

ASR Science Team Meeting

18 March 2013

Bolger Center, Potomac, Maryland

Oliktok/AMF3 Breakout

Rickey Petty

AAF Program Manager

ARM's History with UAVs

- Demonstrated how measurements from UAVs contributed to the understanding of cloud and radiative processes.
- Data collected used in the study of radiative transfer processes through clouds, evaluation of cloud parameterizations, & development of cloud remote sensing methods.
- Total of 8 campaigns / 140h science flights/ 3 UAV platforms (**GNAT -750, Altus, and Altus II**).
- Stephens, G. L., Ellingson, R.G., et. al.; BAMS, Vol. 81, No. 12, December 2000.



ARM-UAV conducted 12 major field campaigns 1993-2006

Field Campaigns :

- Fall 1993, Edwards AFB, CA
- Spring 1994, Northern OK
- Fall 1995, Northern OK
- Spring 1996, Northern OK
- Fall 1996, Northern OK
- Fall 1997, Northern OK
- Spring 1999, PMRF Kauai, HI
- Summer 1999, Monterey, CA
- Winter 2000, Northern OK
- Fall 2002, Northern OK
- Fall 2004, North Slope, AK
- Winter 2006, Darwin, Australia



GA-ASI "GNAT 750"
(F93, S94)



GA-ASI "Altus I" (F96, F97)



Grob "Egrett"
(F95, S96)



GA-ASI "Altus II"
(Su99)



Proteus(F04, W06)

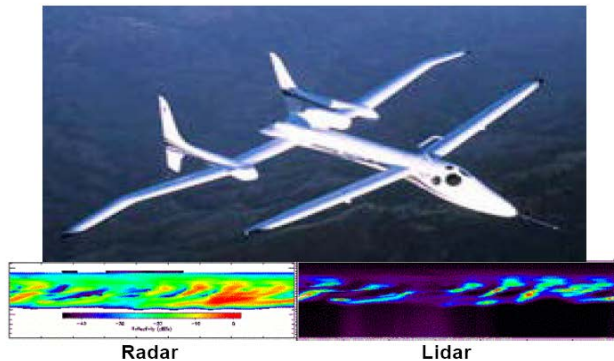


Twin Otter
(F93, S94, F95, S96, F96,
F97, Sp99, Su99, W00)

ARM Aerial Facility (AAF) – formerly ARM UAV

*REVIEW OF
THE U.S. DEPARTMENT OF ENERGY'S
ATMOSPHERIC RADIATION MEASUREMENT (ARM)-
UNMANNED AEROSPACE VEHICLE (UAV) PROGRAM*

FALL 2002 - Oklahoma



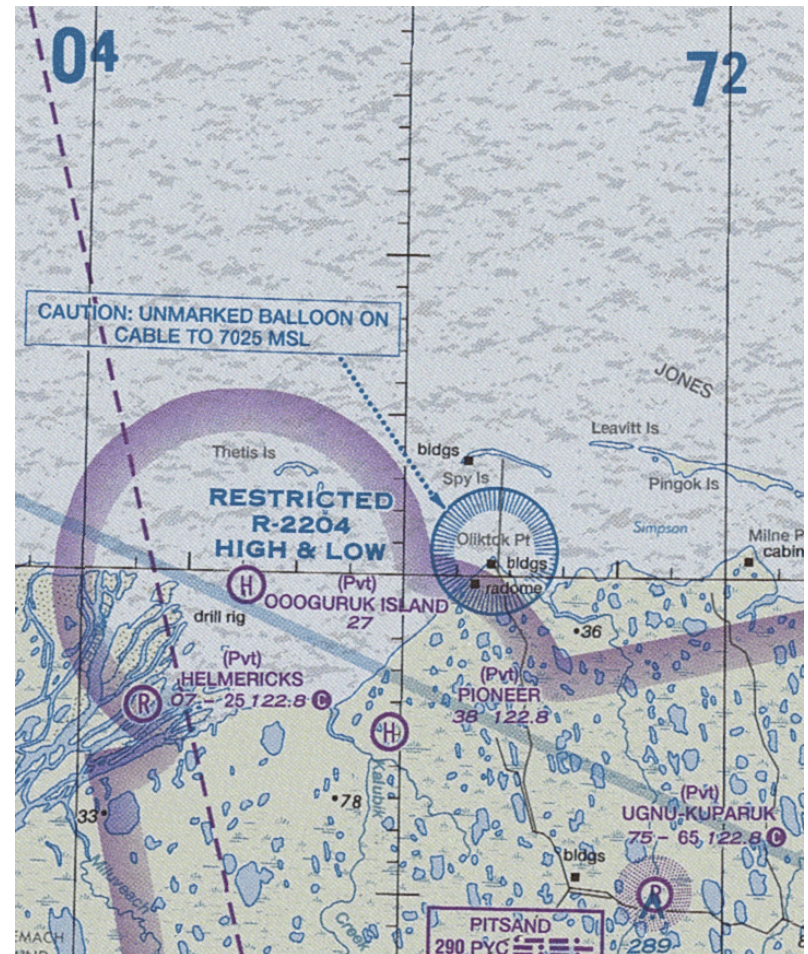
December 2002

Prepared by a Working Group of the
Biological and Environmental Research
Advisory Committee

