AAF ArcticShark

BEAT SCHMID

Manager, ARM Aerial Facility

ARM/ASR Meeting March 13-18

ARM – UAS Capability Development Approach

- Multi-pronged approach:
  - Continue to host UAS activities in Alaska (Oliktok Pt.) and Oklahoma (SGP)
  - Intend to host UAS activities in Azores and with AMF deployments
  - Build up in-house UAS capabilities.
  - SNL and PNNL will jointly implement the ARM UAS Program (i.e. in-house UAS capabilities)
- UAS Implementation Plan www.arm.gov

ARM UAS Advisory Group

Tim Bates, atmospheric chemist at NOAA's Pacific Marine Environmental Laboratory and University of Washington/Joint Institute for the Study of the Atmosphere and Ocean

John Cassano, associate professor of atmospheric and oceanic sciences at the University of Colorado Boulder and researcher at NOAA's Earth System Research Laboratory and Cooperative Institute for Research in Environmental Sciences

Matt Fladeland, Manager, Airborne Science Program Office, NASA Ames Research Center

Martin Stuefer, assistant director at Alaska Climate Research Center and assistant research professor at the Geophysical Institute at the University of Alaska Fairbanks

Jerry Harrington, associate professor of meteorology at Pennsylvania State University

ArcticShark Technical Data

ARM CLIMATE RESEARCH FACILITY

- Navmar Applied Sciences Corp. (NASC)
- DOD Group 3 UAS
- TigerShark – RQ-23
- Modified for ARM → TSB3-AS
- Autonomous w/Piccolo autopilot
- Transponder

Rotary Engine UEL 801	56 hp
Propeller 4 Blades, Diameter	37”
Cruise Speed	~60 kts
Alternator	4,200 W
Payload Power	2,500 W

Wingspan	22”
Length	14’ 3”
Max Altitude	18,000 ft
Max Endurance	8 hours

Range (Radio Line of Sight)	50 nm
Iridium SatCom (BLOS, fuel limited)	420 nm

Max Gross Take-off Weight	650 lbs
Full Fuel Weight	120 lbs
Payload(with full fuel and SatCom)	75 lbs
Max Payload (~2.5 hrs endurance)	150 lbs
Underwing Hardpoints	2 at 50 lbs per wing

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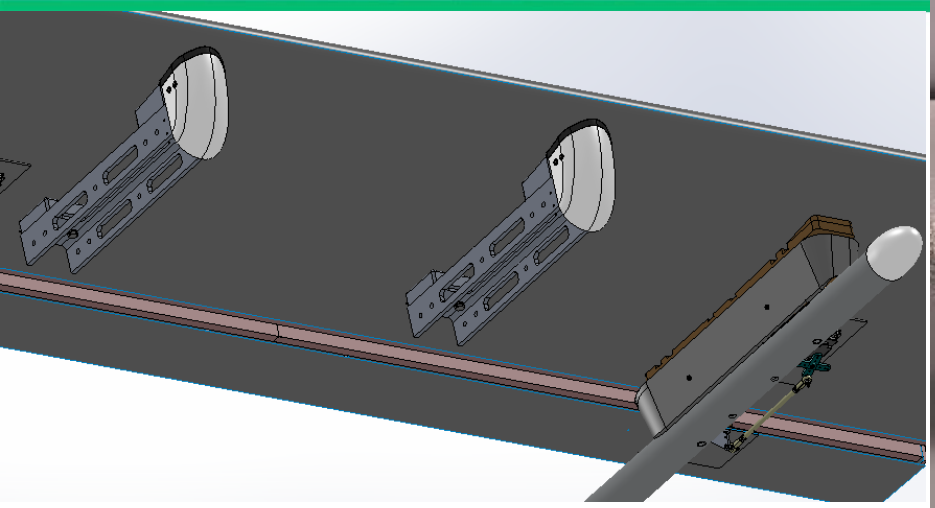
ArcticShark Operations in Pendleton, OR

