

Arctic Research at the Geophysical Institute



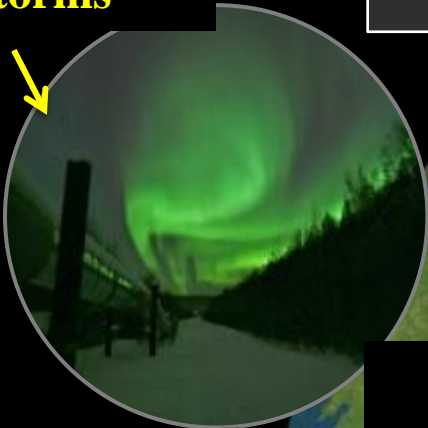
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Geophysics in Alaska

Aurora & Geomagnetic Storms



Arctic Weather



**54 Active Volcanoes
3 Eruptions/yr**



**50,000 Earthquakes/yr
>M7 Every 2 Years**



**100,000
Glaciers**



90% Permafrost



**M 7.0
Nov 30, 2017**



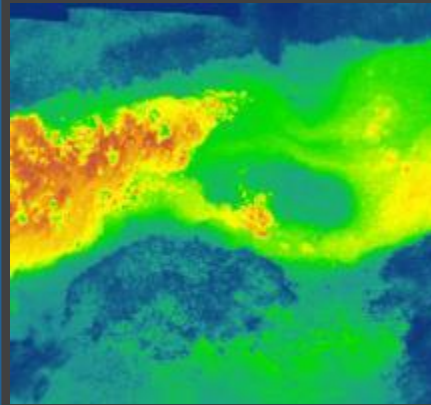
ICEX 2018

**270,000 sq mi
Sea Ice**

GEOPHYSICAL INSTITUTE

RESEARCH CONCENTRATIONS

- Created by Congress in 1946
- Today: ~320
7 Research Groups,
9 Major Operational Programs
& 10 Other Facilities
- ~\$50M Annual Activity



Remote Sensing



Seismology



Snow, Ice & Permafrost



Space Physics & Aeronomy



Tectonics & Sedimentation



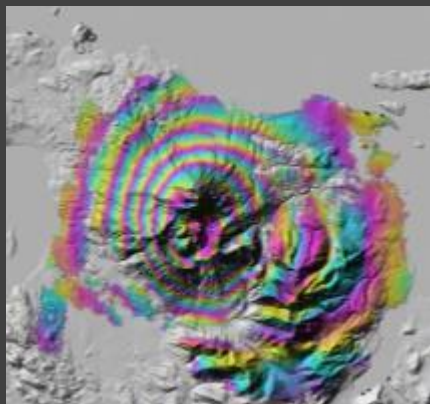
Volcanology



Atmospheric Science

GEOPHYSICAL INSTITUTE

Major Facilities/Operational Programs



Alaska Volcano Observatory



Alaska Earthquake Center



Arctic Geodata Cooperative



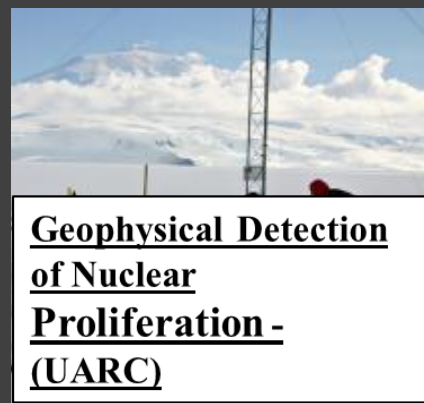
Poker Flat Research Range



Alaska Center for Unmanned Aircraft System Integration



Research Computing Services (former DoD HPCC)

