



Overview of the NOAA Unmanned Aircraft Systems (UAS) Program

Robbie Hood

**Unmanned Aircraft Systems (UAS) Program
Office of Oceanic and Atmospheric Research
National Oceanic and Atmospheric Administration**



National Oceanic and Atmospheric Administration



America's Environmental Intelligence Agency

1. To understand and predict changes in climate, weather, oceans and coasts;
2. To share that knowledge and information with others; and
3. To conserve and manage coastal and marine ecosystems and resources.



NOAA Unmanned Aircraft Systems (UAS) Technology Demonstrations





High Impact Science Focus Area

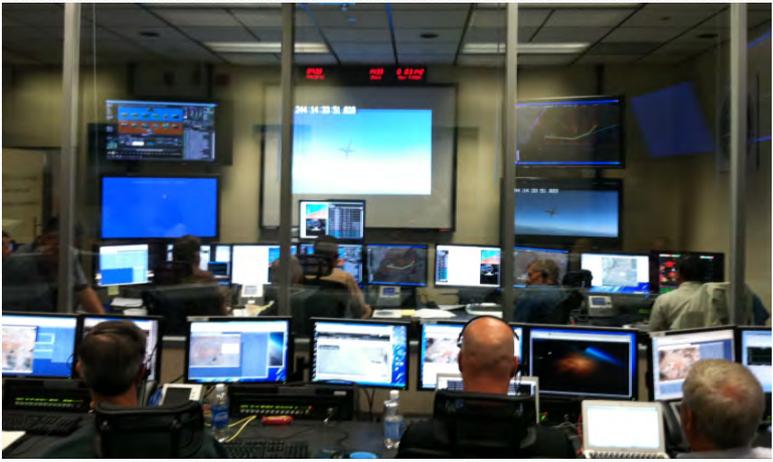




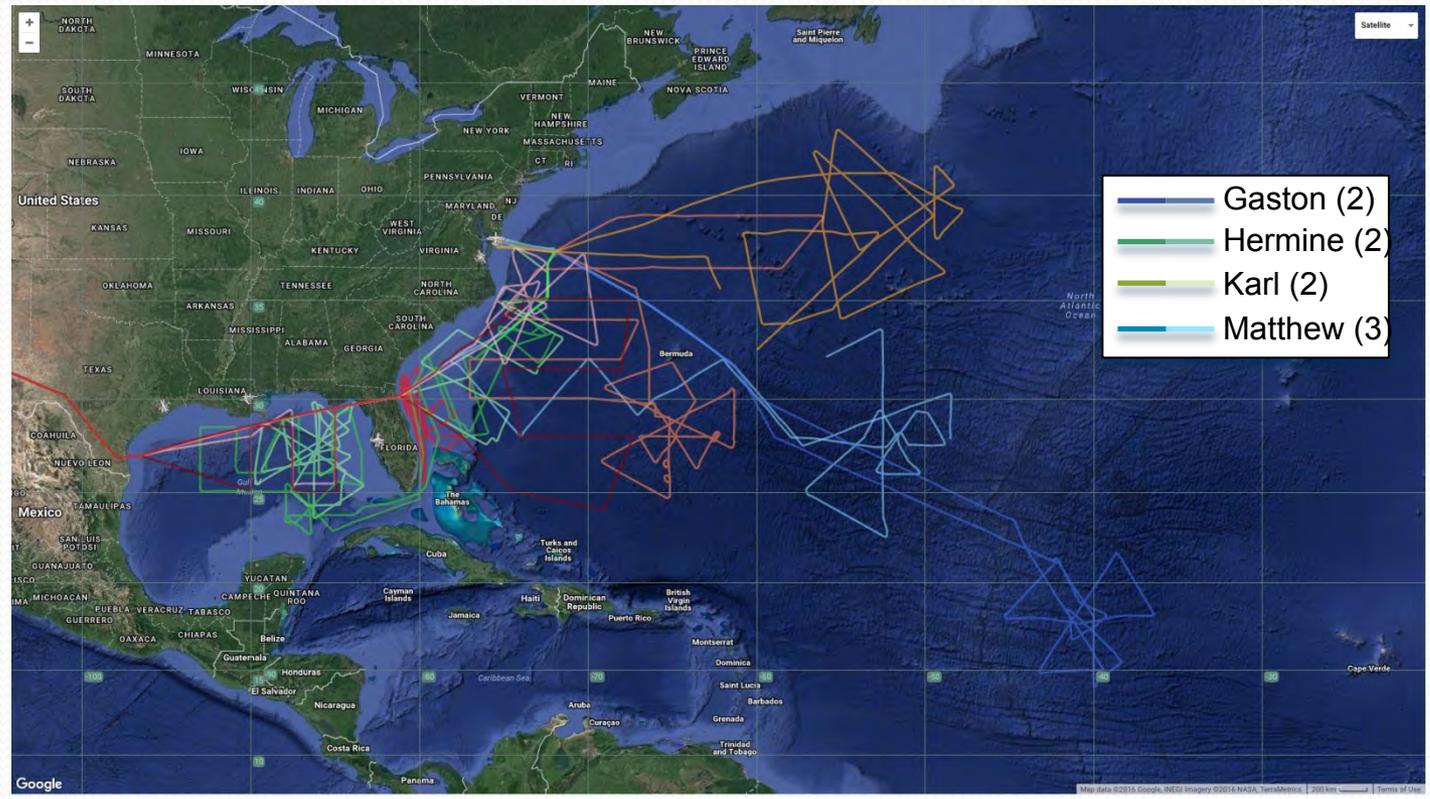
Satellite Data Gap Mitigation Study

- **NASA Global Hawk**
- **Flight Level: ~55-63,000 ft**
- **Duration: ~26 hr**
- **Range: 11,000 nm**
- **Payload: 1,500+ lbs**

- **Deployment Sites:**
 - **NASA Wallops Flight Facility (Wallops Island, VA)**
 - **NASA Armstrong Flight Research Center (Edwards AFB)**



- 9 flights with 3 consecutive flights over Hurricane Matthew
- 213 flight hours,
- 647 dropsondes deployed, a record 90 dropsondes in a single flight
- SHOUT team on call for 10 consecutive weeks