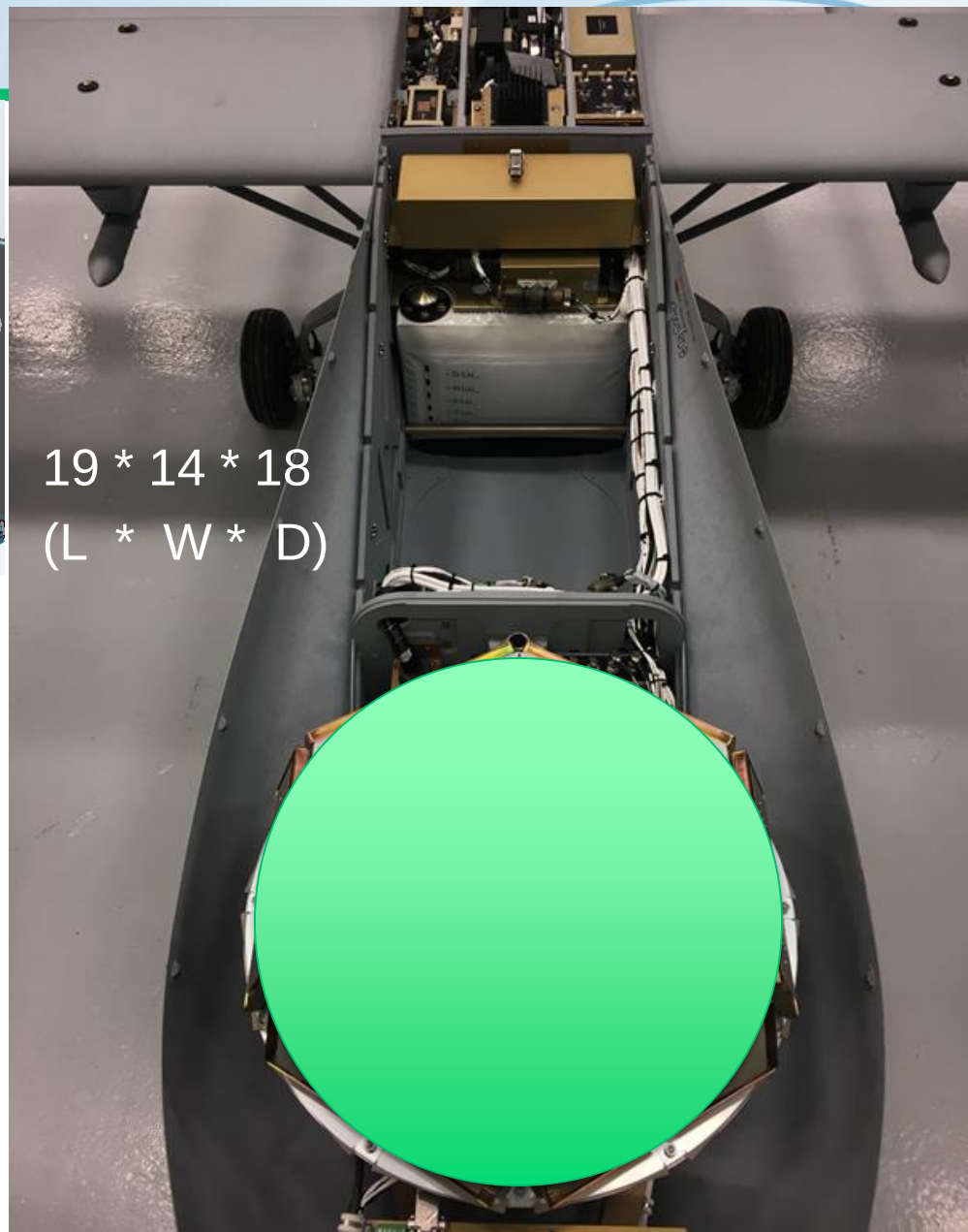
Antenna Radome

The Antenna radome is a 10’ weather resistant sphere used to protect the antenna array from snow, ice and freezing rain in Arctic climates.

