



# **NOAA Unmanned Aircraft Systems (UAS) Program Strategy for Environmental Monitoring**

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# NOAA UAS Strategic Vision and Goals



## *Vision*

- UAS will revolutionize NOAA observing strategies by 2015 comparable to the introduction of satellite and radar assets decades earlier



## *Goals*

- Goal 1: Increase UAS observing capacity
- Goal 2: Develop high science-return UAS missions
  - High impact weather monitoring,*
  - Polar monitoring*
  - Marine monitoring*
- Goal 3: Transition cost-effective, operationally feasible UAS solutions into routine operations

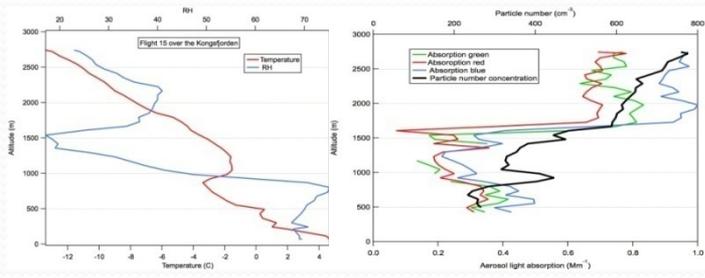




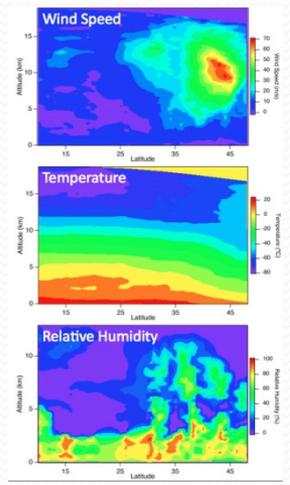
# Wide Range Of Innovative UAS Observing Solutions



**Quiet and Easily Transportable for High Resolution Imaging**



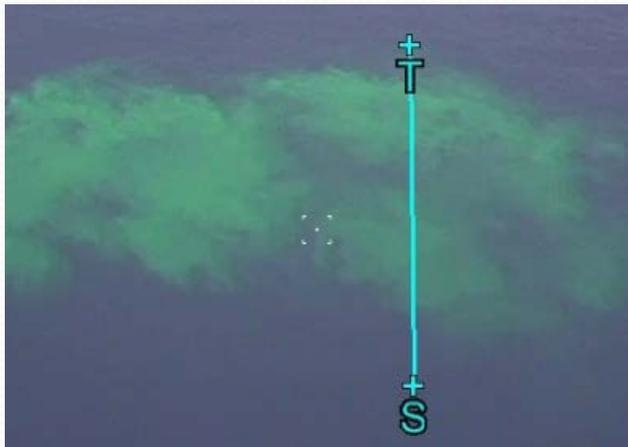
**Versatile Platform and Payload Capabilities for Low Altitude Profiling**



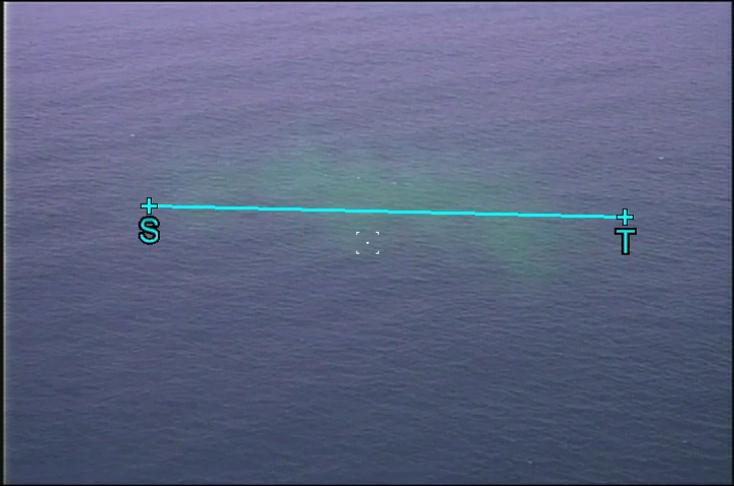
**High Altitude Long Endurance for Comprehensive Imaging and Profiling**



**Coast Guard UAS partnership study of oil spill monitoring in Santa Barbara channel**



Lat/Lon: N 33° 48' 31.53" W 119° 46' 18.60"  
 Alt: 351 ft MSL  
 Mag: 39°



Gimbal  
 FOV Data:  
 Slant Rng: 259 m  
 CFOV Hdg: 320°  
 CFOV Lat/Lon: N 33° 48' 37.61" W 119° 46' 23.82"  
 Horiz. FOV: 29.6°

Targeting Data:  
 Target S Lat/Lon: N 33° 48' 36.66" W 119° 46' 26.12"  
 Target T Lat/Lon: N 33° 48' 39.29" W 119° 46' 23.45"  
 ADD 94 m RIGHT 48 m  
 Range: 106 m Mag Bearing: 27°



# Investigations of Spatial and Temporal Variability of Ocean and Ice Conditions In and Near the Marginal Ice Zone: *The "Marginal Ice Zone Observations and Processes EXperiment"* **(MIZOPEX)**

## Goals:

- Assess ocean and sea ice variability during the melt season within a key Marginal Ice Zone (MIZ) region.
  - Amount and distribution of heat in the ocean mixed layer
  - Relationships between atmospheric conditions and solar heating
  - Sea ice characteristics and relationships to melt rates and change
  - Satellite product validation (SST, ice concentration)
- Demonstrate potential for geophysical research using multiple unmanned aircraft systems (UAS) in polar regions.
- Determine best practices for collaborating with FAA regarding flight requirements and limitations.

