NOAA Unmanned Aircraft Systems (UAS) Program

Current and Future Operations and Transitions

Philip M. Kenul
TriVector Services

19 May 2017

Dangerous, Dirty, Dull, Denied
Efficient, Effective, Economical and Environmentally Friendly

NOAA: America's Environmental Intelligence Agency: 2014 - 2018 Priorities

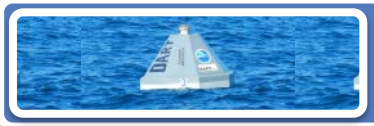
MONITORING MODELING

Support

OBSERVATIONS ASSESSMENT FORECAST & PRODUCTS

Provide information and services to make communities more resilient

Evolve the Weather Service

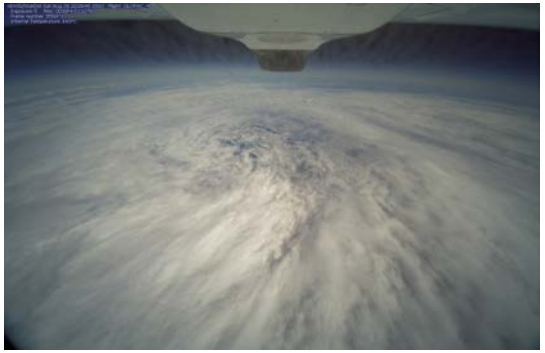


Invest in observational infrastructure

Achieve organizational excellence

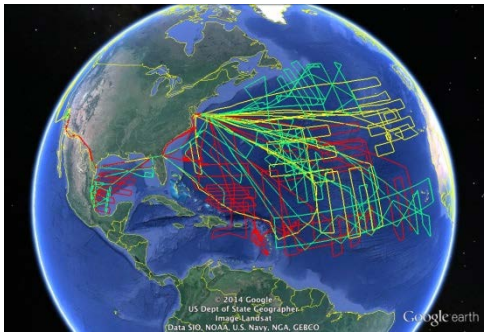
Missions for UAS

- **Goal to evaluate utility of UAS for NOAA operations and research**
- **Three focus areas**
  - **High-impact weather**
  - **Marine monitoring**
  - **Polar research**
- ***End State: Transition to Operations***



NASA Global Hawk
Sensing Hazards with Operational Unmanned Technology (SHOUT)

- **NOAA 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)***
- **Payloads-over 30 approved**
  - ***Dropsondes – in situ vertical temperature, moisture, winds***
  - ***Remote Sensors – vertical temperature, moisture, winds***
  - ***Remote Sensors – ocean surface wind speed and cloud structures***



GRAV-D Project Redefinition of Vertical Datum
Support a New Vertical Datum

- DA-42MPP Aircraft from Diamond Aviation Centaur OPA
- With Aurora Designed Conversion Kit to Enable OPA Capability

Up to 16 hours unmanned (payload dependent)

3 Modes of operation: Manned, Unmanned, Augmented (UAS ops in NAS)

Up to 800lbs useful load

Multi-payload Capability: Bathymetry, LiDAR, Hyperspectral, Gravity, EO/IR, SAR ++