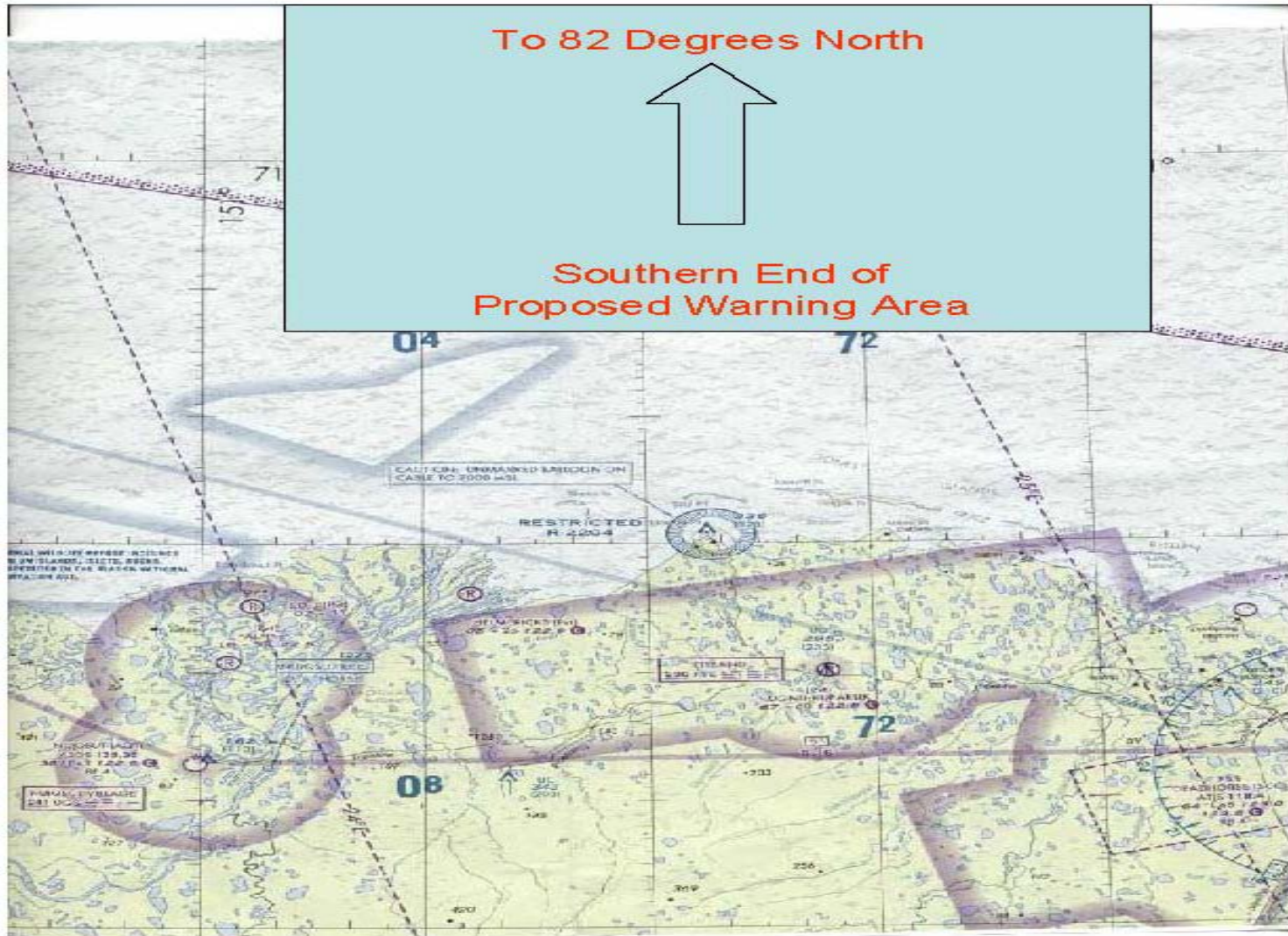
- Subcommittee review March 2001
- Appropriate platform to compliment ARM measurements
- Merge into ARM Infrastructure for budgetary Flexibility
- Interagency partnerships

Current Restricted Airspace Space - 2204

- Latitude 70° 30' 35" North
- Longitude 149° 51' 33" West
- Height 7000 feet
 - Ground to 1500'; balloon operations.
 - 1501 to 7000 feet; UAV flying area.
- 8pm – 6am operating period.