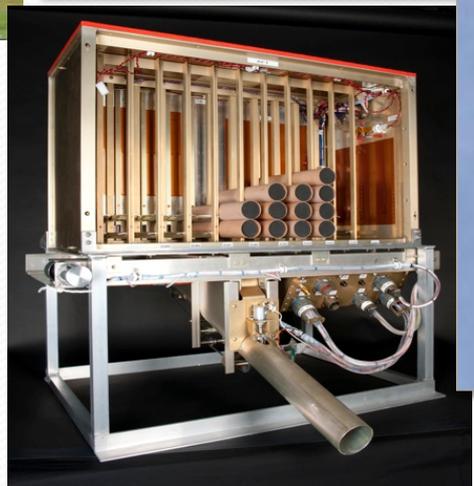
<http://ccar.colorado.edu/mizopex/index.html>

NASA supported, with contributions from NOAA.





Global Hawk Operations Center (GHOC)

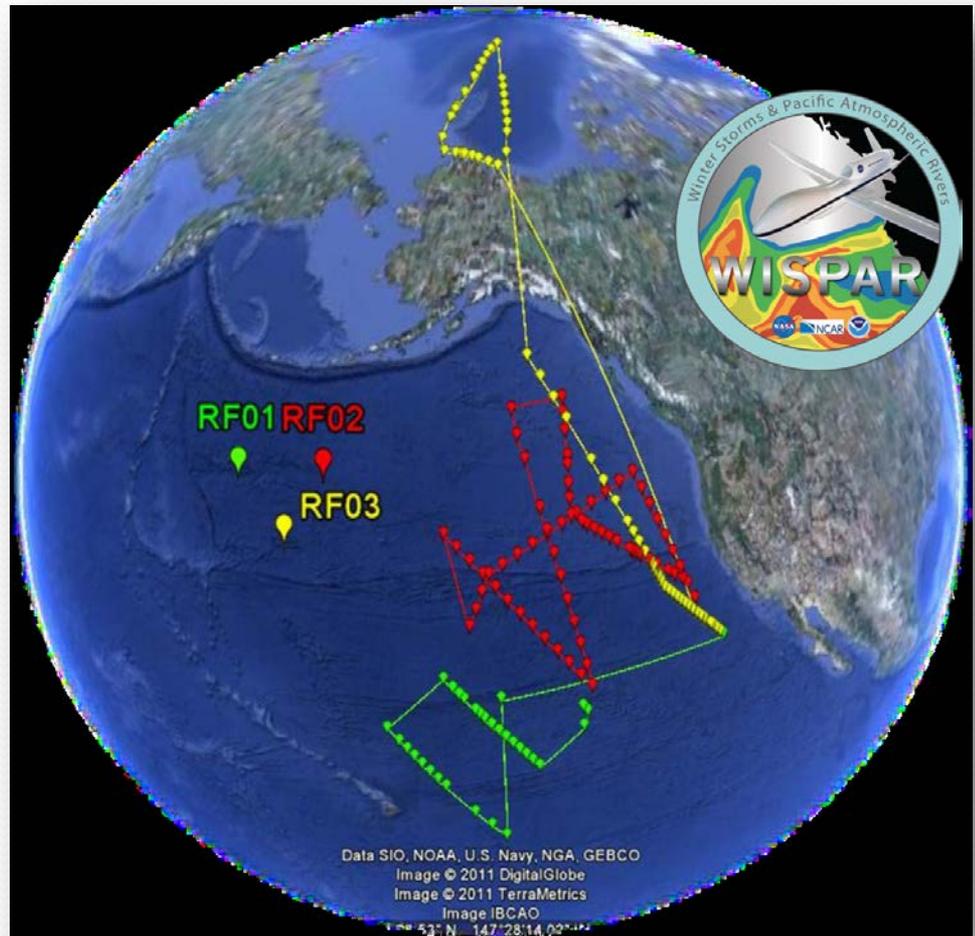


Dropsonde and Launch Assembly



- High-altitude, long-endurance UAS
  - 55,000 – 65,000 ft
  - 28 hour endurance
  - Payload >1500 lbs
- NOAA/NCAR dropsonde system
  - 88 sonde capability
  - High vertical resolution measurements of temperature, humidity, and wind speed