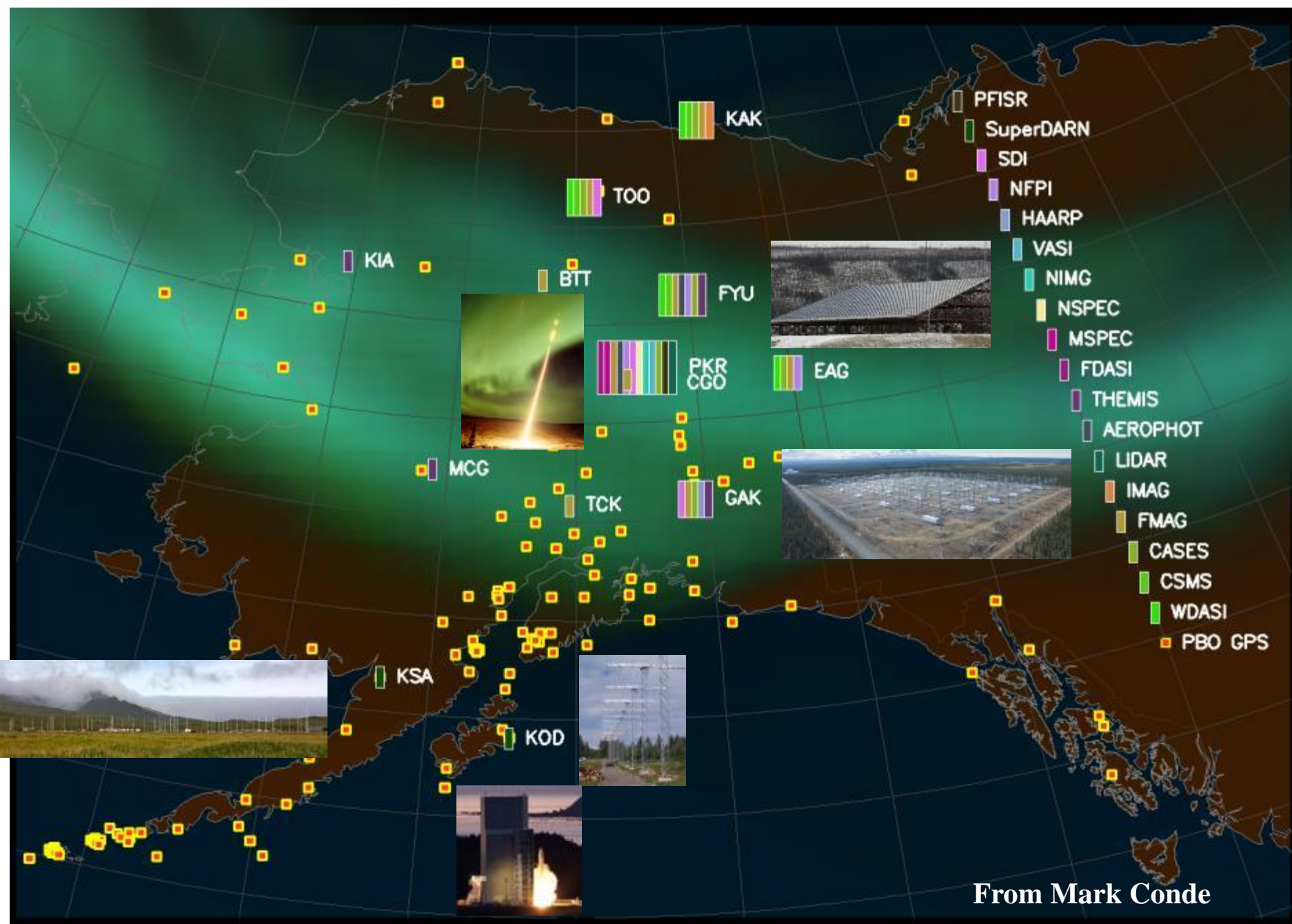


Geophysical Detection of Nuclear Proliferation - (UARC)



