U.S. Antarctic Program
Unmanned Aerial Systems
2016/2017 Operational Summary

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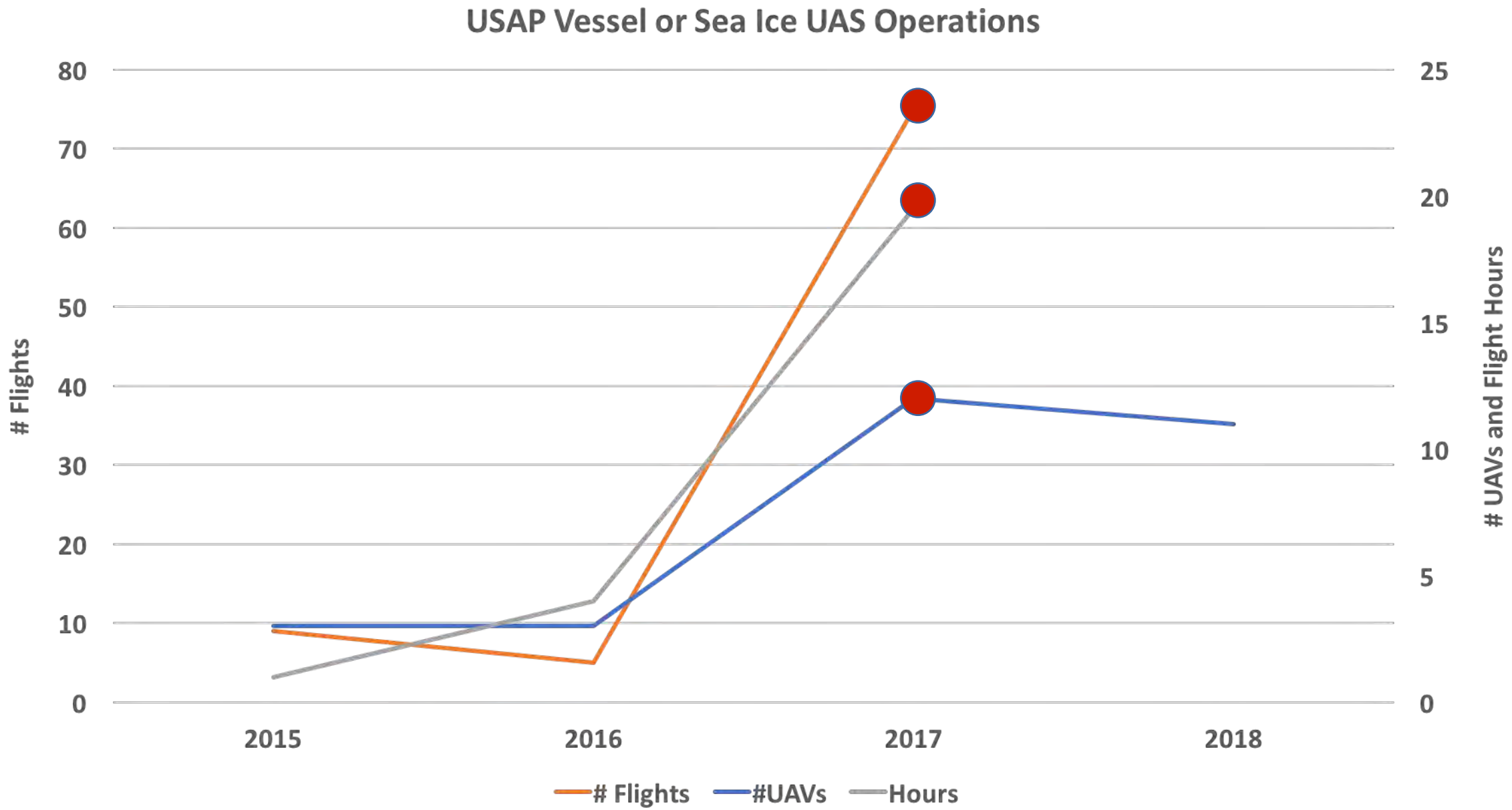

USAP Vessel or Sea Ice UAS Operations
Flights
UAVs and Flight Hours
80
70
60
50
40
30
20
10
0
25
20
15
10
5
0
2015
2016
2017
2018
Flights
#UAVs
Hours

Range of Applications – 2016/2017

Atmospheric Studies

- Atmospheric boundary layer structure, depth, and evolution over sea ice, leads, and polynyas

Sea Ice Studies

- Aerial mapping of sea ice for floe-size distribution and surface topography

Operational

- Ice reconnaissance / navigation and ice station planning

Biological Studies/Sampling

- Less invasive blow collection for microbiome samples in Petri dish mounted on top of airframe.
- Conduct transect-type surveys over colonies of seals and penguins using combination of RGB, thermal and multispectral imagery for population estimates and habitat models
- Seal and penguin scaring, entanglement, and behavior observations

