IGRA v2.2 Format Description: Sounding Data

Last updated: 19 January 2023

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1. This format description is formatted for viewing in a text editor such as Windows Notepad or similar Linux-based editor.

2. The below format description applies to versions 2.0 to 2.2 of IGRA.

3. Data files are available for two different time spans:

   In subdirectory data-por, data files contain the full period of record.
   In subdirectory data-y2d, files only contain soundings from the current
     (or current and previous) year. For example, as of August 2016,
     the files in the data-y2d subdirectory begin with January 1, 2016.

3. Both types of files are updated once a day in the late evening or early morning Eastern
   Time. The latest observations mostly become available within two
   calendar days of when they were taken.

4. Each file in the data-por and data-y2d subdirectories contains the
   sounding data for one station.
   The name of the file corresponds to a station's IGRAv2.2 identifier (e.g.,
   "USM00072201-data.txt.zip" contains the data for the station with the
   identifier USM00072201).

5. Each sounding consists of one header record and n data
   records, where n (given in the header record) is the number of levels
   in the sounding.

Header Record Format:

Variable   Columns Type

HEADREC   1- 1 Character
ID   2- 12 Character

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YEAR          14- 17  Integer
MONTH         19- 20  Integer
DAY           22- 23  Integer
HOUR          25- 26  Integer
RELTIME       28- 31  Integer
NUMLEV        33- 36  Integer
P_SRC         38- 45  Character
NP_SRC        47- 54  Character
LAT           56- 62  Integer
LON           64- 71  Integer
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These variables have the following definitions:

HEADREC is the header record indicator (always set to "#").

ID is the station identification code. See "igra2.2-stations.txt" for a complete list of stations and their names and locations.

YEAR is the year of the sounding.

MONTH is the month of the sounding.

DAY is the day of the sounding.

HOUR is the nominal or observation hour of the sounding (in UTC on the date indicated in the YEAR/MONTH/DAY fields). Possible valid hours are 00 through 23, and 99 = missing. Hours are given as provided by the data provider, and the relationship between this hour and the release time varies by data provider, over time, and among stations.

RELTIME is the release time of the sounding in UTC. The format is HHMM, where HH is the hour and MM is the minute. Possible are 0000 through 2359, 0099 through 2399 when only the release hour is available, and 9999 when both hour and minute are missing.

NUMLEV is the number of levels in the sounding (i.e., the number of data records that follow).

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P_SRC           is the data source code for pressure levels in the
sounding.
                It has 25 possible values:

                bas-data = British Antarctic Survey READER Upper-Air
Data
                cdmp-amr = African Monthly Radiosonde Forms
                           digitized by the U.S. Climate Data
Modernization
                           Program
                cdmp-awc = "African Wind Component Data" digitized
from
                           Monthly Forms by the U.S. Climate Data
                           Modernization Program
                cdmp-mgr = "WMO-Coded Messages" for Malawi,
digitized from
                           "Computer-Generated Forms" by the U.S.
Climate
                           Data Modernization Program
                cdmp-zdm = Zambian "Daily UA MB Ascent Sheets"
digitized by
                           the U.S. Climate Data Modernization
Program
                chuan101 = Comprehensive Historical Upper Air
Network (v1.01)
                erac-hud = ERA-CLIM Historical Upper Air Data
                iorgc-id = IORGC/JAMSTEC-Digitized data for
Indonesia
                mfwa-ptu = West African Temperature-Humidity
Soundings
                           digitized by Meteo-France
                ncar-ccd = C-Cards Radiosonde Data Set from NCAR
                ncar-mit = MIT Global Upper Air Data from NCAR
                ncdc6210 = NCDC Marine Upper Air Data (NCDC DSI-
6210)
                ncdc6301 = NCDC U.S. Rawindsonde Data (NCDC DSI-
6301)
                ncdc6309 = NCDC "NCAR-NMC Upper Air" (NCDC DSI-6309)
                ncdc6310 = NCDC "Global U/A Cards" (NCDC DSI-6310)
                ncdc6314 = Global Telecommunications System messages
received
                           and processed at Roshydromet and archived
at NCDC
                           (NCDC DSI-6314)
                ncdc6315 = NCDC "People's Republic of China Data"
(NCDC DSI-6315)
                ncdc6316 = NCDC "Argentina National Upper Air Data"
(NCDC
                           DSI-6316)
                ncdc6319 = NCDC "Korea National Upper Air Data"
(NCDC DSI-6319)
                ncdc6322 = Global Telecommunications System messages
received
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                              at the Australian Bureau of Meteorology
and
                              archived at NCDC (NCDC DSI-6322)
                    ncdc6323 = NCDC "Australian U/A Thermo/Winds Merged"
(NCDC
                              DSI-6323)
                    ncdc6324 = NCDC "Brazil National Upper Air Data"
(NCDC DSI-6324)
                    ncdc6326 = NCDC "Global Upper Air Cards" (NCDC DSI-
6326)
                    ncdc6355 = Russian Ice Island upper air data
processed by
                              NCAR and archived at NCDC
                    ncdc-gts = Global Telecommunications System (GTS)
messages
                              received at NCDC from the National
Centers for
                              Environmental Prediction
                    ncdc-nws =  U.S. National Weather Service upper air
data
                               received at NCDC in real-time
                    ngdc-har = Historical Arctic radiosonde archive from
the
                              National Geophysical Data Center
                    usaf-ds3 = U.S. Air Force 14th Weather Squadron
Upper Air
                              Data Set ( received in DS3 format)

