National Climatic Data Center

DATA DOCUMENTATION

FOR

DATA SET 6201, 6202 & 6210

NCDC Upper Air Digital Files

October 18, 2005

National Climatic Data Center
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1. Abstract: Data in this file are retained in chronological order by station. Each logical record contains one station's Upper Air (U/A) Observation (Rawinsonde, Radiosonde, or Pibal) for each specific Upper Air Sounding (normally 2 each day). The record consists of a control word, an identification portion, and a data portion. The control word is used by the computer operating system for record length determination. For many systems this control word is transparent to the "users" program. The identification portion identifies the observing station, latitude, longitude, day and time (of release), and the number of repeating groups to follow. The data portion contains the U/A meteorological values and the quality control flag fields for each level. The data portion repeats for each level in the observation. The maximum number of levels is 200.

The Upper Air Observations in this digital data file include stations operated by the National Weather Service, U.S. Navy, and certain South American stations whose data receive quality control at the National Climatic Data Center (NCDC). Additional Upper Air Observation from the WMO's Global Telecommunications System (GTS), and the U.S. Air Force are also included in this digital file, but are not quality controlled by NCDC.

A list of these files are:

TD-6201 U.S. Rawinsonde observations 1945-1990. (Includes U.S. Navy observations, U.S. Air Force, and South American cooperative observations. Derived from TD-5600.)

TD-6202 Northern Hemisphere GTS observations 1963-1970, and Southern Hemisphere 1966-1970. (These data were extracted from NMC Operation Archive and processed into TD-5683.)

TD-6210 Marine Observations

These data were collected from sources listed below:

1. CD-542, CD-544, CD-545, CD-645 that were converted to TD-5600 data set.
2. TD-5600 Marine Area (ships) that were converted to TD-6201/2. This data set (5600) no longer exists.
3. TD-6201 Marine Area (ships) to 1990.
4. NMC Upper Air Marine (ships) 1973-1993.

The sort is by 10 degree square, year, month, day, hour.

Duplicates were removed giving priority listed above (1,2,3,4). QC flags are 0-9 for non-NMC data, for NMC data they are A-Z.

TD-6210 Island Upper Air Stations 1973 to 1993. (available only in data cartridge format)

Approximately 100 stations were selected. Prime selection factors were marine influence and near sea level heights. The intent was to select data that could be used to supplement ship observations.

These data were collected from TD-6201 and NMC upper air stations 1973 to 1993.

The sort is by station, year, month, day, hour for the period 1/73 to 6/88. Additional periods will be added as updates starting with 7/88 from the sources above.

Duplicates were removed giving priority listed above (1,2). QC flags are 0-9 for non-NMC data, A-Z for NMC data. After 1988, priority was given to NMC data for the creation of TD-6210.

Background Information TD-6201

TD-6201:	PERIOD:
National Weather Service	Jan 1946 - Current
U.S. Air Force	Jan 1946 - Dec 1970
U.S. Navy	Jul 1949 - Current

The information contained in TD-6201 includes pressure surface, height of the pressure surface, temperature, relative humidity, wind direction and speed. Beginning with Jan 1981, the elapsed time since release of the sonde is included. The pressure levels included fall into three categories:

1. Mandatory levels -- Levels required by the WMO for transmission in parts A and C of a coded TEMP report.

2. Standard levels -- Levels used for internal processing by the NCDC, but not generally reported in a coded TEMP message.

3. Significant levels -- Levels required to adequately describe a sounding, as transmitted in parts B and D of coded TEMP message.

The number of mandatory and standard levels has increased over time. Table 1 lists the levels that are expected for a given period of record. Significant levels were not generally included in the earlier periods. Significant levels are included for most stations only after July 1952.

Mandatory levels below the surface were generated for the period January 1, 1981 through February 28, 1986. However, these levels only contain unknown values (`9999') for all data elements. Beginning March 1, 1986 this practice as stopped.

From January 1946 through May 1957 actual time of balloon release was indicated on the forms. During data reduction these times were converted to the nearest scheduled time of observation. During this period, scheduled times were 0300; 0900; 1500; and 2100 GMT. From June 1957 onward if observations were taken within one hour of the newly established scheduled release times of 0000; 0600; 1200; and 1800 GMT, only the scheduled time was reported. In most cases, observations taken outside this two hour window should indicate the actual time of release in GMT.