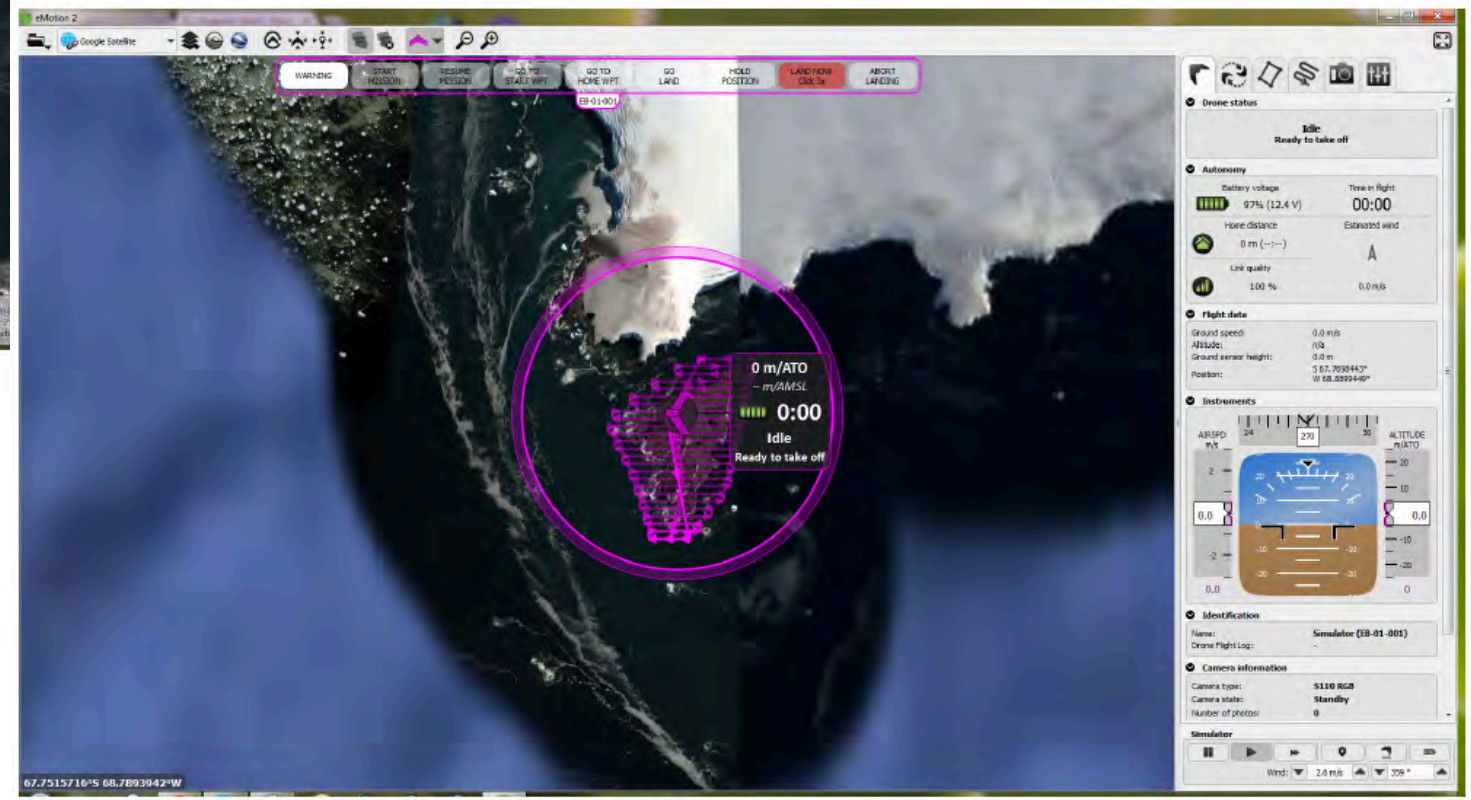
Outreach

- Capture photographs and 360° footage for interactive multimedia public outreach

Range of UAV/UAS Types – 2016/2017

Diversity of Control and Flight Planning Systems

Flight plan for typical Torgerson Island fixed wing UAS survey



Flight plan for typical Avian Island fixed wing UAS survey

Key Challenges

- Extreme Temperatures
  - Impact on touch screens/iPad controllers
- High Wind
  - >20 knots grounds UAVs
- Wildlife Avoidance
- Multi-unit Operations
  - Establishment of “Air Boss”
- Navigational Interference
  - Ship’s hull
  - Compass interference

Questions?