Unmanned Aircraft System (UAS) Research at the Alaska Center for UAS Integration

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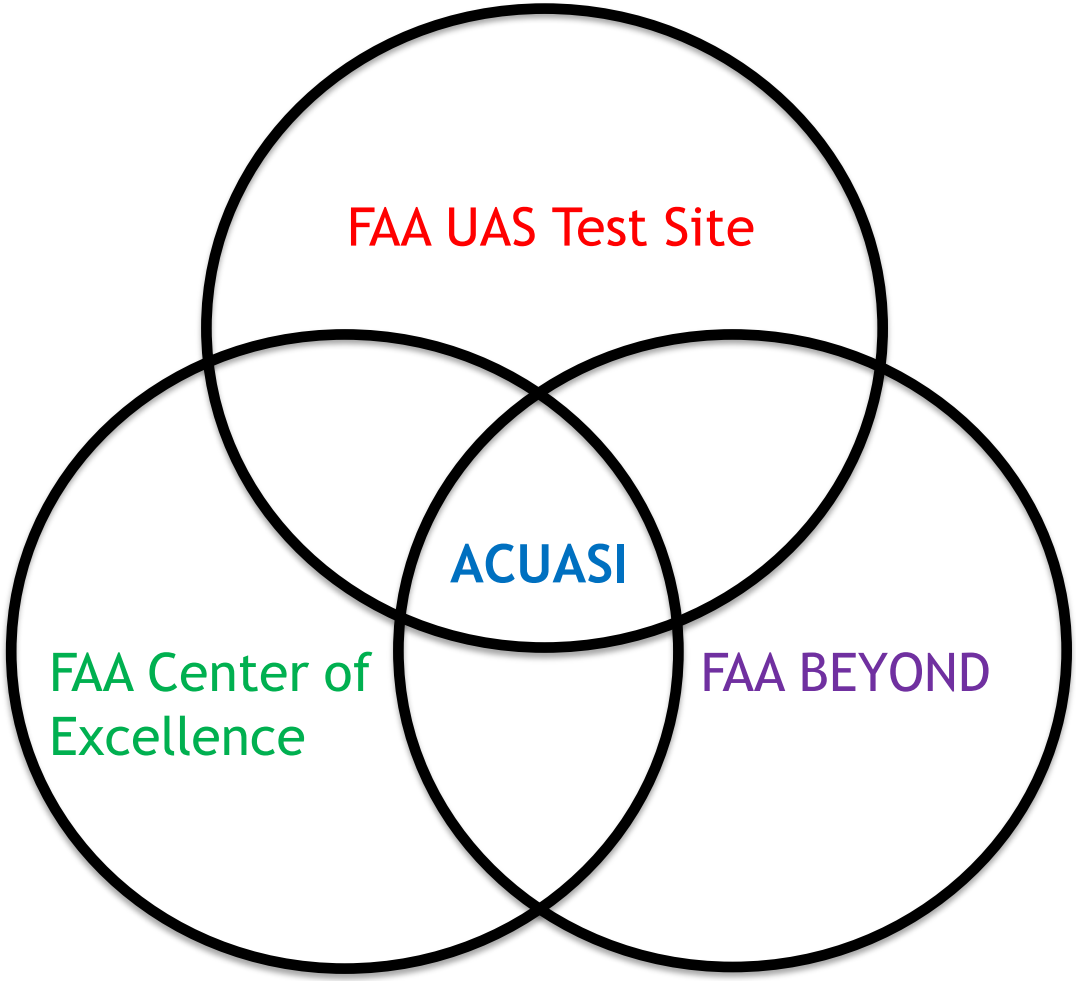
What is the Alaska Center for UAS Integration (ACUASI)?

- ACUASI is the University of Alaska's Unmanned Aircraft System (UAS) research program
- Our missions include:
  - Assisting the FAA in the safe integration of UAS into the National Airspace System
  - Supporting Alaskan/Arctic UAS users
  - Conducting scientific research

Alaska Center for UAS Integration (ACUASI)



Who Are We?