High frequency Active Auroral Research Program

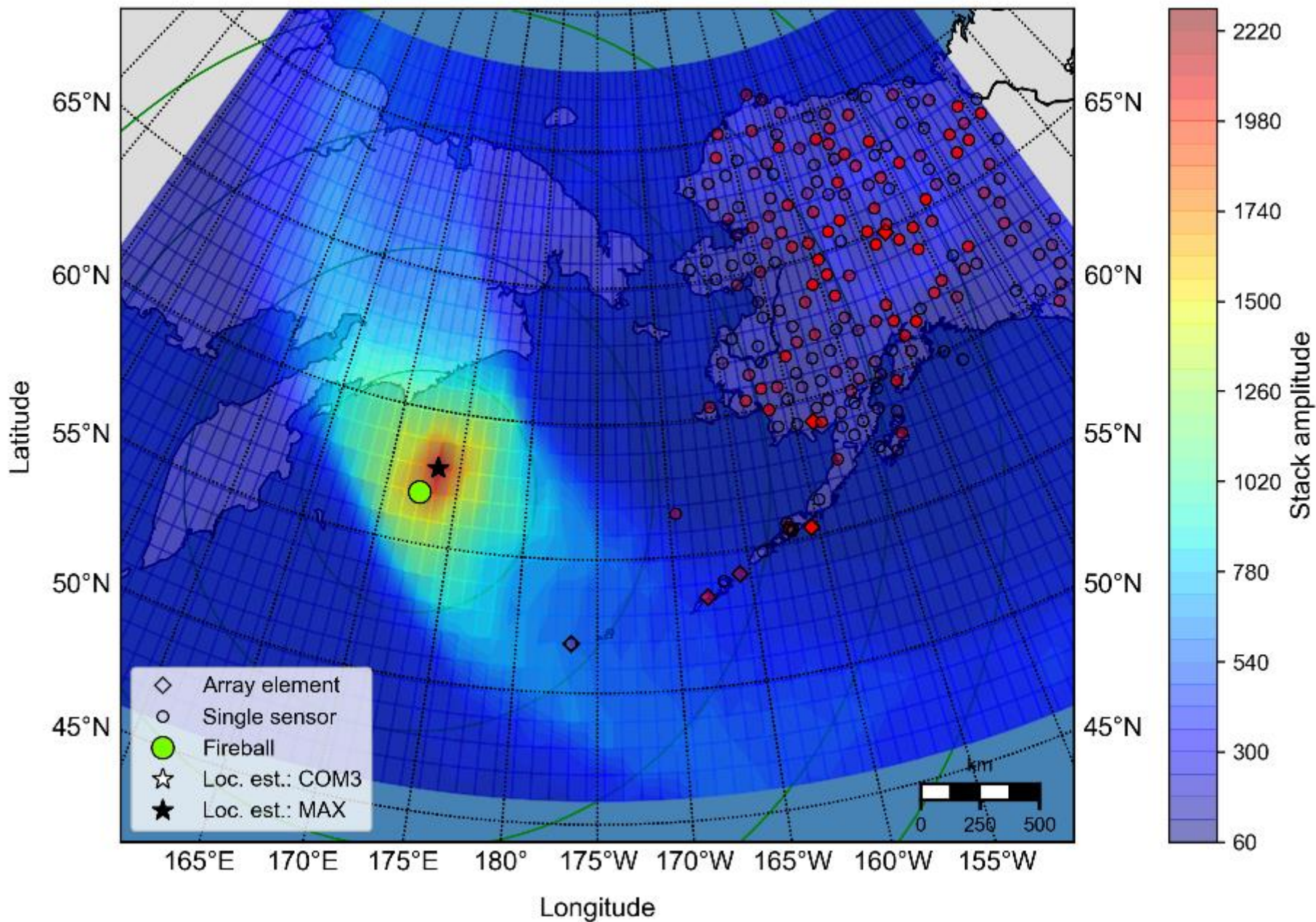
Wilson Alaska Technical Center (Infrasound)



