



NOAA Unmanned Aircraft Systems (UAS) Program

**Robbie Hood, Program Director
Office of Oceanic and Atmospheric Research
Earth System Research Laboratory**

10 June 2009



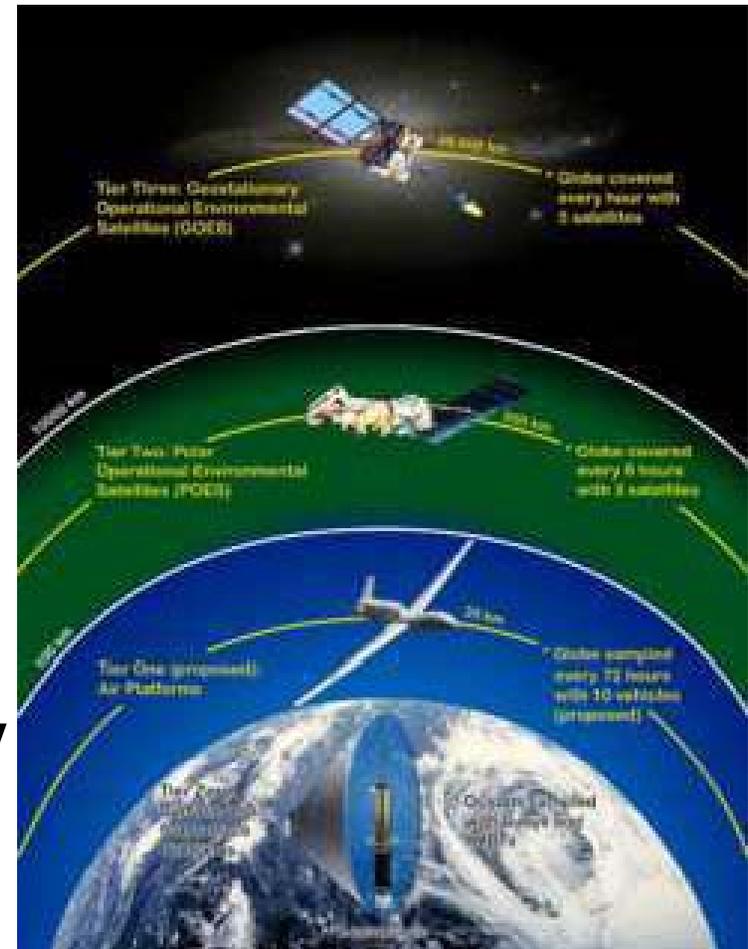
Overview



The NOAA Unmanned Aircraft Systems (UAS) Program is evaluating the feasibility of UAS platforms to meet the NOAA Mission's goals in

- Climate
- Weather and Water
- Ecosystems
- Commerce and Transportation

The evaluation will be based on NOAA observational requirements, technology readiness assessments, UAS science demonstrations and acquisition strategy





Testbed Approach to UAS Science and Technology Assessment



ARCTIC TESTBED

▪ Testbed Co-Leads

- Dr. Elizabeth Weatherhead (ERSL/CIRES)
- Dr. Robyn Angliss (NMFS/NMML)

▪ FY08-FY010 Mission Demonstrations

- Low altitude UAS to study Greenland glacier melt ponds with various observing technologies
- Low altitude UAS to monitor Arctic ice seal populations
- High altitude UAS to sample atmospheric chemistry
- Low altitude UAS to study Antarctic penguin and fur seal populations
- Low altitude UAS system testing for future Arctic atmospheric chemistry mission



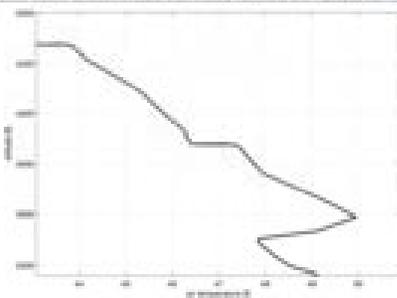
Greenland Glacier Melt Pond Demonstration



