



**ARM**

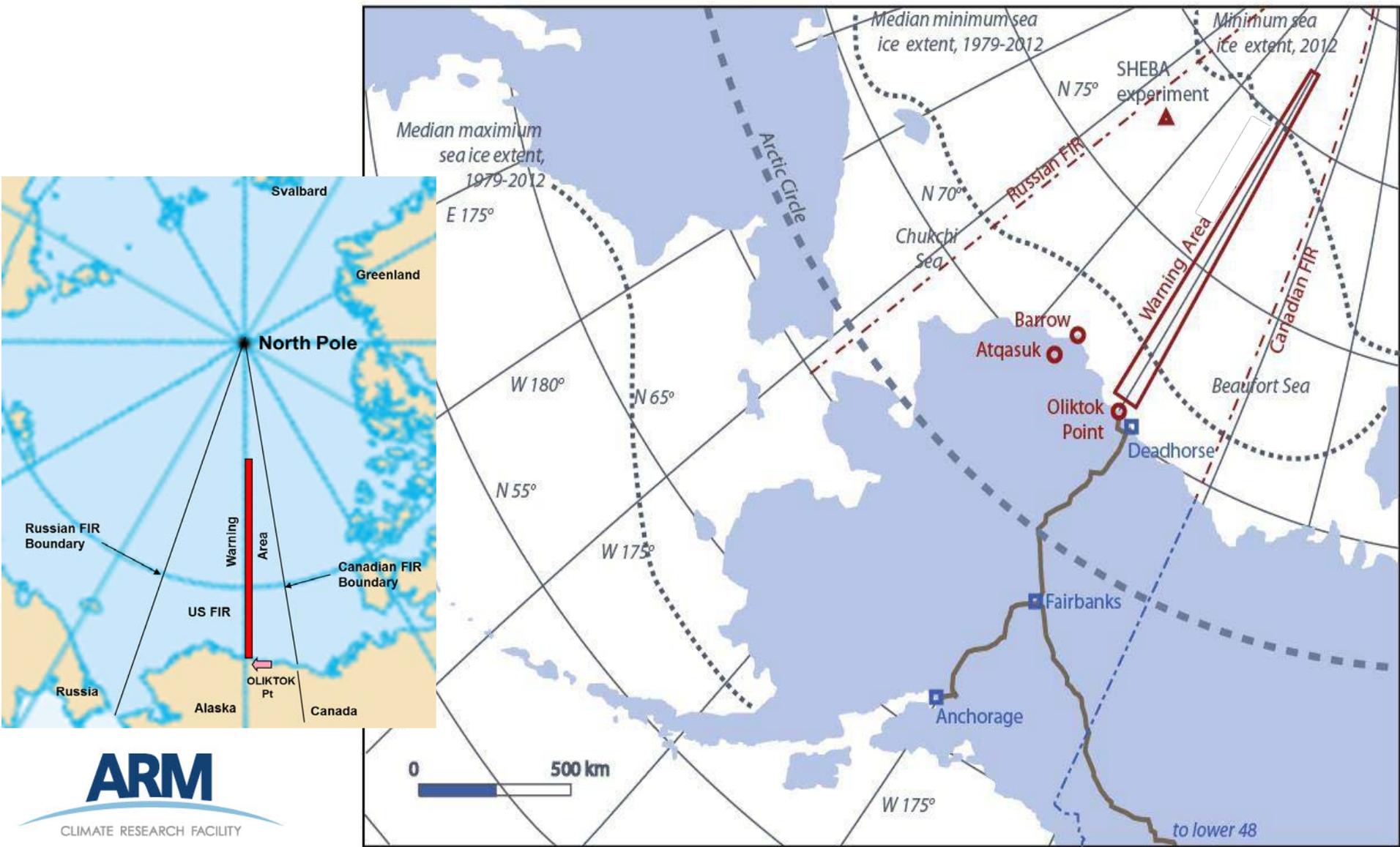
CLIMATE RESEARCH FACILITY

# AAF UAS Capability Update

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**Pacific Northwest National Laboratory**

# 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)



# NOTAM SUA W-220 Notification



U.S. Department  
of Transportation  
Federal Aviation  
Administration

## NOTICES TO AIRMEN

*Domestic/International*

**May 28, 2015**

*Next Issue*

**June 25, 2015**



*Notices to Airmen included in this publication are NOT given during pilot briefings unless specifically requested by the pilot. An electronic version of this publication is on the internet at [http://www.faa.gov/air\\_traffic/publications/notices](http://www.faa.gov/air_traffic/publications/notices)*

Air Traffic Products and Publications Team

Special Use Airspace – W-22 Oliktok, AK

Notices to Airmen

### SPECIAL USE AIRSPACE

#### W-220

#### Oliktok, Alaska

Warning Area W-220 is being established to support research conducted by the Department of Energy as part of the North Slope of Alaska Atmospheric Radiation Measurement Climate Research Facility.