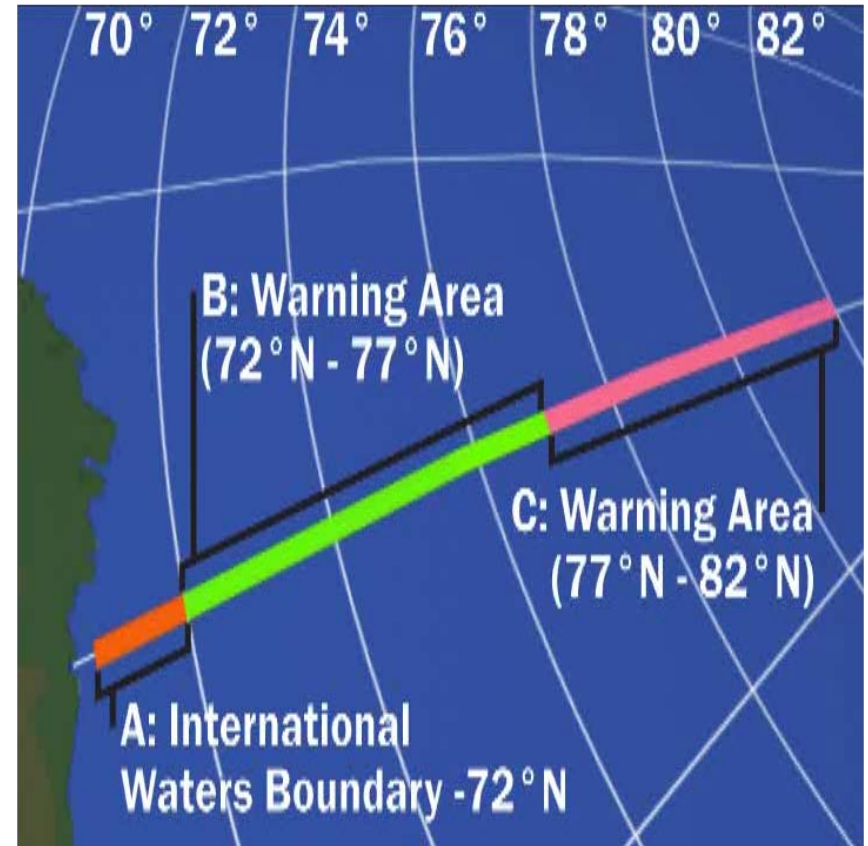


Proposed Warning Area



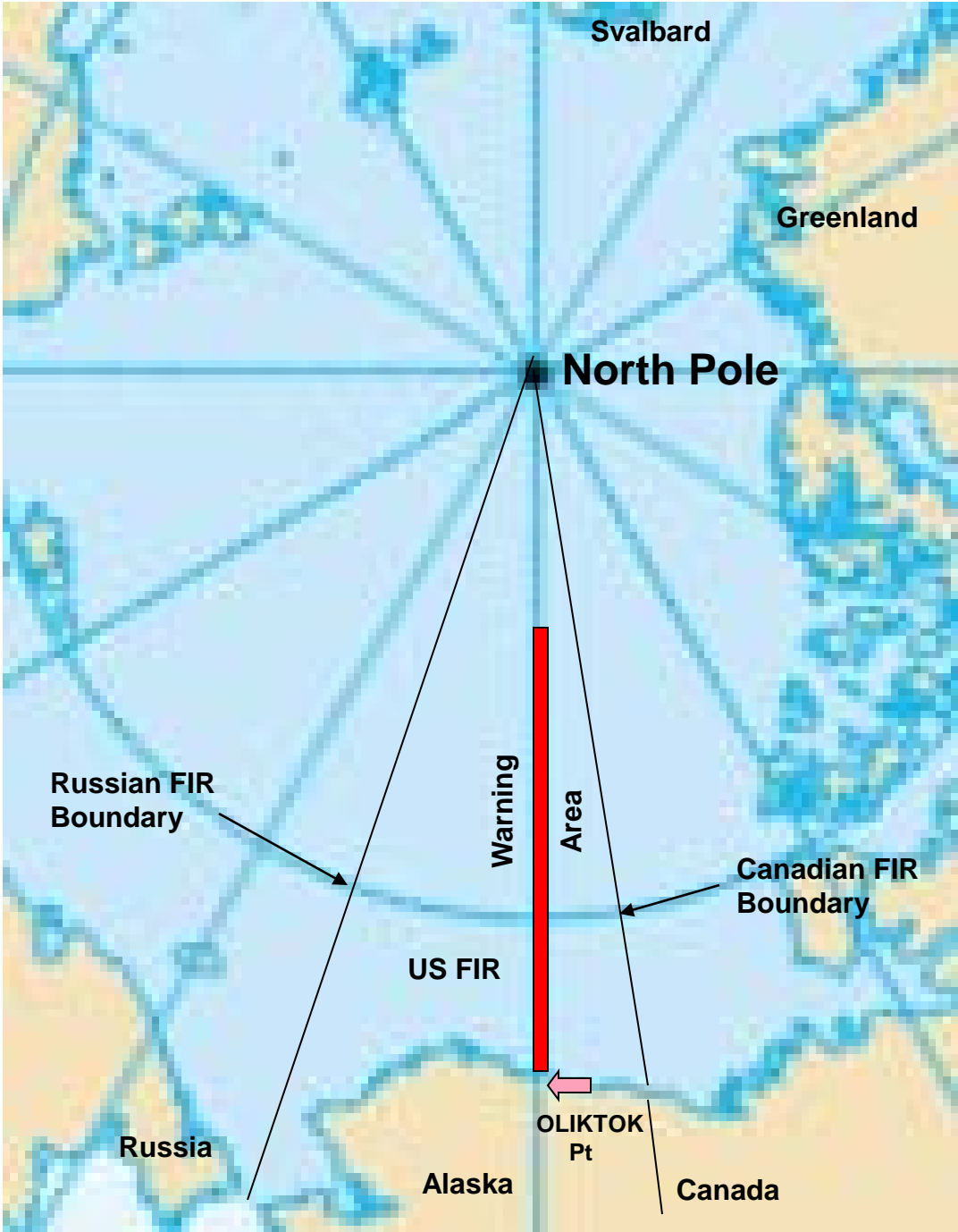
Warning Area Request

- Warning Area proposal issues => Hazardous Activities:
 - Tethered Balloon Operations: 50-ft lighting requirement
 - Dropsonde capabilities with ice-impacting features



Proposed Warning Area (in red)

FIR =
Flight
Information
Region
(relevant
country
controls
flight in
that region)



Special Use Airspace Description of Warning Area

Warning Area Proposed Name: Oliktok North Low / High

ii. Boundaries:

Southern: 70°, 47' North Latitude

Northern: 82°, 47' North Latitude

Eastern: 148°, 51', 33" West Longitude

Eastern: 150°, 51', 33" West Longitude

iii. Altitude for Oliktok WA Low: Surface to 2000 feet MSL / 2001 to 10,000 feet MSL

iv. Times of Use:

The request is for a net total of 90 days (2160 hours) with the calendar year.

v. Controlling Agency: FAA Anchorage Air Route Traffic Control Center (ARTCC)

(2013): Submitted revised proposal to FAA Western Regional February 4TH as per JO7400. The 240-day clock ends October 2.

FAA Regulatory Status 2013

- ORDER JO 7400.2J - Procedures for Handling Airspace Matters Unmanned Aircraft Systems (UAS) Operational Approval: Effective date 1/22/2013 – 1/22/2014
 - Chapter 21: General Information
 - Controlling agency
 - Using Agency
 - Chapter 24: Warning Areas
- Implementation Plan: Expanding Use of sUAS in the Arctic – FAA Modernization and Reform Act of 2012

Implementation Plan for FAA Modernization and Reform Act of 2012

...Not later than 180 days after the date of enactment of this Act, the Secretary shall develop a plan and initiate a process to work with relevant Federal agencies and national and international communities to designate permanent areas in the Arctic where small unmanned aircraft may operate 24 hours per day for research and commercial purposes. The plan for operations in these permanent areas shall include the development of processes to facilitate the safe operation of unmanned aircraft beyond line of sight. Such areas shall enable over-water flights from the surface to at least 2,000 feet in altitude, with ingress and egress routes from selected coastal launch sites...

