GLOBAL UPPER ARCHIVES

1945-2013

Dataset description

Updated May 2013

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Global Upper Archives (GUA) is an ASCII dataset intended for operational and practicing meteorologists. It was developed in response to a lack of standardized global upper air data suitable for immediate use by off-the-shelf software. This makes it a highly convenient source for case studies and investigations. Soundings and constant-pressure (upper air) charts can be readily plotted in seconds using such software.

The Global Upper Archives set was generated by Weather Graphics Technologies in Norman, Oklahoma in April and May 2013 using approximately six key sources of historical radiosonde data, most of it in packed binary or coded records. About 1500 lines of specialized Borland Delphi code was written, tested, and fine-tuned to aggregate and convert these sources into WMO FM-35 datasets. This project required extensive maintenance of the WMO-WBAN-ICAO crossreference dataset, a database developed by Weather Graphics which contained 43,531 rows as of May 2013. The files in Global Upper Archives were tested for basic consistency and integrity in Digital Atmosphere and RAOB. Completion of the V1.0 release was achieved on May 14, 2013.

1. Physical information

1. **Structure**. Records are in plaintext ASCII format using a coded numerical form known as World Meteorological Organization (WMO) FM-35. This is a standard ASCII radiosonde format developed in the 1940s and continues to be in use currently. The data may also be known as "radiosonde format" and "TTAA/TTBB/PPBB format". Multiple observations are contained within one file and are structured similar to GTS/NOAAPORT bulletins, though without header information. See the data sample below for an example.

2. **Period of record**. The dataset spans from January 1945 to April 2013 inclusive (as of this writing).

3. **Geographic coverage**. This dataset is worldwide. There are significant limitations on coverage before 1973 due to a lack of available sources. In an update we will add the remaining stations if records are located. Some stations could not be added, such as research stations during IGY 1957-58 which were never assigned a WMO identifier at any time.

4. **Source**. The source of this data is NOAAPORT captures, NOAA/FSL processed data, and USAF and NCDC tape, 9-track, and LTO-5 data holdings. Though the exact source of each observation cannot be provided in this particular project due to the data structure required. We have attempted to use the best available source where possible.

5. **Files**. Files are named yyyymmddhh_upper.txt, with one file per observation hour. Observations are rounded to the nearest 3-hour synoptic time (0000, 0300, 0600, 0900, 1200, 1500, 1800, or 2100 UTC). The vast majority of observations are for 0000 or 1200 UTC. To conserve disk space, files are compressed into monthly collectives, for example, 2010-09_upper.zip. Users may need to unzip files before importing data.

6. **Size**. The size of the dataset is 5.0 GB (approximately 16 GB uncompressed).

7. **Identifiers**. Identifiers are standard WMO block/identifier numbers and are "Epoch 2010", in other words the WMO numbers are those which would appear if the observation was in the year 2010. For example, before July 1977, Canadian identifiers used the 72xxx block instead of the 71xxx block currently used. Prince George, which used 72896 before July 1977, is always depicted in this dataset using the current 71896 number. This relieves users of the burden of tracking identifier changes for older records and allows all modern plotting software to plot the data correctly. Full information on our station identifier crossreferencing work may be found at: http://www.weathergraphics.com/identifiers

8. **Known deficiencies**.

a. The early era records (before 1973) lack worldwide coverage due to shortfalls in available sources. Weather stations around the world having a U.S. presence or tied to U.S. commerce, research, or military projects are the only ones available before 1973.

b. Older records are slightly more prone to errors from analog and digital conversion errors from older media.

c. Before 1973, data other than mandatory levels are only available in 50 mb *significant level* vertical increments. It is not possible to reconstruct the PPBB (*significant height wind*) data groups, so significant level winds which are available are appended to the TTBB code after the 21212 marker in accordance with FM-35 guidelines. For U.S. stations this is similar to the practice used outside the U.S.

d. As our QC process is somewhat limited and we do not supply QC flags and checks (which would add non-importable data to the FM-35 format files) users should review all data before using them in important work. We have removed all data that we felt is clearly erroneous.

9. **Inventory**. A basic year-by-year inventory for this product is posted on the Global Upper Archives page at: http://www.weathergraphics.com/global/gua/

2. Sample of file contents

This is a sample of about 50 lines of data, showing data for Jan Mayen Island, Norway; Bjornoya Island, Norway; and Desert Rock, Nevada. This shows the general arrangement of the data in a file.

```
--- 1979-02-17 12:00 UTC / (c) 2012 Weather Graphics www.weathergraphics.com
TTAA  67121 01001 99019 00413 21016 00116 00322 21019 92/// /////
///// 85412 02359 21553 70918 12756 23039 50541 29356 23038 40696
42157 21552 30884 57950 21580 25997 61956 21595 20136 59557 23556
15318 56149 26033 10/// ///// ///// 88289 60150 21585 31313 /////
```

```
8////=

TTBB   67129 01001 00019 00413 11980 01146 22937 03708 33900 00067
44840 02959 55723 12514 66688 12959 77622 17163 88558 24256 99399
42156 11268 59157 22248 62156 33145 55758 21212 00019 21016 11014
21016 22850 21553 33584 23028 44239 21600 55150 26033 31313 /////
8////=

TTAA   67121 01028 99012 01625 27030 00112 01027 27036 92/// /////
///// 85400 06139 27055 70925 09567 27050 50544 27165 28052 40702
36564 28556 30893 52762 28555 25008 62361 29083 20143 699// ///99
15316 65161 ///99 10565 62506 ///99 88/// ///// ///// 31313 /////
8////=

TTBB   67129 01028 00012 01625 11950 01137 22868 06909 33844 05950
44825 03362 55700 09567 66475 29765 77452 30365 88382 39164 99226
67561 11206 705// 22181 719// 33165 65961 44142 62161 21212 00012
27030 11904 27065 22736 26537 33669 27560 44600 28040 55318 28550
66218 29110 31313 ///// 8////=

MANDRA
72387 TTAA   67121 72387 99905 02249 09002 00177 ///// ///99 92/// /////
///// 85521 04460 26503 70073 04180 31012 50563 22358 30036 40724
34757 30042 30918 509// 31046 25034 601// 31553 20170 691// 30546
15348 579// 28054 10603 615// 25044 88203 699// 31045 31313 /////
8////=

SGLDRA
72387 TTBB   67120 72387 00905 02249 11887 06661 22735 03763 33725 02380
44638 10380 55565 15363 66481 24556 77360 39961 88167 577// 99128
573// 11100 615// 21212 00905 09002 31313 ///// 8////=

PPBB   67120 72387 90346 09002 20002 31006 90789 33008 32509 31511
91245 31514 29021 28022 9168/ 28525 30033 92058 29540 30547 30555=
```

3. Comments and feedbeck

Improvement of our products is a priority at Weather Graphics, and we plan to issue cor-
rections to the dataset as time permits. Users with feedback should e-mail servicedesk@
weathergraphics.com to report any problems or to submit suggestions.

4. References

* WMO Publication 306. World Meteorological Organization, Geneva. < ftp://ftp.wmo.
int/Documents/MediaPublic/Publications/CodesManual_WMO_No_306/> Describes the
code form for WMO FM-35 TEMP.