We are a combination of:

- Veterans and former defense contractors
- Science and engineering faculty, staff, and students
- Pilots (all pilots are manned aircraft pilots)
- Airframe and Powerplant mechanic
- Retired FAA Air Traffic Control Flight Service Specialist
- Business developer
- Embedded contractors

ACUASI's UAS Fleet

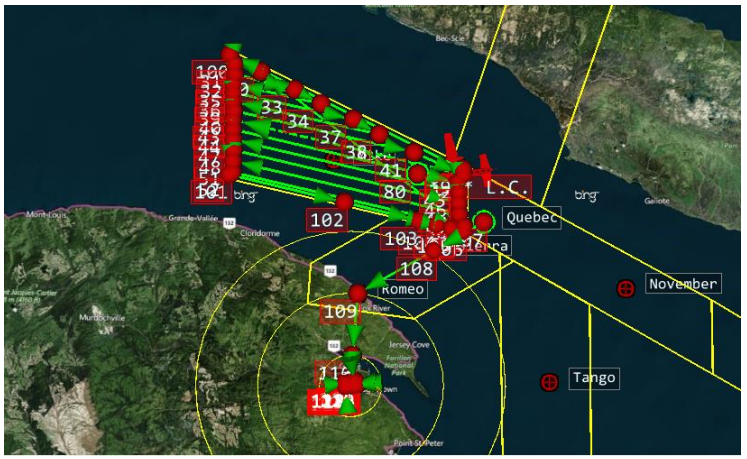
(evolution in action)

SeaHunter flying over the North Slope of Alaska in October.
Photo courtesy of Jordan W. Murdock and Robert J. Edison.

