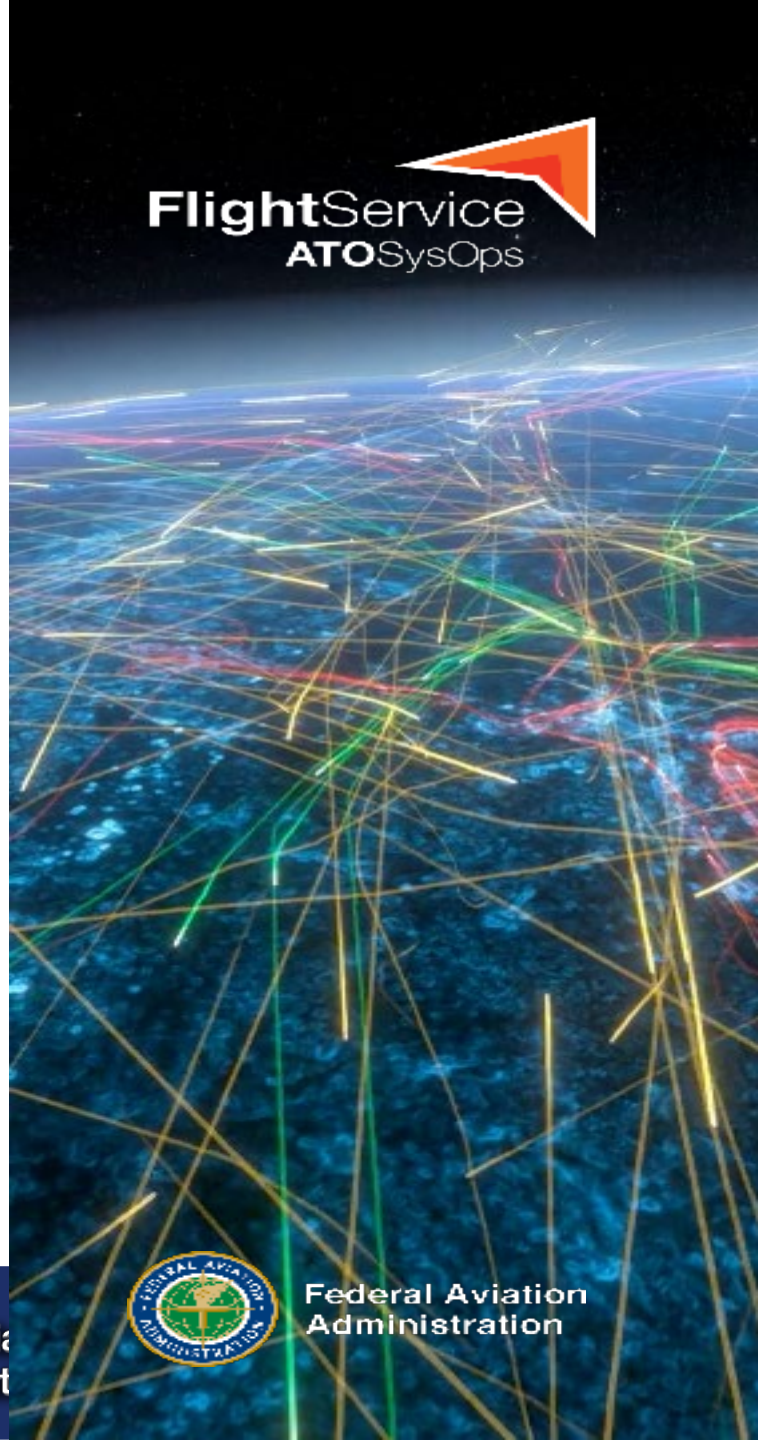
Weather Camera Program

Visual Weather Observation System (VWOS)

