

03/21/13

Presentation:

Unmanned
Aircraft
Systems

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Unmanned Aircraft
Systems</SUBJECT><COMM>HEDT28</COMM></TARGET>

Alaska State Legislature

Representative Shelley Hughes, Chair

Session Address:

Alaska State Capitol, Room 409

Juneau, Alaska 99801-1182

Phone: (907) 465-3743

Fax: (907) 465-2381

House District 8



Representative Lynn Gattis

Representative Bob Herron

Representative Pete Higgins

Representative Craig Johnson

Representative Kurt Olson

Representative Lance Pruitt

Representative Harriet Drummond

Representative Geran Tarr

House Special Committee on Economic Development, Trade and Tourism

AGENDA

March 21, 2013

1. Call to Order

~Gavel~ Welcome to House Economic Development, Trade and Tourism Committee.

The meeting is called to order. The time is _____. Welcome, everyone. Thanks to LIO monitor, _____, and our recording secretary, Debbie, and to committee aide, Ginger Blaisdell.

2. Roll Call and Agenda

- For the record, in attendance are: (representative xx, representative xx,... and representative xx – and remember to include self!)
 - Several members may be coming and going due to other committee meetings underway.

3. Calendar Review

- Today we will hear a presentation by Ms. Ro Bailey, Retired Air Force Brigadier General and Deputy Director of the Alaska Center for Unmanned Aircraft Systems Integration – RDT&E.
- Her presentation will provide the preliminary information for the resolution scheduled for hearing on Tuesday, March 26.
- She is joined by an unmanned aircraft named Scout.

4. EDTT committee Tour of Alaska

- June 4-6 (Tuesday through Thursday)
 - Tuesday early morning – Anchorage bus to Talkeetna
 - Talkeetna optional river raft, flight seeing, etc.
 - O/N Denali Princess hotel
 - Wednesday morning free
 - Afternoon tour of Usibelli
 - Dinner on Riverboat Discovery
 - O/N Fairbanks Princess or flight to Anchorage

- Thursday optional tour of Fairbanks or flight to Anchorage
- How many members, spouses and family, and committee staff?
- Is this week impossible for most members? Is another Tu-Th week in June better?

Next week we planned on hearing two resolutions on Tuesday and a presentation regarding Arctic Development on Thursday. With the floor sessions scheduled on Tuesday and Thursday, we may have to adjust the Thursday schedule but we will meet on Tuesday.

Do members have any closing comments?

- Thank you. We are ADJOURNED at 12:___ (time).” ~Gavel~



Unmanned Aircraft System Operations Industry "Code of Conduct"

The emergence of unmanned aircraft systems (UAS) as a resource for a wide variety of public and private applications quite possibly represents one of the most significant advancements to aviation, the scientific community, and public service since the beginning of flight. Rapid advancements in the technology have presented unique challenges and opportunities to the growing UAS industry and to those who support it. The nature of UAS and the environments which they operate, when not managed properly, can and will create issues that need to be addressed. The future of UAS will be linked to the responsible and safe use of these systems. Our industry has an obligation to conduct our operations in a safe manner that minimizes risk and instills confidence in our systems.

For this reason, the Association for Unmanned Vehicle Systems International (AUVSI), offers this Code of Conduct on behalf of the UAS industry for UAS operation. This code is intended to provide our members, and those who design, test, and operate UAS for public and civil use, a set of guidelines and recommendations for safe, non-intrusive operations. Acceptance and adherence to this code will contribute to safety and professionalism and will accelerate public confidence in these systems.

The code is built on three specific themes: Safety, Professionalism, and Respect. Each theme and its associated recommendations represent a "common sense" approach to UAS operations and address many of the concerns expressed by the public and regulators. This code is meant to provide UAS industry manufacturers and users a convenient checklist for operations and a means to demonstrate their obligation to supporting the growth of our industry in a safe and responsible manner. By adopting this Code, UAS industry manufacturers and users commit to the following:

Safety

- We will not operate UAS in a manner that presents undue risk to persons or property on the surface or in the air.
- We will ensure UAS will be piloted by individuals who are properly trained and competent to operate the vehicle or its systems.
- We will ensure UAS flights will be conducted only after a thorough assessment of risks associated with the activity. This risks assessment will include, but is not limited to:
 - Weather conditions relative to the performance capability of the system
 - Identification of normally anticipated failure modes (lost link, power plant failures, loss of control, etc) and consequences of the failures
 - Crew fitness for flight operations
 - Overlying airspace, compliance with aviation regulations as appropriate to the operation, and off-nominal procedures
 - Communication, command, control, and payload frequency spectrum requirements
 - Reliability, performance, and airworthiness to established standards

Professionalism

- We will comply with all federal, state, and local laws, ordinances, covenants, and restrictions as they relate to UAS operations.
- We will operate our systems as responsible members of the aviation community.
- We will be responsive to the needs of the public.
- We will cooperate fully with federal, state, and local authorities in response to emergency deployments, mishap investigations, and media relations.
- We will establish contingency plans for all anticipated off-nominal events and share them openly with all appropriate authorities.

Respect

- We will respect the rights of other users of the airspace.
- We will respect the privacy of individuals.
- We will respect the concerns of the public as they relate to unmanned aircraft operations.
- We will support improving public awareness and education on the operation of UAS.