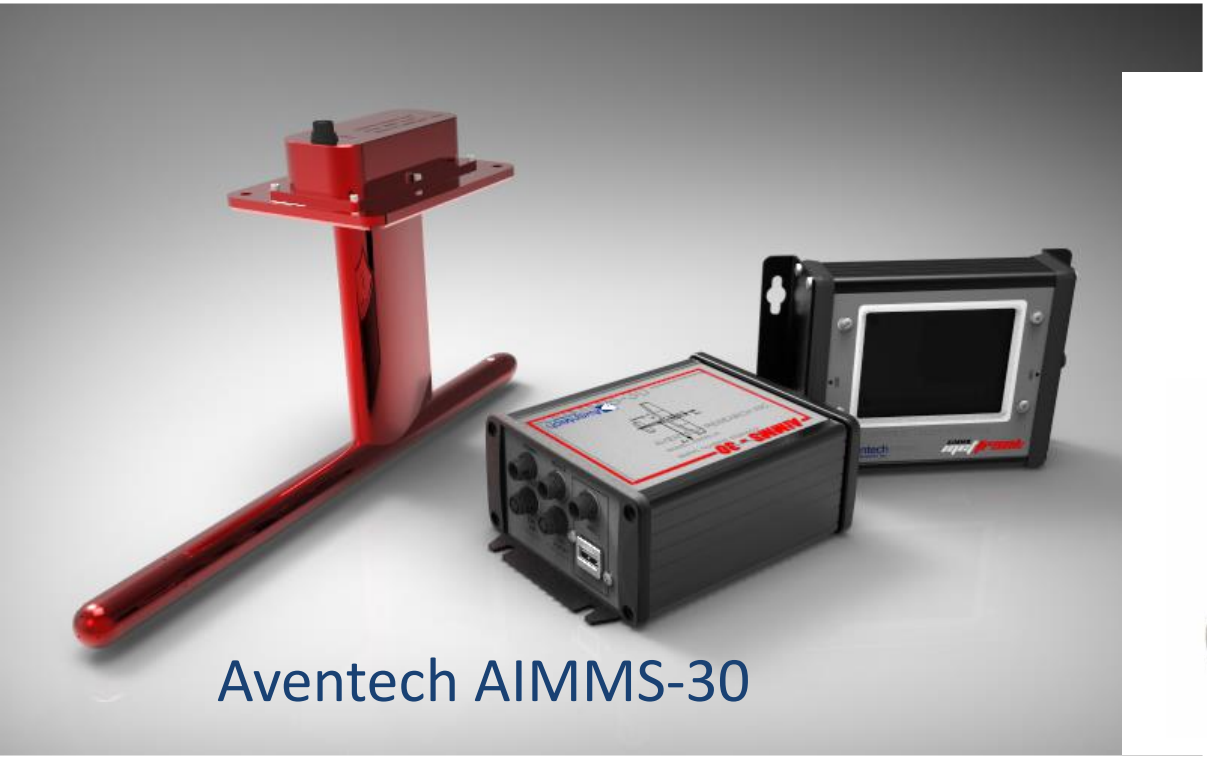
Payload Stores



- 2 hard points/pylons per wing (inboard and outboard)
- ~3” tall, 9” long (total length), 1” deep.
- 250 W per station, 28 (VDC), 10 A
- Max weight inboard, 35 lbs
- Max weight outboard, 30 lbs
- Max weight combined, 50 lbs



AAF ArcticShark Instrumentation



Aventech AIMMS-30

HEITRONICS
Infrarot Messtechnik
CT09

Atmospheric state and thermodynamics
T, RH, 3D winds and turbulence

Surface Temperature

AAF ArcticShark Instrumentation

Radiation

Sunshine Pyranometer (SPN1)

Multi-Filter Radiometer (MFR)

Huskeflux Infrared Radiometer (IR20)