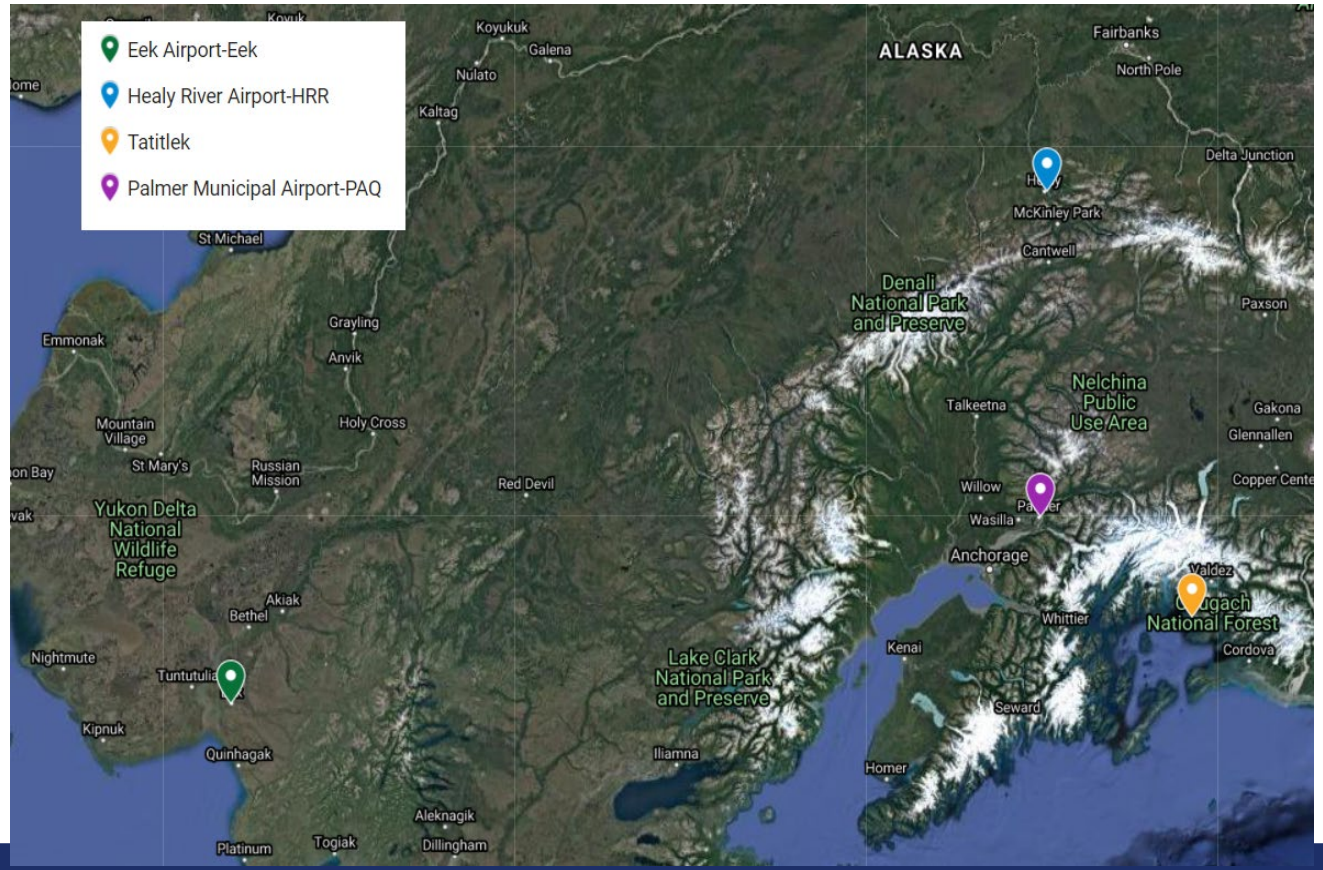
Presenter: Colleen Reiche, FAA Contract Support