As an industry, it is incumbent upon us to hold ourselves and each other to a high professional and ethical standard. As with any revolutionary technology, there will be mishaps and abuses; however, in order to operate safely and gain public acceptance and trust, we should all act in accordance with these guiding themes and do so in an open and transparent manner. We hope the entire UAS industry will join AUVSI in

adopting this industry Code of Conduct.

Supported By:





INTERNATIONAL ASSOCIATION OF CHIEFS OF POLICE

AVIATION COMMITTEE

Recommended Guidelines for the use of Unmanned Aircraft

BACKGROUND:

Rapid advances in technology have led to the development and increased use of unmanned aircraft. That technology is now making its way into the hands of law enforcement officers nationwide.

We also live in a culture that is extremely sensitive to the idea of preventing unnecessary government intrusion into any facet of our lives. Personal rights are cherished and legally protected by the Constitution. Despite their proven effectiveness, concerns about privacy threaten to overshadow the benefits this technology promises to bring to public safety. From enhanced officer safety by exposing unseen dangers, to finding those most vulnerable who may have wandered away from their caregivers, the potential benefits are irrefutable. However, privacy concerns are an issue that must be dealt with effectively if a law enforcement agency expects the public to support the use of UA by their police.

The Aviation Committee has been involved in the development of unmanned aircraft policy and regulations for several years. The Committee recommends the following guidelines for use by any law enforcement agency contemplating the use of unmanned aircraft.

DEFINITIONS:

1. **Model Aircraft** - A remote controlled aircraft used by hobbyists, which is manufactured and operated for the purposes of sport, recreation and/or competition.
2. **Unmanned Aircraft (UA)** – An aircraft that is intended to navigate in the air without an on-board pilot. Also called Remote Piloted Aircraft and “drones.”
3. **UA Flight Crewmember** - A pilot, visual observer, payload operator or other person assigned duties for a UA for the purpose of flight.
4. **Unmanned Aircraft Pilot** - A person exercising control over an unmanned aircraft during flight.

COMMUNITY ENGAGEMENT:

1. Law enforcement agencies desiring to use UA should first determine how they will use this technology, including the costs and benefits to be gained.
2. The agency should then engage their community early in the planning process, including their governing body and civil liberties advocates.
3. The agency should assure the community that it values the protections provided citizens by the U.S. Constitution. Further, that the agency will operate the aircraft in full compliance with the mandates of the Constitution, federal, state and local law governing search and seizure.
4. The community should be provided an opportunity to review and comment on agency procedures as they are being drafted. Where appropriate, recommendations should be considered for adoption in the policy.
5. As with the community, the news media should be brought into the process early in its development.

SYSTEM REQUIREMENTS:

1. The UA should have the ability to capture flight time by individual flight and cumulative over a period of time. The ability to reset the flight time counter should be restricted to a supervisor or administrator.
2. The aircraft itself should be painted in a high visibility paint scheme. This will facilitate line of sight control by the aircraft pilot and allow persons on the ground to monitor the location of the aircraft. This recommendation recognizes that in some cases where officer safety is a concern, such as high risk warrant service, high visibility may not be optimal. However, most situations of this type are conducted covertly and at night. Further, given the ability to observe a large area from an aerial vantage point, it may not be necessary to fly the aircraft directly over the target location.
3. Equipping the aircraft with weapons of any type is strongly discouraged. Given the current state of the technology, the ability to effectively deploy weapons from a small UA is doubtful. Further, public acceptance of airborne use of force is likewise doubtful and could result in unnecessary community resistance to the program.
4. The use of model aircraft, modified with cameras, or other sensors, is discouraged due to concerns over reliability and safety.

OPERATIONAL PROCEDURES:

1. UA operations require a Certificate of Authorization (COA) from the Federal Aviation Administration (FAA). A law enforcement agency contemplating the use of UA should contact the FAA early in the planning process to determine the requirements for obtaining a COA.
2. UA will only be operated by personnel, both pilots and crew members, who have been trained and certified in the operation of the system. All agency personnel with UA responsibilities, including command officers, will be provided training in the policies and procedures governing their use.
3. All flights will be approved by a supervisor and must be for a legitimate public safety mission, training, or demonstration purposes.
4. All flights will be documented on a form designed for that purpose and all flight time shall be accounted for on the form. The reason for the flight and name of the supervisor approving will also be documented.
5. An authorized supervisor/administrator will audit flight documentation at regular intervals. The results of the audit will be documented. Any changes to the flight time counter will be documented.
6. Unauthorized use of a UA will result in strict accountability.
7. Except for those instances where officer safety could be jeopardized, the agency should consider using a "Reverse 911" telephone system to alert those living and working in the vicinity of aircraft operations (if such a system is available). If such a system is not available, the use of patrol car public address systems should be considered. This will not only provide a level of safety should the aircraft make an uncontrolled landing, but citizens may also be able to assist with the incident.
8. Where there are specific and articulable grounds to believe that the UA will collect evidence of criminal wrongdoing and if the UA will intrude upon reasonable expectations of privacy, the agency will secure a search warrant prior to conducting the flight.

IMAGE RETENTION:

1. Unless required as evidence of a crime, as part of an on-going investigation, for training, or required by law, images captured by a UA should not be retained by the agency.
2. Unless exempt by law, retained images should be open for public inspection.

