

UAH MAPNet Instrument Summary



PERiLS Year 2

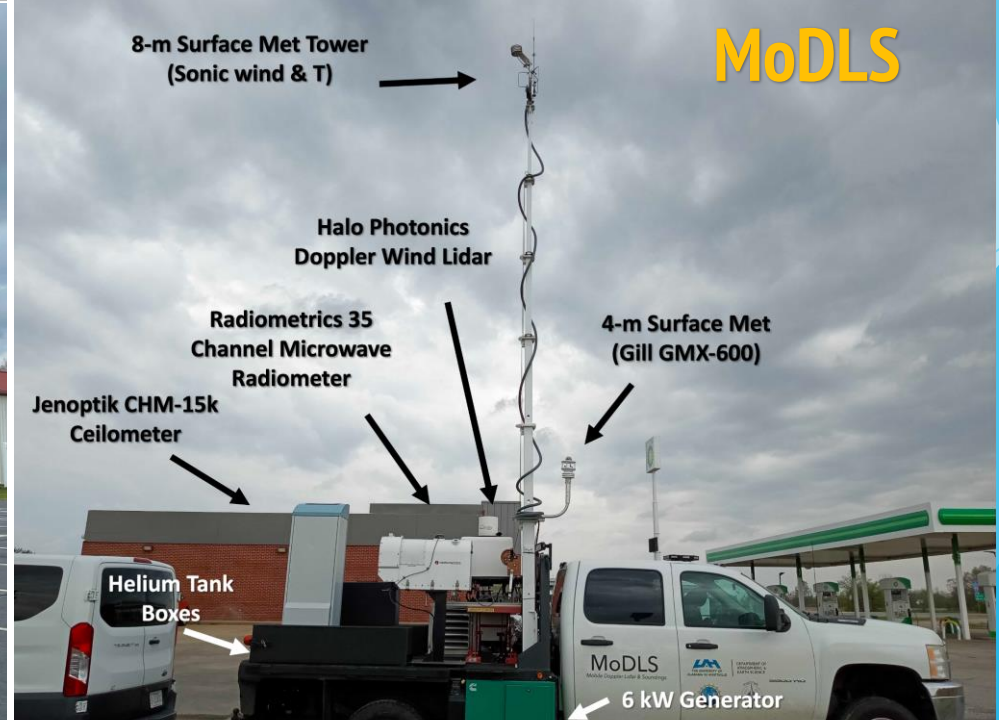
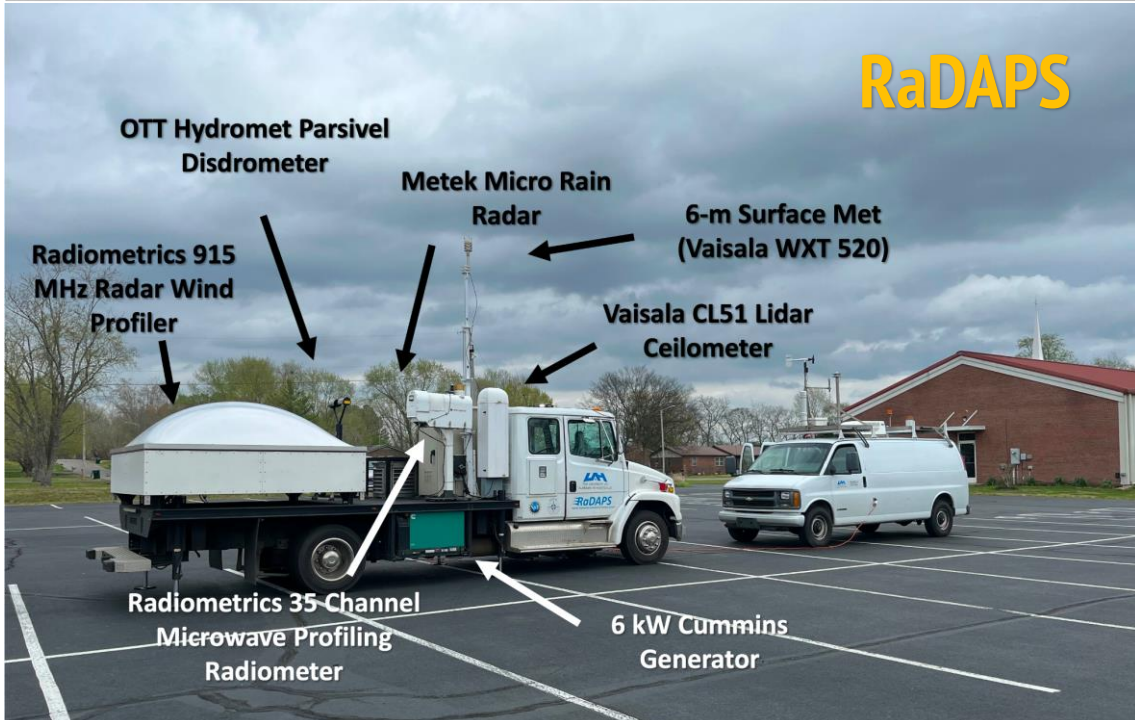
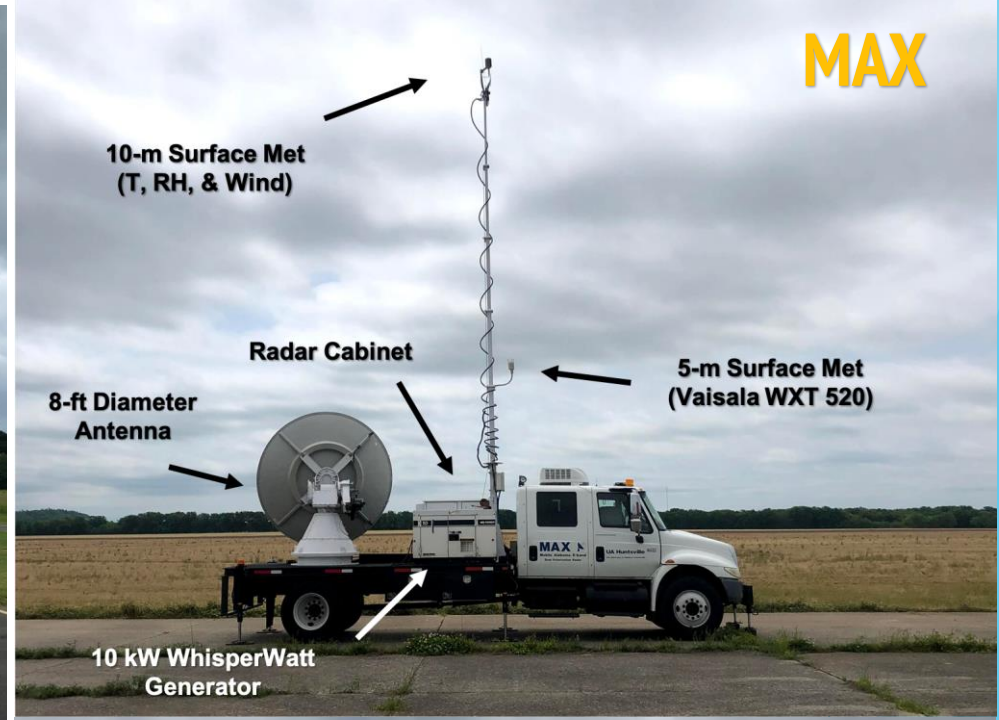