October 5, 2021

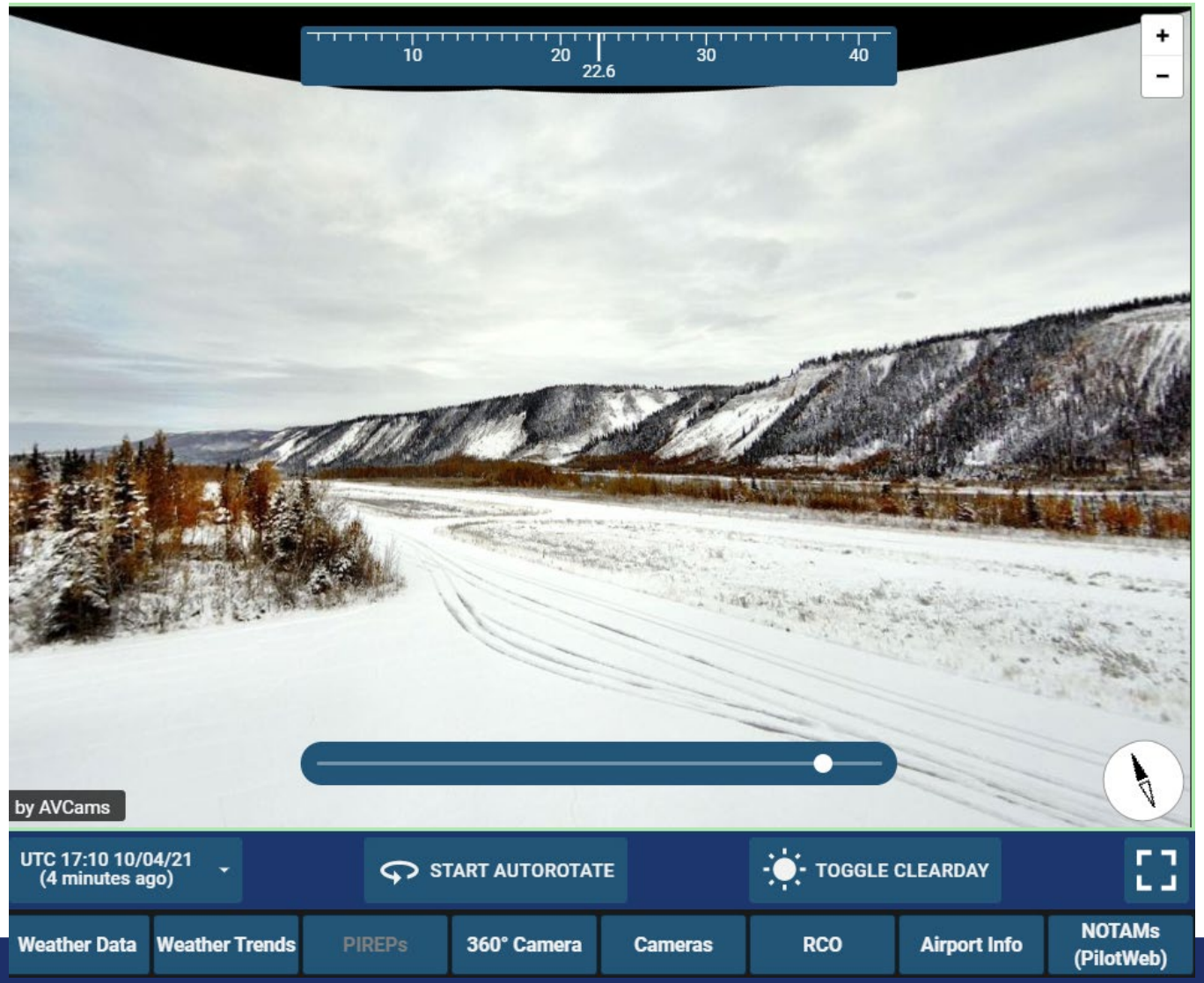


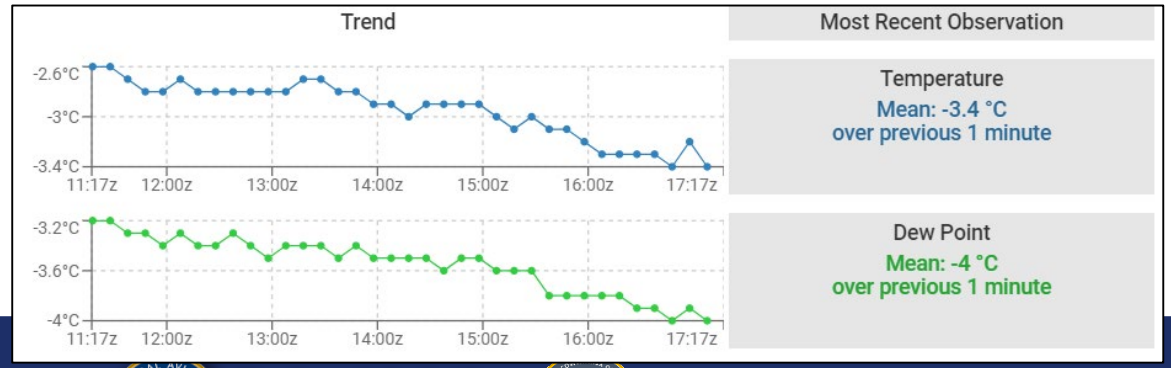
VWOS Demonstration Overview

- **Visual Weather Observation System (VWOS) is a prototype new camera platform including surface sensors to augment 360 degree cameras being demonstrated and evaluated at four test sites in Alaska**
  - Surface sensors capture wind, ceilings, visibility, present weather, temperature, humidity, and pressure observations
  - System contains 3 stages of self-checks to ensure sensor performance and data validity
  - Extensive stakeholder and user engagement including pilots, dispatchers, and National Weather Service (NWS) forecasters
  - System performance being monitored and evaluated through early 2022 with goal of demonstrating **accuracy and operational benefit**