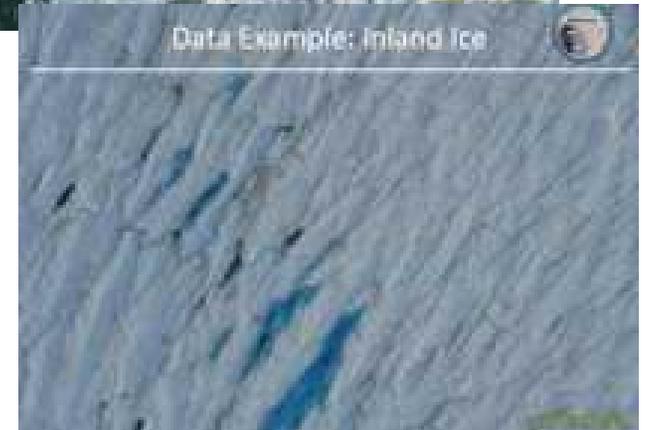
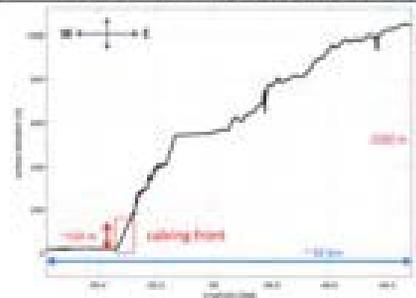
Partners: NOAA Earth Science Research Laboratory
University of Colorado
Advanced Ceramics



