PERiLS Year 2
ULM Doppler Wind LiDAR (DWL)
+ Sounding Data Update

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PERiLS Science Meeting

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Halo Photonics Streamline XR DWL

- Instrument Info
  - 18-m range gate spacing; Doppler bandwidth ± 19 m s^{-1}
  - First useable gate near 40-m AGL; Z_{MAX} depends on aerosol load, cloud base height, and precipitation.
  - DWL provides near instantaneous observations of the wind field
- Operation strategy
  - Fixed location for IOP duration beginning 4-hours before T-0; coordinated with other profiler PIs
  - 8-pt az VAD scans at 70° el every 5-min with continuous vertical stares in between
  - Care taken to ensure DWL was level and correct heading recorded in operating software
- QC underway
  - Final datasets will be netCDF (*.stare.nc and *.VAD.nc)
  - All files will include *epoch time*, *hours* (since 00 UTC on day), *lat*, *lon*, *alt*, *SNR*, *height* (AGL above DWL)
  - Stare files will include *w* (m s^{-1}; vertical velocity) & *attenuated backscatter* (m^{-1} sr^{-1})
  - VAD files will include *u*, *v*, *w* (as retrieved from VAD technique), *horizontal wind speed*, *horizontal wind direction*, *RMS* (m s^{-1}; root mean square error of derived radial velocity compared to observed radial velocity) & R^2 (coefficient of determination comparing derived radial velocity to observed radial velocity; gives measure of wind field homogeneity)

iMet-4-AB 403 MHz sondes

- Operation strategy
  - 60-90 min radiosonde launches at fixed DWL location coordinated with other profiling teams typically beginning 4 hours prior to T-0
  - Launch frequency typically increased as convection approached but launches became less coordinated between teams
  - Balloons filled to target median ascent rates 3-5 m s^{-1}
- QC complete; need to upload data
  - Similar to year 1 process
  - Automatic processing of raw sonde data by iMetOS-II software; resampled to 5-s resolution
  - QC for inconsistent heights, temp/dew, and wind data. Data removed if balloon was descending.
  - 3 CSV text files for each launch (primary format, SPC/SHARPPy format, and flight summary)
  - Primary format gives launch date/time, location, and elevation in header with: lat, lon, UTC time, height, pressure, temp, RH, dew, wind speed, wind direction, & ascent rate

iMet-4-AB 403 MHz sondes

- iMet-4 sondes tend to exhibit a low RH bias relative to surrounding surface data in some instances.
- This has been examined in detail; bias is not systematic, but for some sondes dew points were 2-4°C lower than known calibrated sensors
- Low bias was always within the uncertainty (5%) of the iMet RH sensor
- During QC sonde data compared to surrounding surface datasets. Only a few flights had large discrepancies in surface dew points. These were adjusted by increasing the RH (≤ 5%) to better align with surrounding datasets.

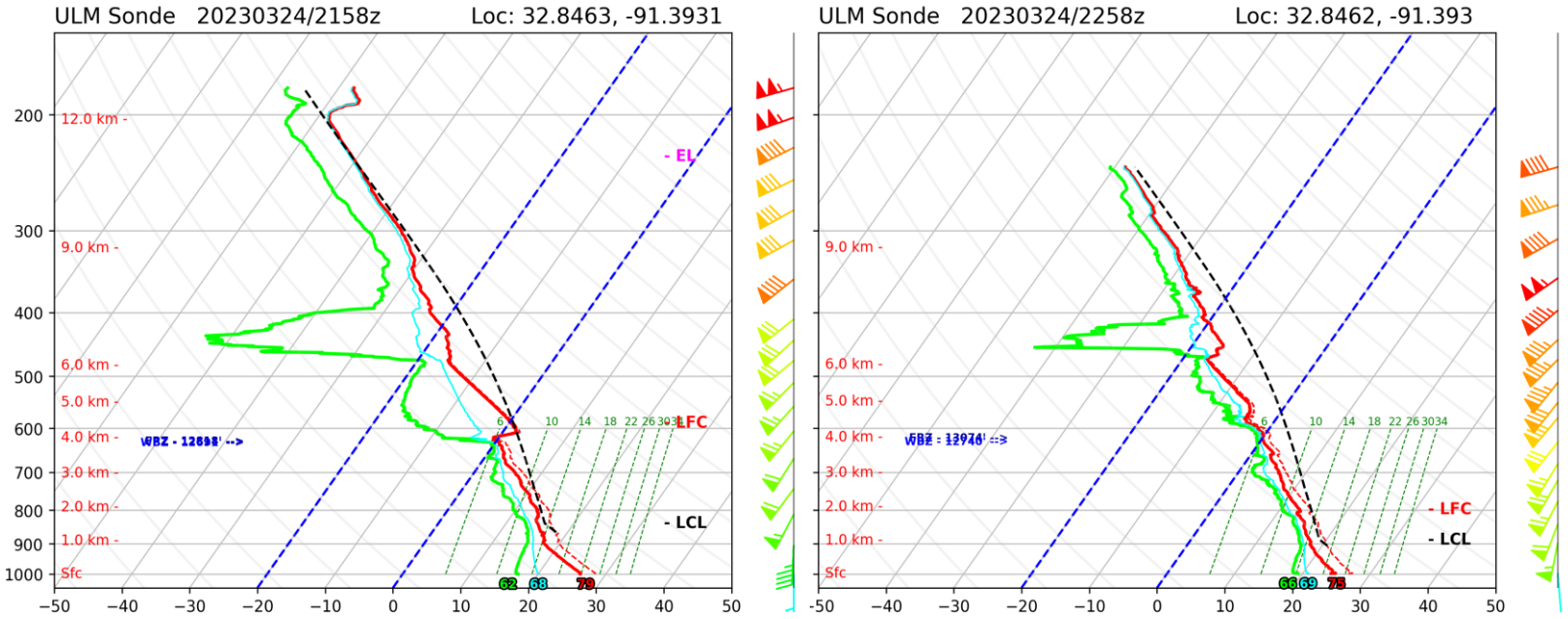
Summary

YEAR 1	IOP1	IOP2	IOP3	IOP4	Total
DWL hours	9	7.5	7	5.5	29
Soundings	8	9	7	7	31

YEAR 2	IOP1	IOP2	IOP3	IOP4	IOP5	Total
DWL hours	12.8	10	9.3	10.7	6.4	49.2
Soundings	9	8	8	9	6	40

- With the exception of IOP4, both sonde and DWL data (including VAD retrievals) are good to excellent quality.
- IOP4 (TN Valley) exhibited persistent signal quality issues with the sondes and lower quality DWL data; VAD retrievals are of poorer quality compared to the other IOPs – needs to be fully investigated
- iMet sondes have transmission issues when lightning is nearby
  - Only an issue for a handful of sondes in year 2

IOP3 Oak Grove, LA



DWL VAD Derived Helicity + Sonde Helicity