UNMANNED AIRCRAFT SYSTEMS FOR ALASKA



Ro Bailey
Deputy Director
Alaska Center for Unmanned
Aircraft Systems Integrator
(907) 455-2104



since 1917

Roadmap

- University of Alaska UAS history
 - Vision, mission, why unmanned
- Projects & why they matter to Alaska
 - Economic value
 - Science, engineering, & safety value
- FAA Test Site Proposal
- What about privacy? Law Enforcement?
- House Concurrent Resolution No. 6

UAF's History of Unmanned Aircraft

- **2001 - Partnership with New Mexico State University**
 - Tasked to develop applications within the Technical Analysis and Applications Center (TAAC)
- **2003/2004 - Funded to work with USAF and USCG**
 - Maritime domain awareness
 - Wildfires in the Interior of Alaska
- **2006 - Acquired first ScanEagle with 50% loan from University Foundation**
- **2007 to present - Multiple missions for science, emergency response, humanitarian needs, and engineering development**
- **Today our unmanned aircraft fleet is diverse and growing**
 - Existing fixed wing systems
 - Existing rotor systems
 - Developing new systems

June 2007



First UAF Launch

Altair "Mariner" Alaska July 2004



Meeting Alaska's Needs

- Research
 - Science
 - Engineering
- Public Safety / Emergency Response
- Natural Resource Management

Bering Sea



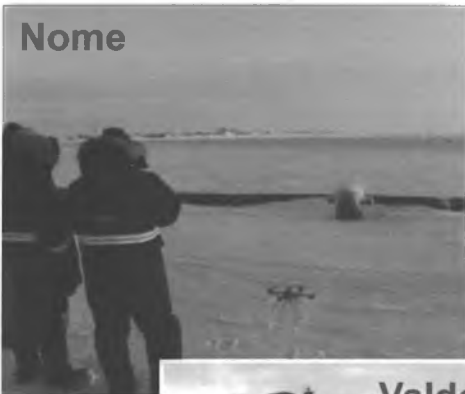
Circle



Aleutians



Nome



Prudhoe Bay



Valdez



Value to Alaska

- **UAF alone has brought in over \$4.5 M**
- **Technology**
 - **Three small company start-ups since 2010**
 - **Two aerospace companies opened/opening offices in Fairbanks—one is ARTIC, or Atkinson Robotics and Technology Integration Corporation**
 - **Both Alaskan and Outside companies partnering with UAF to pursue FAA Test Site**
- **Value to Alaska business**
 - **Fish & game management & protection**
 - **Support oil industry, mining, fisheries, others**

Economic Impact in Alaska

Before Expected Impact of a Test Range Designation



Northern
Embedded
Solutions



Alaska-based development partners

Expected Value

- **Value to Alaska**
 - Better deploy wildfire fighters
 - Support disaster response
 - Assess/protect transportation routes—e.g., monitor slopes
 - Search & rescue in remote areas
 - High resolution mapping
 - Infrastructure monitoring
 - Oil spill response & monitoring
 - Counter unilateral Federal decisions with facts
 - River monitoring during breakup

Why Unmanned?

- **Risky work: over remote, extreme terrain or unreachable locations in volatile weather conditions**
 - Nov 1999: Helicopter crashed, two Nez Perce biologists conducting surveys seriously injured
 - Polar & distant maritime locations
- **Dirty work: observations over chemical spills, volcanoes, wildfire smoke**
- **Dull: capturing thousands of photos to process into 3D maps is boring, repetitive work**
- **Other means not possible**
 - Monitoring sea ice from under 1000 ft
 - Flying through volcanic ash plumes

What Alaska Offers

- **Vast open airspace with little traffic**
- **Wild, extreme, unpopulated, diverse terrain**
- **Access to large military ranges with data gathering ability**
- **History of pioneering aviation technology**
- **Culture of innovative use of aviation**
- **Close relationship with regional FAA**
- **Perhaps most important, willingness to be thoughtful and methodical in potential policy decisions**

Vision

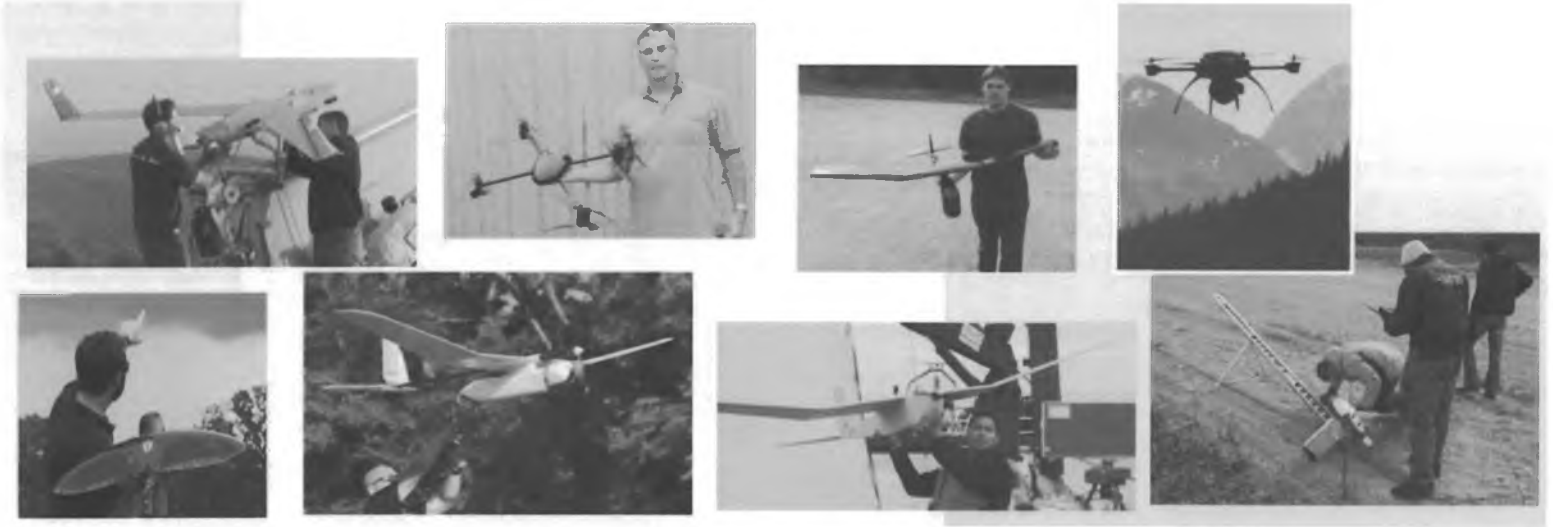
Develop, test, and ultimately exploit emerging unmanned aircraft technology and its uses to create a positive economic and social benefit within the State of Alaska.