NP_SRC              is the data source code for non-pressure levels in
the
                    sounding. These include levels whose vertical
coordinate
                    is only identified by height as well as surface
levels without
                    either pressure or height.
                    NP_SRC has 15 possible values:

                    cdmp-adp = "African Daily Pilot Balloon Ascent
Sheets" digitized
                              by the U.S. Climate Data Modernization
Program
                    cdmp-awc = "African Wind Component Data" digitized
from
                              "Monthly Forms" by the U.S. Climate Data
                              Modernization Program
                    cdmp-us2 = "U.S. Winds Aloft digitized from "Daily
Computation
                              Sheets" by the U.S. Climate Data
Modernization
                              Program
                    cdmp-us3 = "U.S. Winds Aloft" digitized from
"Military Daily
                              Computation Sheets" by the U.S. Climate
```

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Data
                          Modernization Program
                cdmp-usm = U.S. pilot balloon observations digitized
from
                          "Monthly Forms" by the U.S. Climate Data
                          Modernization Program
                chuan101 = Comprehensive Historical Upper Air
Network (v1.01)
                erac-hud = ERA-CLIM Historical Upper Air Data
                mfwa-wnd = West African Winds Aloft digitized by
Meteo-France
                ncdc6301 = NCDC U.S. Rawindsonde Data (NCDC DSI-
6301)
                ncdc6309 = NCDC "NCAR-NMC Upper Air" (NCDC DSI-6309)
                ncdc6314 = Global Telecommunications System messages
received
                          and processed at Roshydromet and archived
at NCDC
                          (NCDC DSI-6314)
                ncdc-gts = Global Telecommunications System (GTS)
messages
                          received at NCDC from the National
Centers for
                          Environmental Prediction
                ncdc-nws =  U.S. National Weather Service upper air
data
                           received at NCDC in real-time
                ngdc-har = Historical Arctic radiosonde archive from
the
                          National Geophysical Data Center
                usaf-ds3 = U.S. Air Force 14th Weather Squadron
Upper Air
                          Data Set (received in DS3 format)

LAT             is the Latitude at which the sounding was taken. For
mobile
                stations, it is the latitude at the time of
observation.
                For fixed stations, it is the same as the latitude
shown
                in the IGRAv2.2 station list regardless of the date
of the
                sounding since no attempt was made to reconstruct
the
                sounding-by-sounding location history of these
stations.

LON             is the longitude at which the sounding was taken.
For mobile
                stations, it is the longitude at the time of
observation.
                For fixed stations, it is the same as the longitude
shown
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in the IGRAv2.2 station list regardless of the date of the
sounding since no attempt was made to reconstruct the
sounding-by-sounding location history of these stations.

Data Record Format:

Variable	Columns	Type
LVLTYP1	1- 1	Integer
LVLTYP2	2- 2	Integer
ETIME	4- 8	Integer
PRESS	10- 15	Integer
PFLAG	16- 16	Character
GPH	17- 21	Integer
ZFLAG	22- 22	Character
TEMP	23- 27	Integer
TFLAG	28- 28	Character
RH	29- 33	Integer
DPDP	35- 39	Integer
WDIR	41- 45	Integer
WSPD	47- 51	Integer

These variables have the following definitions:

LVLÞTYP1 is the major level type indicator. It has the following
three possible values:

1 = Standard pressure level (for levels at 1000, 925, 850,
700, 500, 400, 300, 250, 200, 150, 100, 70, 50, 30,
20, 10, 7, 5, 3, 2, and 1 hPa)
2 = Other pressure level
3 = Non-pressure level

LVLÞTYP2 is the minor level type indicator. It has the following
three possible values:

1 = Surface
2 = Tropopause
0 = Other

ETIME is the elapsed time since launch. The format is MMMSS, where

