Title: 2023 PERiLS UAH MAPNet Sounding Dataset

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1.0 Overview
The UAH Mobile Atmospheric Profiling Network (MAPNet) used three 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 iMet systems were used on boht the Mobile Integrated Profiling System (MIPS) and Rapidly Deployable Atmospheric Profiling System (RaDAPS) platforms. The Windsond systems were used on both the Mobile Doppler Lidar & Soundings (MoDLS) and Mobile Alabama X-Band (MAX) platforms . The data from the iMet systems are unchanged other than quality controlling for invalid surface data, inconsistent heights and bad wind data. This process is outlined in section 3. The Windsond data underwent further processing to reduce noise in the wind data which is also outlined in section 3. The data for both systems were rearranged into a consistent format using python code.

IOP 1 Release Times:
MIPS (32.9137, -87.8689): 1400Z, 1608Z, 1800Z, 1900Z, 1952Z, 2215Z,2303Z &,0031Z

MoDLS (32.8334, -88.143): 1400Z, 1600Z,1800Z, 1900Z, 2012Z, 2205Z, 2300Z, 0030Z

RaDAPS (32.8016, -88.1992): 1402, 1630, 1800, 1900, 1954, 2059, 2207, 2320, 0031

IOP 2 Release Times:
MIPS (34.43138, -90.73124): 0100, 0230, 0400, 0500, 0600, 0700, 0800

MoDLS (34.43138, -90.73124): 0100, 0230, 0400,0500, 0600, 0700, 0800

RaDAPS (34.21916, -90.95392): 0100, 0230, 0400, 0500, 0600, 0700, 0800

IOP 3 Release Times:
MIPS (33.123954, -91.381511): 1709Z, 1842Z, 2344Z, 0045Z, 0135Z

RaDAPS (33.298621° -90.904305°): 1707, 1823, 2005, 2112, 2205, 2300, 0030, 0135

MoDLS (33.5592711, -90.8057507): 1702, 1829, 2100, 2200, 2300, 0130Z

IOP 4 Release Times:
MIPS (34.724, -86.646): 1500, 1630, 1800, 2000, 2130, 2300, 0018,
0200, 0300, 0500, 0600, 0700, 0800

RaDAPS (35.17621, -87.04821): 2000, 2129, 2300, 0000, 0100, 0200, 0300, 0400, 0500, 0600, 0700Z

MoDLS (34.7969441, -87.1527087):2000Z, 2130Z, 0000Z, 0100, 0230, 0400, 0500, 0600, 0700

MAX (34.655203, -87.349702): 2000, 2130, 2300, 0000, 0100, 0200, 0300, 0400, 0500, 0600Z

M3V (Roaming): 2000, 2130, 2300, 0000, 0100, 0200, 0300, 0400 0500, 0600, 0624, 0643, 0728

IOP 5 Release Times:
MIPS (35.799629, -91.140336): 1105Z, 1230, 1400, 1500, 1730

MoDLS (35.3876997, -90.2712585): 1115, 1230, 1400, 1500, 1600, 1700, 1752

RaDAPS (35.77341, -90.34875): 1107, 1230, 1400, 1500, 1700

2.0 Instrumentation Description

UAH used InterMet's (iMet) 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 with iMet-OSII. 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. The data was then run through computer code that checked for inconsistent heights or wind data and then rearranged into a consistent format using python code. If the data showed the balloon was descending, it was omitted. If wind data was erroneous (exceeded 350 knots, it was replaced with -9999.0. Windsond data was quality controlled through a two-step quality control process as follows:

1. Windsonds 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. Windsond-provided wind data was still sub-par. Therefore, wind data was smoothed using moving averaging over a 10-second moving window. This smoothed wind data were then written to a new file with the rest of the data (pressure, air temperature, dew point, UTC time, and height).

4.0 Data Format

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 2: 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 (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

Each data file is one individual sounding launched.

5.0 Data Remarks

Surface Data – Surface measurements for the iMet sondes were collected via the co-located platform's surface tower (typically a 10-m AGL tower). WIndsonde surface measurements were obtained from the sonde itself typically held at 2-m AGL. Verification of surface data was often completed using surface stations on the co-located mobile instrument platforms. Surface data were verified using the co-located platform's surface measurements in post-processing and were corrected if necessary.

- 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.