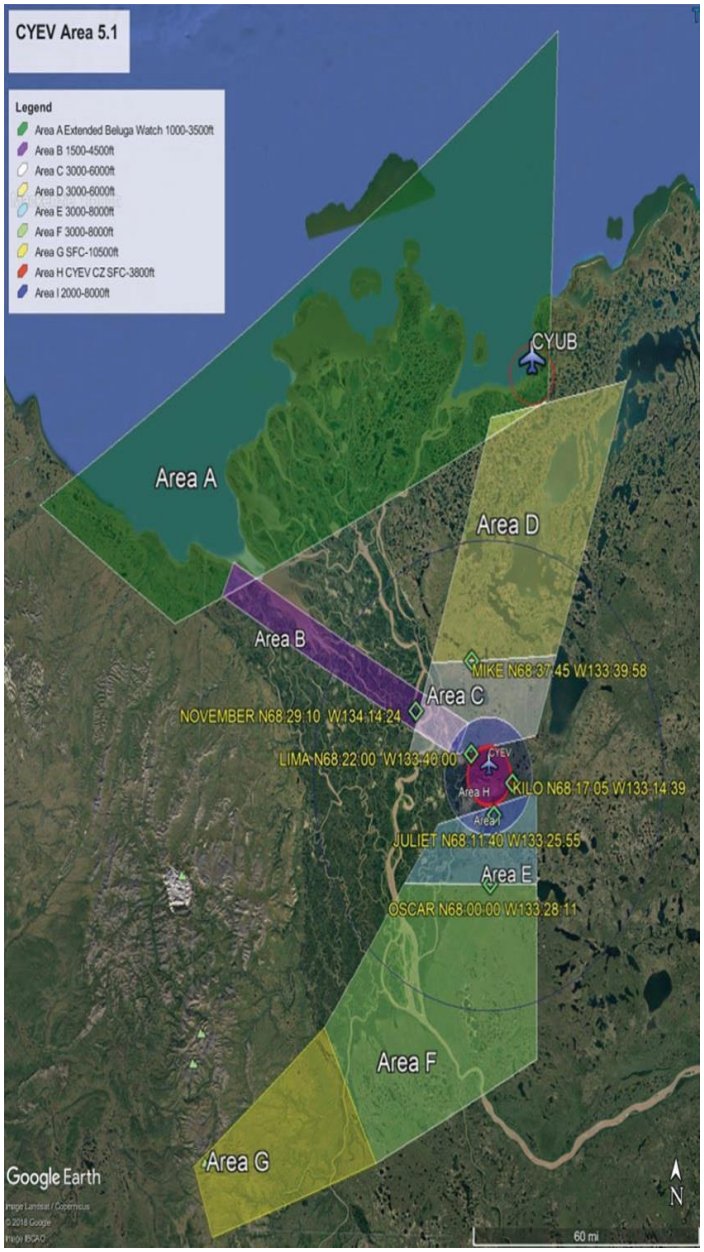
Transport Canada Operations

SeaHunter in Inuvik, Canada

Transport Canada Operations



- Development of CONOPs for operating in airport environments
- Road and land surveys
- Marine mammal surveys (e.g. Beluga Whales in Inuvik and North Atlantic Right Whales in Gaspé)
- Channel marker locations
- Automatic Identification System (AIS) ship identification



INUVIK 2019

- Mapping Survey of the Inuvik to Tuktoyaktuk and Dempster highways, and Beluga whale survey in Mackenzie Bay
- Mission planning took 2 years and included considerable outreach and community engagement
- Flew 42.2 hours, 3,376 NM BVLOS, over 80,000 high-resolution images, 15 days on-site, 7 flight days, 7 weather days, and 1 maintenance day
- Substantial outreach and community engagement led to smooth integration into busy summer operations at Inuvik airport

Inuvik Infrastructure Images

Tsiigehtchic NWT – 3 Aug 2019 (3,500 ft)

ITH – 1 Aug 2019 (3,000 ft)

Quarry – 3 Aug 2019 (1,500 ft)

Images captured using Nikon D850
45Mp Camera with 50 mm Lens

Transport Canada Successes

- 181 flight hours BVLOS, flying 14,480 nautical miles
- Over 130,000 high resolution images captured
- Maximum flight from launch point - 110 NM
- Maximum single flight endurance - 9.7 hours (not including 2 hours reserve fuel)
- Introduction of AI algorithms for NARW mission
- Contributed significantly to BVLOS regulatory and procedural development through collaboration with TC RPAS Task Force and NavCanada

The Path Forward

- ACUASI is working with the FAA to obtain BVLOS permissions
- Working out of airports, with larger aircraft, and under a variety of conditions
  - Transport Canada work
  - DRS HP Sentry operations
    - Fairbanks International Airport
  - Larger aircraft usually can carry larger payloads and fly longer distances
  - Cargo Delivery

DRS Sentry HP UAS

Former Naval Postgraduate School aircraft will support Navy Research Laboratory Arctic mission next year