Aircraft-Launched UAS

Raytheon Coyote

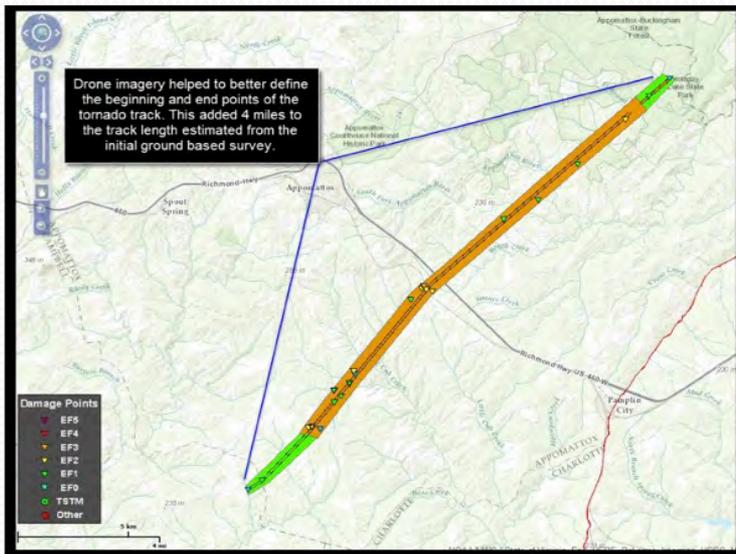


Piasecki Whimbrel

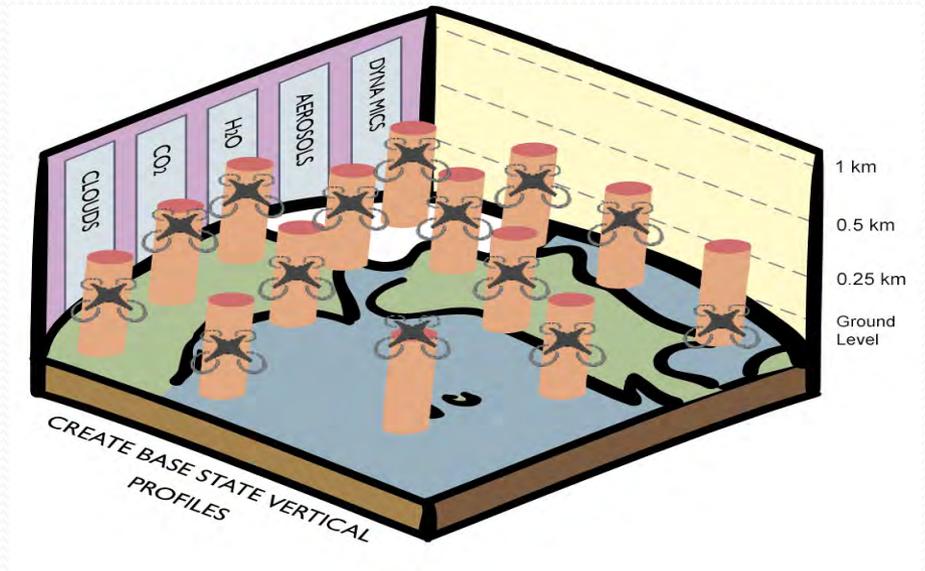


Lower Atmosphere Weather Applications

Storm Damage Assessment



UAS Grids for Weather and Air Quality





SHOUT4RIVERS

Leadership – Northern Gulf Institute

Objective

Document requirements of NOAA NWS River Forecast Centers

Conduct technology demonstrations

Develop effective observing strategy and information management plan

Current Demonstration

High-resolution monitoring of Pearl River Basin with Puma and Altavian aircraft

- 📍 Detailed land/water maps
- 📍 Digital elevation maps
- 📍 Flow estimates





Marine Science Focus Area



Hawaii Marine Monitoring 2014

Papahānaumokuākea Marine National Monument



NOAA PUMA

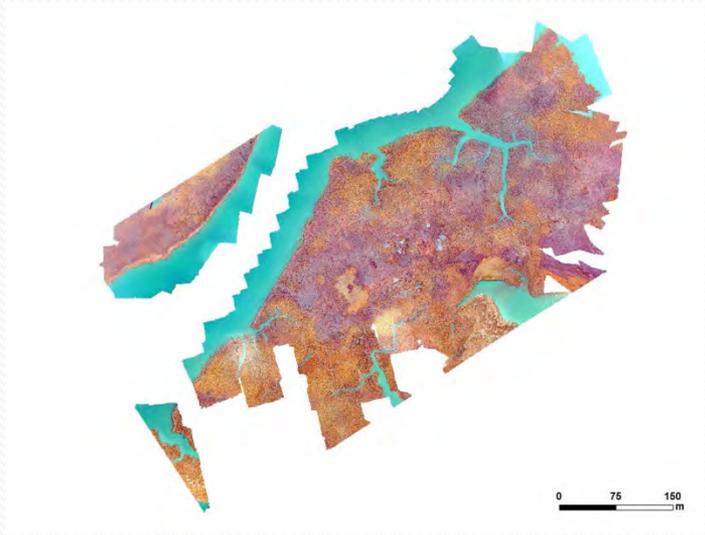
More than 360,000 square kilometers of the Pacific Ocean