When the cost of the hardware is no longer a factor what will people do with the capability?

- **Plan today to prepare for the future**
- **Develop what is needed to support**
- **Participate in policy development for benefit and protection of Alaska & the nation**

Mission Statement

A research center for small, unmanned aircraft systems providing integration of unique payloads and supporting pathfinder missions within government and science communities, with a special emphasis on the Arctic region.

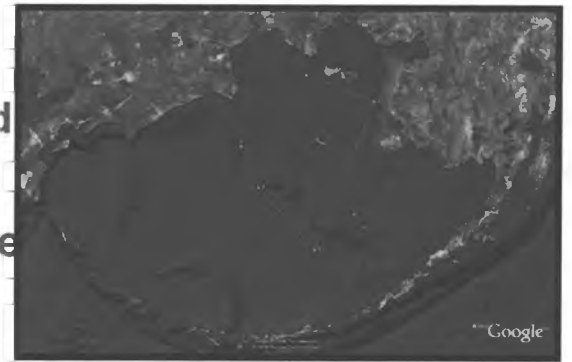


Conducted over 150 mission flight days worldwide in 2012

The Evidence: a sample of projects

Ice Seal Population Study

- **Scientific Need**
 - Marine Mammal Protection Act mandated
- **Relevance**
 - Large-scale, systematic ship-based survey
- **Outcome**
 - Safer (than manned aviation)
 - More effective (they do not startle seals)
 - vs. manned fixed wing or helicopters

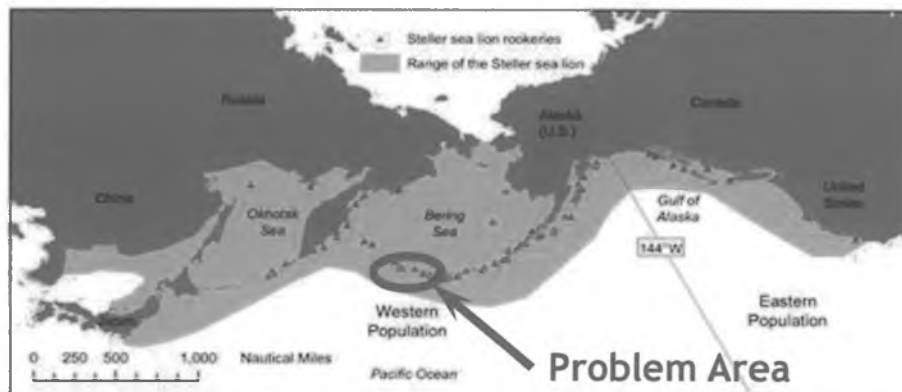


2009 First Deployment
2014 Proposed Expanded Survey
Joint NOAA and US Navy Funded

since 1917

Augmenting Steller Sea Lion Surveys Western Aleutians

- **Problem:** Biological opinion, based on limited observations, eliminated a commercial fishery
- **Goal:** Demonstrate a method to collect high quality imagery for population surveys in hard to observe areas
- **Possible Benefit:** Improved understanding of animal use of and movement through their habitat



Steller Sea Lion Habitat Monitoring



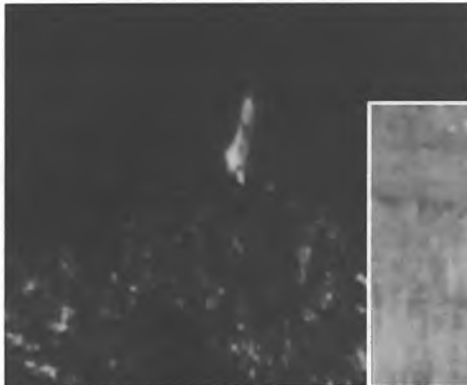
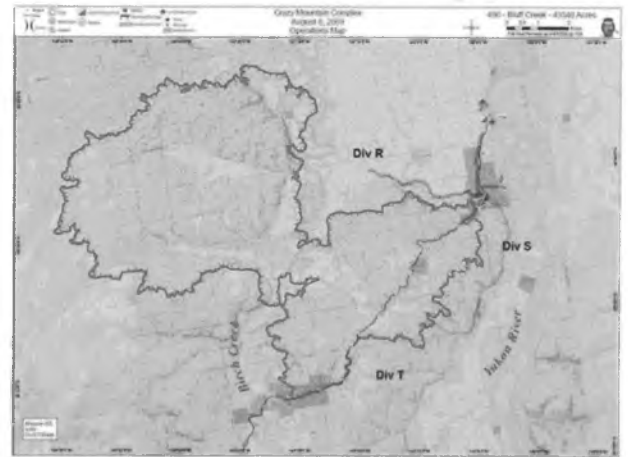
Preliminary Findings
- Migration Patterns
- Transient Killer Whales



