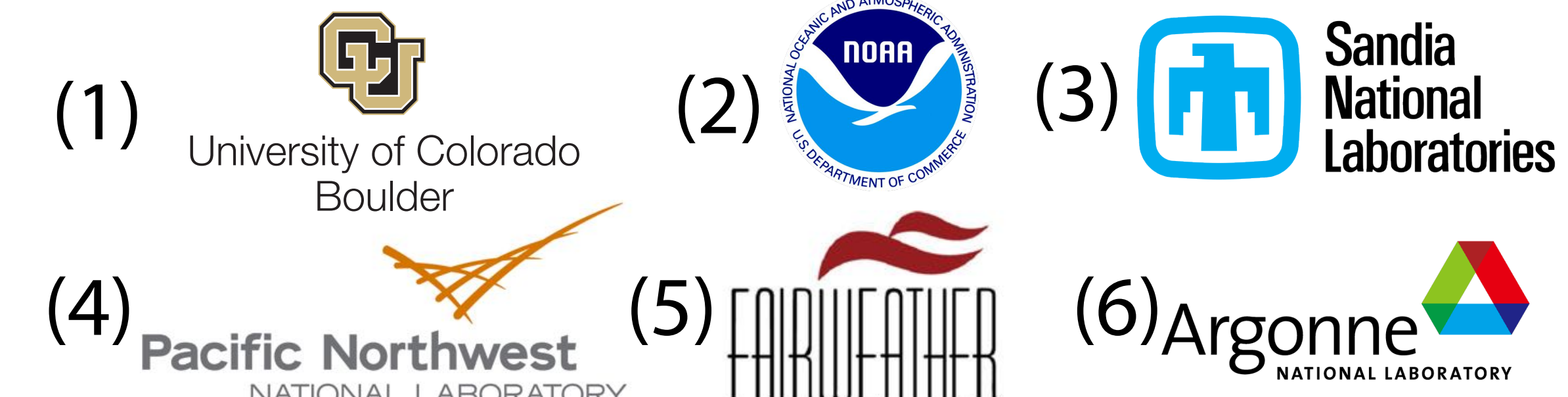
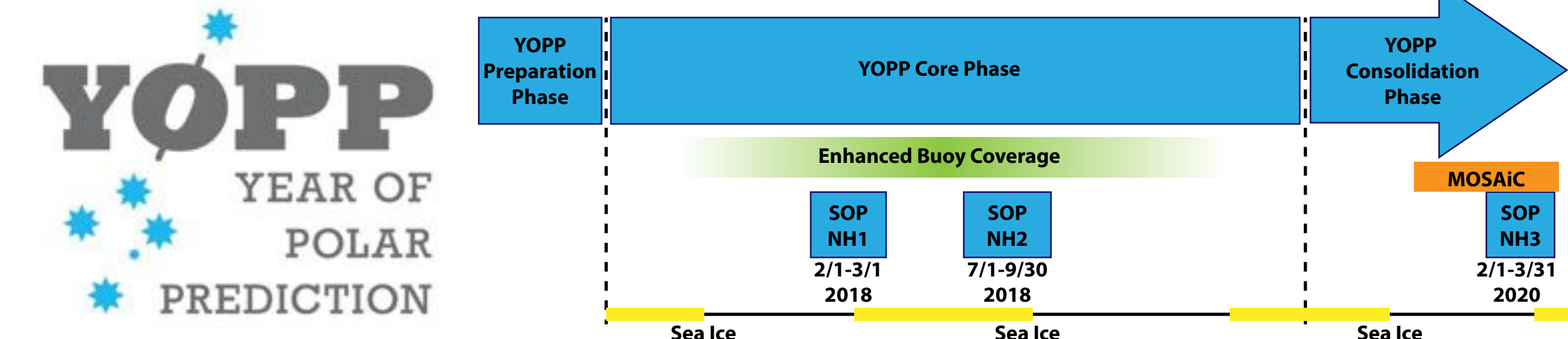