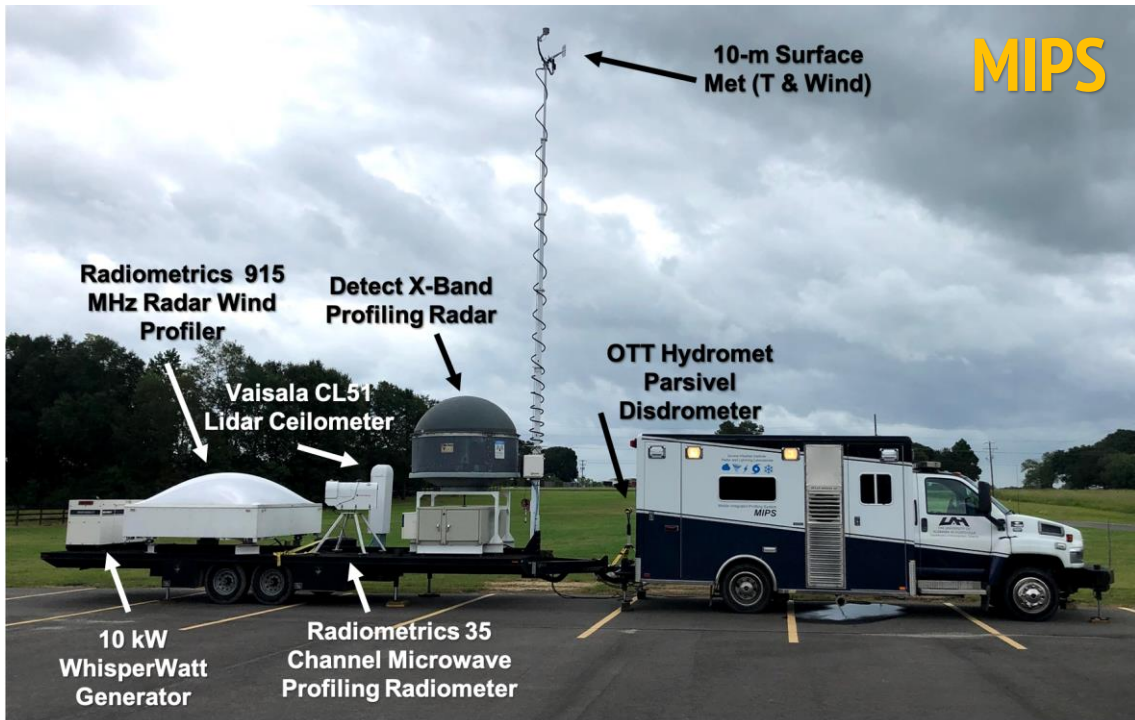
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MAPNet - Mobile Atmospheric Profiling Network

