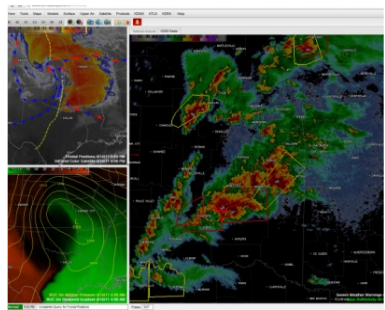
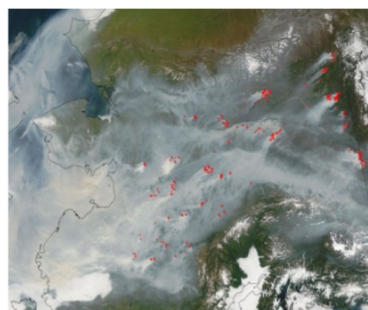


# Transportable Array Workshop



National Weather Service  
Alaska Region



Carven Scott  
Regional Director



# Outline

- **NWS Alaska Region**
- **Observation Program Priorities and Expansion**
- **Transportable Array Gap Filling**
- **Space Weather Needs from USArray (Douglas Biesecker)**
- **Tsunami Needs from USArray (Paul Whitmore)**
- **Conclusion**

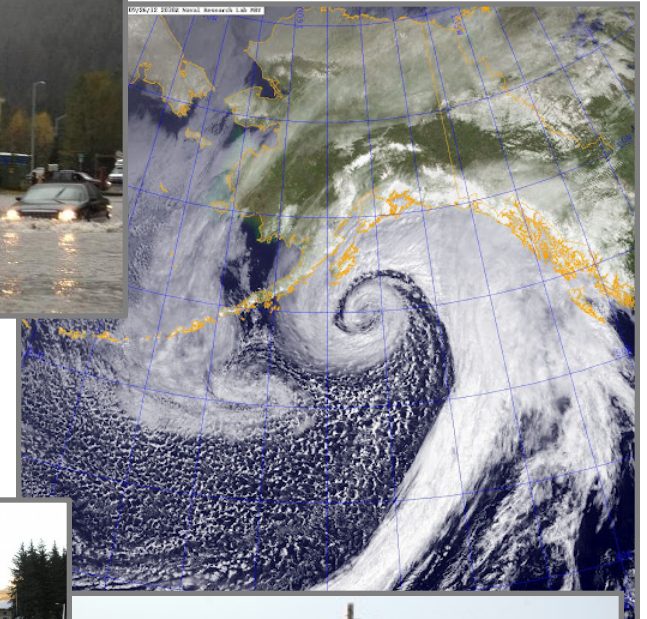


# NWS Alaska Region

**Mission:** Provide weather, water and climate data, forecasts and warnings for the protection of life and property and enhancement of the national economy

**Vision:** Alaska's residents and visitors will be prepared to respond to potentially hazardous environmental conditions based upon timely and relevant information from the dedicated people of the NWS.

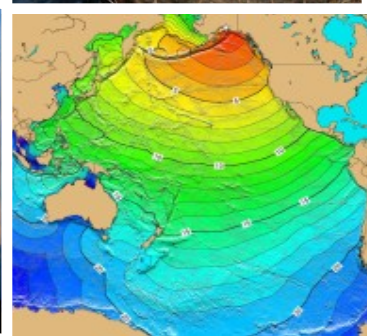
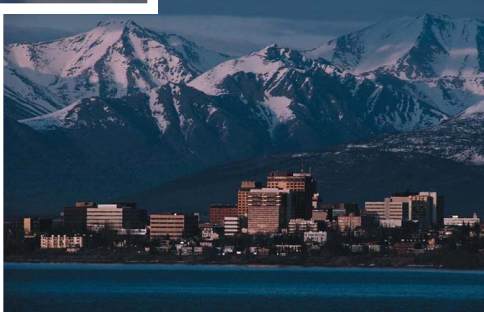
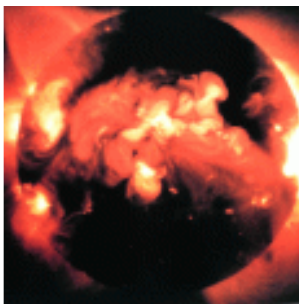
242 positions in the Alaska Region