Crazy Mountain Wildfire

Alaska Fire Service Incident Command Team Support

- Tasked by Alaska Fire Service Incident Command Team
- Manned aviation not flown for 5 days due to the smoke and limited visibility
- Satellite imagery (MODUS) incapable of showing critical activity



Salmon Spawning Habitat

October - December 2012

- Mapping Fall Salmon Nests along a 162 km of the Snake and Clearwater River in Idaho, Washington, and Oregon
- “THREATENED” under the Endangered Species Act



An aerial photograph of a riverbank. The left side shows a rocky and vegetated shoreline, while the right side is a wide, calm body of water. The text "How many reds?" is overlaid in the center-right of the image.

How many reds?



26

A female on each nest

Fish Habitat Data Products

Weekly Mosaic Images of Select Sites



Rx-CADRE

Prescribed Fire Combustion and Atmospheric Dynamics Research Experiment

- October 29 - November 17 2012
- Eglin AFB Florida



Bear Bite - SAREX

Mass Casualty Exercise 7-10 February 2013

“An aircraft crashed in the tundra roughly 20 miles outside Bethel Alaska many died with some survivors”

Deployed two unmanned aircraft systems with support team

Coordinated with manned aviation on the scene

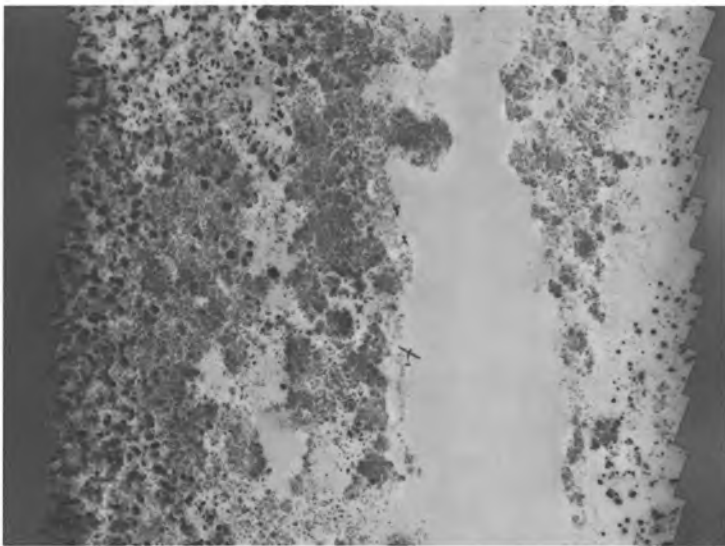
Mission:

- **Map scene for event documentation**
- **Real-time SAR response**



Bear Bite - SAREX

“I’ve worked with the MQ9 and the MQ1 before and when compared these products were pretty sweet” - SAR Duty Officer statement at after action review 11 Feb 2013. “Within just a couple hours imagery was collected and turned into mosaic products in the field”



Bear Bite - SAREX

cold weather operations – our most challenging yet

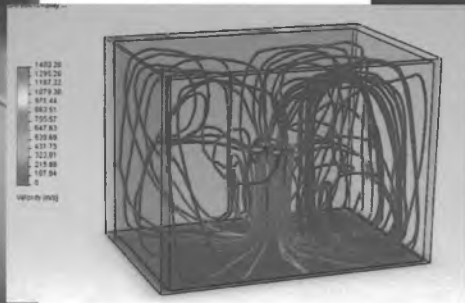


Shoreline Clean-up Assessment Technique (SCAT) Evaluation



BP Exploration (Alaska) Inc. Partnership

Oil Infrastructure Monitoring Research



- Flare Stacks
- Pipelines
- Processing Facilities
- Access Roads

BP North America Partnership

High Arctic Ship Piloting Experiments

Aboard the Canadian CCGS LOUIS S. ST. LAURENT



**Phase I Research conducted by
Capt Stephen Wackowski (USAF)**

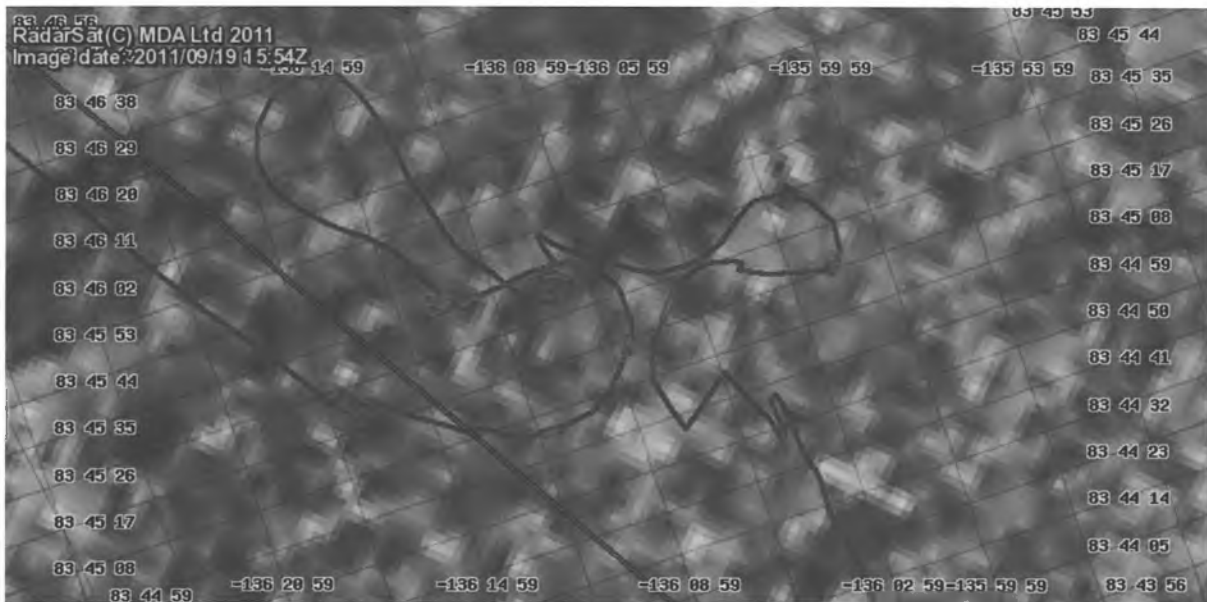
**Phase II Ongoing with UAF
graduate students with modified
Raven systems acquisition**