The FAA plans to establish 3 permanent Arctic areas to comply with the Act

- 1) Southern Arctic Area: The portion of the Anchorage Continental Control Area (CTA) Flight Information Region (FIR) overlying the Bering Sea, north of the Aleutian chain and south of the Bering Strait beyond domestic US airspace.
- 2) Bering Strait Area: An area connecting the Southern and Northern Area through the Bering Strait which will allow sUAS to assist with SAR operations and shipping lane ice surveys.
- 3) Northern Arctic Area: The Anchorage Arctic CTA/FIR areas of the Chukchi Sea and the Beaufort Sea beyond domestic US airspace. The Anchorage Arctic CTA/FIR has a floor of FL230, the airspace below is Class “G” or uncontrolled airspace.

Members of the FAA Arctic Team

- NOAA
- USCG
- NASA
- DOE
- DOI
- UAS Executive Committee Steering Group
 - DOS
 - Arctic Counsel and member States
 - Cross Polar WG
 - ICAO
 - The State of Alaska

SBIR Atmospheric Measurement Technology

- ***(Topic 17a)***: Instrument Package for Characterization of Aerosols, Turbulence, and Surface Characteristics in the Arctic (NSA footprint expansion).
- ***(Topic 17b)***: Greenhouse Gas and Carbon Isotope Measurements from UAVs (NGEE)
- ***<http://science.energy.gov/~media/sbir/pdf/docs/DOEFY13Phase1Release1TopicsAmend1081512.pdf>***

SBIR Atmospheric Measurement Technology Cycle 32 – Phase I Release 1 Awardees Topic 17a

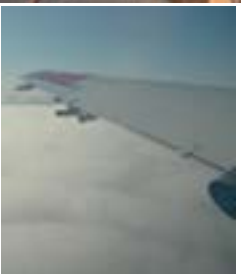
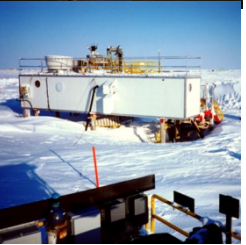
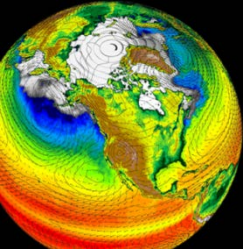
- Compact, Lightweight Dynamic Saturation Cloud Condensation Nuclei Spectrometer for UAV Missions
- Compact Raman Lidar for Aerosol Extinction Profiling from Small UAVs
- Low SWAP LIDAR Instrument for Arctic Ice Sheet Mass Balance Monitoring