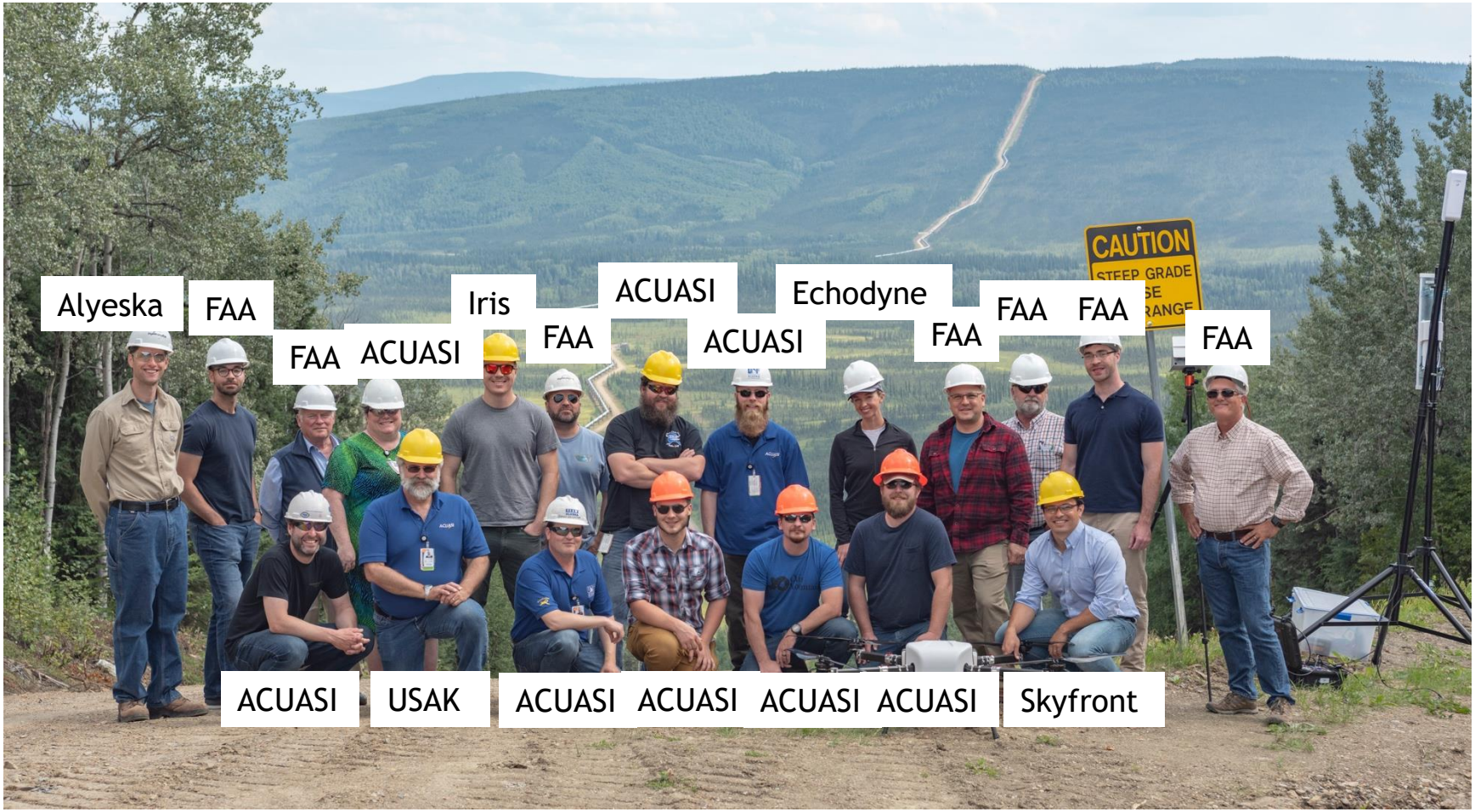
The Path Forward

- ACUASI is working with the FAA, NASA, and commercial entities to develop, test, and evaluate “Detect and Avoid” (DAA) technologies for use on UAS to allow BVLOS
- ACUASI and partners are developing payloads and on-board processing capabilities for exfiltration of data in remote regions

Detect and Avoid Intercomparisons

- UAF has conducted two DAA intercomparisons at the Poker Flat Research Range northeast of Fairbanks
- DAA systems – Iris Casia (onboard optical) and Echodyne Echoguard (ground-based radar)
- Intruders – manned helicopter and fixed-wing and small UAS (and bonus F15s)