# Service Areas

- Aviation
- Climate
- Fire Weather
- Marine Weather and Sea Ice
- Public Forecasts and Warnings
- Rivers/Hydrology
- Space Weather
- Tsunami
- Volcanic Ash





# National Weather Service Alaska Region Facilities

★ Weather Forecast Offices

● Weather Service Offices

T National Tsunami Warning Center

▲ In Anchorage:

- Volcanic Ash Advisory Center
- Alaska Aviation Weather Unit
- Weather Forecast Office
- Alaska Pacific River Forecast Center
- Center Weather Service Unit
- Alaska Regional Headquarters

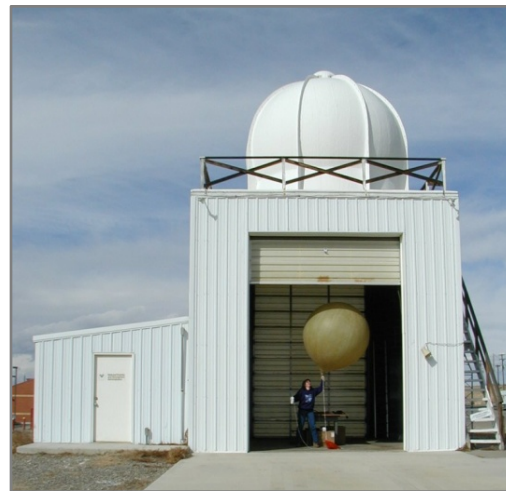
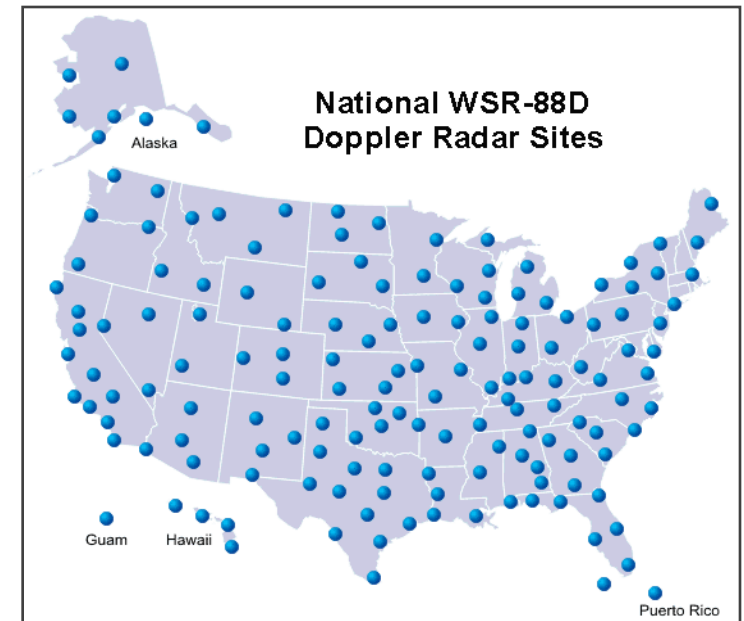




# Major Observational Systems

## Observations

- Automated Surface Observing Systems (44)
- Doppler Radars (7 - FAA owned and maintained)
- Upper Air Soundings (13)
- Wind Profilers (3)
- Alaska Region Surface Observing Systems (15)