From Mark Conde



Fireball (12/18/18) located with stacked TA/AVO/AEC/IMS/GSN infrasound data

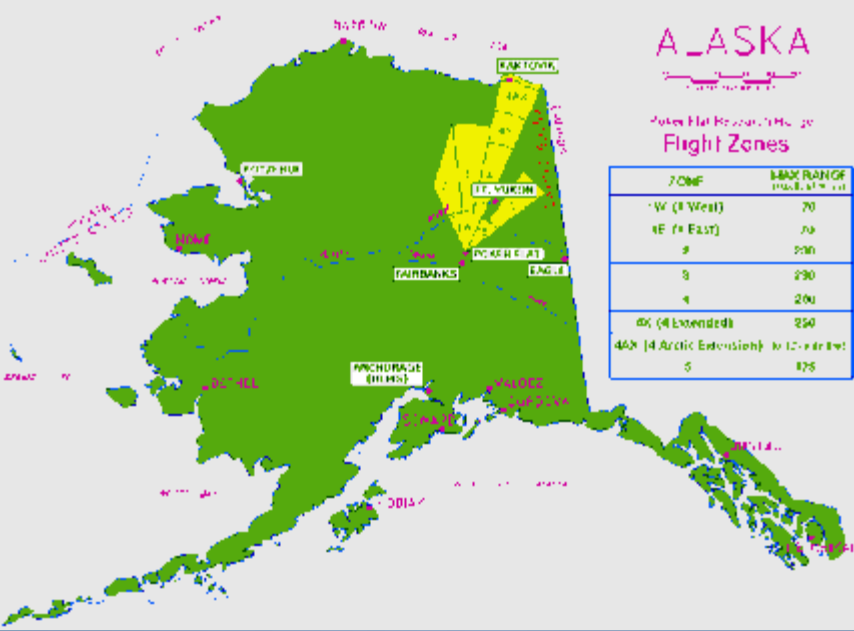


Poker Flat Research Range

Largest land-based rocket range
Only rocket range owned by a university
35 miles from campus



PF Incoherent Scatter Radar



Safety



Payload Assembly



Boo

Poker 2015 Campaign MIST & MTeX





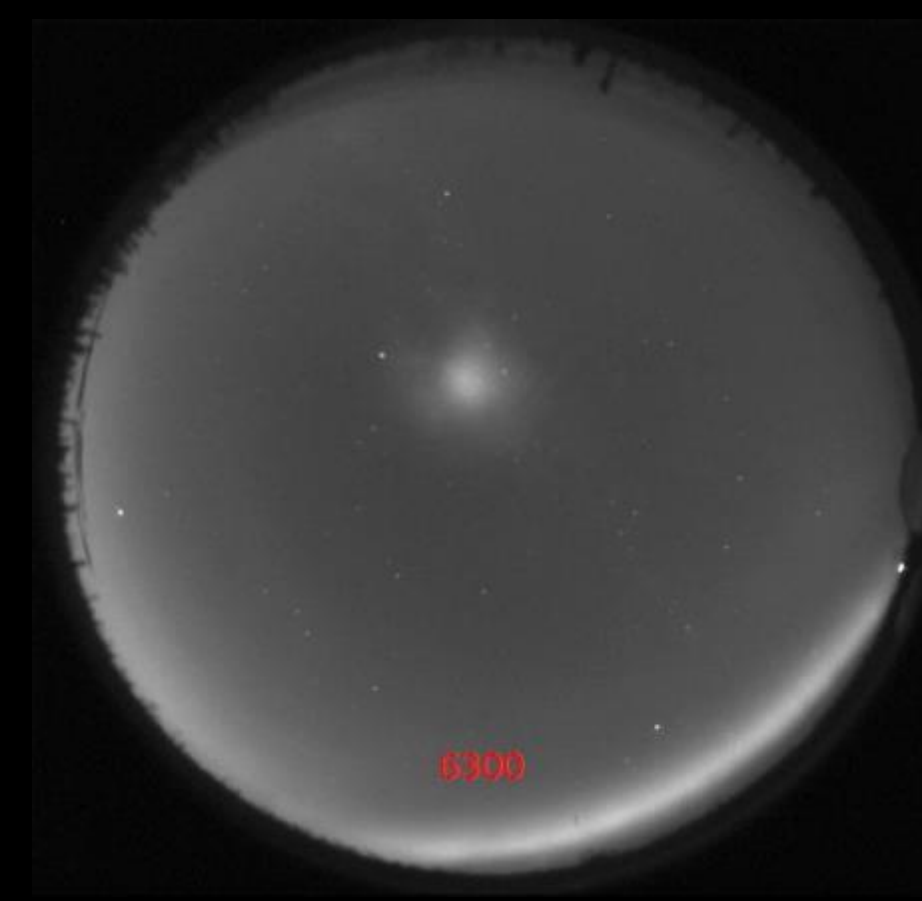
High-frequency Active Aurora Research Program (HAARP) Reaching Out & Touching the Ionosphere



- **Gakona AK - 62.39 deg, 145.15 deg (West)**
- **33 acre phased HF transmitter array;**
- **2.8 to 10 MHz;**
- **Multiple beams & transmission to 30 elevation angle**
- **5 x 3600 hp diesel engines; 3.6 MW;**
- **\$290M (half Congressional earmarks + half AFRL, ONR & DARPA)**



Chris Fallen Experiment: First simultaneous high-power HF radio aurora and SSTV broadcast, Sep 2017



Twitter, Inc.

