Title: PERiLS 2023 UAH MAPNet MoDLS Doppler Lidar Dataset

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1.0 Dataset Overview

The UAH Mobile Atmospheric Profiling Network (MAPNet) Mobile Doppler Lidar and Soundings (MoDLS) was deployed with the Doppler lidar for all 5 PERiLS deployments. The lidar was operated in two modes - VAD mode and vertical stare mode. These modes are described in more detail in section 3. Logbooks are provided for the user's reference for any data collection issues, etc.

> IOP 1
> Time Period: 2023/02/16 1356 to 2023/02/17 0130Z
> Location: 32.8334, -88.143 elevation: 26 m
>
> IOP 2
> Time Period: 2022/03/02 2350Z to 2022/03/03 11Z
> Location: 34.43138, -90.73124 elevation: 60 m
>
> IOP 3
> Time Period: 2022/03/24 1705Z to 2022/03/25 0225Z
> Location: 33.5592711, -90.8057507 elevation: 81 m
>
> IOP 4
> Time Period: 2022/03/31 1917Z to 2022/04/01 0800Z
> Location: 34.7969441, -87.1527087 elevation: 239 m
>
> IOP 5
> Time Period: 2022/04/05 1115Z to 2022/04/05 1830Z
> Location: 35.3876997, -90.2712585 elevation: 66 m

2.0 Instrument Description

The UAH MoDLS utilizes a Halo Photonics Streamline Scanning Doppler Lidar. The lidar operates at near-infrared with a wavelength of 1.5 µm. Mores information for MoDLS can be found here: https://www.nsstc.uah.edu/mapnet/facilities/modls.php.

3.0 Data Collection and Processing

During the PERiLS field campaign, the lidar performed 2 VAD scans at 15 deg and 60 deg elevation. The radial velocities were then passed through a typical VAD algorithm to produce high resolution wind profiles within the boundary layer. These scans were completed every 5 minutes. While not performing the VAD PPI scans, the lidar was pointed vertically to collect vertical backscatter and velocity data. Beyond VAD computations, no additional processing has been completed on these datasets. Note that the lidar heading should have been manually applied for each IOP. Although headings were validated during the QC process, users should always verify this was completed when using data.

4.0 Data Format

A netCDF file for each scan type was generated for each day. Wind profiles produced from the VAD scans are also provided as separate netCDF files.

Data Descriptors for Stare Files

Identifier	Units	Description
decimalTime	UTC Hours	UTC Time in Decimal Hours from 0000 UTC
height	meters	Height AGL
elevation	Deg	Elevation angle above horizon
azimuth	degrees	Azimuth angle
velocity	m/s	Vertical velocity
intensity	unitless	Intensity computed as SNR+1
backscatter	m(^-1) sr^(-1)	Attenuated Backscatter

Data Descriptor for VAD files

Identifier	Units	Description
epochTime	Seconds	Seconds Since 00 UTC 1970 01 01
height	meters	Height AGL
decimalTime	UTC	Seconds Since 00 UTC 1970 01 01
elevation	degrees	Elevation from Horizon
azimuth	degress	Azimuth of scanner
u	m/s	Computed U wind Component
v	m/s	Computed V wind Component
w	m/s	Computed W wind Component
rmse	unitless	Root mean square error between observed PPI velocities and fitted values
wdir	degress	Wind direction from True North
wspd	m/s	Computed wind speed

The file naming convention for regular lidar files is as follows:
MoDLS_DWL_scanType_YYYYMMDD-HHmm_numGates.nc where:

scanType -> defined scan (Stare - Vertical measurements, User - 15 deg VAD PPI, Wind - 60 Deg VAD PPI)
numGates -> number of gates for each profile

The file naming convention for the VAD files is as follows:
MoDLS_YYYYMMDD_HHmm_VAD_elev.nc where elev corresponds to the elevation used to compute the VAD.