# Profiling at Oliktok Point to Enhance YOPP Experiments (POPEYE): Campaign Overview

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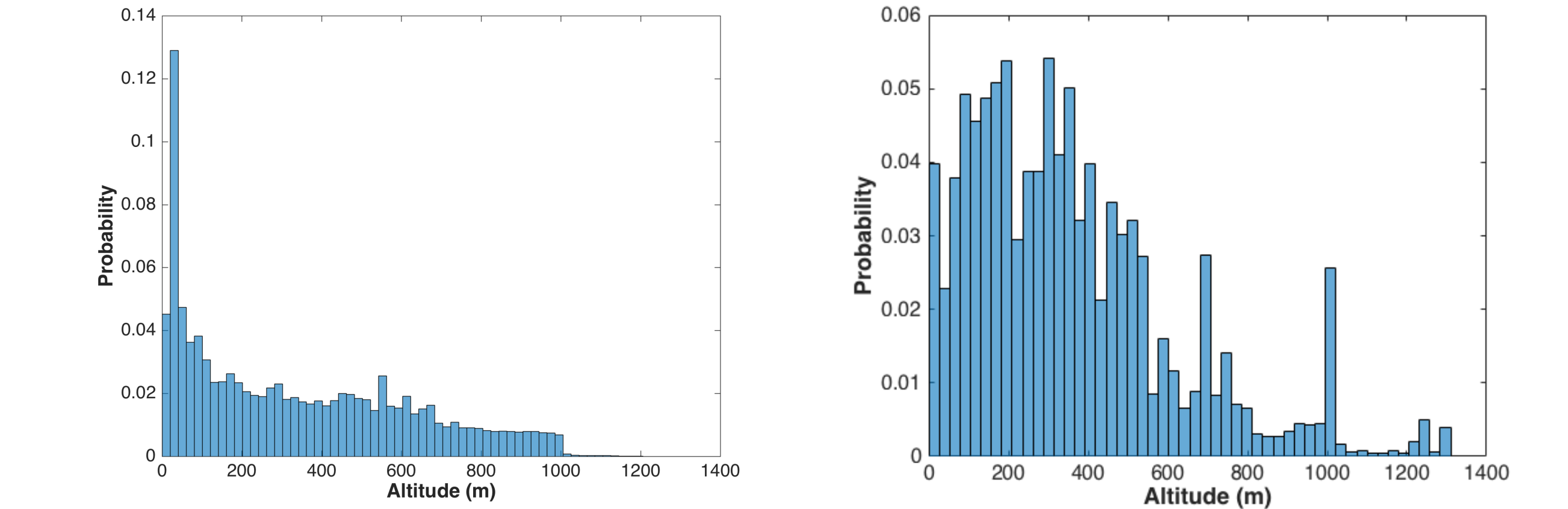
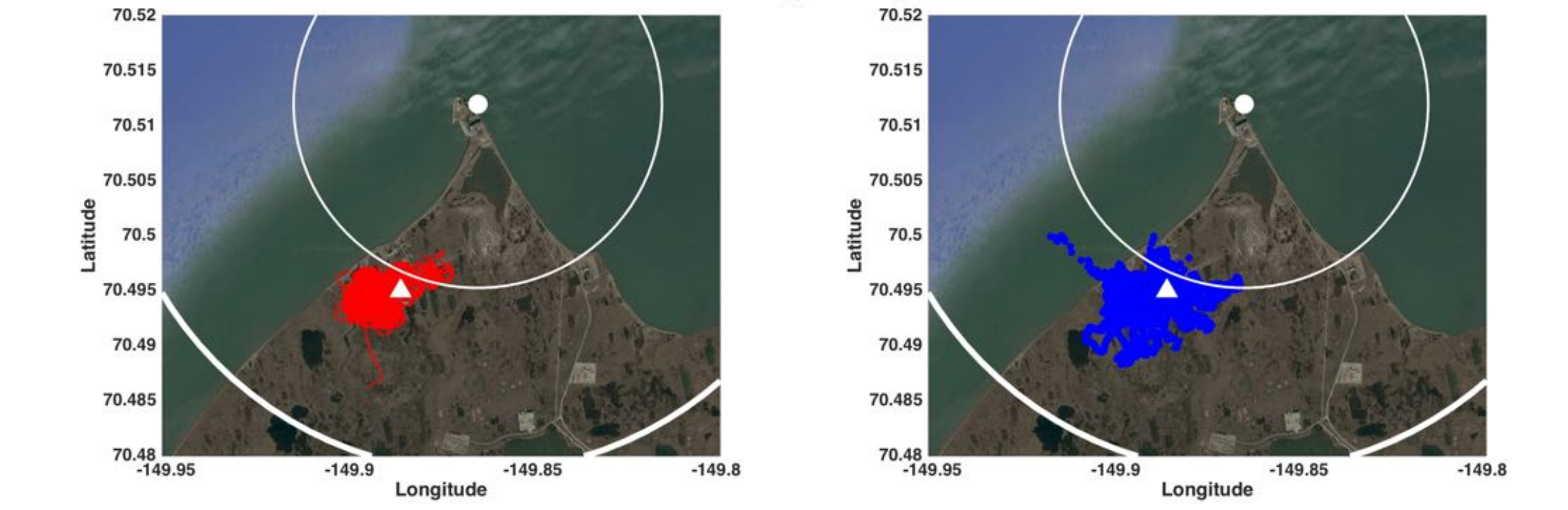
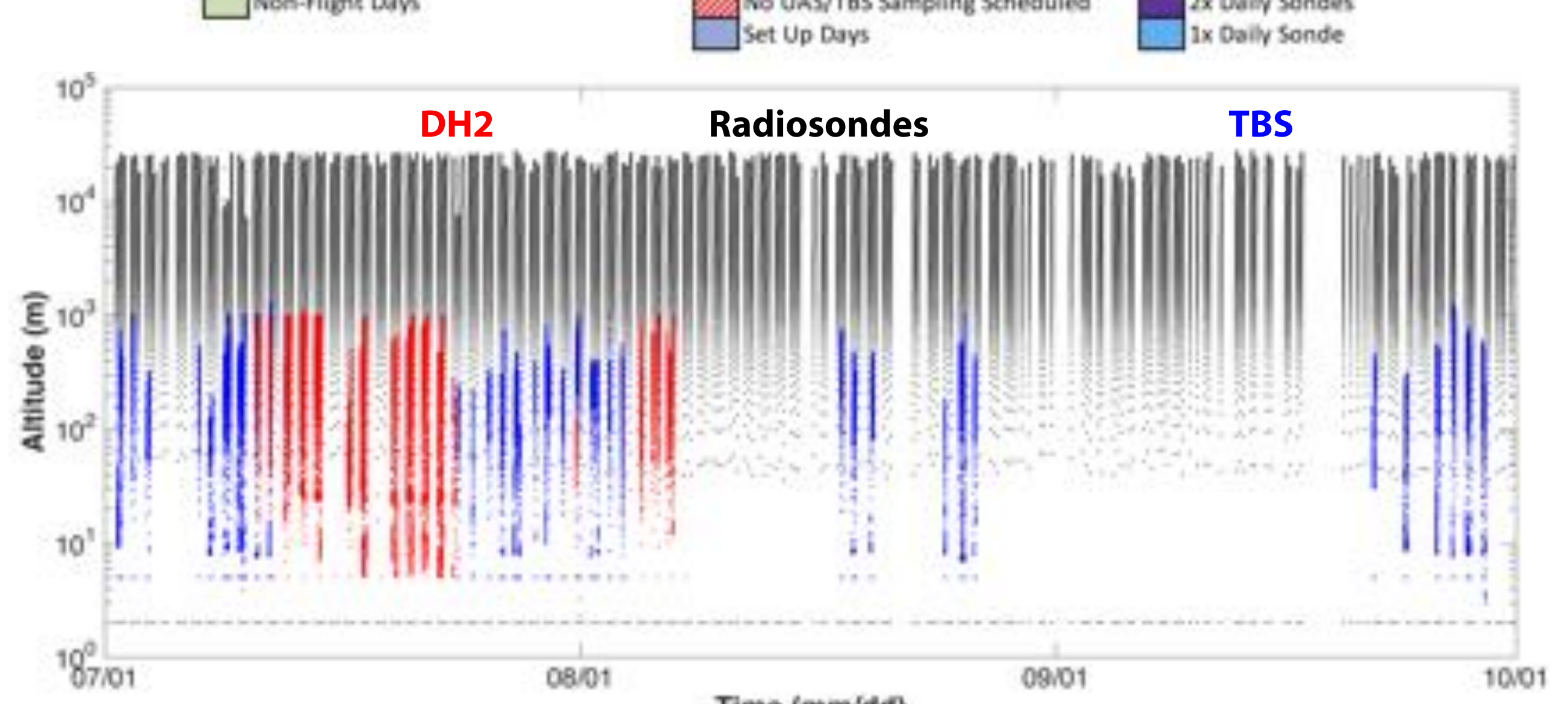
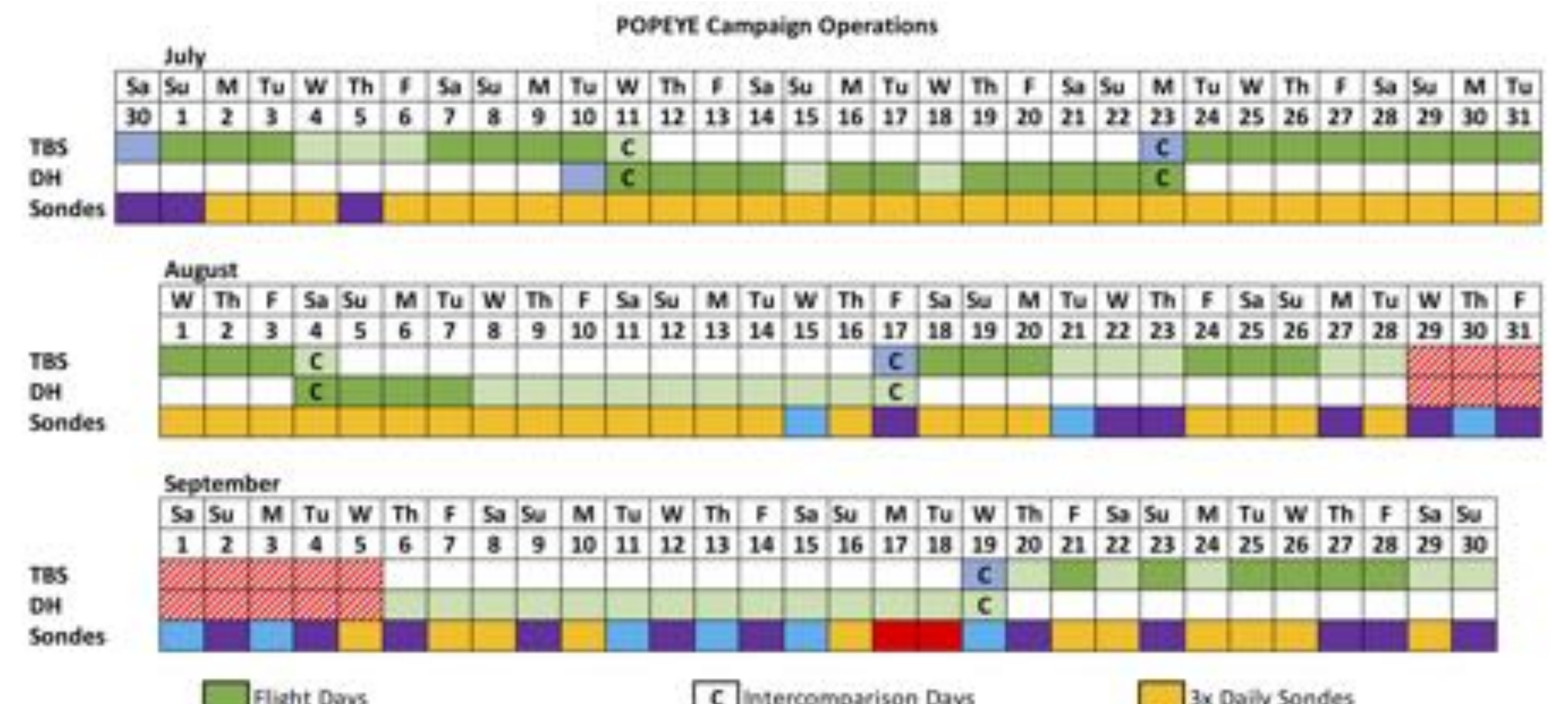