Project Challenges

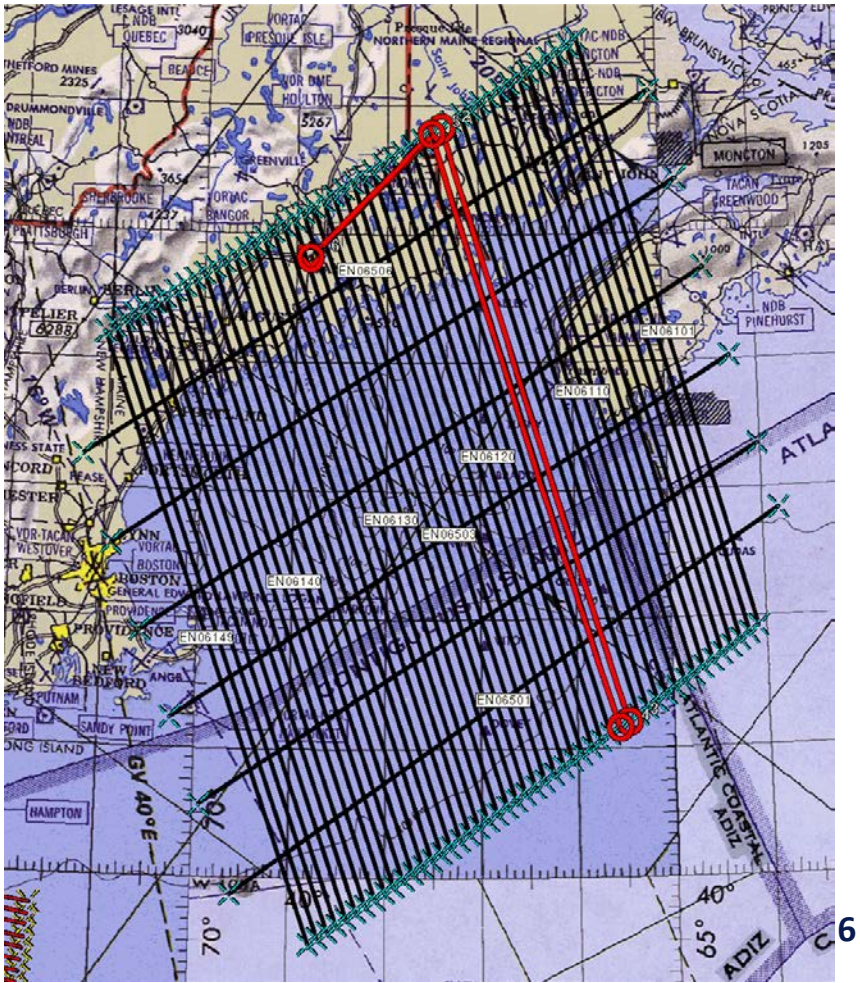
Operational

- Long, boring flights-Dull
- Large area to cover with some long distances (Aleutians, Pacific Islands)
- Aircraft stability critical for good data

Management

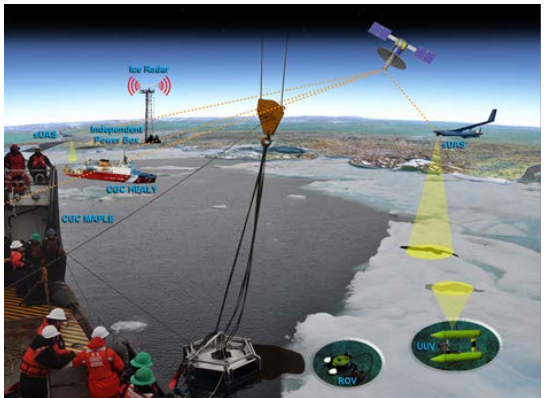
- Efficiently covering the entire country in terms of cost and time

First operation gravity survey on a UAS



sUAS
Marine Monitoring

- Living Marine Resources
- Coast Mapping
- Ice Detection and mapping
- Oil Spill Response
- Marine Debris
- Ecosystem/Habitat Assessment
- Sea and Air Quality Studies (Norway)
- Arctic, Antarctic, US Coastal Waters