Imagery Used For Ship Piloting in Ice

Ship tracks superimposed (Sept 2011)

Background Image: National Ice Center highest resolution RADARSAT

- Desired icebreaker track (green)
- Actual navigation track (red)



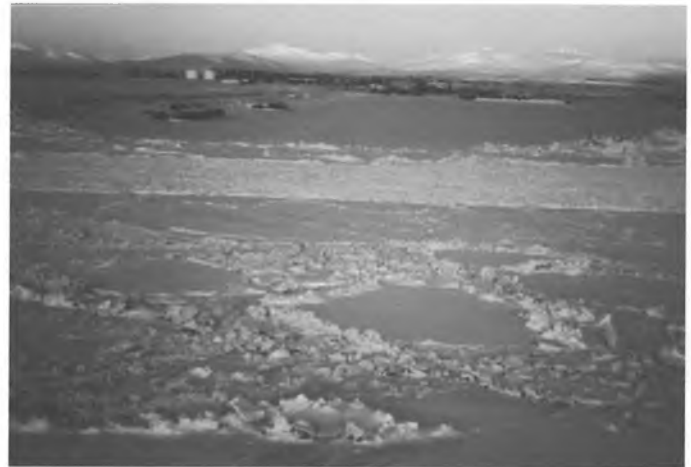
Small UAS Imagery of Ice Ridges

IR image from RAVEN UAS (Sept 2011)



Navigating Sea Ice during the Nome Fuel Delivery

University Engagement and Decision Support



Mission

- 1. Identify potential safety concerns for those working on the ice**
- 2. Document the site for mission response activity**
- 3. Collect imagery for the USCG Public Affairs Officer**

iPASS

UAF's Portable Airspace Surveillance System

Designed and built by UAF for Alaska's airspace monitoring needs



Status
Operational, used in
Canada and NASA
Certified



Airspace activity monitoring

Monitors airspace use patterns and validates traffic pattern assumptions

Enhanced situational awareness during aircraft or spacecraft operations

Provides real-time position and track of local airspace activity to assist in traffic avoidance



Ongoing UAS Survey of Marine Debris Generated by 2011 Japanese Tsunami



NOAA Funded Effort



**Partnering with a Wasilla
Alaska based UAS
Manufacturer Airborne
Technologies Inc**



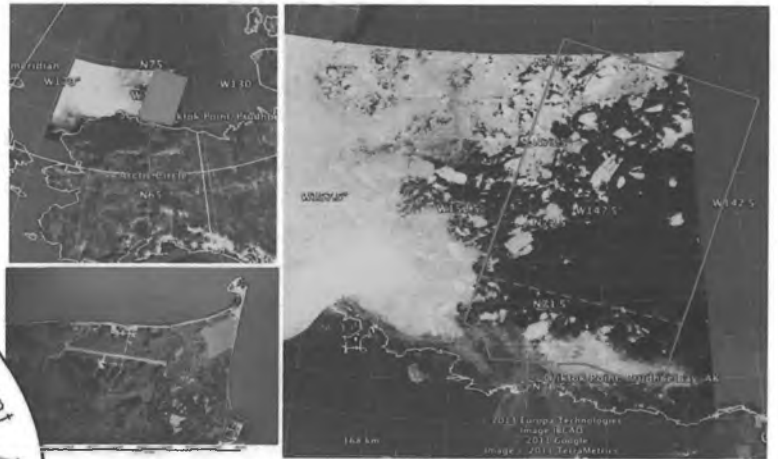
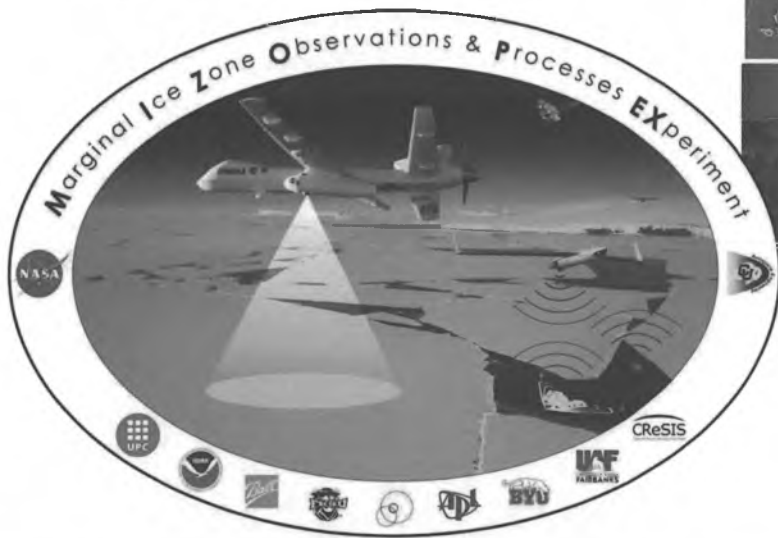
Upcoming ACUASI Projects