NASA IKHANA

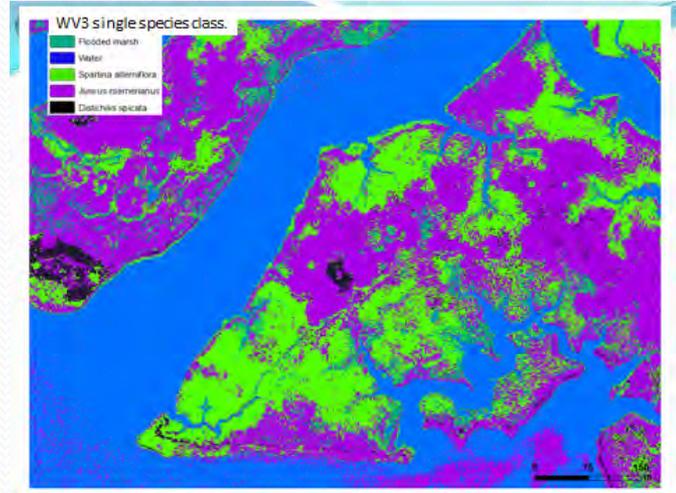
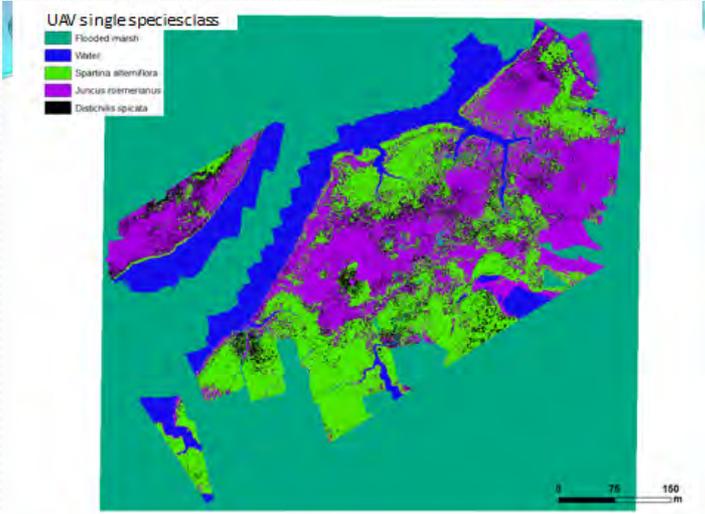
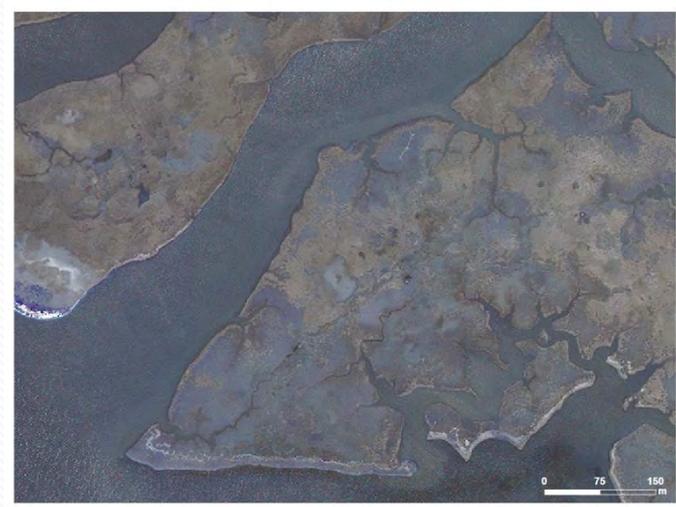


Mapping and Analysis of Grand Bay National Estuarine Research Reserve

ALTAVIAN UAS



WORLDVIEW-3 SATELLITE





Polar Science Focus Area





Arctic Shield 2013-2015 Accomplishments

USCG - NOAA - Aerovironment Partnership

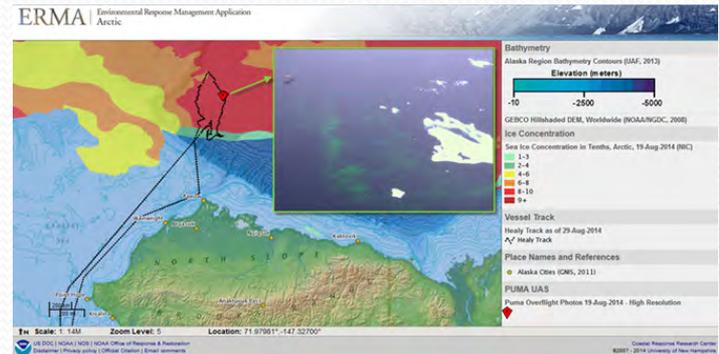
Information Management and Delivery



Oil Spill Simulation



Real-time Imagery



Data Visualization

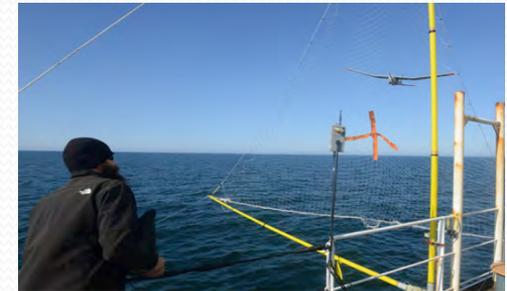
Shipboard Operations and Air Space Access