- ▶ A part of the NSF Community Instruments and Facilities Program
- ▶ 3 profiling platforms and a scanning radar
- ▶ **Mobile Doppler Lidar & Soundings (MoDLS)**
 - ▶ Scanning Doppler lidar, 35 channel microwave radiometer, lidar ceilometer, 8-m retractable mast for in-situ surface (PTU, RH, 3D sonic)
- ▶ **Mobile Integrated Profiling System (MIPS)**
 - ▶ 915 MHz RWP, 35 Channel Microwave Radiometer, lidar ceilometer, parsivel disdrometer, vertically pointing x-band radar, 10-m mast for in-situ surface (PTU, rain)
- ▶ **Rapidly Deployable Atmospheric Profiling System (RaDAPS)**
 - ▶ 915 MHz RWP, 35 Channel Microwave Radiometer, lidar ceilometer, parsivel disdrometer, vertically pointing K-band radar, 6-m mast for in-situ surface (PTU, rain, RH)
- ▶ **Mobile Alabama X-band Radar (MAX)**
 - ▶ Scanning dual-pol Doppler X-band radar, 10-m mast for in-situ surface (PTU, rain, RH)





Deployment Summary

- Successful year for MAPNet
- All 4 Platforms deployed for all 5 IOPS
- Soundings
 - Soundings accompanied MIPS (iMet), RaDAPS (iMet), and MoDLS (Windsond)
 - Windsonds with MAX for IOP 4
 - Release times coordinated with other PIs (1-2 hr launches)
- Noteworthy Issues
 - MIPS - XPR down due to bad STALO and amp (long lead times)
 - RaDAPS - 915 RWP wind data degraded due to manufacturer software issue. Winds quality varies
 - MAX - failed EL motor during IOP 4 prevented scans above 1 deg but still operated
- More detailed MAPNet IOP summaries are available on the Field Catalog

	MIPS	RaDAPS	MoDLS	MAX
IOP 1	Deployed	Deployed	Deployed	Deployed
IOP 2	Deployed	Deployed	Deployed	Deployed
IOP 3	Deployed	Deployed	Deployed	Deployed
IOP 4	Deployed (at SWIRLL)	Deployed	Deployed	Deployed
IOP 5	Deployed	Deployed	Deployed	Deployed