VWOS Information Display



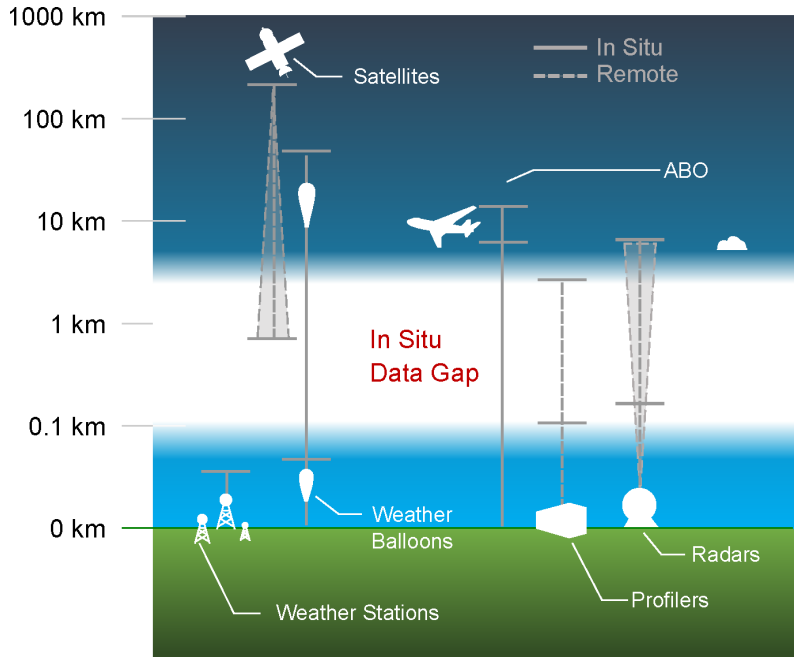


Federal Aviation Administration

Federal Government Aviation Weather TEM

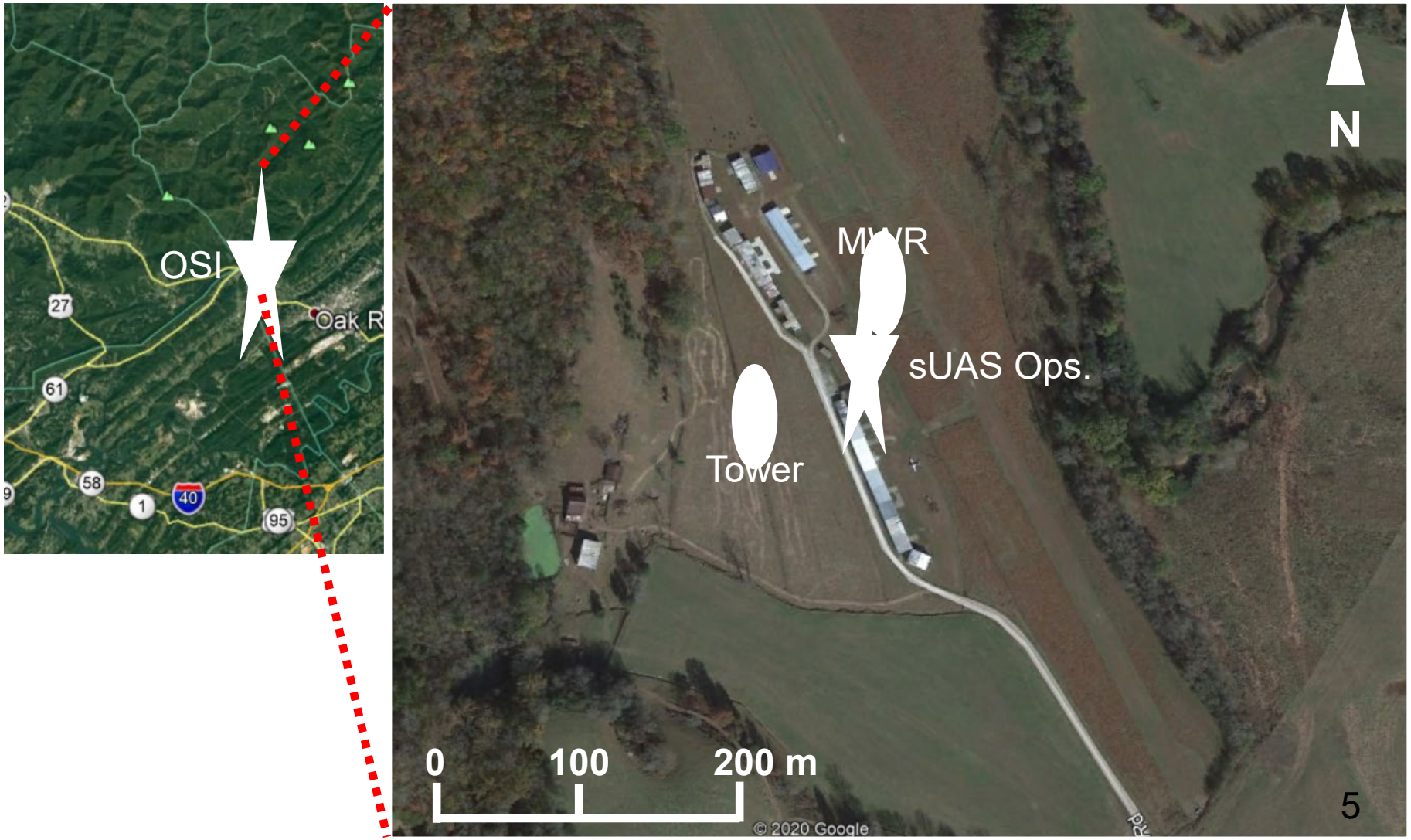
C. Bruce Baker, Senior Scientist NOAA/OAR/ARL