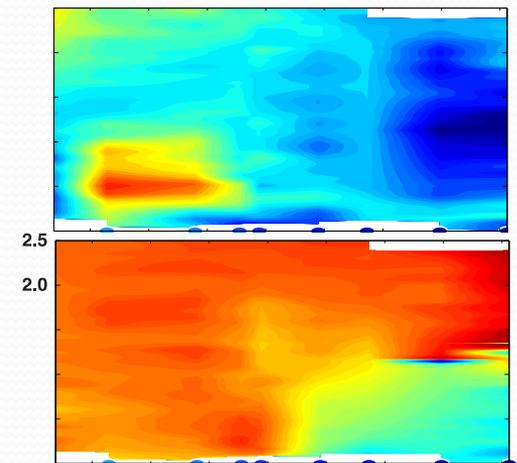
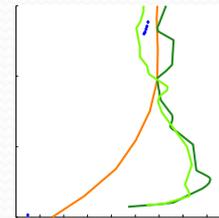
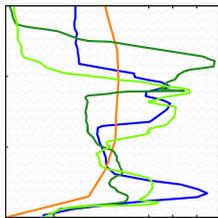
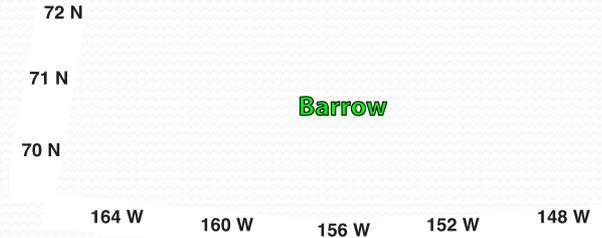
- WISPAR Feb-Mar 2011, NASA Dryden Flight Research Center, Edwards, CA
- Collaborative effort between NOAA-NASA-NCAR
- WISPAR flights were designed to:
  - Demonstrate the NOAA/NCAR GH dropsonde system for NOAA operations and research
  - Evaluate the capabilities of the GH for operational observations of atmospheric rivers (ARs), winter storms, and remote Arctic atmosphere
- 177 soundings performed on 3 high-altitude long-endurance science flights



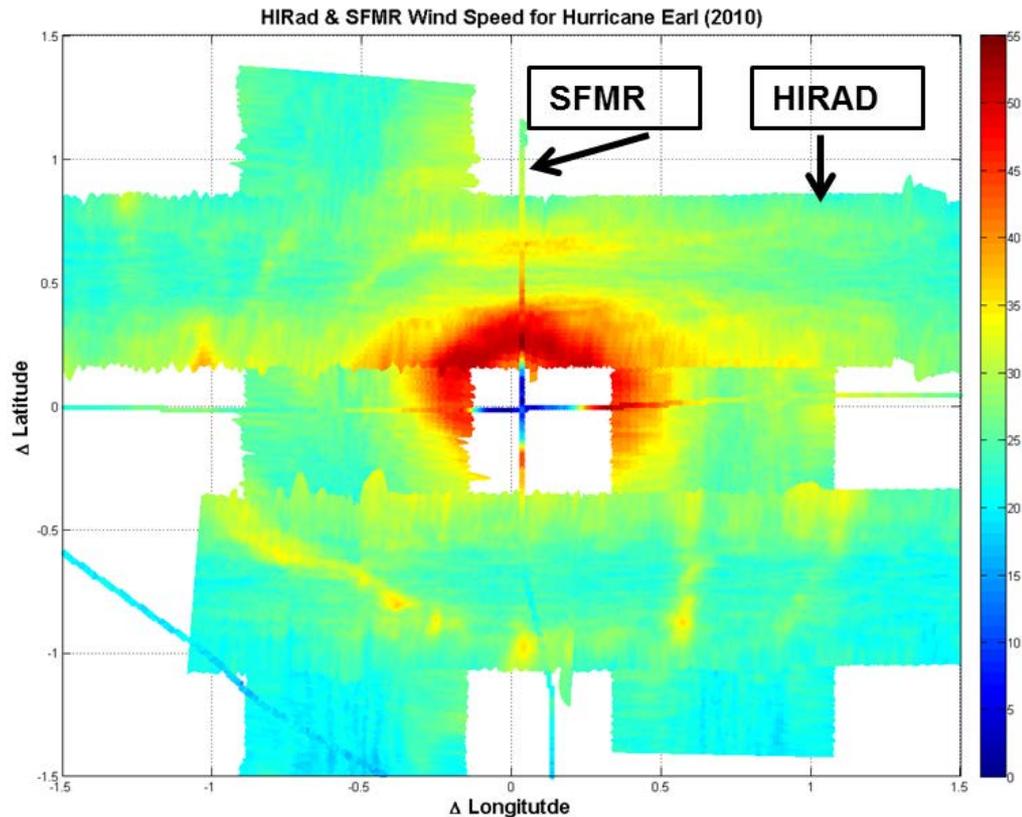
- Atmospheric Rivers
- Winter Storms
- Arctic Atmosphere

# WISPAR Arctic Observations

- Dropsondes deployed north of Alaska coast over sizable lead during arctic flight
- Results show high level of structure and variability
- Provides detailed observations in harsh, data sparse regions



- NASA Hurricane Imaging Radiometer (HIRAD)



*Comparison of joint HIRAD and SFMR ocean surface wind observations collected for Hurricane Earl during 2010*

# QUESTIONS?

