLLOW

The number of values entered in the record, up to 60 one-minute values. If a particular data value was not taken or is unavailable, there is no entry for it.

MINUTE (MIN)

The minute to which the data refer (00 - 59).

SIGN OF THE METEOROLOGICAL VALUE

The algebraic sign of the meteorological data value is entered as a blank (positive) or minus sign, "-" (negative).

VALUE OF THE METEOROLOGICAL ELEMENT

The actual data value is given as a five-digit integer.

FLAG1

The data measurement flag is used to indicate whether a given ceilometer value is the first 30-second sample (coded 01) or the second 30-second sample (coded 02) during the minute. See the codes CxTy and CxHy, where x is the ceilometer number (1,2 or 3) and y is cloud layer (1 or 2). The data measurement flag is also set to day, " D", or night, " N", for the visibility element. See VCF1.

FLAG2

The data quality flag is set to 00 when the element has passed computer quality control algorithms. The data quality flag is set to 01 when the element has not passed the computer quality control algorithms. Specific algorithms are listed in the Surface Climate Information Archive and Dissemination System (SCIADS) Operations Guide.

3. Start Date: Data begin in April 1992 for a limited number of stations and time periods. By June 1992, approximately 21 stations, mainly in the central U.S., were operating in the pre-commissioning stage. Commissioning of the ASOS systems, the start of the official observation, began in September 1992.

4. Stop Date: On going.

5. Coverage: U.S.A., Caribbean Islands, Pacific Islands, and other overseas stations of the National Weather Service.

a. Southernmost Latitude: 90S
b. Northernmost Latitude: 90N
c. Westernmost Longitude: 180W
d. Easternmost Longitude: 180E

6. How to Order Data:

Ask NCDC's Climate Services about the cost of obtaining this data set.
Phone: 828-271-4800
FAX: 828-271-4876
E-mail: NCDC.Orders@noaa.gov

7. Archiving Data Center:

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, NC 28801-5001
Phone: (828) 271-4800.

8. Technical Contact:

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, NC 28801-5001

Phone: (828) 271-4800.

9. Known Uncorrected Problems: See ASOS User's Guide.

10. Quality Statement: Quality of the Surface Hourly data is considered quite good. The ASOS data receive various types of quality control at the station. For example, pressure is quality controlled by use of redundant sensors. If one or more of the six samples read each minute from one pressure sensor is missing, only the remaining sensors are used to determine the pressure. Sensor values for the same minute may not differ by more than 0.04 inches. The lowest pressure reading that does not differ from the other sensor readings by more than 0.04 inches mercury is considered the observed pressure. Discussion of quality control procedures for other sensors may be found in the ASOS USER'S GUIDE.

11. Essential Companion Datasets: None.

12. References:

National Weather Service, August 1991: ASOS USER'S GUIDE, NOAA-NWS, Silver Spring, MD.

Environmental Information Summary C-2, Local Climatological Data, National Climatic Data Center (NCDC).