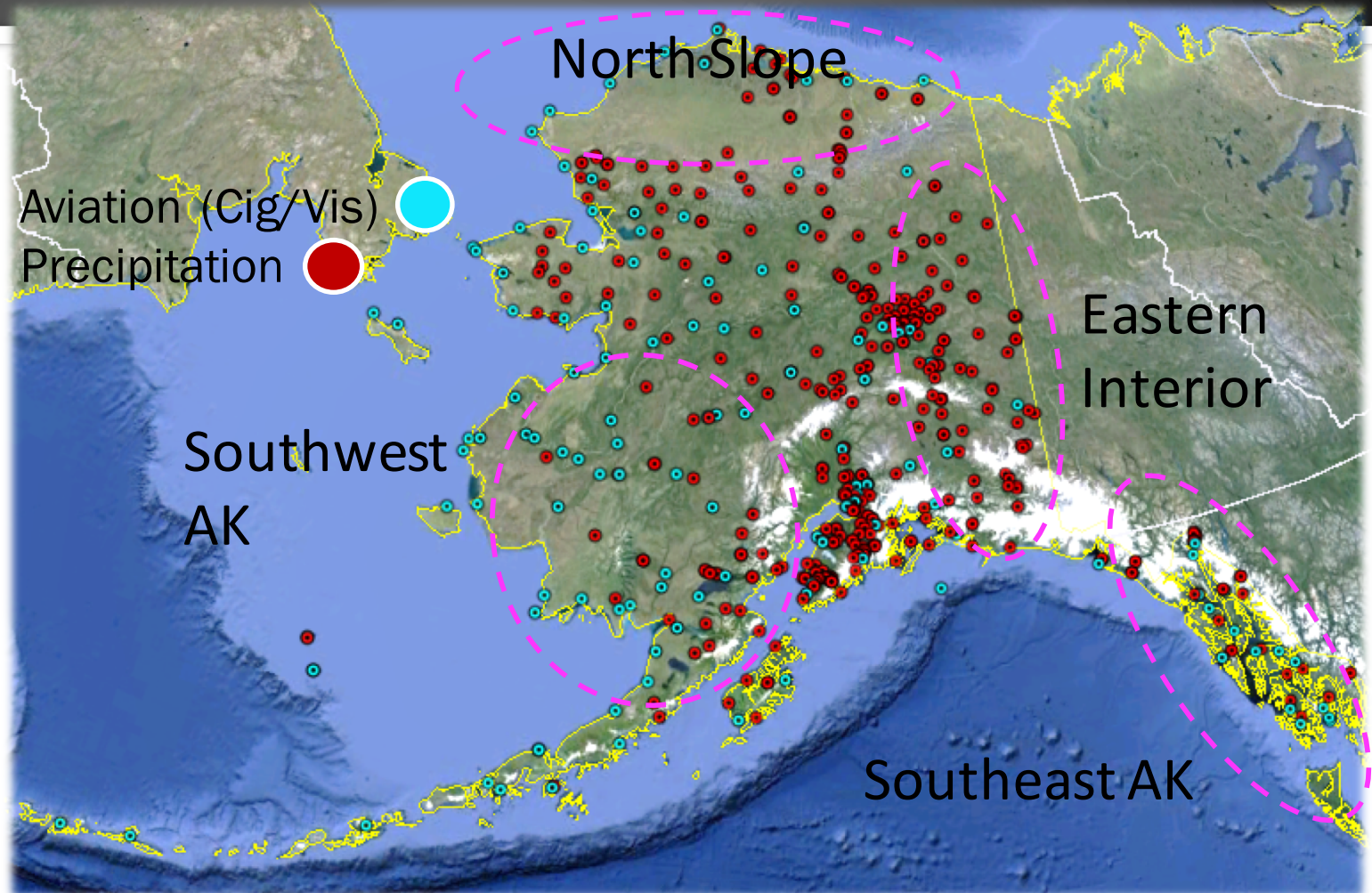




# Aviation/Rain Observations

## Major Gaps

- Many precipitation observations from COOP observers are seasonal
- Ceiling and visibility also a need in most areas
- Large General Aviation community
- Riverine flooding a huge source of disaster declarations