Topic 17b

- Infrared laser direct absorption spectroscopy for carbon isotope measurements from UAVs
- Compact QCL spectrometer for carbon isotopologue measurements from Small UAVs

FY 2013 Phase I Release 1 SBIR/STTR Award Selections

<http://science.energy.gov/~media/sbir/pdf/awards%20abstracts/fy13/FY13-Phase-1-Release-1Final.pdf>



Backup Slides



U.S. DEPARTMENT OF
ENERGY

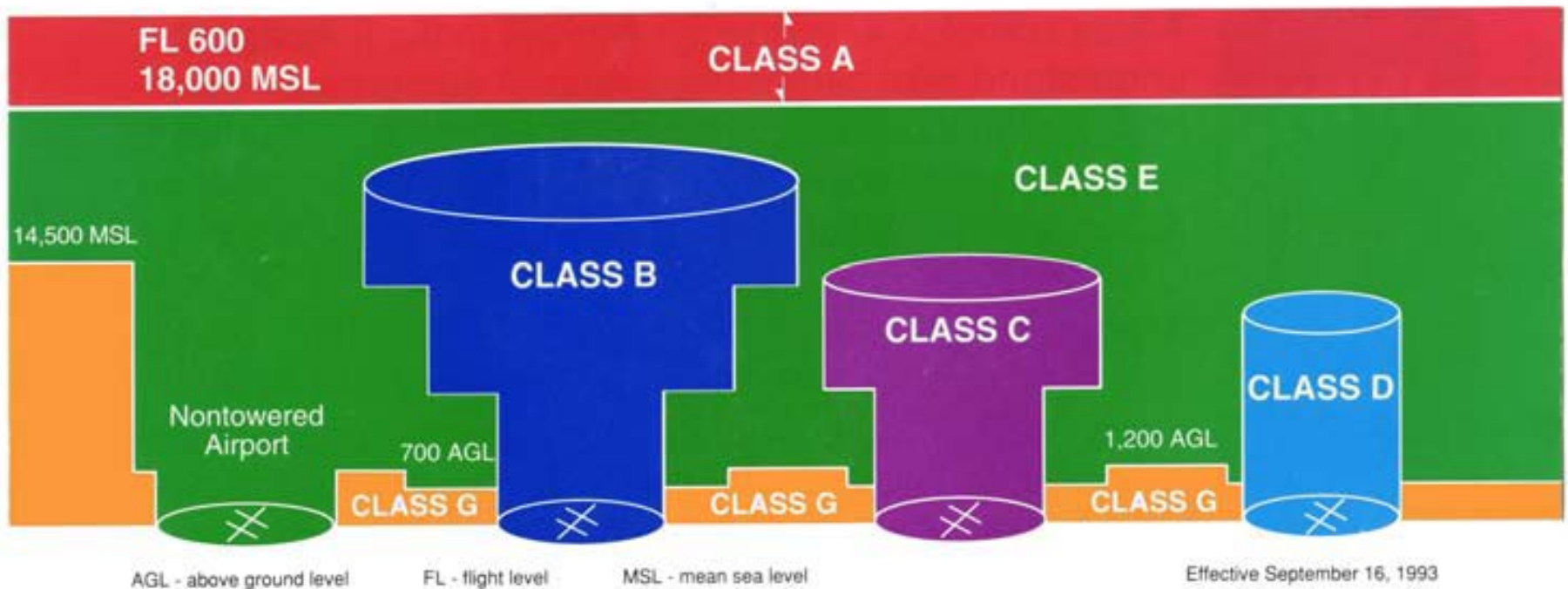
Office
of Science

Office of Biological
and Environmental Research

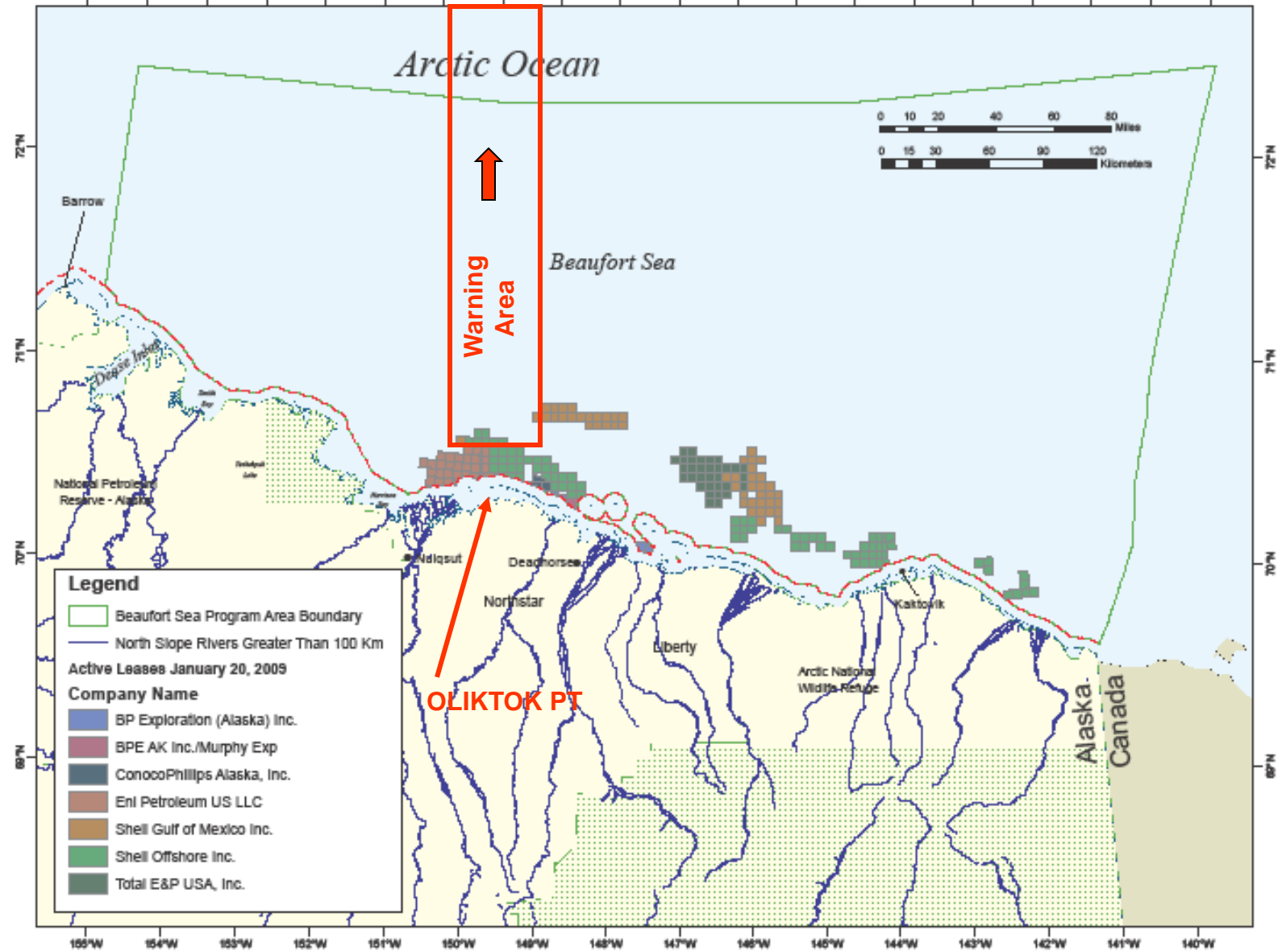
FY 2013 Phase II Release 1 Award

- **Title:** Development of a Compact Instrumentation Package for Characterization of Aerosols, Turbulence and Surface Characteristics in the Arctic from Unmanned Aerial Vehicles Phase II