Data Example: Temperature Profile

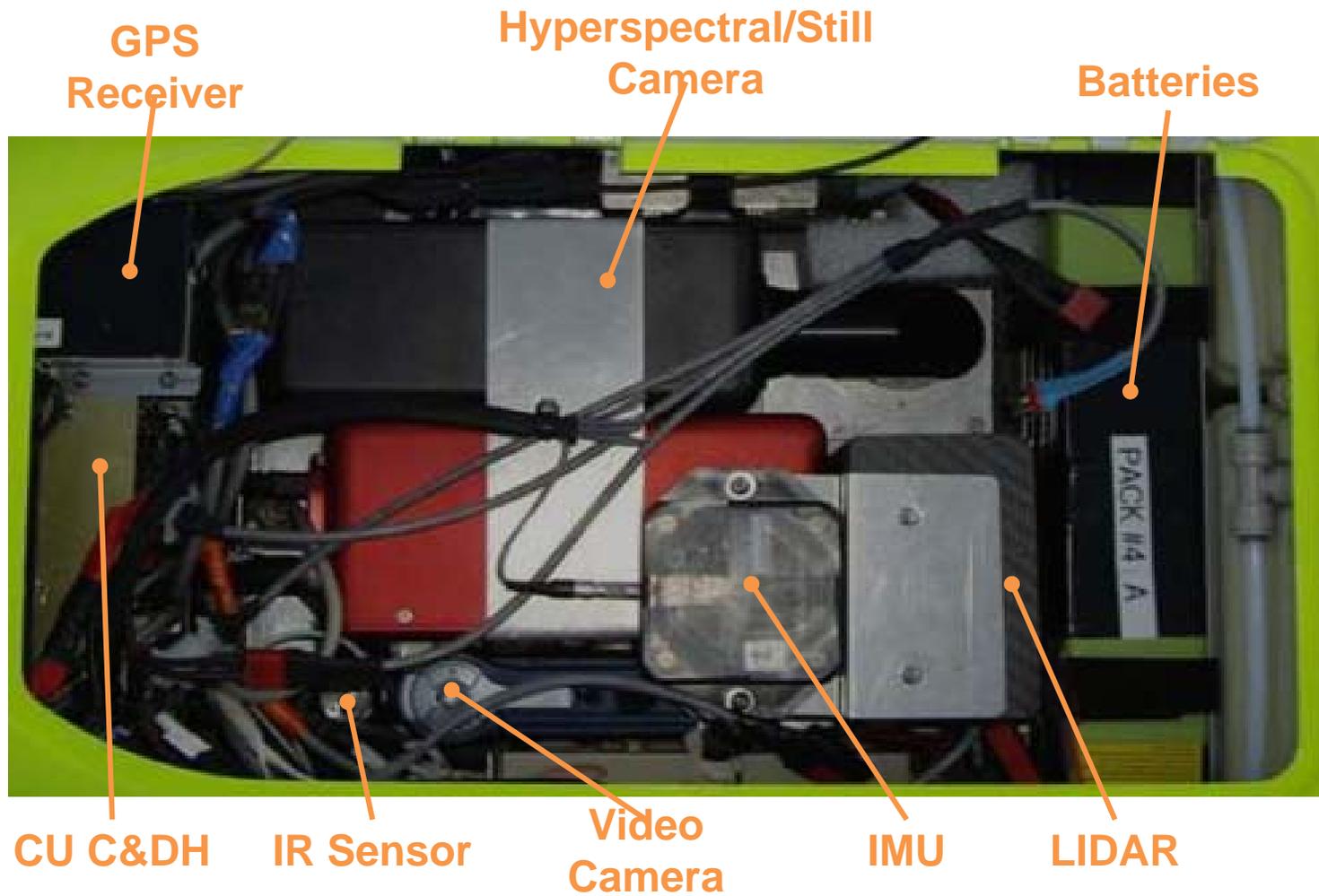


Data Example: Ice Sheet Profile



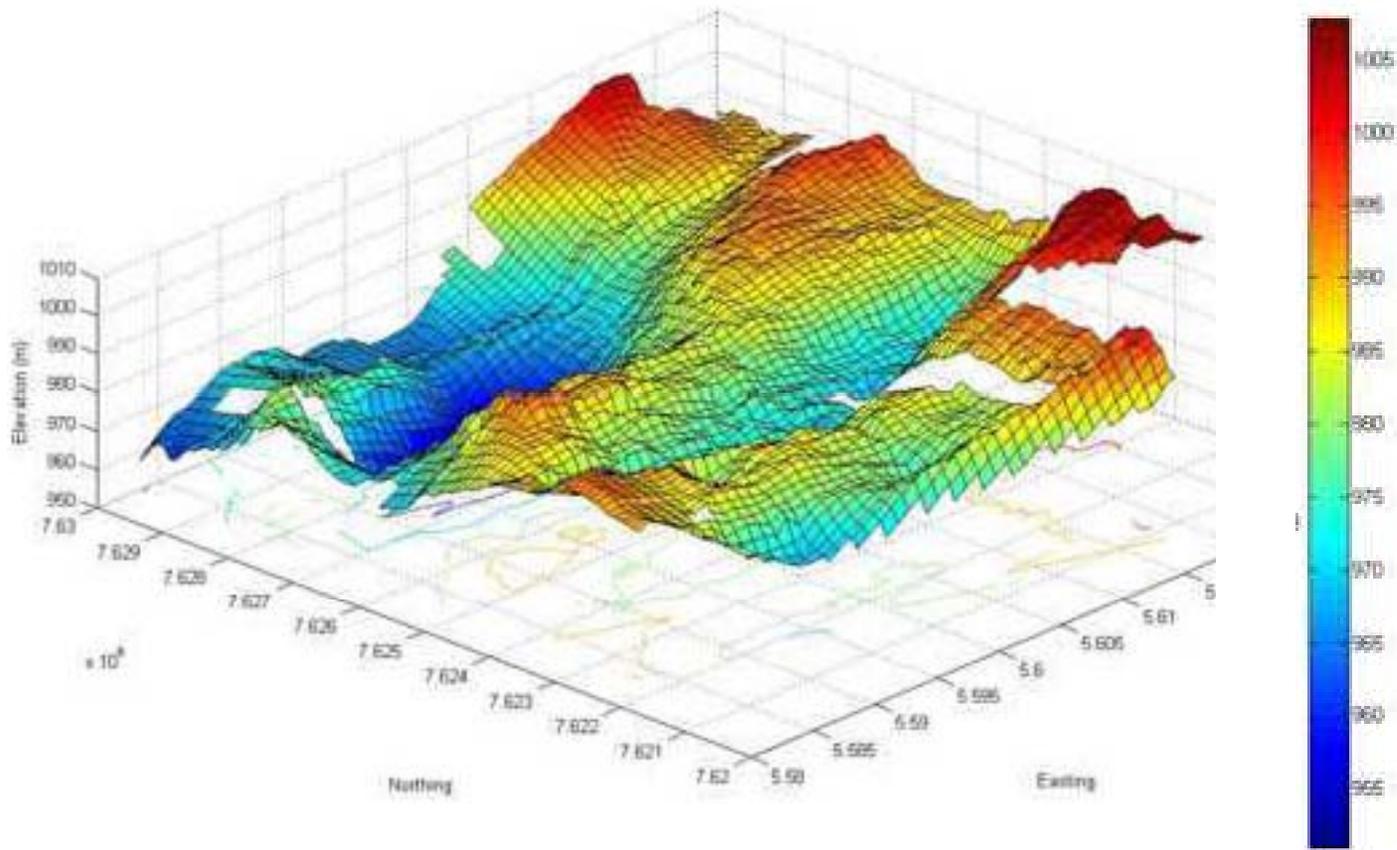


Greenland Payload





Preliminary Digital Elevation Map



John Adler /NOAA OMAO



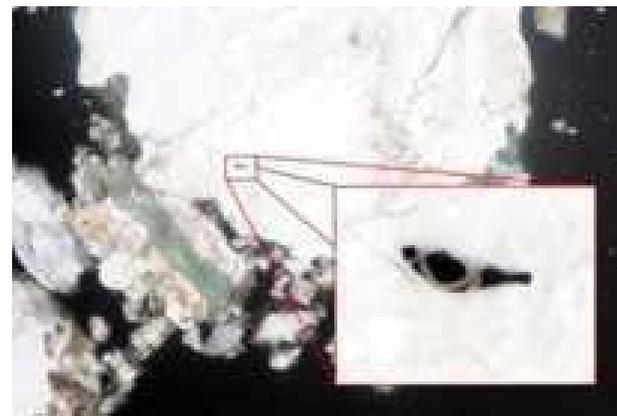
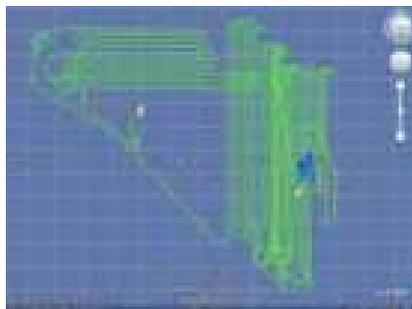
Arctic Ice Seal Demonstration



**Partners: NOAA National Marine Fisheries Service /National Marine Mammal Laboratory
University of Alaska – Fairbanks
InSitu Corporation**



Sample Target



**UAS Observation from 400 ft Altitude
6 June 2009**

Slide 7

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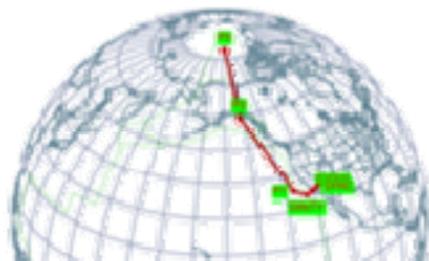
Robbie.Hood, 3/25/2009



High Altitude UAS

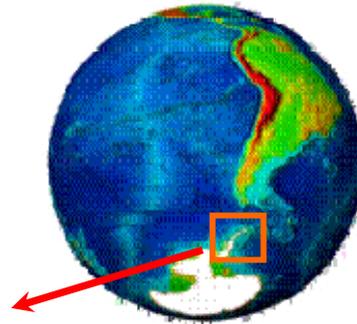


- **Platform: NASA/NOAA Global Hawk partnership started in FY08**
- **Missions:**
 - 2009 GloPac atmospheric chemistry
 - 2010 hurricane
 - 2011 or 2012 possible Arctic
- **Potential R&D sensors:**
 - NASA UAVSAR
 - NASA Temperature and humidity profiling radiometers
 - NASA/NOAA All weather ocean wind speed, sea surface temperature, precipitation, ice edge imaging radiometer
 - NASA Precipitation and wind profiling radar
 - NOAA/NSF dropsonde system
 - Northrop Grumman hyperspectral imager