## Introduction



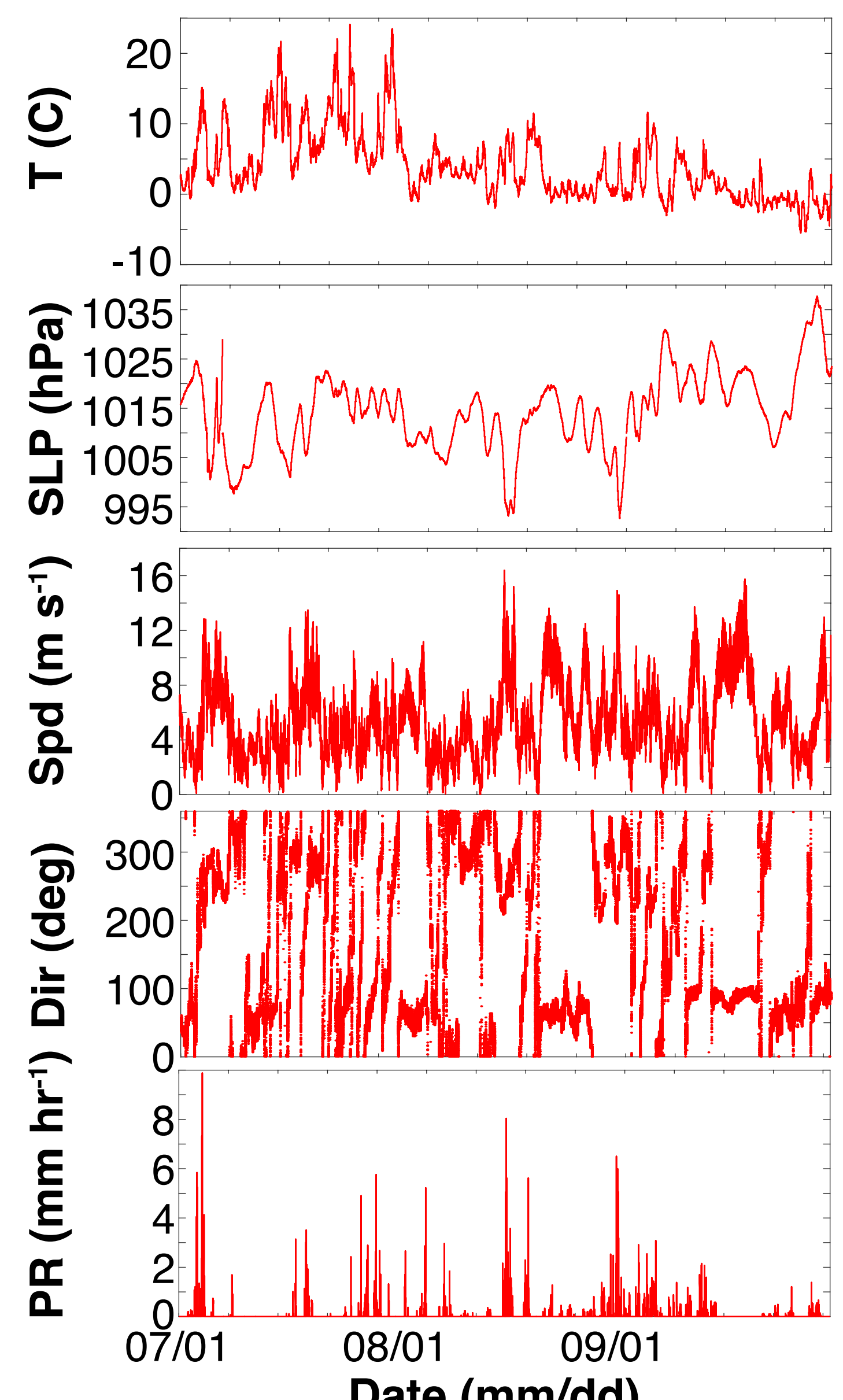
Between 1 July and 30 September 2018, small unmanned aircraft systems (sUAS), tethered balloon systems (TBS), and additional radiosondes were deployed at Oliktok Point to measure the atmosphere during the second special observing period for the Year of Polar Prediction (YOPP). These measurements, collected as part of the "Profiling at Oliktok Point to Enhance YOPP Experiments" (POPEYE) campaign, targeted quantities related to enhancing our understanding of boundary layer structure, cloud and aerosol properties and surface-atmosphere exchange, and provide extra information for model evaluation and improvement efforts. Over the three-month campaign, a total of 59 DataHawk2 sUAS flights, 52 TBS flights, and 238 total radiosonde launches were completed as part of POPEYE. The data from these coordinated activities provide a comprehensive three-dimensional data set of the atmospheric state (air temperature, humidity, pressure, and wind), surface skin temperature and aerosol properties, over Oliktok Point. These data sets have been checked for quality and archived to the US Department of Energy (DOE) Atmospheric Radiation Measurement (ARM) program data archive.