AAF ArcticShark Instrumentation

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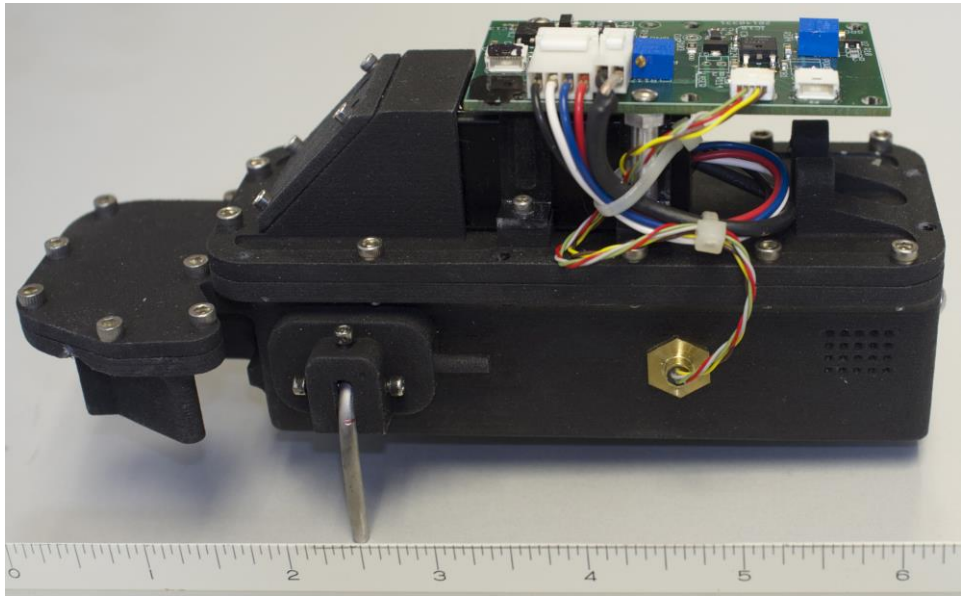
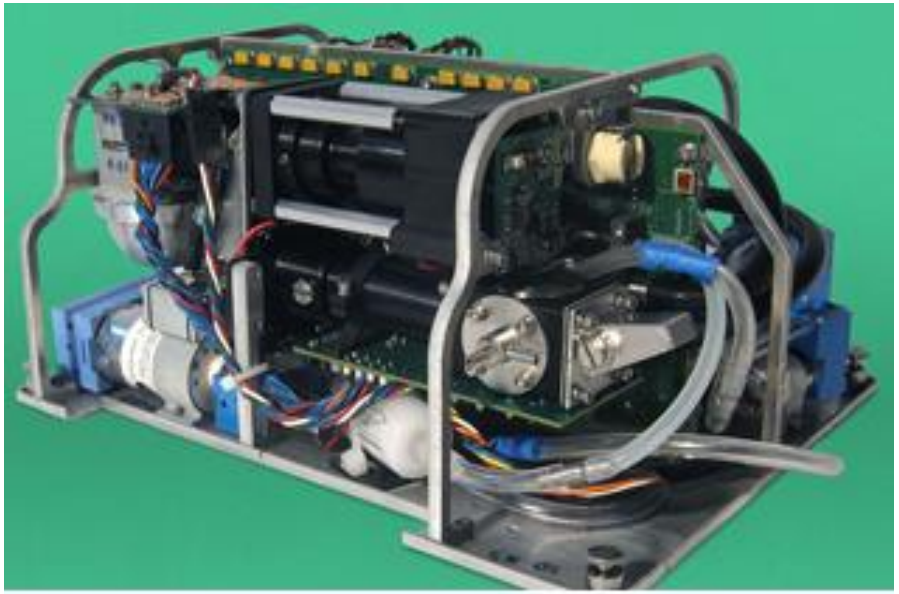
Aerosols



Printed Optical Particle Spectrometer (POPS), Handix



Aerosol Counting, Composition, Extinction and Sizing System (ACCESS), Brechtel

AAF ArcticShark Instrumentation

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Clouds

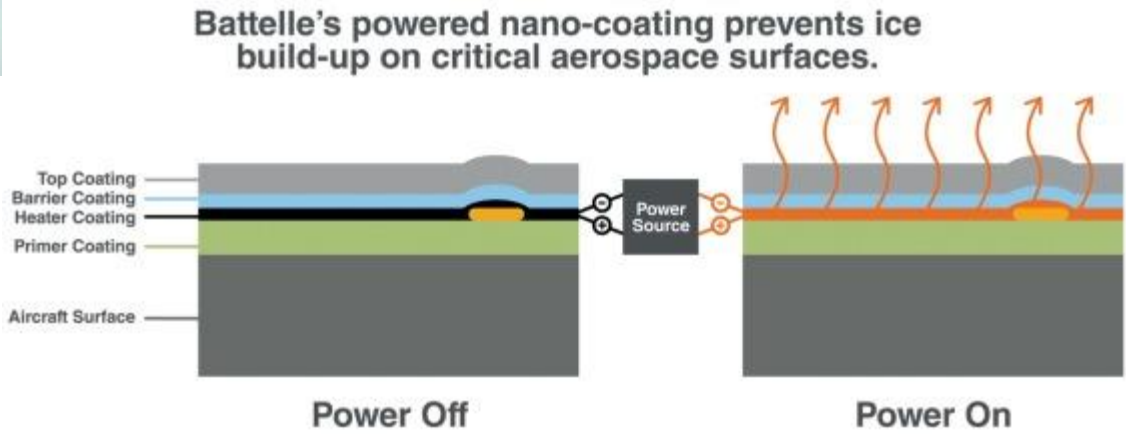
DMT Cloud Droplet Probe (CDP)