Deck Landing



Water and Ice Landings



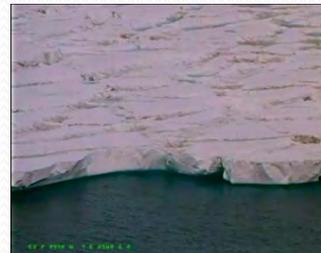
Net Capture System



Operation Deep Freeze 2016

USCG - NOAA - NSF - Private Industry Collaboration

- Two-month Polar Star Cruise to Antarctica
- 20 UAS flights flown by Aerovironment
 - Beyond Line of Sight operations out to 46 kilometers
 - High resolution imaging payload testing
- Real-time satellite imagery provided by National Ice Center and IMARSAT





Contact Information

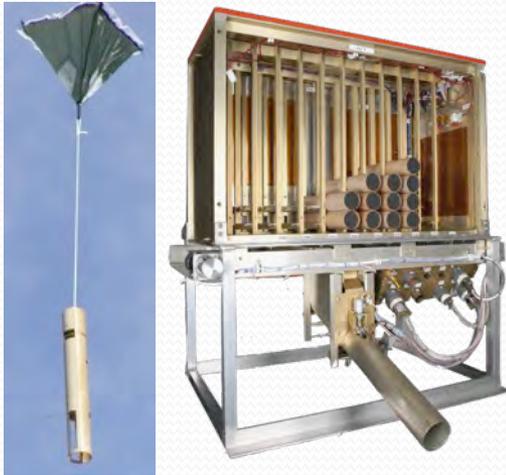
UAS Web Site: <http://uas.noaa.gov/>

Questions should be directed to:

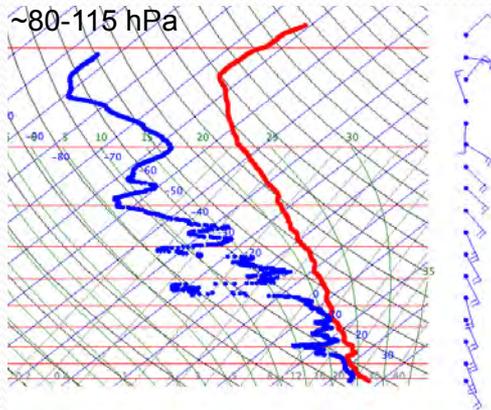
**Robbie Hood - NOAA UAS Program Director
(robbie.hood@noaa.gov / 303-905-3411)**

SHOUT Global Hawk Instrumentation

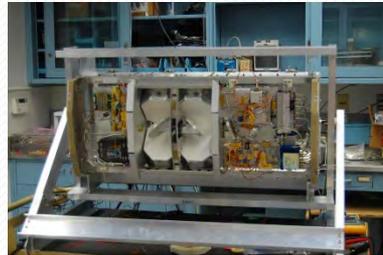
Airborne Vertical Atmospheric Profiling System (AVAPS)



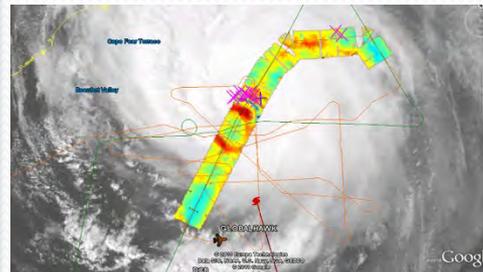
PI: Terry Hock, NCAR
 Measurements: Temperature, Pressure, wind, humidity vertical profiles; 88 sondes per flight



High Altitude Monolithic Microwave Integrated Circuit (MMIC) Sounding Radiometer (HAMSR)



PI: Dr. Bjorn Lambrigtsen, Jet Propulsion Laboratory
Measurements: Microwave radiometer sounder operating at 25 spectral channels in 3 bands (50-60 GHz, 118 GHz, and 183 GHz): 3-D distribution of temperature, water vapor, and cloud liquid water;
Resolution: 2 km vertical, 2 km horizontal (nadir), 60 km wide swath



High-Altitude Imaging Wind and Rain Airborne Profiler (HIWRAP)



PI: Dr. Gerald Heymsfield, NASA GSFC
Measurements: Dual-frequency (Ka- and Ku-band), dual beam, conical scanning Doppler radar: 3-D winds, ocean vector winds, and precipitation;
Resolution: 60 m vertical, 1 km horizontal;