Marginal Ice Zone Ocean and Ice Observations and Processes EXperiment (MIZOPEX)

UAF deployments

NASA Exercise July 2013

Preparation May/June 2013



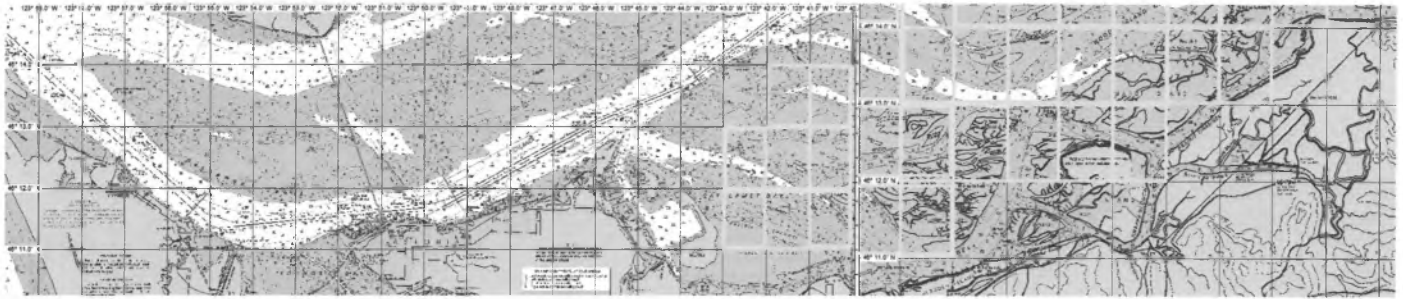
Multiple aircraft simultaneously
Many new scientific payloads

Alaska Department of Public Safety

- **Provided demonstration of a vertical takeoff UAS**
- **Provided concepts in which a UAS could be used including:**
 - **Forensic evidence at crash or crime scene**
 - **Search and rescue**
 - **Wildlife protection**
- **Provide UAS subject matter expert as AST forms its concept of operations**
- **Possible development of UAS training package to train State troopers**
- **Supporting any FAA interaction needs**
- **Providing connections to legal experts on privacy**

Most Recent ACUASI Project

Oil Spill Response Exercise - Columbia River Estuary



- 11-13 March 2013
- Puma AE Operation



Low-altitude, over-the-pole capability

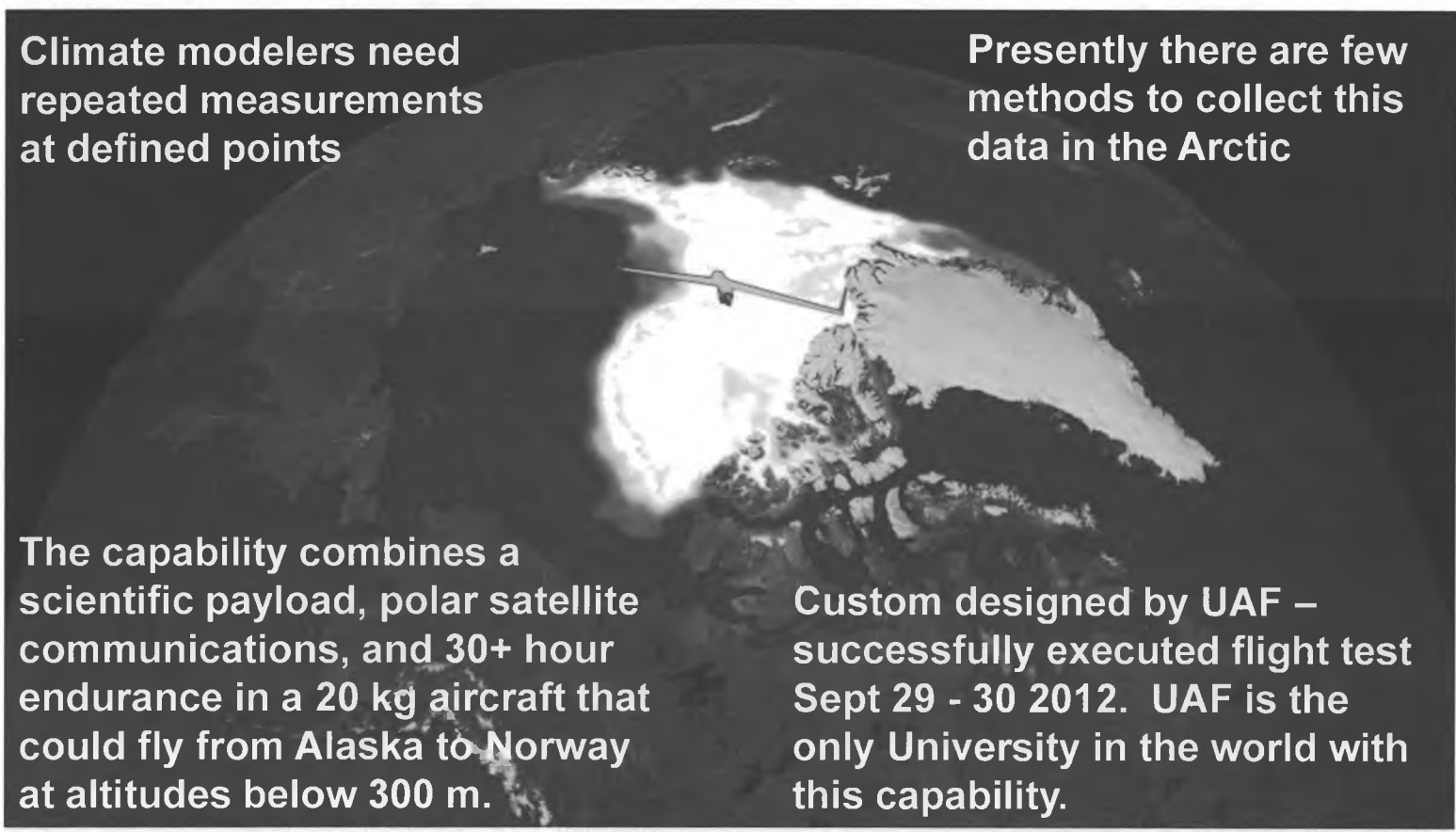
**Fuel-injected, Iridium-communication-enhanced,
long-endurance, small unmanned aircraft**