 Deployed  Deployed w/issues  Not Deployed



Table 2. Instrument characteristics

Instrument, model	Platform	Freq. or wavelength	# beams	Sampling rate or Δt	N_z (gates)	R_{\min} (m)	R_{\max} (km)	Vertical (range) resolution (m)
RWP, XBS-BL	MIPS, RaDAPS	915 MHz	7	2, 5, 60 min	100	120	>10	60, 100, 200
XPR	MIPS	9.5 GHz	vert	6 Hz	10^3	100	>20	20, 39, 60, 100
MRR-2	RaDAPS	24.2 GHz	vert	10-3600 s	30	30	<3 to 6	10-200
MAX	MAX	9.6 GHz	scan	1200 Hz	10^3	250	100	30-1500?
CL51 ceilometer	MIPS RaDAPS	0.91 μm	vert	15 s	10^3	10	15	10
Halo DWL	MoDLS	1.5 μm	scan	1-2 Hz	~ 500	100	9.6	18-60 typical
PA0 sodar ¹	any ¹	3-6 kHz	5	100-300 s	20-50	15	0.7	10-30 typical
MP3000A	MIPS RaDAPS MoDLS	22-30 GHz 51-59 GHz	scan	~ 60 s	cont.	10	10	Varies: ~ 10 m to >2 km

¹ A Remtech PA0 Doppler sodar can be added to any of the four platforms, most typically MIPS and RaDAPS.



In-Field Operations

- ▶ MAX - Operated in two modes
 - ▶ For convection > 50 km range: BL scans focused on low-level BL obs, RHIs over profilers
 - ▶ BL Scans: 0.7°, 1.3°, 2°, 2.7°, 3.7°, 5°, 7°, 9°; PRF 1200 Hz, Pulse width of 0.8 microseconds
 - ▶ For convection < 50 km range: faster scan rate, 360 sec update time; shallow, deep, shallow, deep
 - ▶ 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
 - ▶ Bird baths at the end of IOPs when time and precipitation allowed
- ▶ Wind Profilers used a standard mode
 - ▶ Averaged winds every 5 minutes and 60 minutes
- ▶ Lidar - Operated in two modes
 - ▶ VAD scans every 5 minutes - 15° elevation (8-point) and 60° elevation(6-point)
 - ▶ vertical stares in between VAD scans
- ▶ Radiometers
 - ▶ Zenith-only obs



Data Quality Control

- ▶ All data were checked for inconsistencies; data points corrected or omitted where necessary
- ▶ Wind profilers - Software-controlled QC Algorithm used (provides confidence flag for data, ranging 0-1) does a good job; headings verified; no other QC performed
- ▶ Lidar - Headings were corrected where necessary; VAD scans used to produce wind profiles
- ▶ Radiometer - No QC to data; LN2 calibrations performed in Feb 2023 prior to IOP 1
- ▶ Surface data - Removed erroneous data; applied wind heading corrections where necessary



Data Quality Control Cont'd

▶ Soundings

- ▶ Verified surface points with surface data from co-located platforms
- ▶ Inconsistent height or wind data were corrected or omitted
- ▶ Windsound wind data underwent basic smoothing to mask noise produced by noisy GPS (outlined in metadata)
- ▶ Recent batches of iMet sondes have seem to show an inconsistent Td bias
 - ▶ this variation has tested and was within factory specs (5% RH uncertainty); so no QC there

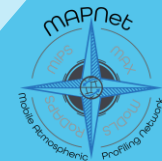
▶ Radar data

- ▶ Locations and headings verified
- ▶ Zdr corrected using Pyart and available bird baths - files include both corrected and raw Zdr
- ▶ No other QC applied



Data Format & Access

- ↳ All available UAH MAPNet data will be uploaded to EOL in coming weeks
 - ↳ Metadata - readme and field logs
 - ↳ Detailed IOP summaries are provided on the EOL catalog
- ↳ All surface and sounding data provided in CSV text files w/headers
- ↳ All profiling and radar data provided in netCDF
 - ↳ Radar data follows CFRadial format
- ↳ Radiometer lvl2 (T and moisture profiles) data provided; lvl1 (brightness temperatures) can be requested
- ↳ Additional and “raw” data can be requested
 - ↳ (preston.pangle@uah.edu or kevin.knupp@nsstc.uah.edu)



Questions or Comments?

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More
MAPNet
Info