MMM represents minutes and SS represents seconds, though values are not left-padded with zeros. The following special values are used:

-8888 = Value removed by IGRA quality assurance, but valid data remain at the same level.
-9999 = Value missing prior to quality assurance.

PRESS is the reported pressure (Pa or mb * 100, e.g., 100000 = 1000 hPa or 1000 mb). -9999 = missing.

PFLAG is the pressure processing flag indicating what level of climatology-based quality assurance checks were applied. It has three possible values:

blank = Not checked by any climatology checks. If data value not equal to -9999, it passed all other applicable checks.
A = Value falls within "tier-1" climatological limits based on all days of the year and all times of day at the station, but not checked by "tier-2" climatology checks due to insufficient data.
B = Value passes checks based on both the tier-1 climatology and a "tier-2" climatology specific to the time of year and time of day of the data value.

GPH is the reported geopotential height (meters above sea level). This value is often not available at variable-pressure levels. The following special values are used:

-8888 = Value removed by IGRA quality assurance, but valid data remain at the same level.
-9999 = Value missing prior to quality assurance.

ZFLAG is the geopotential height processing flag indicating what level of climatology-based quality assurance checks were

applied. It has three possible values:

blank = Not checked by any climatology checks or flag not applicable. If data value not equal to -8888 or -9999, it passed all other applicable checks.
A = Value falls within "tier-1" climatological limits based on all days of the year and all times of day at the station, but not checked by "tier-2" climatology checks due to insufficient data.
B = Value passes checks based on both the tier-1 climatology and a "tier-2" climatology specific to the time of year and time of day of the data value.

TEMP is the reported temperature (degrees C to tenths, e.g., 11 = 1.1°C). The following special values are used:

-8888 = Value removed by IGRA quality assurance, but valid data remain at the same level.
-9999 = Value missing prior to quality assurance.

TFLAG is the temperature processing flag indicating what level of climatology-based quality assurance checks were applied. It has three possible values:

blank = Not checked by any climatology checks or flag not applicable. If data value not equal to -8888 or -9999, it passed all other applicable checks.
A = Value falls within "tier-1" climatological limits based on all days of the year and all times of day at the station, but not checked by "tier-2" climatology checks due to insufficient data.
B = Value passes checks based on both the tier-1 climatology and a "tier-2" climatology specific to the time of year and time of day of the data value.

RH is the reported relative humidity (Percent to tenths, e.g.,

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                11 = 1.1%). The following special values are used:

                -8888 = Value removed by IGRA quality assurance, but
valid
                        data remain at the same level.
                -9999 = Value missing prior to quality assurance.
DPDP            is the reported dewpoint depression (degrees C to
tenths, e.g.,
                11 = 1.1°C). The following special values are used:

                -8888 = Value removed by IGRA quality assurance, but
valid
                        data remain at the same level.
                -9999 = Value missing prior to quality assurance.

WDIR            is the reported wind direction (degrees from north,
                90 = east). The following special values are used:

                -8888 = Value removed by IGRA quality assurance, but
valid
                        data remain at the same level.
                -9999 = Value missing prior to quality assurance.

WSPD            is the reported wind speed (meters per second to
tenths, e.g.,
                11 = 1.1 m/s). The following special values are
used:

                -8888 = Value removed by IGRA quality assurance, but
valid
                        data remain at the same level.
                -9999 = Value missing prior to quality assurance.
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