 **Walter Salmaniw**
@VolodyaVik [Follow](#)

Replying to [@ctfallen](#)

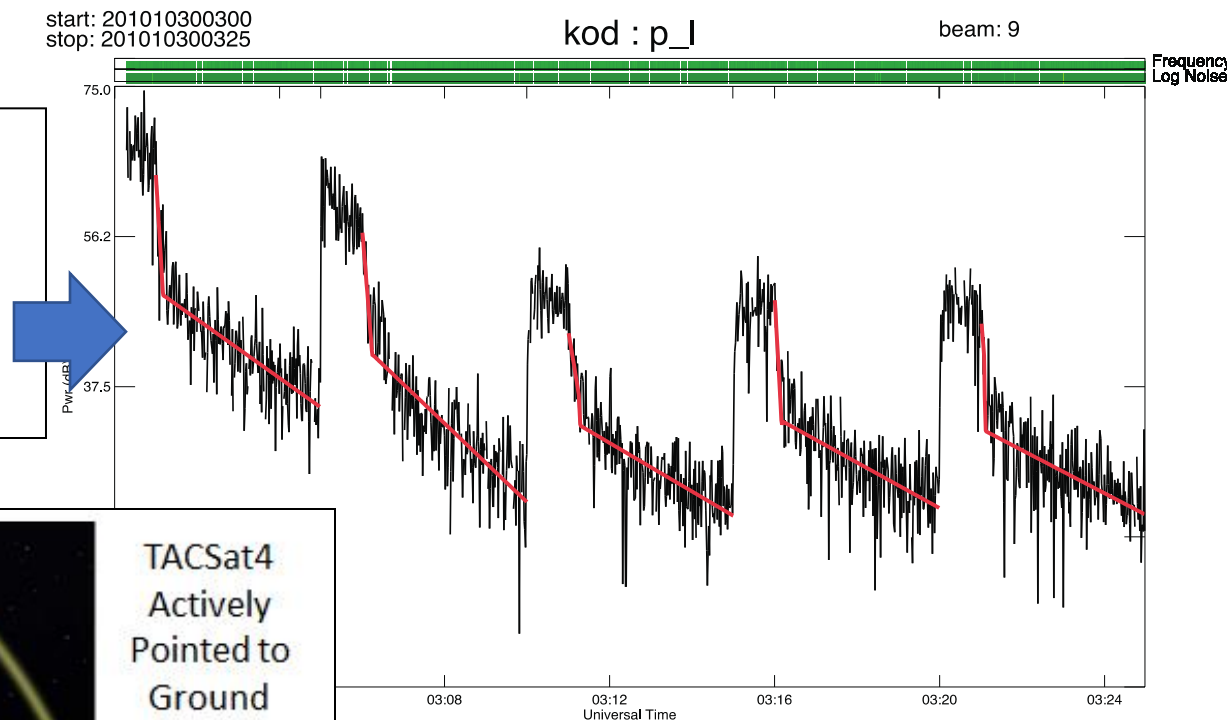
05:41, 05:44 and 05:53 recorded by my MixW program. Nice reception, indeed, from Victoria, BC



12:10 AM - 26 Sep 2017

Previous HAARP Results

Bristow – Decay rates of scattered power related diffusion of the neutral atmosphere.