Due to the yearly print cycle of the Point Barrow Sectional, W-220 will be effective before the charting in 2016. This graphic notice is provided until the Point Barrow Sectional chart is updated to reflect the W-220 airspace. W-220 is divided in 16 sub-areas, W-220A through H, each with a high and low division. Only W-220A and W-220B will appear on the Sectional chart, the remaining areas fall outside the lateral boundaries of the U.S. Sectional publications, extending north to 82°00'00"N. In all subdivisions, the Times of Use are by NOTAM, the Controlling Agency is Anchorage ARTCC and the Using Agency is U.S. Department of Energy, Office of Science, Biological and Environmental Research. The descriptions of W-220A and W-220B are as follows:

#### W-220A Low Oliktok, AK

**Boundaries:** Beginning at lat. 70°47'00"N, long. 150°58'15"W;  
To lat. 71°37'00"N, long. 151°01'03"W;  
To lat. 71°37'00"N, long. 148°42'04"W;  
To lat. 70°47'00"N, long. 148°44'52"W;  
To the point of beginning.

**Altitudes:** Surface up to but not including 2,000 feet MSL.

#### W-220A High Oliktok, AK

**Boundaries:** Beginning at lat. 70°47'00"N, long. 150°58'15"W;  
To lat. 71°37'00"N, long. 151°01'03"W;  
To lat. 71°37'00"N, long. 148°42'04"W;  
To lat. 70°47'00"N, long. 148°44'52"W;  
To the point of beginning.

**Altitudes:** 2,000 feet MSL up to but not including 10,000 feet MSL.

#### W-220B Low Oliktok, AK

**Boundaries:** Beginning at lat. 71°37'00"N, long. 151°01'03"W;  
To lat. 72°27'00"N, long. 151°04'09"W;  
To lat. 72°27'00"N, long. 148°39'03"W;  
To lat. 71°37'00"N, long. 148°42'04"W;  
To the point of beginning.

**Altitudes:** Surface up to but not including 2,000 feet MSL.

#### W-220B High Oliktok, AK

**Boundaries:** Beginning at lat. 71°37'00"N, long. 151°01'03"W;  
To lat. 72°27'00"N, long. 151°04'09"W;  
To lat. 72°27'00"N, long. 148°39'03"W;  
To lat. 71°37'00"N, long. 148°42'04"W;

ALASKA

4-A & H-12

**ARM**

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# ARM/SNL continues to host UAS campaigns at Oliktok Point

- Arctic Shield 2015 (Coast Guard, InSitu, Conoco: Scan Eagle)
- ERASMUS 2015/16 (U Colorado, DataHawk, Pilatus)



de Boer, G., M. D. Ivey, B. Schmid, S. McFarlane, and R. Petty (2016), Unmanned platforms monitor the Arctic atmosphere, *Eos*, 97, doi:10.1029/2016EO046441. Published on 22 February 2016.

# ERASMUS (Evaluation of Routine Atmospheric Scientific Measurements using Unmanned Systems. PI: G. deBoer)



Pilatus P1-A (kit-plane)

Payload ~10 lbs

Subset of T, RH, **SW or LW (up and down)**, aerosol size distr.