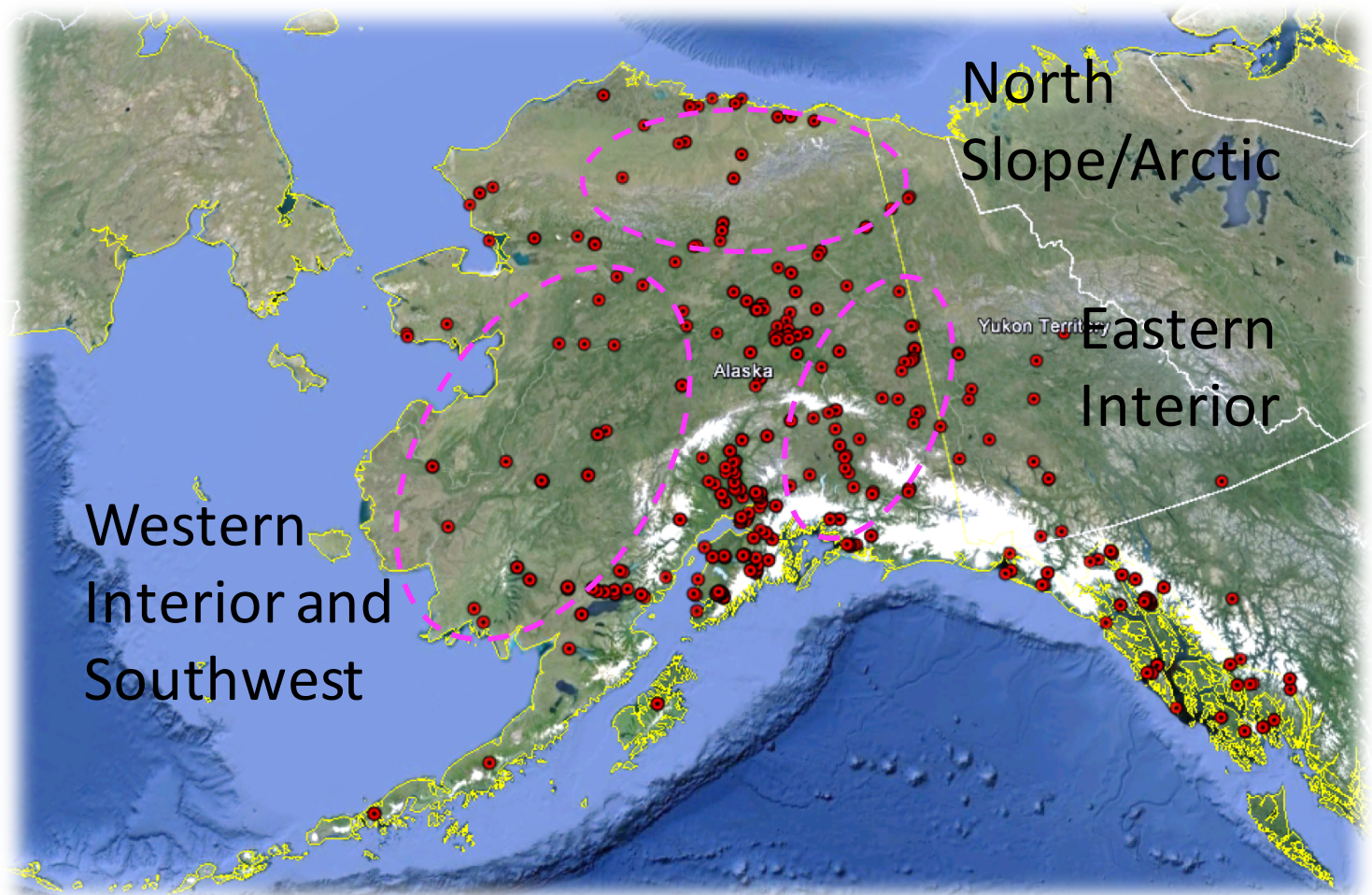




# River Gauges

## Major Gaps

- Large gaps in headwaters affecting populated areas
- Riverine flooding a major source of disaster declarations
- Supplemented by Riverwatch program