A number of observing/recording/reduction techniques were used during the period of record found in the TD-6200 series. These, where necessary, were converted to the units now considered standard. For example, during the period July 1949 through December 1955 wind directions were reported in a 16-point scale and wind speeds were in meters per second. Prior to July 1949 winds were reported in tens of degrees and miles per hour. Although conversion of directions can lead to some bias, conversion of wind speeds is fairly straightforward.

It is impossible in this manual to describe every variant found in the originally keyed data. In most instances that information is on file and can be provided to those who need that level of detail.

Mandatory and Standard Levels TD-6201

Surface	1/46-6/49	7/49-12/55	1/56-6/57	7/57-12/60	1/61-Present
1000	*	*	*	*	*
950	*	*	*	*	*
900	*	*	*	*	*
800	*	*	*	*	*
750	*	*	*	*	*
700	*	*	*	*	*
650	*	*	*	*	*
600	*	*	*	*	*
550	*	*	*	*	*
500	*	*	*	*	*
450	*	*	*	*	*
400	*	*	*	*	*
350	*	*	*	*	*
300	*	*	*	*	*
250	*	*	*	*	*
200	*	*	*	*	*
175	*	*	*	*	*
150	*	*	*	*	*
125	*	*	*	*	*
100	*	*	*	*	*
80	*	*	*	*	*
70					*
60	*	*	*	*	*
50	*	*	*	*	*
40	*	*	*	*	*
30	*	*	*	*	*
25				*	*
20	*	*	*	*	*
15		*	*	*	*
10	*	*	*	*	*
7		*	*	*	*
5		*	*	*	*
4		*	*	*	*
3		*	*	*	*
2			*	*	*
1.5					*
1					*

Background Information TD-6202

TD-6202: PERIOD:

National Meteorological Center (NMC)
Northern Hemisphere Sept 1963 - Dec 1970
Southern Hemisphere June 1966 - Dec 1970

These data were received at the World Meteorological Center in Washington, DC via the Global Telecommunications System (GTS). All observations were subjected to quality control measures before being used in hemispheric

analyses. Results of these quality controls can be found in the various flags for this data set. No additional quality control measures were employed during the conversion of these data to TD-6202.

The U/A observations contain all available mandatory and significant levels transmitted under International agreement. The period of record may vary from station to station, the general collection began September 1963 and continued through December 1970 (Northern Hemisphere). Stations in the Southern Hemisphere are usually not available until mid-1966 or later through December 1970.

Areal coverage is worldwide.

The digital file contains: Station Identification (land and ships), Latitude and Longitude of location, date/time, and elements:

LEVEL QUALITY INDICATOR - results by level

TIME - elapsed time since release

PRESSURE - by level in kilopascals

HEIGHT - by level in geopotential meters

TEMPERATURE - by level in degrees Celsius

RELATIVE HUMIDITY - by level in whole percent

WIND - Direction and speed by level

QUALITY CONTROL FLAGS - by level for time, pressure, height, temperature, relative humidity, wind, and type of level.

2. <u>Element Names and Definitions</u>:

FIELD	RECORD POSITION	ELEMENT NAME	CODE DEFINITIONS AND REMARKS
001	1-8	STATION-ID	STATION IDENTIFICATION-For U.S. controlled and cooperative stations, this is a WBAN number. For stations received through GTS, it is the WMO number. This field may contain alphabetic characters for ships and remote sensed observations. Numeric station numbers are right justified and zero filled, while alphanumeric station identifiers are left justified and blank filled. If unknown, this field contains "99999999". If the station identification is unknown, both latitude and longitude must be present.
002	9-12	LATITUDE	LATITUDE-The station latitude in degrees and minutes. When unknown, this field contains "9999". Latitude will not normally appear for land stations.
003	13	LATITUDE	LATITUDE CODE - CODE used to indicate the

		CODE	Northern (N) or Southern (S) latitudes.
004	14-18	LONGITUDE	LONGITUDE-The station longitude in degrees and minutes. When unknown, this field contains "99999". Longitude will not normally appear for land stations.
005	19	LONGITUDE CODE	LONGITUDE CODE-CODE used to indicate longitudes East (E) or West (W).
006	20-29	DATE-TIME	DATE/TIME-The scheduled time of the observation, as defined by WMO. The format of date/time is YYYYMMDDHH, i.e., year, month, day, hour. This field may never be unknown.
	20-23	YEAR	YEAR-This is the Year of record. Range of values is 1946-current year processed.
	24-25	MONTH	MONTH-This is the Month of record. Range of values is 01-12.
	26-27	DAY	DAY-This is the Day of record, Range of values is 01 to 31.
	28-29	HOUR	HOUR-This is the Hour of record. Range of values is 00 to 23. Hour is GMT. Normal scheduled observation times are 00 and 12 GMT. For selected periods and areas observations may have been taken at other times, especially 06 and 18 GMT.
007	30-32	NUMBER-REPEAT-GROUPS	NUMBER-OF-REPEATING-GROUPS--This number represents the number of data levels found in the current observation, including edited levels. Range of values is 001-200. Two hundred is the maximum number of levels.
008	33	LEVEL-QUALITY-INDCTR	LEVEL-QUALITY-INDICATOR--Denotes the results of any quality controls applied to this level.