Climate modelers need repeated measurements at defined points

Presently there are few methods to collect this data in the Arctic

The capability combines a scientific payload, polar satellite communications, and 30+ hour endurance in a 20 kg aircraft that could fly from Alaska to Norway at altitudes below 300 m.

Custom designed by UAF – successfully executed flight test Sept 29 - 30 2012. UAF is the only University in the world with this capability.



Volcanic Ash Analysis and Detection

USAF Small Business Innovative Research

- Collaboration between UAF researchers and new industry
- Opportunity to launch a business to capitalize on USAF funding with UAF Intellectual Property



FAA Test Site

- **Jan 2012: FAA Reauthorization Act directed FAA to select 6 Test Sites to research and test for safe integration of UAS into the national airspace**
- **Feb 14 2013: Solicitation was released**
- **UAF leads team for states of Alaska, Oregon, and Hawaii, plus 56 additional team members**
 - **Includes state agencies (DOT, DPS, Forestry of DNR, DHS&EM, National Guard**
 - **Universities, EDCs, corporations**
- **Proposals due multiple dates, last by May 6**
- **Selection targeted by FAA for Dec 31 2013**

Pan Pacific UAS Test Range Complex

- University ACUASI is lead
- Fourteen specific spots around the three states
 - Strong link with military JPARC ranges
 - Forging links with manned aviation safety specialist
- Key questions to answer:
 - Procedures to protect manned aviation
 - Policies to protect privacy
 - Technical testing to assure control, see & avoid, lost link procedures work, etc

How is Privacy Protected?

- **We're dedicated to protect privacy so beneficial uses can be obtained**
- **Current statutory/case law strongly protects privacy while defining legal airborne activities (manned)**
 - **Unmanned a new technology, but subject to same restrictions**
 - **DHS & National Institute for Justice have taken on task of defining specific UAS privacy rules**
 - **FAA committed to incorporating into Test Site and future rules once developed**
 - **DoD & Guard training on domestic privacy well underway**

More on Privacy

- **International Chiefs of Police issued guidelines for law enforcement use of UAS**
 - Handout with full text available
 - The essence:
 - Follow FAA rules
 - Use strict supervisory accountability
 - Get warrants if any possibility of use for surveillance or investigation
 - Notify locals of intent to fly over them
 - Delete recordings not authorized by warrant, training use, or as required by law
- **UAF working with DPS to assist with program, procedures, all to be set up before first flight**

What about Weapons on UAS?

- **Despite media scares, this won't happen**
- **The Unmanned Aircraft System community uniformly against any such use**
- **Small UAS incapable of carrying weapons**
 - **But even if they could...**
- **FAA prohibits weapons completely—or any dropping of objects from aircraft**
- **IACP advises against even considering—sees as unlikely technologically, unacceptable to public, ineffective use of UAS**

HR No 6

- **Thank you for a thoughtful and balanced view of the potential benefits and risks of UAS**
- **Recognition of UAF's work to date is gratifying—our goal always has been to benefit Alaska**
 - **You've seen many benefits already, but potential remains far greater**
 - **Military users & media treatment have created an impression of danger for domestic use**
 - **No violations yet; we pledge to work hard both on the task force and in the test site to craft solid, defensible policy for your consideration**



Alaska Center for UAS Integration

2012 Alaska Legislature Capital Budget

Research and Development of Unmanned Aerial Systems	5,000,000	5,000,000
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16 (HD 1-40)

It is the intent of the Legislature that the University of Alaska collaborate with the Federal Aviation Administration in establishing a research and development program and possible test facility for Unmanned Aerial Systems in Alaska. Unmanned Aerial Systems are already being utilized in Alaska in many ways and as the Arctic race progresses, they will become even more vital as a resource to the State and the Country.

Excerpt From DoD Training Briefing



General Principles

- Do NOT infringe on US Persons' Constitutional rights
- Protect privacy rights of US Persons
- Collect, retain, and disseminate information based on a lawfully assigned mission and function
- Employ the least intrusive lawful techniques
- Comply with all regulatory requirements