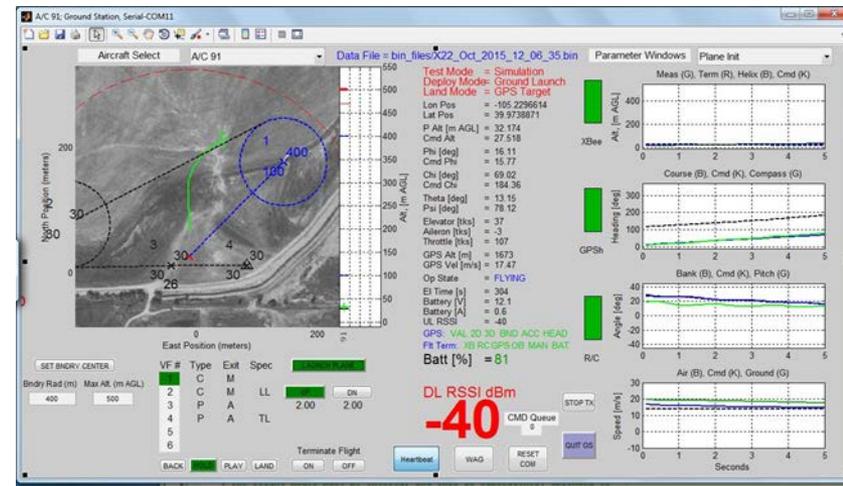
de Boer, G, S Palo, B Argrow, G LoDolce, J Mack, R Gao, H Telg, C Trussel, J Fromm, CN Long, G Bland, J Maslanik, B Schmid, T Hock, (2016), The Pilatus unmanned aircraft system for lower atmospheric research, *Atmospheric Measurement Techniques*, 9(4), 1845–1857, doi:10.5194/amt-9-1845-2016. Published 4/28/2016

# ARM – UAS Capability Development

## DataHawk sUAS (managed by PNNL)



- October 2015: Training near Boulder, CO
- December 2015: 4 Units delivered to PNNL
- March 2016: First PNNL flights in Pendleton, OR UAS Range
- May 2016: Additional PNNL flights in Pendleton UAS Range
- June-Aug 2016: 7 weeks of flights at Oliktok Point, Alaska.



# ARM – UAS Capability Development

## Mid-Size UAS

- More market research (AUVSI)
- UAS Advisory Group 1-day face-to-face meeting, June 2015



Wingspan: 17.5 ft  
MTOW 175 lbs  
Payload: 65 lbs, 750 W



Wingspan: 16 ft  
MTOW: 135 lbs  
Payload: 40 lbs, 350 W



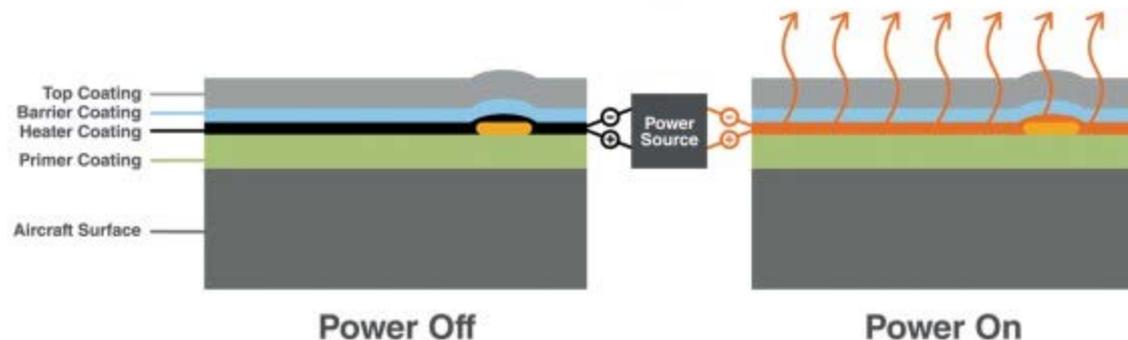
Wingspan: 22.8 ft  
MTOW: 750 lbs  
Payload: 110 lbs, 2000 W

# 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.



**Battelle's powered nano-coating prevents ice build-up on critical aerospace surfaces.**



**ARM**

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# ARM – Mid-Size UAS

- PNNL has run an RFI (Jan/Feb 2015)
- PNNL issued 2 RFP's Aug 6, 2015. Q&A ended Aug 28, due date Sep 25.
- Main difference between 2 RFP's:

|                  | <b>Payload weight</b> | <b>Electrical Power</b>                        | <b>Operational Range</b>      |
|------------------|-----------------------|------------------------------------------------|-------------------------------|
| Moderate Payload | >40 lbs               | >350 W                                         | 50 nm<br>LOS radio link       |
| Large Payload    | >70 lbs               | >1400 W<br>to allow for anti-icing and deicing | 500 nm<br>BLOS satellite link |

- Large Payload preferred if affordable
- Feb 6, 2016 Awarded contract for Large Payload to Navmar Applied Sciences Corp (NASC)