October 5, 2021



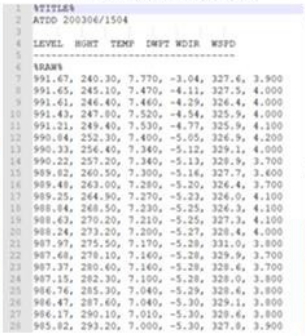
Schematic illustrating the in situ observation gap in the lower atmosphere. Horizontal lines indicate nominal regions of primary data collection. ABO refers to commercial Aircraft Based Observations.

Oliver Springs TN Testbed



WxUAS Profiling

Remote Data Processing/Formatting



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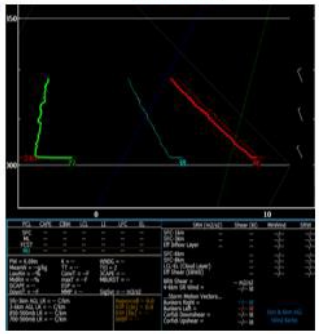
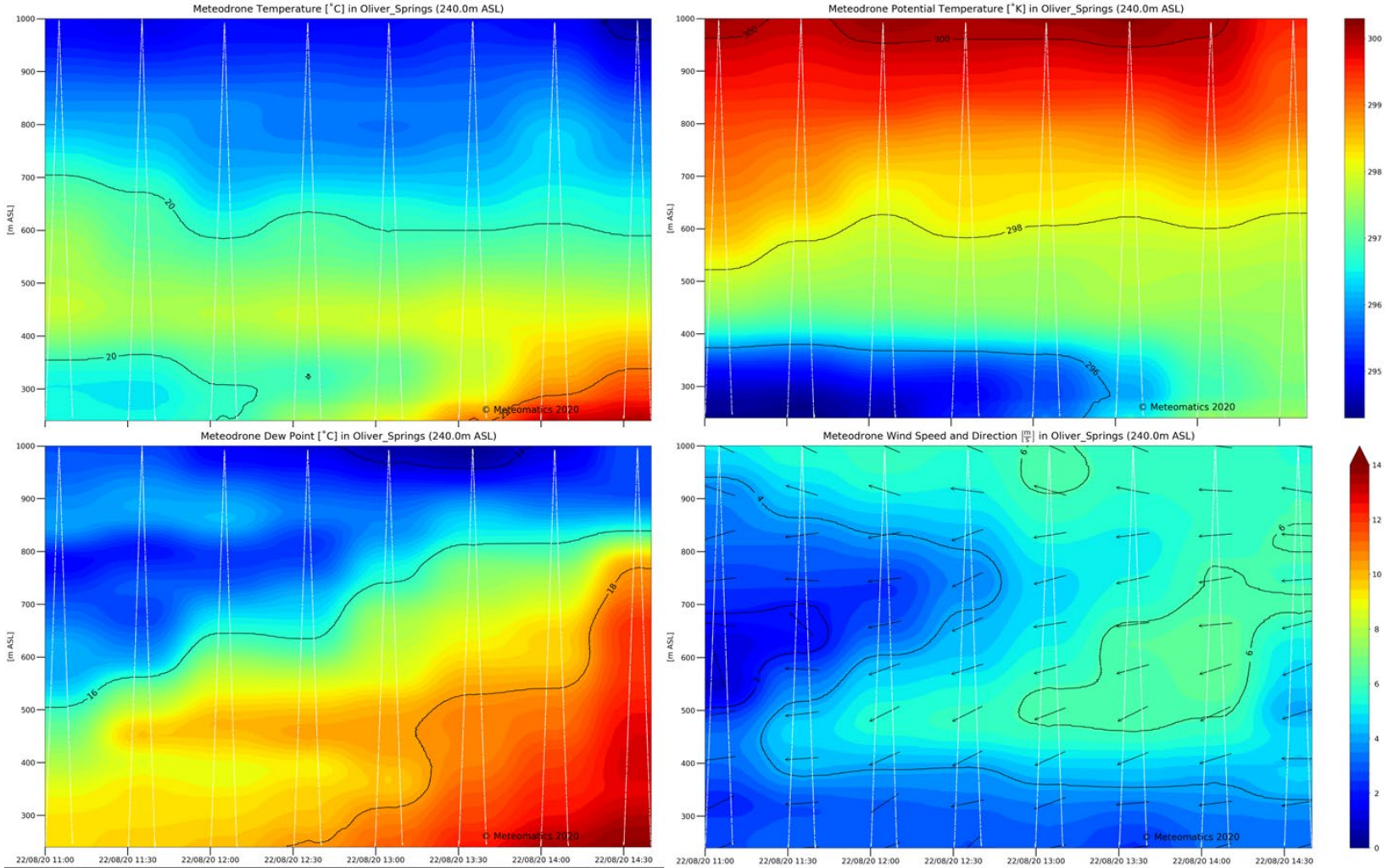
Forecaster AWIPS Display