## Completed Sampling



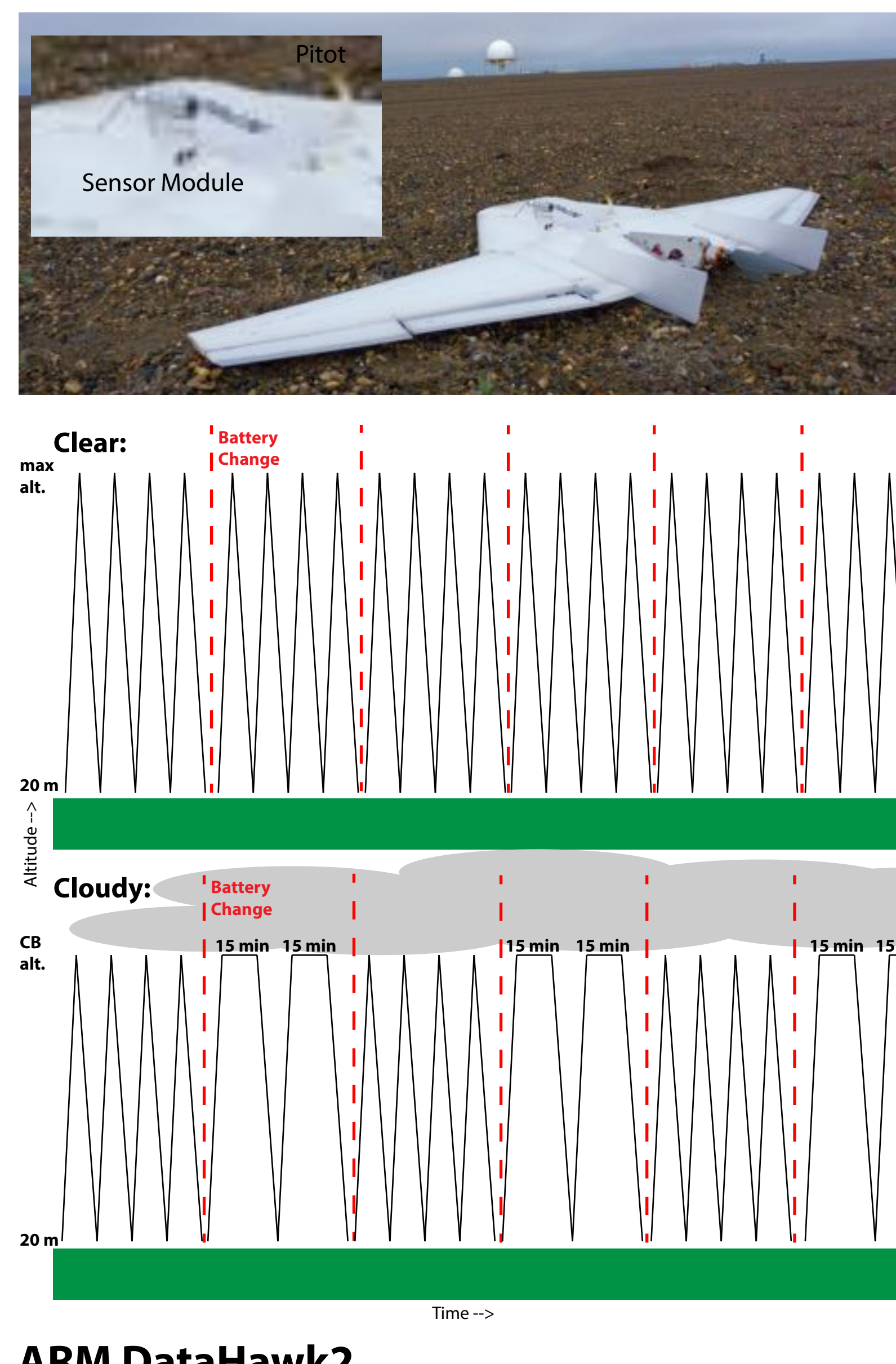
A graphical representation of the completed POPEYE operations for all platforms (top). A time-height cross-section of POPEYE sampling for the entire 2nd YOPP SOP (below) and sampling maps for the TBS and DH2 (bottom).

