AVAPS Dropsonde Mission Dashboard

Kevin McMahon[1,2], Rick Brownrigg[1]

[1]Earth Observing Laboratory at the National Center for Atmospheric Research, [2]Department of Computer Science at the University of Colorado Boulder

Why

- Dropsondes are meteorological instruments that are dropped from aircraft to profile the atmosphere
- NCAR-developed AVAPS dropsonde system is used by NOAA and USAF Hurricane Hunters to fly forecast missions into hurricanes and atmospheric river events
- Dropsondes measure ambient temperature, pressure, humidity, wind speed and wind direction using GPS
- No tool exists which gives a user a synoptic overview of missions

Objectives

1. Create a lightweight, user-centric application using a modern tech-stack to ensure performance with high data load
2. Design an interactive geospatial map to provide mission level flight summary
3. Allow users to perform detailed analysis of individual sonde data through a collection of interactive plots
4. Engineer a modular and well-documented codebase that simplifies maintenance and the addition of new features.

Mission Overview
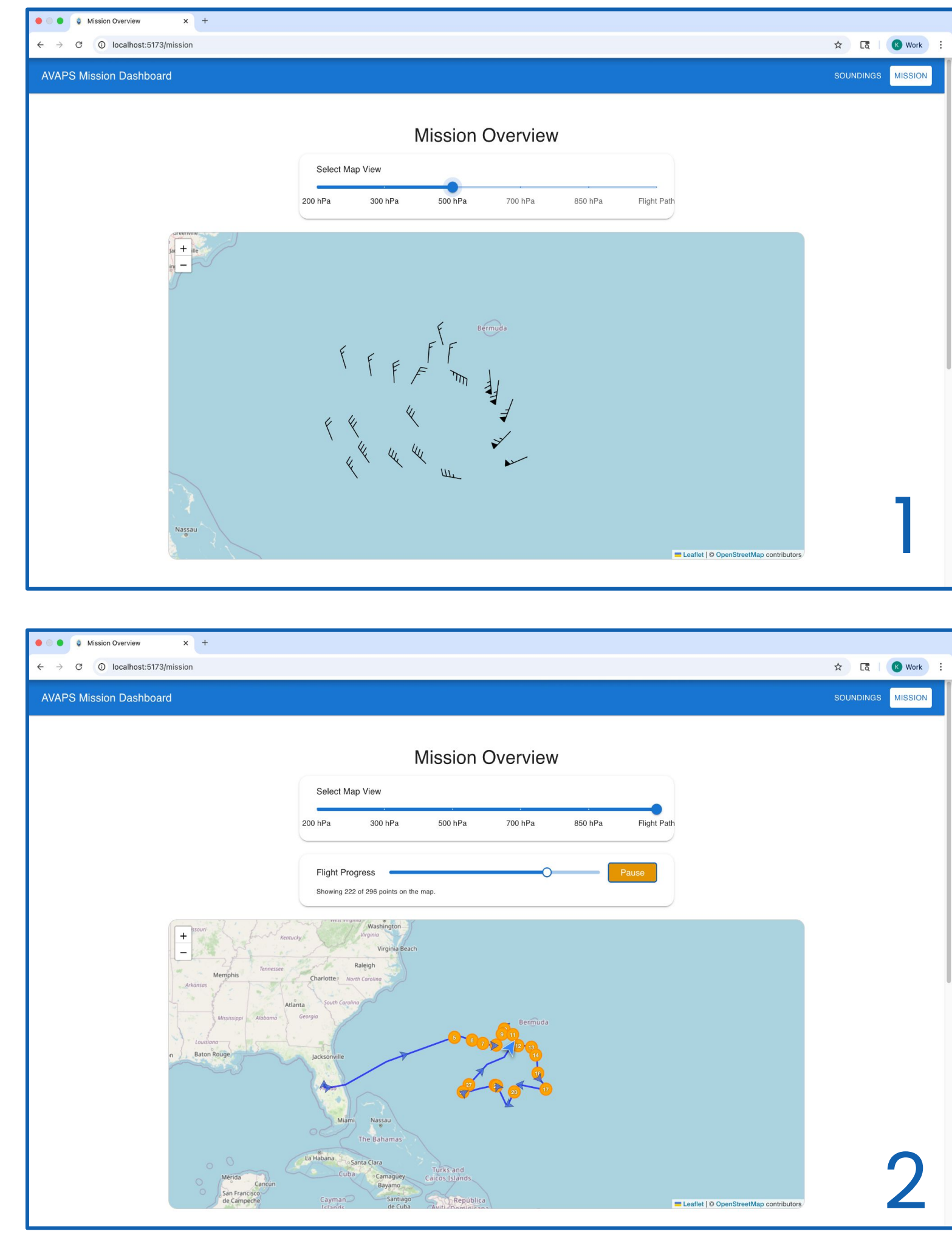
1. <u>Wind profile map:</u> Interactive wind barbs mapped to show user wind patterns using each dropsonde data for each standard meteorological pressure zone