- **Project Summary:** Brechtel Manufacturing Incorporated (BMI) proposes to develop a new air quality and climate change-relevant instrument suite to measure airborne nanoparticles. The device will be simple to use, inexpensive, easily deployable for remote operation, and offer sensitivity to a broad range of particles found in the air we breathe

Air Space Classification



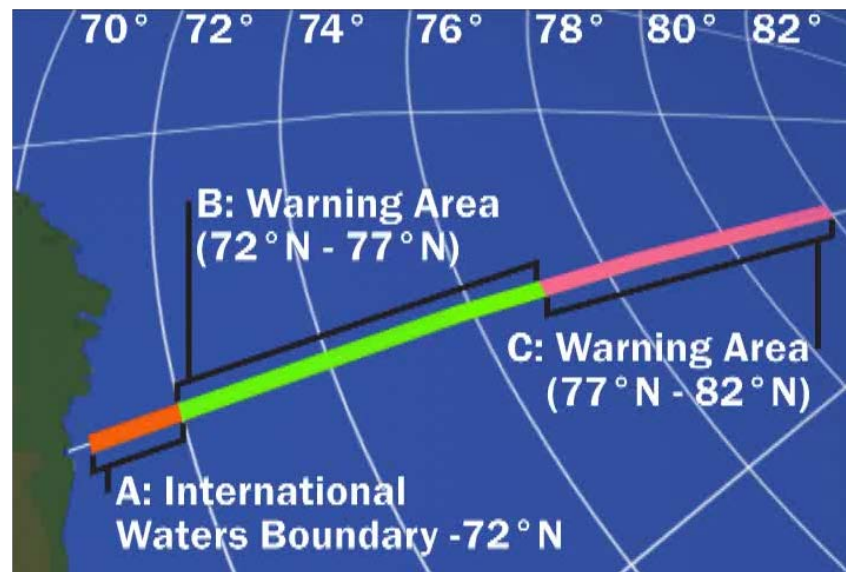
157°W 156°W 155°W 154°W 153°W 152°W 151°W 150°W 149°W 148°W 147°W 146°W 145°W 144°W 143°W 142°W 141°W 140°W 139°W 138°W



Taking Steps Toward an Airborne Arctic Climate Observatory

Based on Federal Register Rules and Regulations / Vol. 75, No. 52 / Thursday, March 18, 2010 / page 12976, DOE has been granted Restricted Area R-2204 by the FAA.