First BVLOS in the Nation under the Small UAS Rule - July 31, 2019



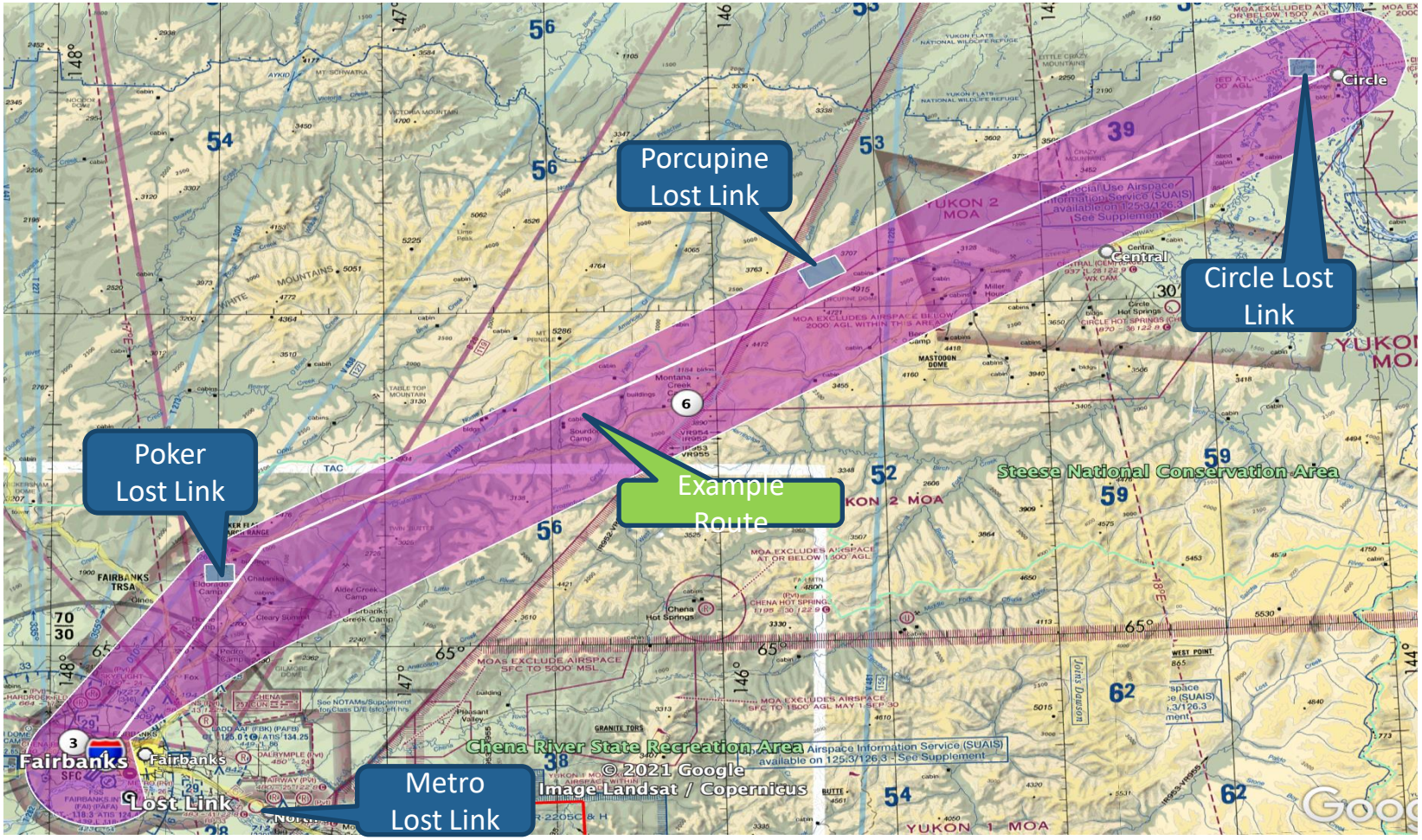
LOA

- We are working with David Chilson and Travis Williams on an LOA with FAI ATCT
- Our Sentry is ready to operate on FAI
- The SeaHunter will be ready next year
- We are limited to 02R-20L
- Normal 1500 ft MSL traffic pattern
- The drone will be with in Line Of Sight (LOS) from the ground or a chase aircraft

LOA

- First will be taxi and fast taxi testing at agreed upon low traffic times with FAI and ATC
- The Ground Control Station will be just south of Y off of C
- After taxi and fast taxi we will do traffic patterns
- A Remote Pilot in Command will be communicating with ATCT
- Lost Link Points

COA and Example Route



Questions?