## Meteorological Conditions

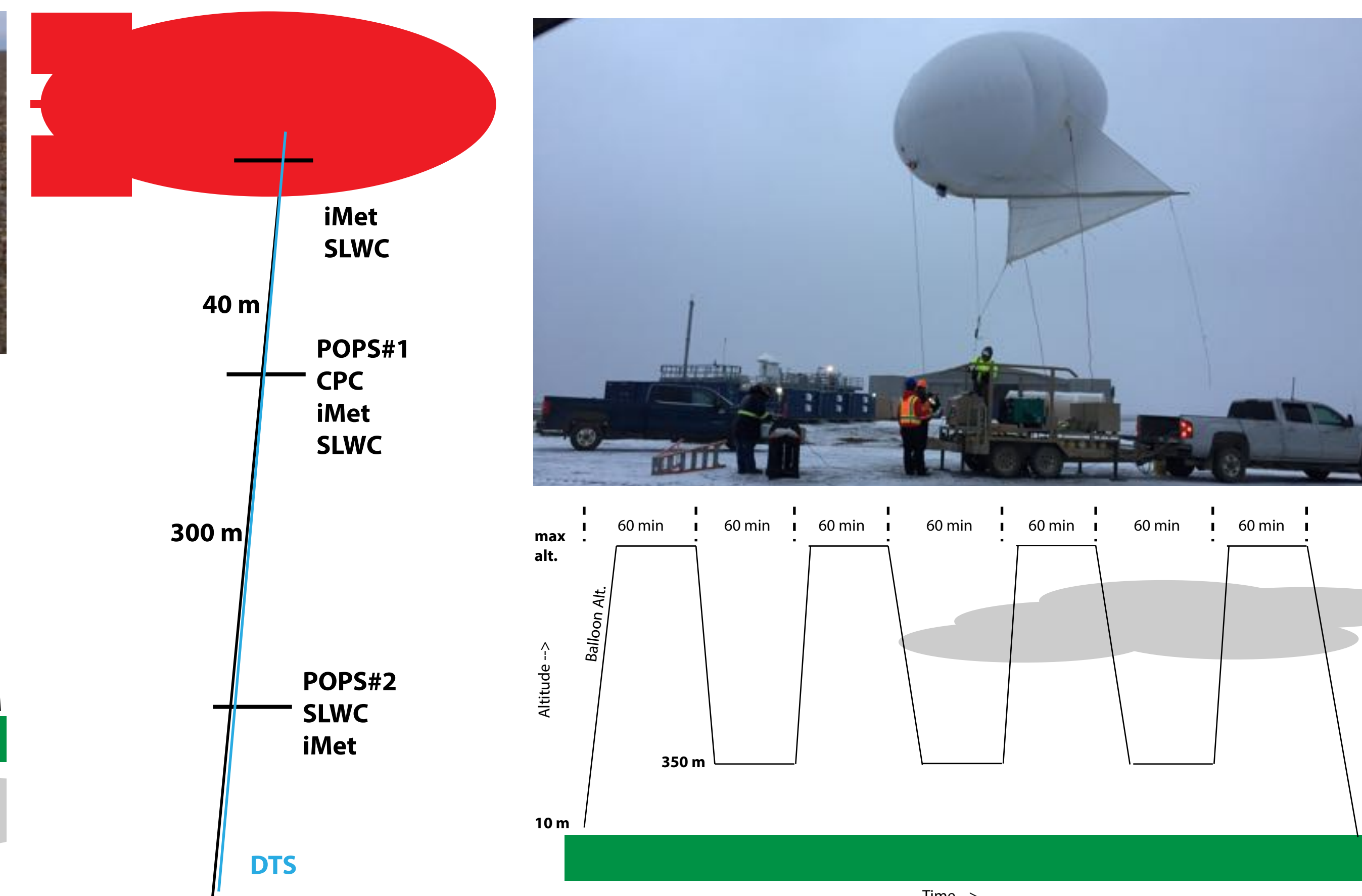


**Surface Met:** A variety of conditions were sampled during POPEYE, including storms, warm conditions and various stratification regimes and surface states.