 - Other sensors developed by private industry, academia, and Federal agencies





Antarctic Mission



Partners: NOAA National Marine Fisheries Service / Southwest Fisheries Science Center

Enerdyne

Aerial Imaging Solutions



- UAS will collect vertical images of penguin colonies (Adelie, Chinstrap, Gentoo) and fur seal rookeries at Cape Shirreff for calibration of counts from images against those collected by scientists on the ground
- Aircraft will be taken aboard ship and will stage from vessel to sample otherwise inaccessible sites.



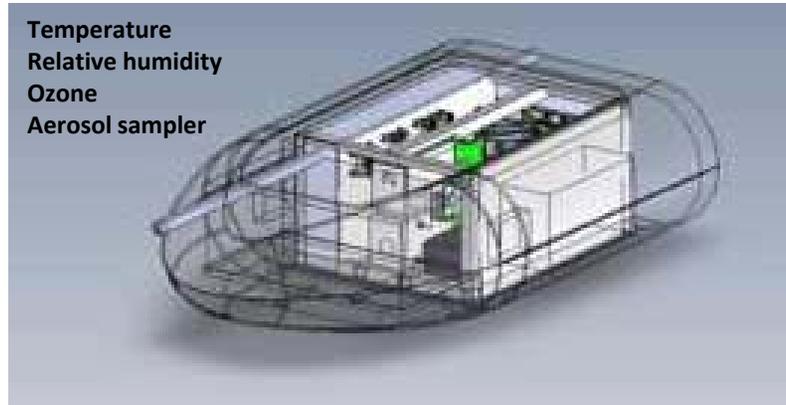
Arctic Atmospheric Chemistry System Test



Partners: NOAA Pacific Marine Environmental Laboratory
Advanced Ceramics



Temperature
Relative humidity
Ozone
Aerosol sampler



- Identifying aerosol layers in the atmosphere and the optical properties of the aerosols in these layers (example: black carbon in the Arctic).
- Aerosol-cloud interactions – simultaneously flying below, above and within clouds to quantify the radiative effect of changing cloud droplet number.
- Climate-Air Quality studies – mapping the vertical and spatial extent of pollution plumes advecting off the continents.



Contact Information



NOAA UAS Web Site

<http://UAS.noaa.gov>

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