Trace Gases

LI-840A Gas Analyzer: CO2 &H2O

BATTELLE HeatCoat™

A revolutionary aircraft deicing solution. Battelle has transformed in-flight aircraft ice protection with a newly developed proprietary technology based on resistive heating coating. This innovative anti-icing and deicing solution's small size, weight and power envelope are unmatched in the industry.



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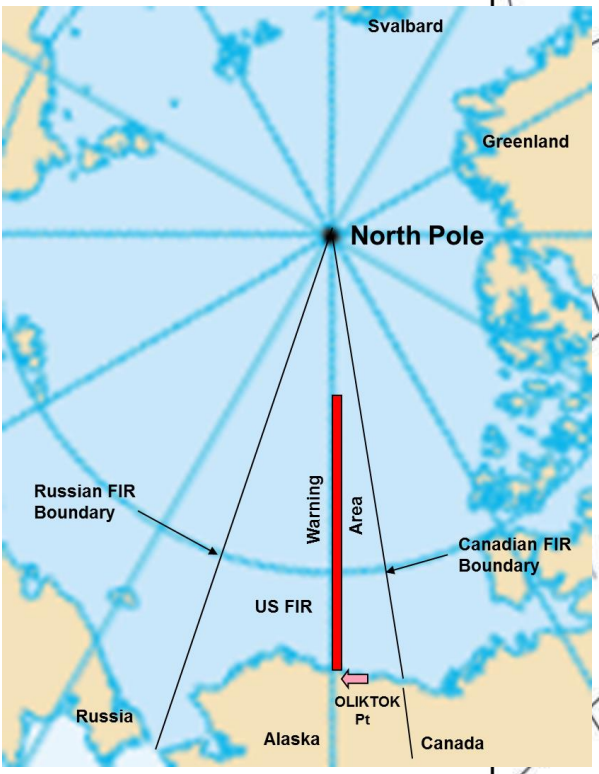
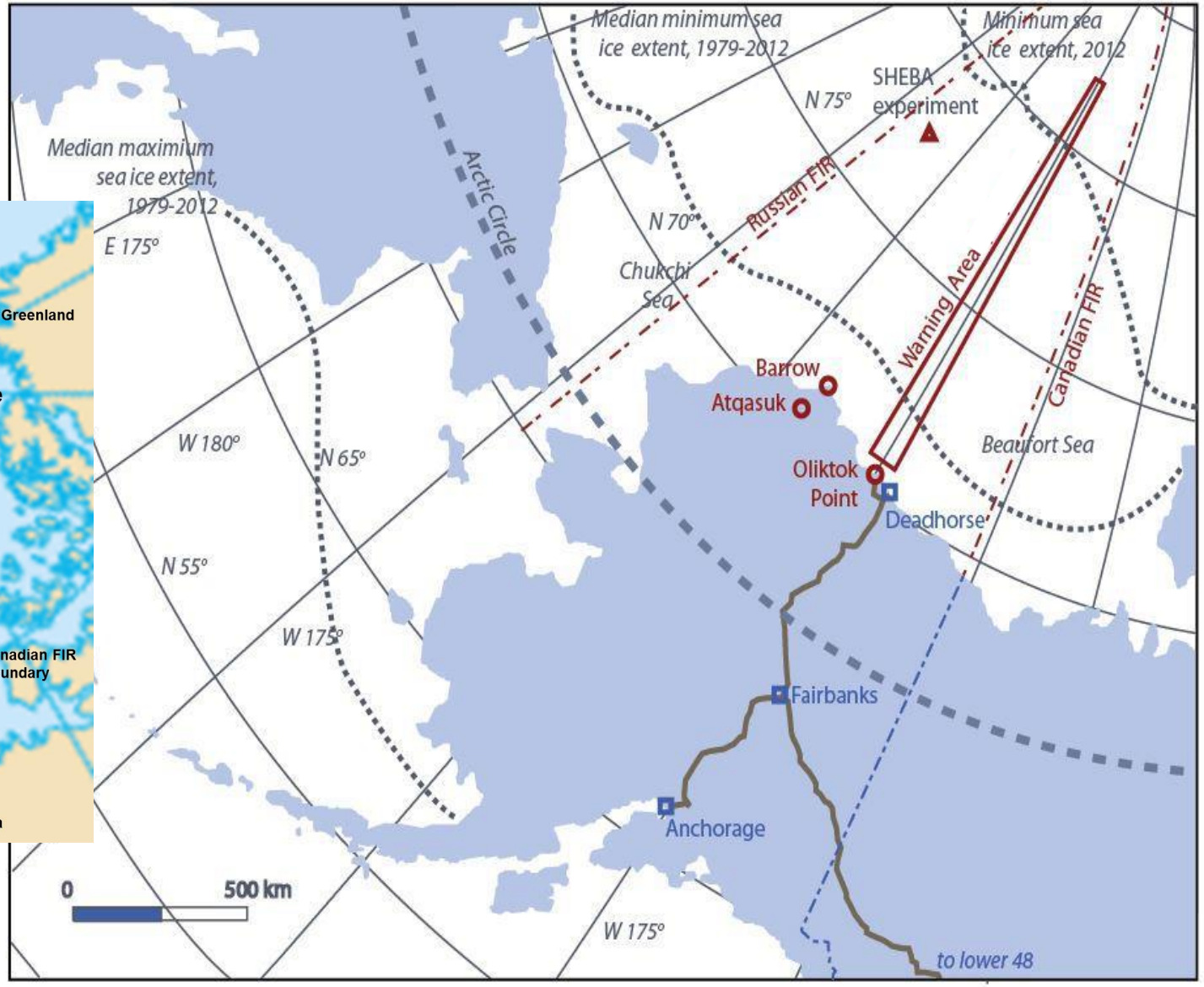
DOE Special Use Airspace in Alaska

