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: 258 m
CFOV Hdg: 320°
CFOV Lat/Lon: N 33° 48' 37.61" W 119° 46' 23.82"
Horiz. FOV: 29.8°

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 46 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.
NASA Global Hawk

- 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

Global Hawk Operations Center (GHOC)

Dropsonde and Launch Assembly
Winter Storms & Pacific Atmospheric Rivers

- 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
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

J. M. Intrieri et al., GRL, submitted
Other Payloads for Weather Observations

- NASA Hurricane Imaging Radiometer (HIRAD)

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