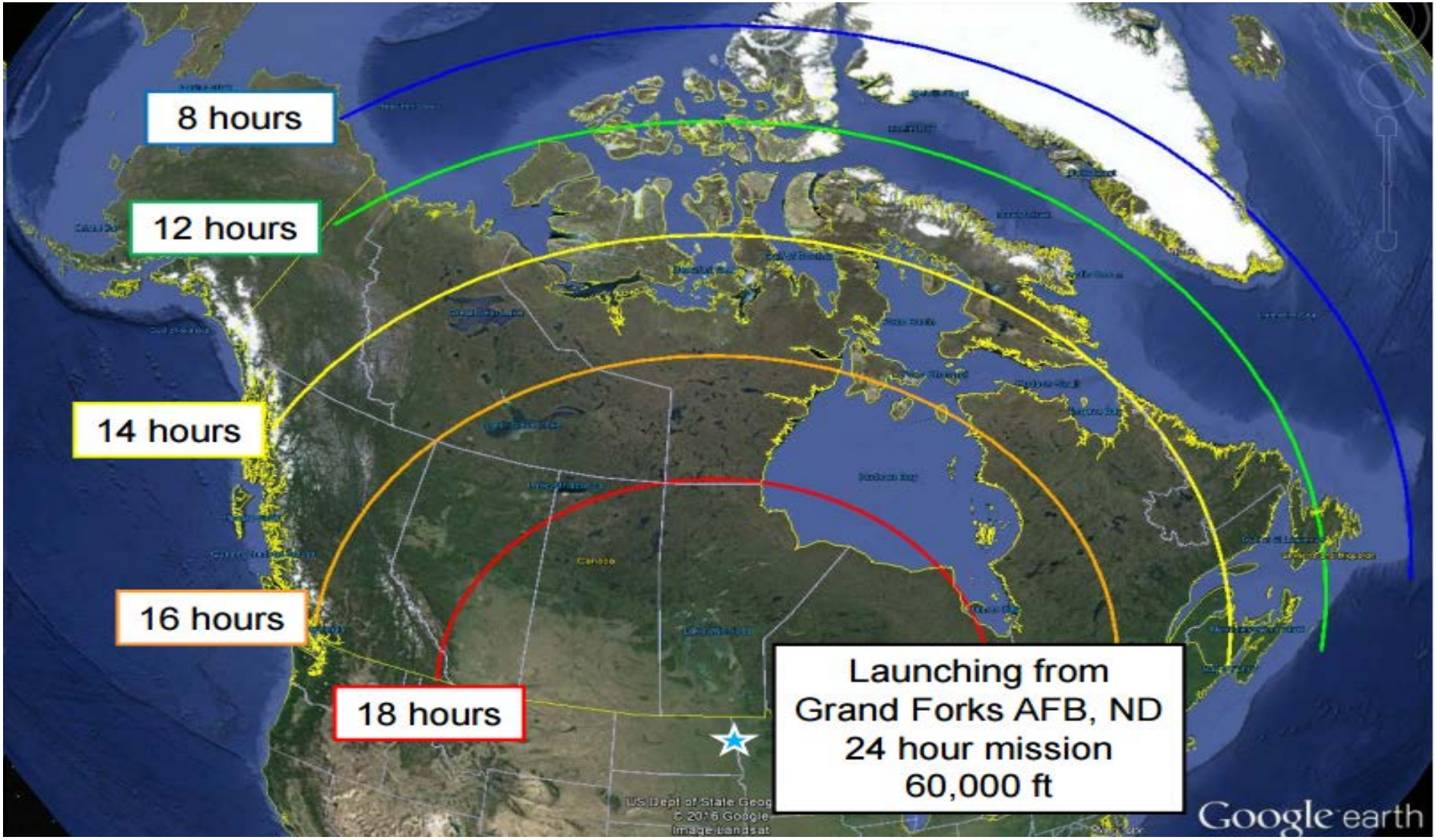
Comparative body condition

UAS SNOT-BOT

Arctic Shield ISR Missions
Oil Spill & SAR
USCG/NOAA/Industry Partnership

- ✓Sea ice ridge detection/monitoring
- ✓Marine and marine mammal monitoring
- ✓Usefulness in search and rescue scenarios
- ✓Detection and monitoring of oil spilled from ship
- ✓Detection and monitoring of marine debris from ship

GLOBAL ARCHER 2018
Arctic Domain Awareness
Ice Mapping/Arctic Weather



Recent Focus Areas

- Emergency Response (Oil spill/Storm Damage Assessment)
- Operating BVLOS
- Integration with manned aviation in controlled environments
- Polar Operations
- Supporting development of new capabilities through partnerships and CRADAS:
  - High-resolution sensor
  - Autonomous recovery system
  - Ice sensing and deicing
- Data products and dissemination
- Collaborating with industry and other agencies to share knowledge and experience
- Use of Autonomy to Reduce Costs and Increase Mission Effectiveness

Unmanned? GHOC at WFF

Fully Staffed During a Hurricane

NOAA Contact Information

NOAA UAS Web Site: http://uas.noaa.gov/

Questions should be directed to:

Robbie Hood - NOAA UAS Program Director
NOAA Office of Oceanic and Atmospheric Research
(robbie.hood@noaa.gov / 301-734-1102)

Philip M. Kenul– NOAA UAS Program
NOAA Office of Oceanic and Atmospheric Research
(philip.m.kenul@noaa.gov / 301- 346-5939)