- Oliktok Restricted Airspace R-2204 (up to 7’000 ft)
- Oliktok Warning Area W-220 (up to 10’000 ft)





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Integration into NAS

Our Vision

ARM CLIMATE RESEARCH FACILITY

- Science requires flying where it is important not just where it is possible
- Pendleton, OR: UAS Range designated by the FAA (part of the Pan-Pacific UAS Test Range Complex, led by UAF)

PENDLETON UAS RANGE

FEDERAL AVIATION ADMINISTRATION

UAF UNIVERSITY OF ALASKA FAIRBANKS

- Current COA: 5 nm, 3500 ft asl, vLOS

Timeline

ArcticShark UAS (updated 3/12/2017)

Milestone	Date
Contract award to NASC	Feb 6, 2016
Maintenance technician and pilot training, Rome NY	Nov/Dec 2016
Completed “Advanced Systems” class	Feb 17, 2017
Delivery of ArcticShark, Pendleton, OR	Feb 28, 2017
Completed acceptance test flights, Pendleton, OR	Mar 5, 2017
Media Day, Pendleton, OR	Mar 8,2017
Complete pilot training, Pendleton, OR	Mar 17, 2017
Transport ArcticShark to PNNL	Mar 20, 2017
Additional training flights and radio change, Pendleton, OR	Jun & Aug 2017
Complete integration of small payload, PNNL	Sep 2017
Engineering/test flights with small payload, Pendleton, OR	Sep - Nov 2017
Complete integration of more complete payload, PNNL	Apr 2018
Science/engineering flights, Oliktok, AK	May & Aug 2018
ArcticShark available for missions proposed, Oliktok, AK	May - Aug 2019