

Title: 2022 PERiLS UAH MAPNet Sounding Dataset

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1.0 Overview

The UAH Mobile Atmospheric Profiling Network (MAPNet) used two to four mobile radiosonde systems that were co-located with the UAH MAPNet mobile profiling platforms. Release times and locations from each platform are listed below. The systems used include iMet and Windsound systems. The data from the iMet systems are unchanged other than quality controlling for inconsistent heights and bad wind data. These checks are outlined in section 7. However, the wind data from the Windsound systems were corrected using methods described in section 3. The data for both systems were rearranged into a consistent format using python code.

IOP 1 Release Times:

MIPS (32.82905, -88.48475): 1400Z, 1545Z, 1700Z, 1820Z, 1900Z, 2000Z

MoDLS (32.799110, -88.162043): 1400Z, 1545Z, 1700Z, 1800Z, 1900Z, 2000Z

RaDAPS (33.233778, -88.643729): 1400Z, 1530Z, 1700Z, 1820Z, 1900Z, 2000Z

IOP 2 Release Times:

MIPS (34.0079941, -88.47614): 1800Z, 1910Z, 2000Z, 2100Z, 2200Z, 2300Z

MoDLS (33.2336933, -88.5707833): 1500Z, 1600Z, 1900Z, 2115Z, 2200Z, 2300Z

RaDAPS (33.595558, -88.987904): 1500Z, 1600Z, 1700Z, 1800Z, 1837Z, 1900Z, 2015Z, 2100Z, 2119Z, 2200Z

IOP 3 Release Times:

MIPS (32.498719, -86.424616): 0940Z, 1240Z

RaDAPS (32.1659, -86.9086): 1120Z, 1230Z, 1340Z, 1500Z

IOP 4 Release Times:

MIPS (36.53955, -89.7034077): 1512Z, 1600Z, 1730Z, 2000Z

RaDAPS (36.40374,-90.1161): 1500Z, 1600Z, 1700Z, 1800Z, 1900Z, 2100Z

2.0 Instrumentation Description

UAH used InterMet's iMet-4 radiosondes and Windsond S1H radiosondes. The manufacturer's specifications for both radiosondes are below. The software used with the iMet system was the iMet-3050 Portable Sounding system. The software used with the Windsond was the WS-250 for Windows software with the RR1-250 and RR2 Radio Receivers. The specifications are available via the links:

iMet: https://www.intermetsystems.com/wp-content/uploads/2022/01/202084-12_iMet-4_Technical_Data_Sheet.pdf

Windsond: http://windsond.com/windsond_catalog_Feb2019.pdf

iMet-4 Sonde Specifications

Temperature Resolution	<0.01 Deg C
Temperature Accuracy	0.3 Deg C
Humidity Resolution	0.1% RH
Humidity Accuracy	5% RH
Pressure Resolution	0.01 hPa
Pressure Accuracy	1.5 - 2.0hPa
Wind Accuracy	0.5 m/s
GPS Position Accuracy	0.1 m
Altitude Accuracy	15 m

Windsond S1H Sonde Specifications

Temperature Resolution	0.01 Deg
Temperature Accuracy	0.3 Deg C
Humidity Resolution	<0.01% RH
Humidity Accuracy	2% RH
Pressure Resolution	<0.02 hPa
Pressure Accuracy	1 hPa
Wind Accuracy	0.1 m/s
GPS Position Accuracy	0.1 Deg

3.0 Data Collection and Processing

The data from the iMet systems were automatically quality controlled by the iMet software. Surface points were taken from the co-located MAPNet platform surface meteorological tower. The data were run through computer code that checked for inconsistent heights or wind data and then rearranged into a consistent format. If the data showed the balloon was descending, it was omitted. If wind data was erroneous (e.g. exceeded 350 knots, it was replaced with -9999.0. These checks were added in order to reduce errors when attempting to plot data in plotting software. Windsound data was quality controlled through a two-step quality control process as follows:

1. Windsounds transmit environmental data (temperature, pressure, relative humidity, wind speed, wind direction) every 1 second. The GPS transmits every 3 seconds. Because of the discrepancy, only data that contained GPS coordinates were kept, making the data 3-second data. The data was then written into a new file.
2. Windsound-provided wind data was still sub-par. Therefore, wind data was smoothed using moving averaging over a 10-second moving window. This recalculated wind data were then written to a new file with the rest of the data (pressure, air temperature, dew point, UTC time, and height). The original and quality controlled Windsound data are provided. The quality controlled data are denoted by "QC" before the file extension (e.g. "QC.txt").

4.0 Data Format

Data is provided via two files: one file contains the complete sounding profile. A summary file is also provided that contains site information, launch time surface measurements, and maximum altitude measurements.

The filename format is as follows:

upperair.UAH_Sonde.YYYYMMDDHHMM.City_State.txt

Where:

YYYYmmDDHHMM -> release date (4-digit year, 2-digit month, 2-digit day, 4-digit UTC time)

City/State -> nearest city/town name and State balloon was released in

The header information provided contains several characteristics about the sounding. The headers are the first three lines of the file and are as follows:

Line 1: Data Type

Line: Release date, time, and location. The date and time are in UTC time.

Line 3: Variables and units

Field	Parameter	Units	Missing Value
1	Latitude	Degrees	-9999.0
2	Longitude	Degrees	-9999.0
3	Time	UTC Time	-9999.0
4	Height	Meters (MSL or AGL)*	-9999.0
5	Pressure	mb	-9999.0
6	Temperature	Celsius	-9999.0
7	Relative Humidity	Percent	-9999.0
8	Dew Point	Celsius	-9999.0
9	Wind Speed*	Knots	-9999.0
10	Wind Direction*	Degrees	-9999.0

*Wind data headers may say Calculated due to Windsond quality controlled outlined in section 3. Windsond and iMet log height differently. The proper height scale will be noted in file headers

Each data file is one individual sounding launched.

5.0 Data Remarks

Surface Data – Surface measurements were collected via the radiosonde measurements at the surface and inserted as “surface measurements”. Verification of surface data was often completed using surface stations on the co-located mobile instrument platforms (UAH MIPS, MAX, MoDLS, RaDAPS, and M3V). Otherwise, surface measurements were compared with a Kestrel 3500.

- Occasionally, the Windsond software does not automatically detect the launch. When this happens, data is not logged and will be missing for the first few meters of the sounding. Users may notice the difference between launch site elevation and the height of the first data point to vary up to 20-30 meters.