2. <u>Flight mission animation:</u> Flight-path animated with interactive dropsonde release locations to give user understanding of mission flight pattern

3. <u>Spectrum analysis:</u> Visualization of the frequency utilization of the 400-406mHz band which contains data transmission between the dropsonde and aircraft
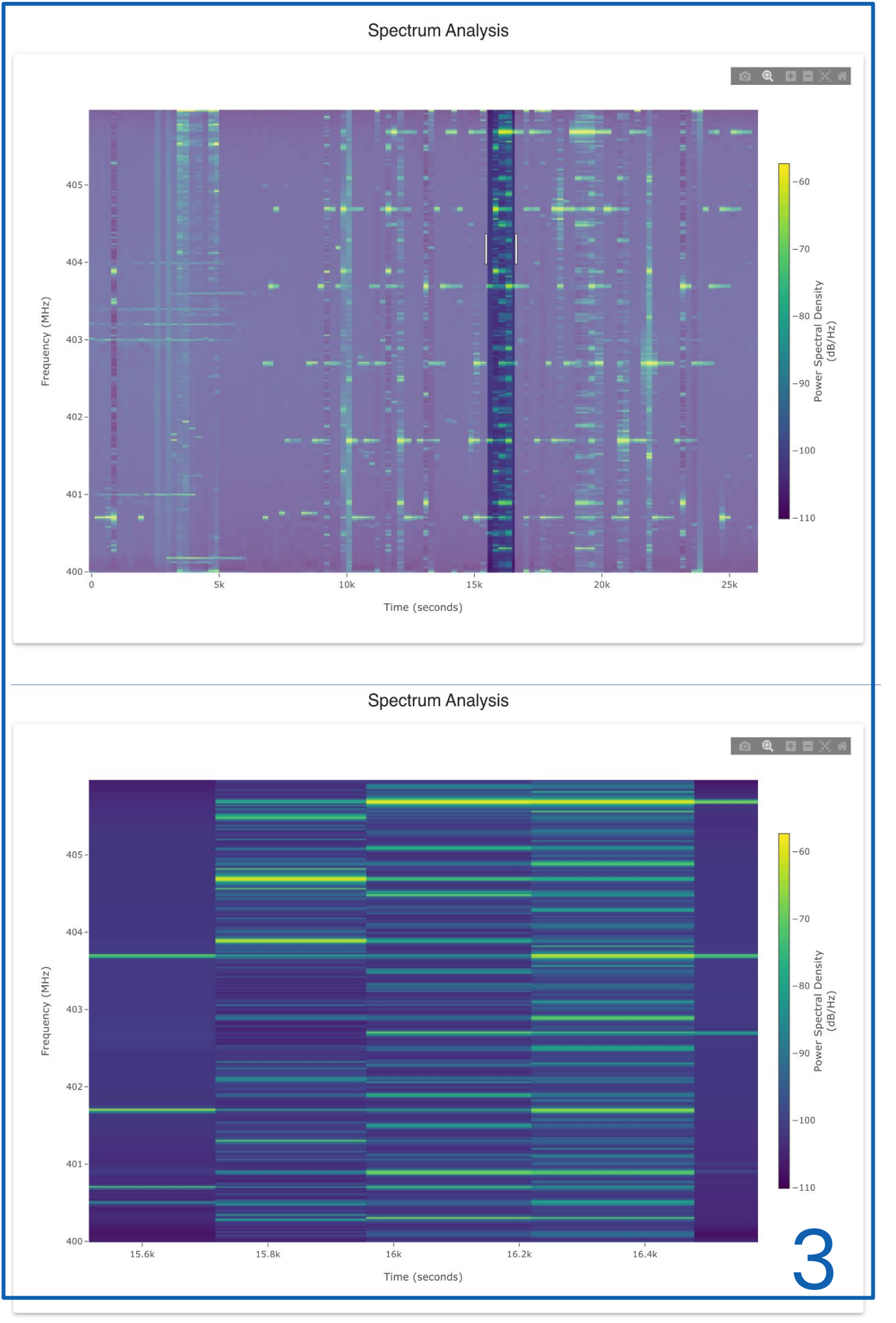
Sonde Overview
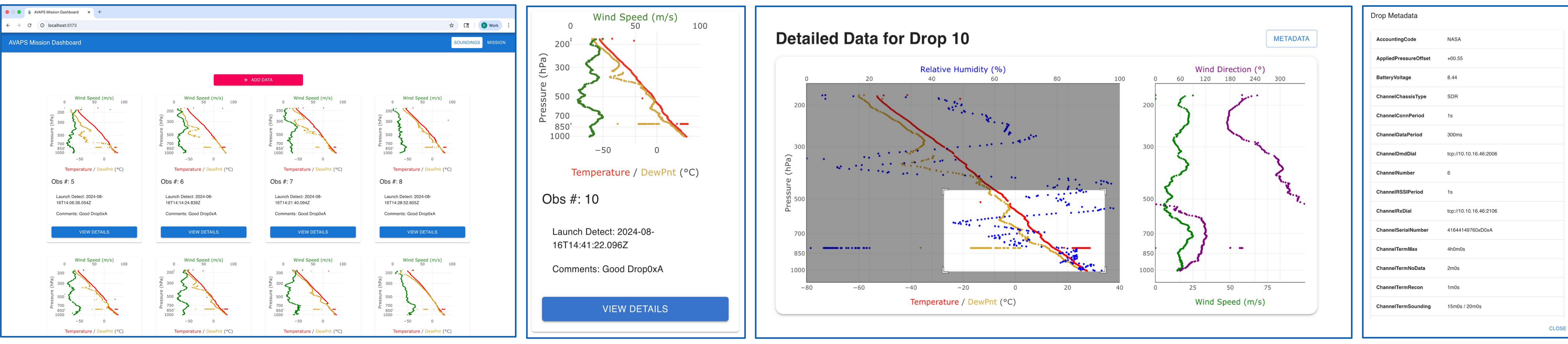
- Dropsondes represented as cards on main page to give user basic overview of data and important attributes
- Higher-resolution interactive plots displaying all data metrics are rendered on a new page by clicking "view details" to allow for side-by-side data comparison of multiple soundings
- Comprehensive list of all metadata attributes available for soundings to provide system data

Future

- Add more visualizations and reporting of automated quality-control (QC) tests
- Potential opportunities for deployment to NOAA hurricane research and operations centers (HRC/AOC)
- 3D visualizations of dropsonde nad aircraft trajectories
- Integration as monitoring / QC tool abroad AVAPS flights

Acknowledgements