Range is as follows:

0 Original values are correct.
1 Original values are missing.
2 Original values doubtful, a corrected level follows.
3 Original values doubtful, uncorrected.
4 Original values in error, a corrected level follows.
5 Original values in error, uncorrected.
6 Corrected level.
9 Level not checked.

A-Z Indicators supplied by NMC.

(A-G, blank) Automatic via computer system.
A Passed vertical consistency check with tight limits.

B Failed vertical consistency check and has not been recomputed.
C Failed vertical consistency check and was recomputed.
D Failed vertical consistency check with tight limits and passed with loose limits.
E (Not assigned)
F Has been checked but did not pass vertical consistency check with loose limits.
G (Not assigned)
blank (Not specified)

(H-P, $) Manual via Human Intervention
H Hold value for next analysis run
I (Same as A)
J (Same as B)
K (Same as C)
L (Same as D)
M (Same as E)
N (Same as F)
O (Same as G)
P Purge from analysis run

009	34-37	TIME-SINCE-RELEASE	TIME-The elapsed time since the release of the sounding, in minutes and tenths. If the elapsed time is not known, this field contains "9999". Range is 001 through 9999. Available only for U.S. quality controlled stations beginning January 1981.
010	38-42	PRESSURE-AT-LEVEL	PRESSURE-Atmospheric pressure at the current level in kilopascals and hundredths. If unknown, this field contains "99999". (TD-6201 only - subsurface levels were generated from January 1, 1981 through February 28, 1986. The values were always unknown. This practice was stopped March 1, 1986).
011	43-48	HEIGHT-AT-LEVEL	HEIGHT-Geopotential height of the current level in whole meters. If unknown, this field contains "-99999". Range of values is -99999 through 99999.
012	49-52	TEMPERATURE AT-LEVEL	TEMPERATURE-The free air temperature at the current level in degrees and tenths Celsius. If unknown, this field contains "-999". Range of values is -999 through 999.
013	53-55	RELATIVE-HUMIDITY AT-LEVEL	RELATIVE-HUMIDITY-The relative humidity at the current level in whole percent. If unknown, this field contains "999". In TD-6202, relative humidities are derived statistically for RH's not reported originally.

014	56-58	WIND-DIRECTION AT-LEVEL	WIND-DIRECTION-Direction of the wind in whole degrees (nearest five degrees for observations received through GTS). If unknown, this field contains "999".
015	59-61	WIND-SPEED AT-LEVEL	WIND-SPEED-Speed of the wind in whole meters per second. If unknown, this field contains "999".
016	62-67	QUALITY-FLAGS	QUALITY-FLAG-FIELD--This field contains the results of any quality control procedures, identifying each individual element found in error (see table below).

QUALITY CONTROL FLAG

0 Element is correct
1 Element is doubtful
2 Element is in error
3 Replacement value
4 Assumed or estimated value
9 Element not checked

A-Z Indicators supplied by NMC

(A-G, blank) Automatic via computer system.
A Passed vertical consistency check with tight limits.
B Failed vertical consistency check and has not been recomputed.
C Failed vertical consistency check and was recomputed.
D Failed vertical consistency check with tight limits and passed with loose limits.
E (Not assigned)
F Has been checked but did not pass vertical consistency check with loose limits.
G (Not assigned)
blank (Not specified)

(H-P, $) Manual via Human Intervention
H Hold value for next analysis run
I (Same as A)
J (Same as B)
K (Same as C)
L (Same as D)
M (Same as E)
N (Same as F)
O (Same as G)
P Purge from analysis run

62	TIME-QF	Time Quality Flag
63	PRESSURE-QF	Pressure Quality Flag
64	HEIGHT-QF	Height Quality Flag
65	TEMPERATURE-QF	Temperature Quality Flag

:
:

	66	HUMIDITY-QF	Humidity Quality Flag
	67	WIND-QF	Wind Quality Flag
017	68	TYPE-OF	TYPE OF LEVEL FLAG--See Table below.

0 Surface
1 Mandatory
2 Significant
3 Generated
4 Tropopause
5 Maximum wind
9 Other/unspecified

NOTE: DSI-6201 through December 1975 will contain Type of Level Flags 0, 1, and 9 only. During this period significant, generated, tropopause and max wind all have Flag = 9.

