Title: PERiLS 2023 UAH MAX Mobile Radar Data

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1.0 Dataset Overview

The UAH Mobile Atmospheric Profiling Network (MAPNet) Mobile Alabama X-Band radar (MAX) is a mobile r X-Band radar. Data from MAX was collected during each IOP unless otherwise noted. Field notes are also provided to assist the user. Locations and operating times are as follows:

IOP 1
Time Period: 2023/02/16 1440 to 2023/02/17 0145Z
Location: 32.89008, -88.34295 elevation: 68 m

IOP 2
Time Period: 2022/03/03 0025Z to 2022/03/03 12Z
Location: 34.62544, -90.90049 elevation: 58 m

IOP 3
Time Period: 2022/03/24 1713Z to 2022/03/25 0236Z
Location: 33.580853, -91.061535 elevation: 43 m

IOP 4
Time Period: 2022/03/31 1858Z to 2022/04/01 0831Z
Location: 34.655203, -87.349702 elevation: 177 m

IOP 5
Time Period: 2022/04/05 1123Z to 2022/04/05 1849Z
Location: 35.792799, -90.584331 elevation: 70 m

2.0 Instrument Description:

Mounted to the back of an International 4300, MAX is a dual polarization mobile X-band radar. For detailed information regarding MAX, see the link below:
https://www.nsstc.uah.edu/mapnet/facilities/max.php

3.0 Data Collection and Processing:

Prior to the onset of convection, volume scans focused on obtaining clear air measurements were conducted. This strategy consisted of a longer pulse width, slower rotational rates, and a series of low elevation angles. Once precipitation was located within a 50 km radius from the radar, a rapid cycle scan strategy was used. The scan contained two different sets of elevations for both shallow and deep convection. Vertical scans, otherwise known as bird baths, were completed during a few of the IOPs during stratiform precipitation intended to be used for Zdr corrections. During the clear air sequence, Range Height Indicator (RHI) scans were conducted in the direction of the UAH MAPNet profiling platforms. These azimuths are defined in the field logs for each IOP. The strategies are defined below:

- Clear Air Sequence - 0.7, 1.3, 2.0, 2.7, 3.7, 5.0, 7.0, 9.0; pulse with of 0.8 microseconds
- Rapid Cycle Volume scans consisted of a cycle following: shallow, deep, shallow, deep where:
    Shallow Scan Sequence - 0.7, 1.5, 2.6 3.8, 5; pulse with: 0.4 microseconds
    Deep Scan Sequence - 0.7, 1.5, 2.6, 6, 9; pulse with: 0.4 microseconds

A ZDR bias was noted in the data and corrected using the DOE Pyart python library was applied to the data. Heading corrections were also applied to the data where necessary. However, users are encouraged to verify headings prior to using the data. No other processing was applied. Both the uncorrected and corrected Zdr fields are provided.

4.0 Data Format

Data is provided as netCDF files following the CFRadial file format. Each file contains the entire volume. The file naming convention follows:

RAW_NA_000_xxx_YYYYmmddHHMMSS.nc where:
xxx -> scan type (100 - PPI; 125 - RHI; 050 - Bird Bath)

5.0 Data Remarks:

During IOP 4, the elevation drive motor failed which prevented the radar from tilting higher than 1 deg in elevation. The radar remained operational during the entire IOP, but data above 1 degree in elevation is limited. The field notes defined at what point during the IOP this failure occurred.

6.0 References:

Helmus, J.J. & Collis, S.M., (2016). The Python ARM Radar Toolkit (Py-ART), a Library for Working with Weather Radar Data in the Python Programming Language. Journal of Open Research Software. 4(1), p.e25. DOI: http://doi.org/10.5334/jors.119