Testbed demonstration of a NOAA WxUAS in operational meteorology showing vertical profile data from a WxUAS that was processed and transmitted to the Morristown Weather Forecast Office in real-time for analysis in their operational AWIPS display to support the short-term forecasting desk.

Sample Data Provided to Morristown WFO

T, θ, T_d, W_{spd} Time-Height Cross-Sections



Expand sUAS operations to second WFO; letters of endorsement from six WFOs in eastern region:

- Kansas City, MO
- Northern Indiana
- Milwaukee/Sullivan, WI
- Marquette, MI
- Des Moines, IA
- Portland, ME

Continue to scale sUAS operations to other NWS WFOs

Work to assimilate sUAS obs. In real-time into HRRR, RRFS, GFS, other operational models

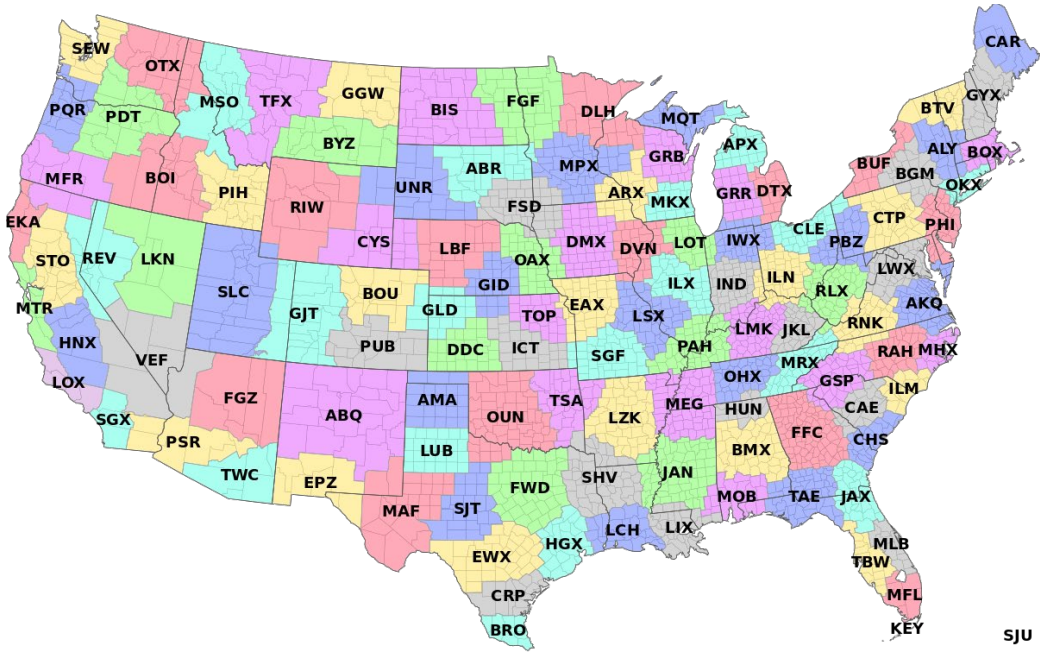
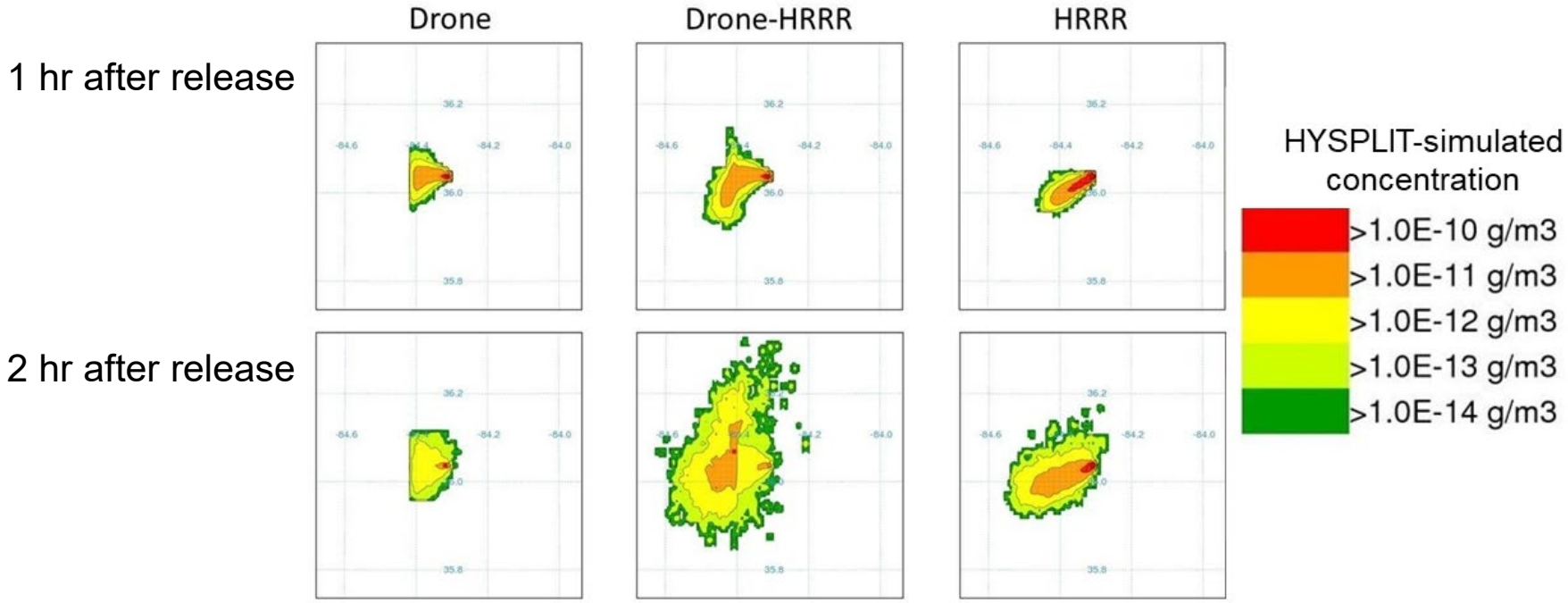


Figure courtesy of https://commons.wikimedia.org/wiki/File:NWS_Weather_Forecast_Offices.svg