The following FORTRAN and COBOL statements may be used to read this format:

Typical FORTRAN 77 Data and File Description.

```
DEFINE FILE 10 (ANSI, VB, 7632, 12000)

IMPLICIT INTEGER (A-Z)

CHARACTER*8 STNID
CHARACTER*1 LATA,LONAQIND(200),TIMEF(200),PRESSF(200),
            HGTF(200),TEMPF(200),RHF(200),WINDF(200),TYPLEV(200)

REAL*4 LAT,LON,ETIME(200),PRESS(200)HGT(200),TEMP(200)

DIMENSION ETIME(200),PRESS(200),HGT(200),TEMP(200),RH(200),WD(200),WS(200)

READ (10,20,END=999) STNID,LAT,LATA,LON,LONA,YEAR,
                  MONTH,DAY,HOUR,NUMLEV,(QIND(J),ETIME(J),PRESS(J),HGT(J),
                  TEMP(J),RH(J),WD(J),WS(J),TIMEF(J),PRESSF(J),HGTF(J),
                  TEMPF(J),RHF(J),WINDF(J),TYPLEV(J),J=1,NUMLEV)

20 FORMAT
(A8,F4.0,A1,F5.0,A1,I4,3(I2),I3,200(A1,F3.1,F5.2,F6.0,F4.1,3(I3),7A1))
```

Typical ANSI COBOL Data Description.

```
FD    US-DATA
      LABEL RECORDS ARE STANDARD
      RECORDING MODE D
      BLOCK CONTAINS 1200 CHARACTERS.
01    UA-RECORD.
      02    STATION-NUMBER          PICTURE X(8)
      02    LATITUDE.
            03    LATITUDE-NUM      PICTURE 9999.
            03    LATITUDE-ALPH     PICTURE X.
      02    LONGITUDE.
:
:
```

```
        03    LONGITUDE-NUM     PICTURE 99999.
        03    LONGITUDE-ALPH    PICTURE X.
 02     DATE-TIME.
        03    YEAR              PICTURE 9(4).
        03    MONTH             PICTURE 99.
        03    DAYS              PICTURE 99.
        03    HOUR              PICTURE 999.
 02     NUMBER OF LEVELS        PICTURE 999.
 02     LEVEL-RECORD
              OCCURS 1 TO 200 TIMES DEPENDING ON NUMBER-OF-LEVELS.
        03    QUALITY-INDICATOR PICTURE X.
        03    ELAPSED-TIME      PICTURE 999V9.
        03    PRESSURE          PICTURE 999V99.
        03    HEIGHT            PICTURE S99999
                                SIGN LEADING SEPARATE.
        03    TEMPERATURE       PICTURE S99V9
                                SIGN LEADING SEPARATE.
        03    RELATIVE-HUMIDITY PICTURE 999.
        03    WIND-DIRECTION    PICTURE 999.
        03    WIND-SPEED        PICTURE 999.
        03    FLAGS.
              04    TIME-FLAG         PICTURE X.
              04    PRESSURE-FLAG     PICTURE X.
              04    HEIGHT-FLAG       PICTURE X.
              04    TEMPERATURE-FLAG  PICTURE X.
              04    R-H-FLAG          PICTURE X.
              04    WIND-FLAG         PICTURE X.
              04    TYPE-OF-LEVEL     PICTURE X.
```

3. **Start Date**: 19450101

4. **Stop Date**: 19930630

5. **Coverage**: Global

   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: None.

10. Quality Statement: U.S. data processed by the NCDC are subjected to extensive quality control procedures. Suspect data are returned to a verifier for manual correction. GTS data are subjected to various degrees of automated quality control by the receiving agency. NCDC accepts the data as correct during the reformatting procedure. Therefore, the user must be prepared to perform his own quality checks on GTS data. (The primary function of NMC and the Air Force Weather Agency (AFWA) is to produce forecasts, not to provide an archive database.)

11. Essential Companion Datasets: None.

12. References: No information provided with original documentation.