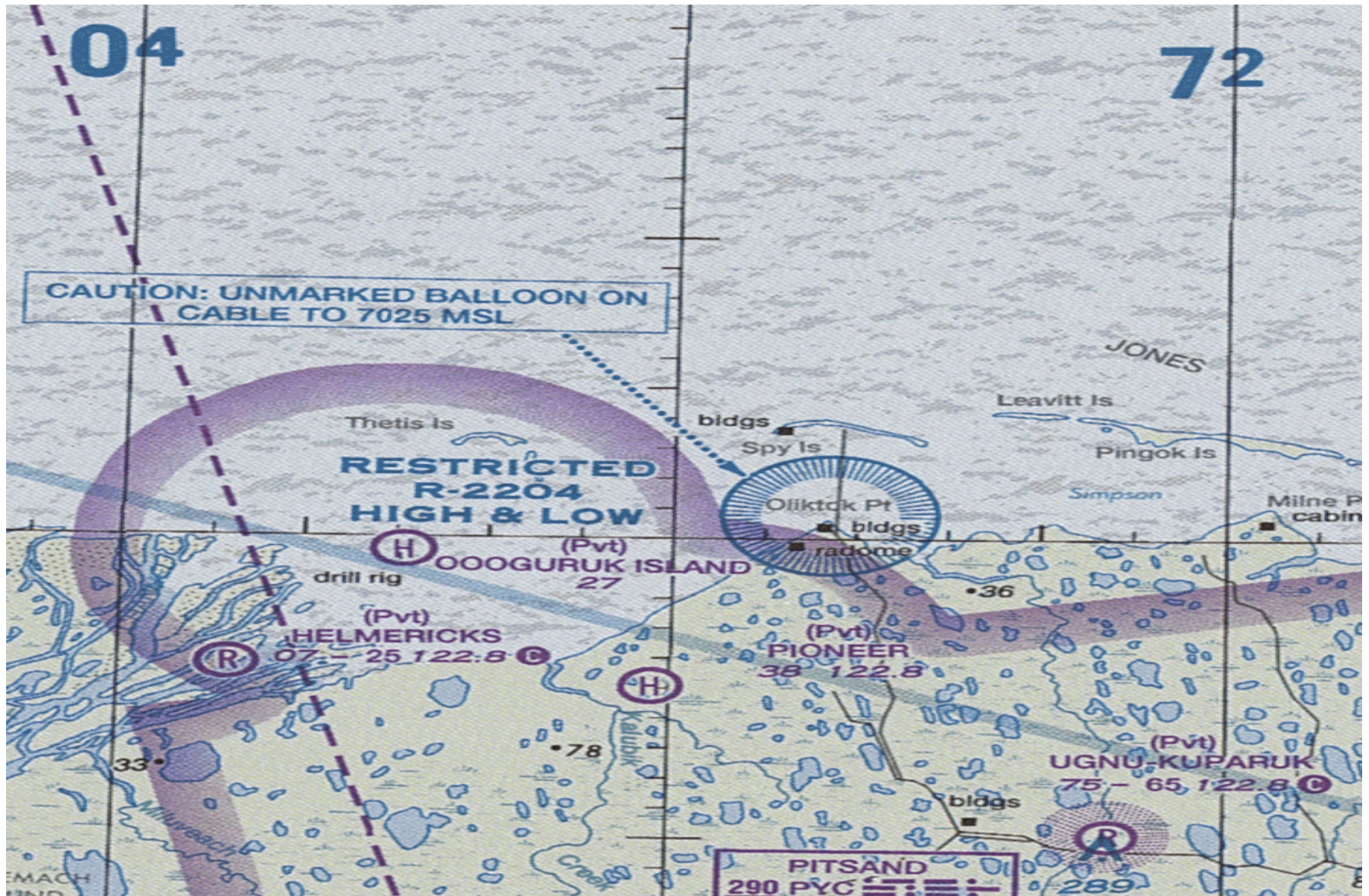
DOE has requested Warning Area over International Waters adjoining Oliktok accommodating measurements over land, ocean, and sea ice.