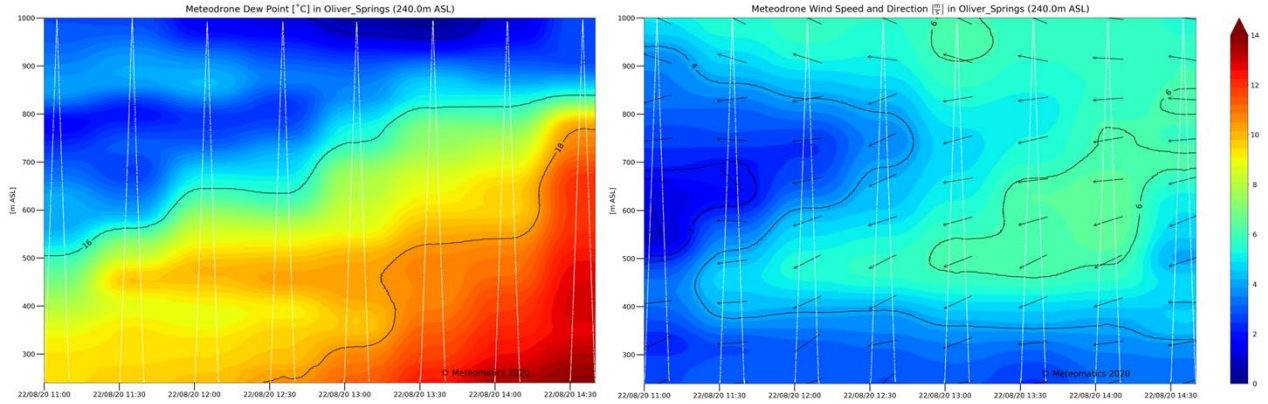
Assimilation of sUAS Data into HYSPLIT

HYSPLIT = Hybrid Single Particle Lagrangian Integrated Trajectory

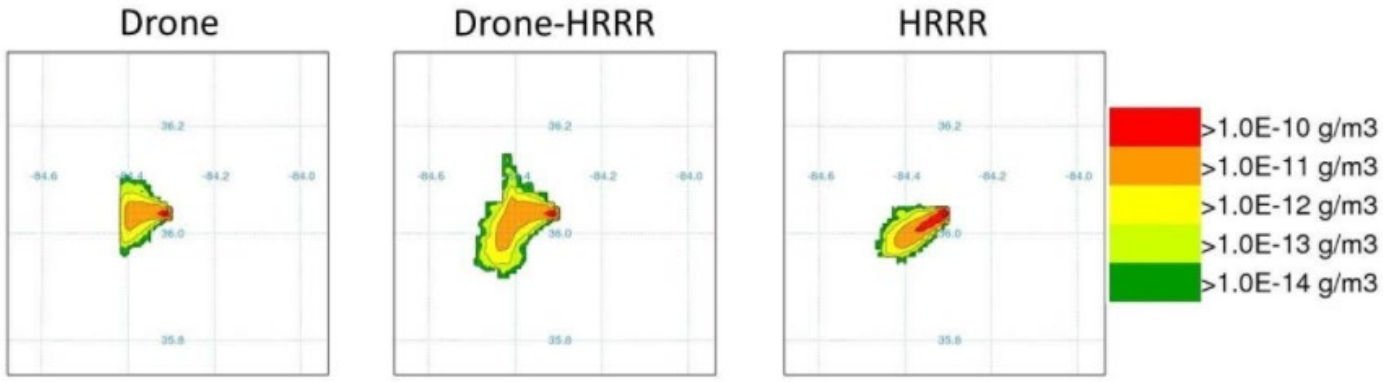
sUAS obs. used to help improve HYSPLIT-based air pollutant dispersion forecasts



Next Steps



Continue to support Morristown WFO with routine sUAS profiles, rawinsonde releases, etc.



Use sUAS observations to continue to improve HYSPLIT-based emergency-response air pollutant dispersion forecasts

Challenges to the Transition of UAS for Meteorological Operations

- NOAA has FAA wide area approval to fly to 1,200ft AGL. Altitude limit is too low for critical atmospheric measurements
  - **minimum needed is 9,800 ft (3.0 km)**
- Detect and avoid requirement prevents flying in clouds, requires night time lighting, and limits UAS altitude.
  - NOAA has approved waiver for 3,300 ft (1.0 km)
- There are no established standards for alternative mitigations to detect and avoid requirements
  - **It is up to the program to propose safety mitigations**
  - **ADSB is not a mitigation due to non-participating aircraft**
  - **Proposed track and ID requirement will not immediately be a solution**
- It is challenging to train NOAA personnel to be proficient as UAS pilots as well as normal duties

Moving Forward

- NOAA/ATDD sUAS used to support four NOAA-funded field experiments as well as forecast operations at the local NWS WFO and others.
- Exploring ways for semi-autonomous / autonomous sUAS profiling is critical to reducing manpower requirements of routine sUAS flights to support NWS ops.
  - Example: Meteomatics Meteobase
- Explore ways for safe BVLOS ops.
- Sampling throughout boundary layer and above in all weather conditions will be most critical to forecasters at NWS WFOs