## Platforms and Flight Patterns



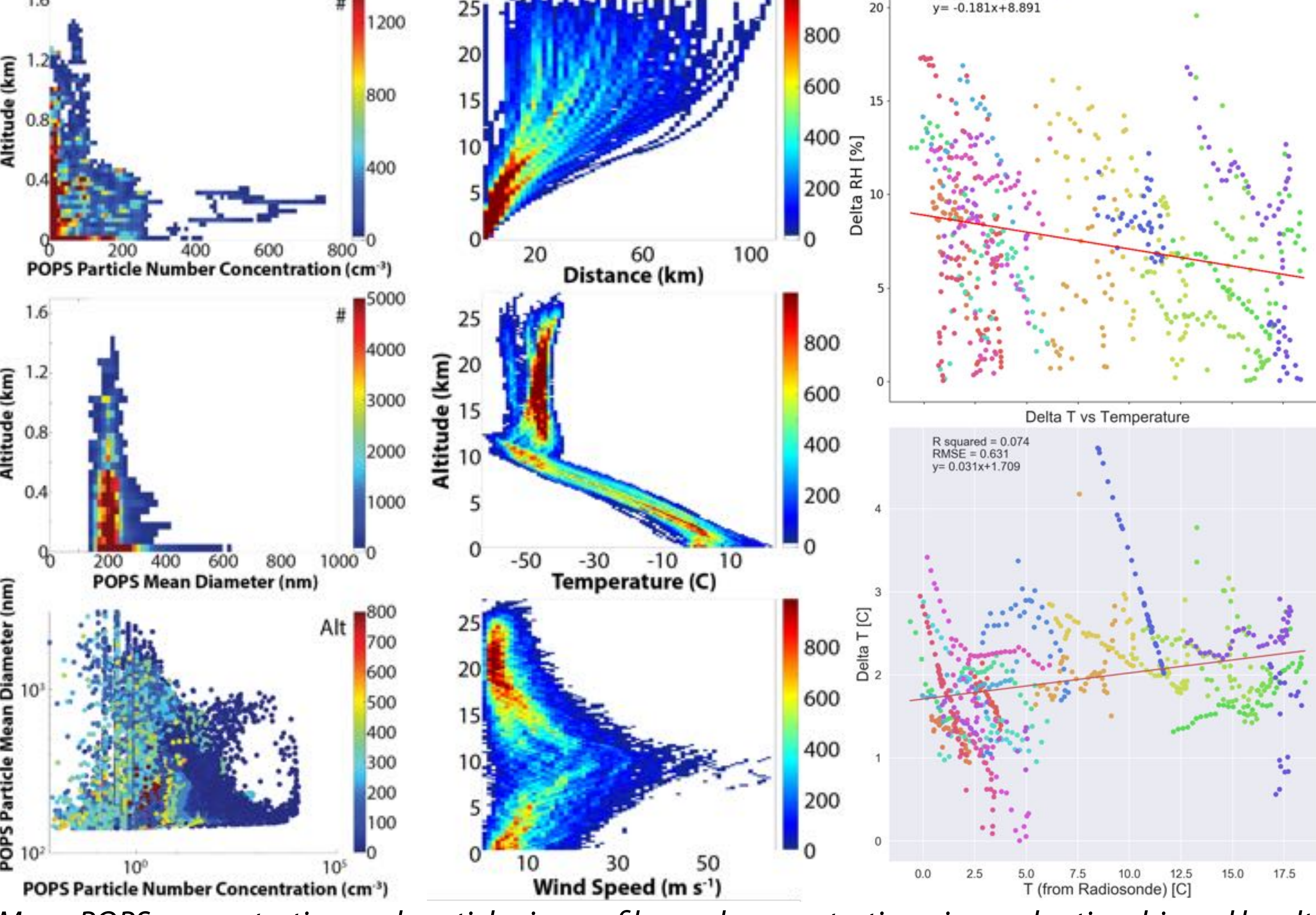
**ARM DataHawk2**  
The DH2 is a fixed-wing unmanned aircraft. Primary measurement objectives include atmospheric thermodynamic state, turbulence, surface and sky temperature, and winds.



**ARM Tethered Balloon Systems**  
For POPEYE, the ARM TBSs were outfitted with instruments to measure thermodynamic state, aerosol concentration and size, and liquid water content.