Small Business Innovative Research (SBIR)

- Congress established the SBIR and STTR programs to support scientific excellence and technological innovation through the investment of Federal research funds in critical American priorities to build a strong national economy.
- Purpose
 - Stimulate technological innovation
 - Use small business to meet Federal R/R&D needs
 - Foster and encourage participation by the socially and economically disadvantaged small businesses, and those that are 51 percent owned and controlled by women, in technological innovation
 - Increase private sector commercialization of innovations derived from Federal R/R&D, thereby increasing competition, productivity, and economic growth

Current Restricted Airspace Space - 2204



04

72

CAUTION: UNMARKED BALLOON ON CABLE TO 7025 MSL

RESTRICTED
R-2204
HIGH & LOW

(H) OOOGURUK ISLAND
27 (Pvt)

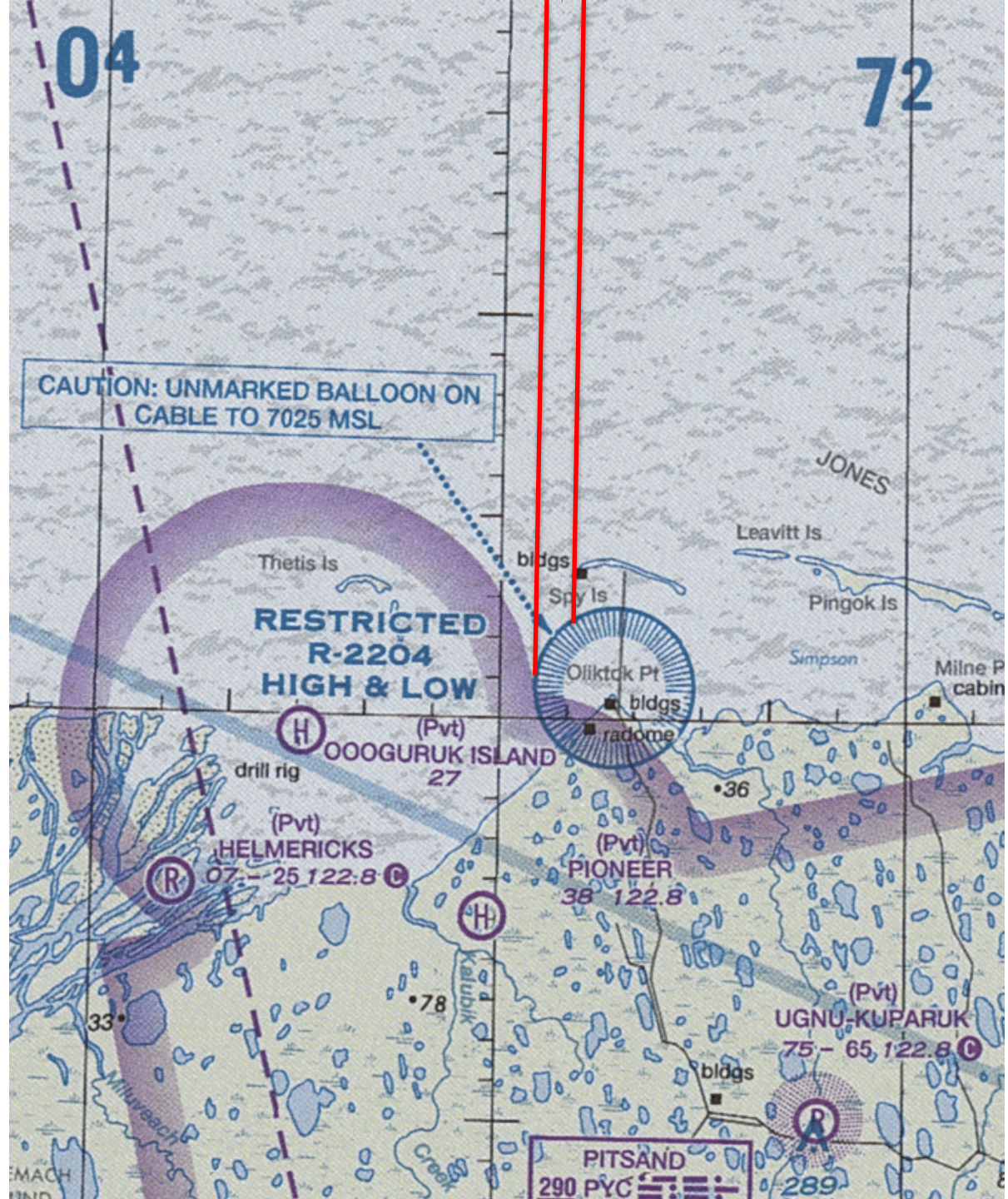
(Pvt) HELMERICKS
07 -- 25 122.8 (R)

Oliktok Pt
bldgs
radome

(Pvt) PIONEER
38 122.8 (H)

(Pvt) UGNU-KUPARUK
75 - 65 122.8 (R)

PITSAND
290 PYC



JONES

Leavitt Is

Pingok Is

Simpson

Milne P
cabin

bldgs

Spy Is

bldgs

radome

drill rig

•36

33

•78

bldgs

289

MACH
HAND

Recently placed radar X-SAPR in Barrow

- “X-band” refers to the 9.5-gigahertz frequency at which the radar operates.
- This dual-polarization Doppler radar provides details about precipitation that allow scientists to more accurately estimate rainfall, classify precipitation types (rain, sleet, snow) and map wind fields.
- The X-band radar is sensitive to precipitating particles, and in the snow and light rain common in Barrow, it can "see" these precipitating systems to extended ranges.