COMMX
Working
with
HAARP

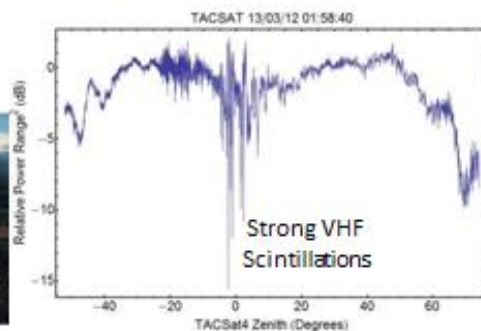


TACSat4
Actively
Pointed to
Ground
Receiver

Modified
Region

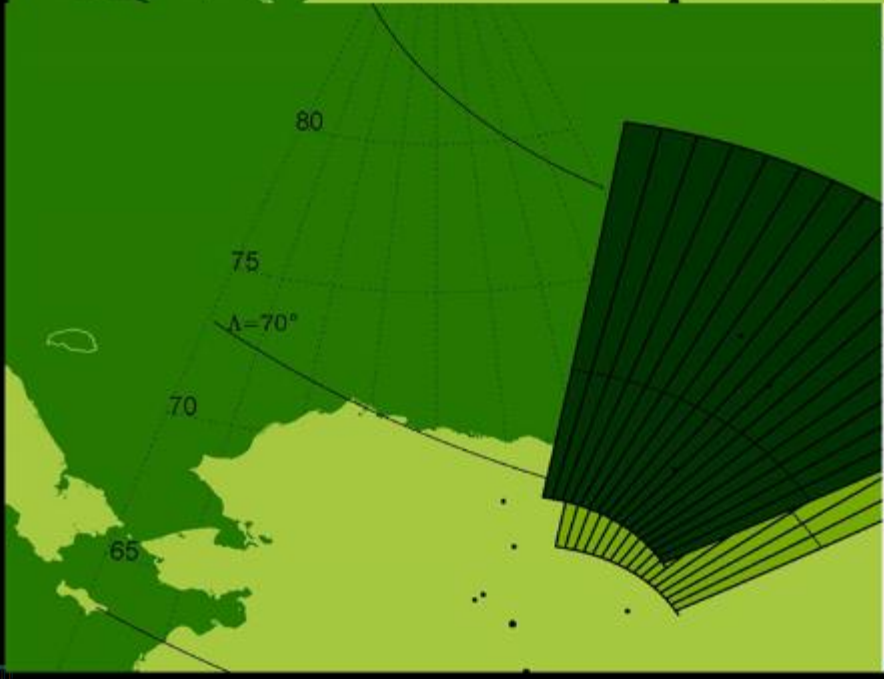
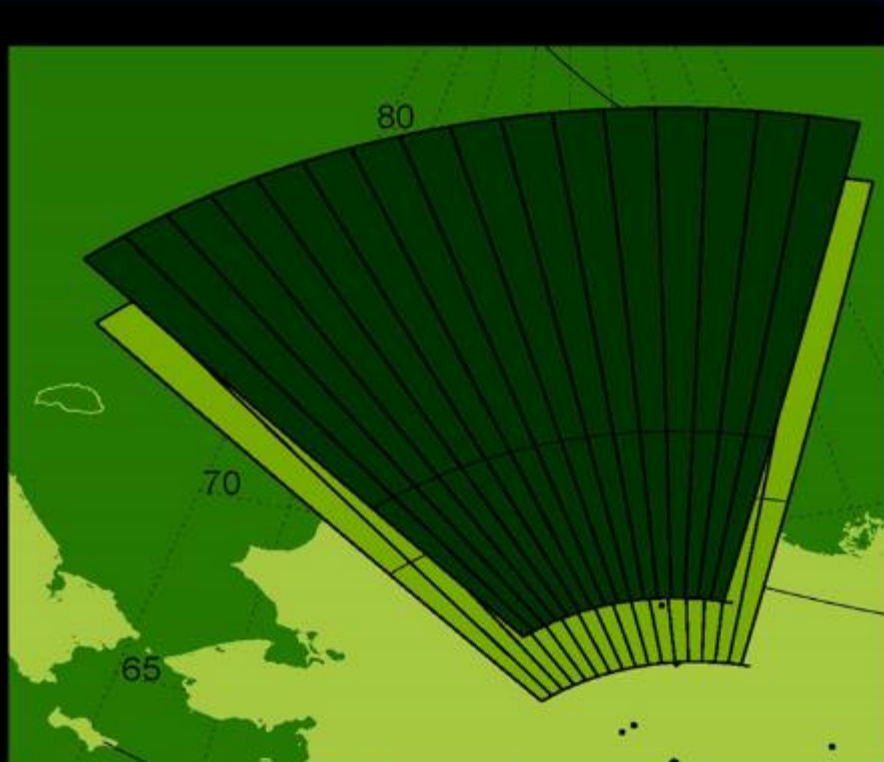
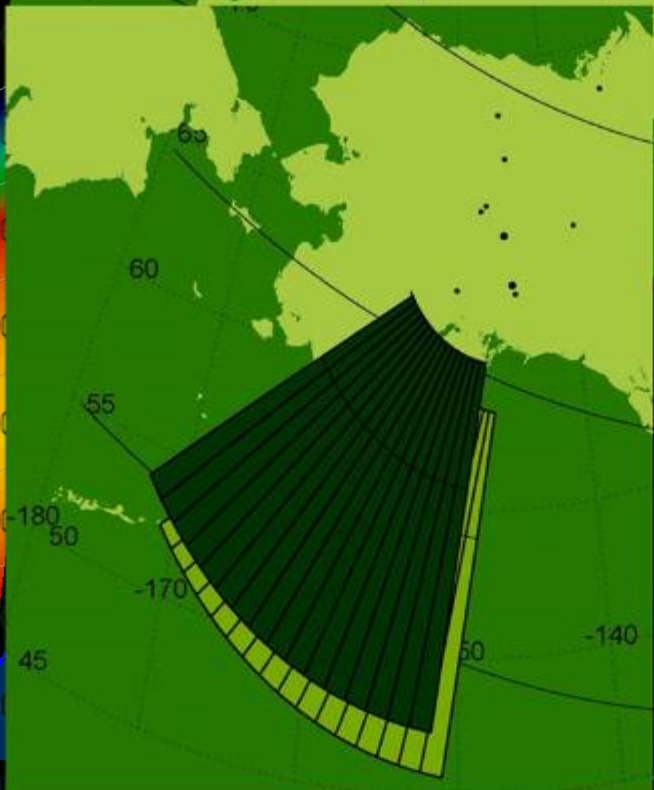
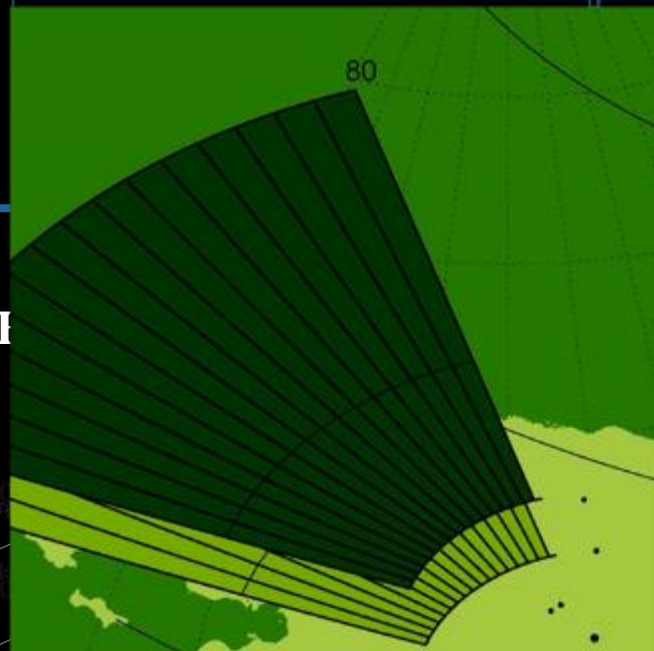
F-Layer Ionosphere

Courtesy Paul Bernhardt
NRL



Bernhardt – Triggered scintillation used to server space-to-ground UHF communication

8 MI



O

2000 km

m

-130



**Woodrow Wilson
International
Center
for Scholars**



**Future of High Frequency
Active Ionospheric
Research Facilities
in the U.S.
9 Apr 2019**



**Ronald Reagan Building &
International Trade Center**





Thanks, Questions?