**ARM Radiosondes**  
For POPEYE, the launch frequency of radiosondes at OLI was increased from two to three daily launches. In addition to the standard 1800 and 0000 Z launches, a 0600 launch was added to the schedule. This was a significant contribution to YOPP, as it coincided with additional extra launches from other Arctic observing sites during the Special Observing Period.

## Initial Glimpses into the Dataset

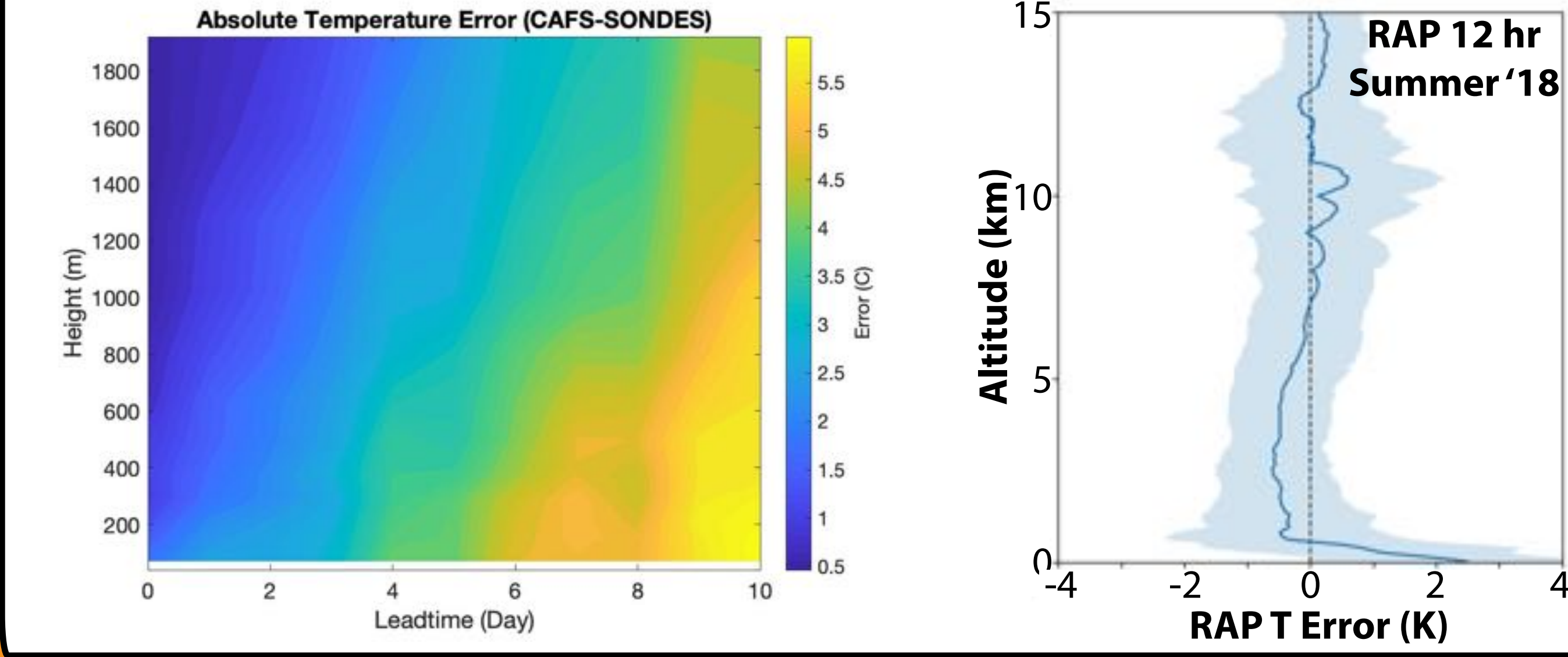


Mean POPS concentration and particle size profiles and concentration-size evaluation, binned by altitude for all POPEYE cases (left column). Two-dimensional histograms of POPEYE radiosonde distance from Oliktok Point, air temperature, and wind speed (middle). A comparison of DataHawk2 and radiosonde temperatures and relative humidities for coincident sampling times (<1 hour; right).

## Ongoing work

A variety of efforts are underway to improve the utility of the POPEYE data and use them for model evaluation and improvement. These include:

- **Development of a uniform TBS dataset:** Hagen Telg (North Slope site science team) is working with instrument and platform mentors and the data archive to improve the uniformity of the TBS data, with initial focus on the aerosol instrumentation (see Creamean poster).
- **Development of DataHawk2 data products:** Lexie Goldberger (PNNL) is working with others at PNNL, the North Slope site science team and CU contributors to develop uniform wind and turbulence products from the DataHawk measurements (see Goldberger poster).
- **Model evaluation efforts:** There are three Hollings students (Hadland, Koskelo, Bray) working with the North Slope site science team this summer to help use POPEYE measurements for evaluation of numerical simulations completed using research and operational models. This includes the operational Rapid Refresh (RAP) and Coupled Arctic Forecasting System (CAFS) models.



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