# ARM – UAS Capability Development

## TigerShark XP Mid-Size UAS

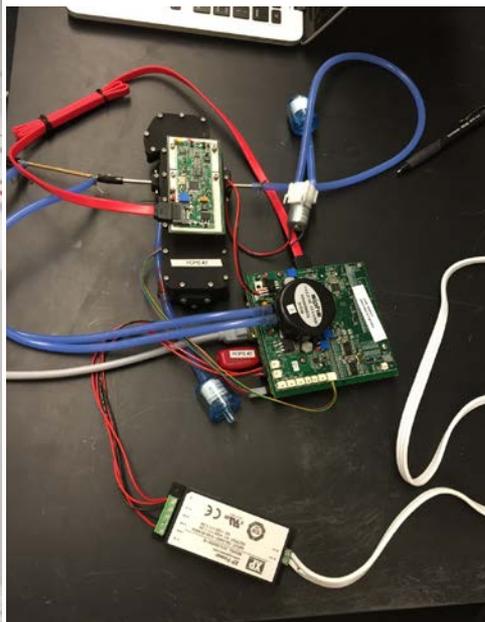
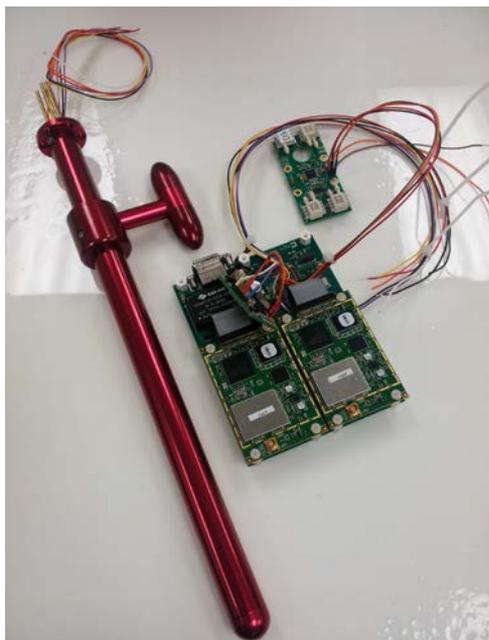


|                                 |             |
|---------------------------------|-------------|
| Wingspan                        | 21' 3"      |
| Length                          | 14' 3"      |
| Empty Weight                    | 427 lbs     |
| Max Gross Take-off Weight       | 625 lbs     |
| Max Payload                     | 100 lbs     |
| Payload Power                   | 2500 W      |
| 4 Underwing Hardpoints          |             |
| Max Altitude                    | 15kft       |
| Endurance                       | 10-12 hours |
| Iridium SatCom BLOS             |             |
| By Navmar Applied Sciences Corp |             |



# Existing and planned UAS Instrumentation

| Instruments       | Measurement                                                   |
|-------------------|---------------------------------------------------------------|
| SPN-1, MFR, CGR-4 | Radiation (broad band and spectral, SW and LW)                |
| CDP               | Cloud drop/ice crystal size distribution                      |
| ACCESS            | Aerosol number, size distribution, absorption, filter sampler |
| POPS              | Aerosol size distribution                                     |
| AIMMS-30          | Atmospheric state and thermodynamics, winds and turbulence    |
| TBD               | Passive remote sensing (imaging any wavelength)               |
| TBD               | Active remote sensing (radar, lidar)                          |
| TBD               | Trace gases                                                   |



# Timeline

## Mid-Size UAS

| Milestone                                                                                 | Date     |
|-------------------------------------------------------------------------------------------|----------|
| Maintenance Technician Training for (2) on TigerShark by NASC                             | Oct 2016 |
| Pilot training for (3) on TigerShark by NASC: Nov 2016                                    | Nov 2016 |
| Acceptance and flight testing of TigerShark XP at vendor site                             | Nov 2016 |
| Delivery and Acceptance of TigerShark XP, Pasco, WA                                       | Nov 2016 |
| Training flights (no payload), Pendleton, OR                                              | Jan 2017 |
| Complete lab testing of AAF owned UAS instrumentation                                     | Jan 2017 |
| Complete integration of initial payload onto TigerShark XP                                | Aug 2017 |
| TigerShark XP engineering/test flights (Pendleton, Boardman or Yakima) with small payload | Sep 2017 |
| Science/engineering flights Oliktok                                                       | May 2018 |
| TigerShark XP available for missions proposed (Oliktok)                                   | May 2019 |