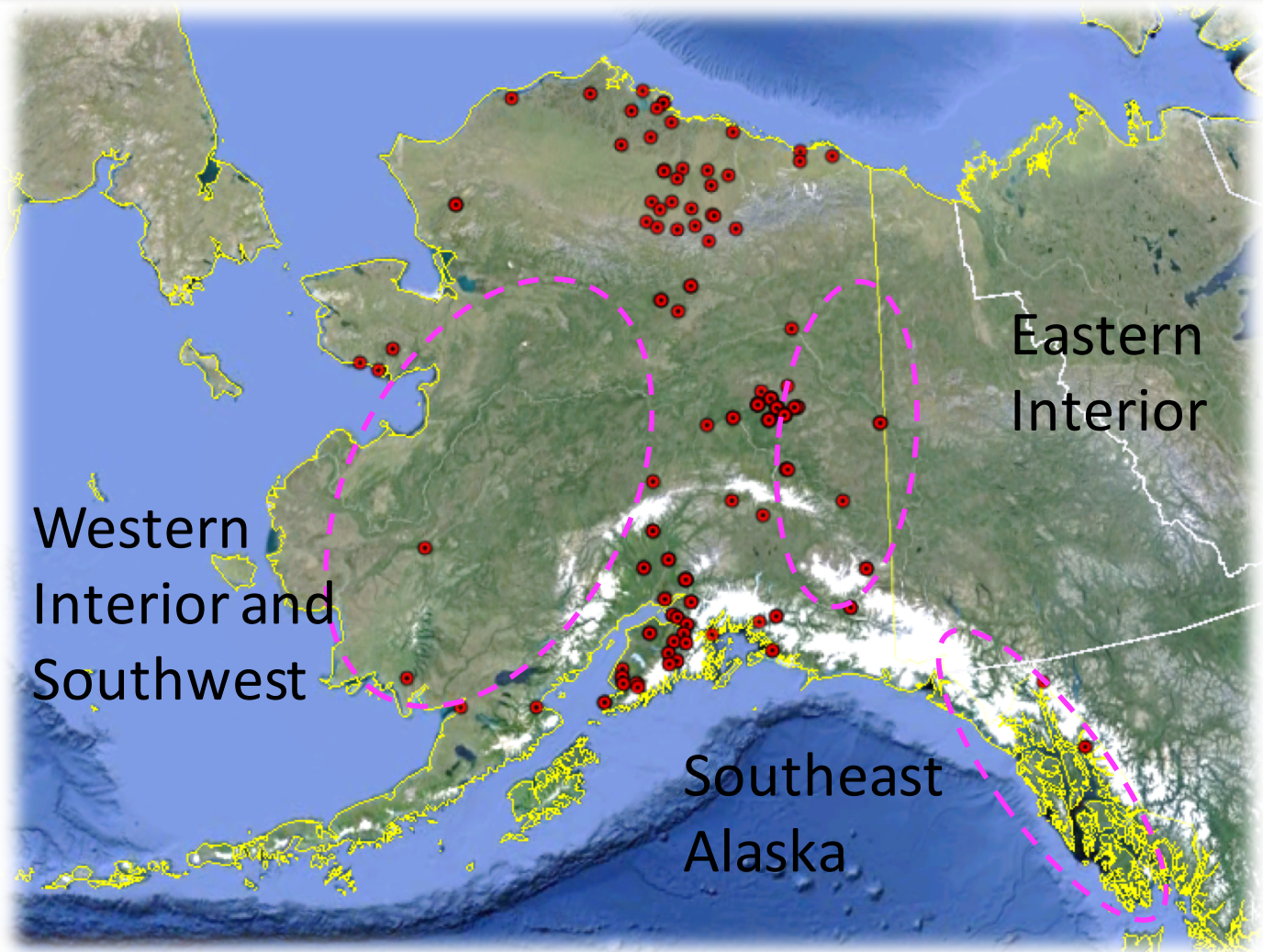




# Snow Depth Observations

## Major Gaps

- Very few observations at elevation
- Key for avalanche safety
- Important for hydroelectric power in Southeast Alaska
- Often a precursor for upcoming fire weather season

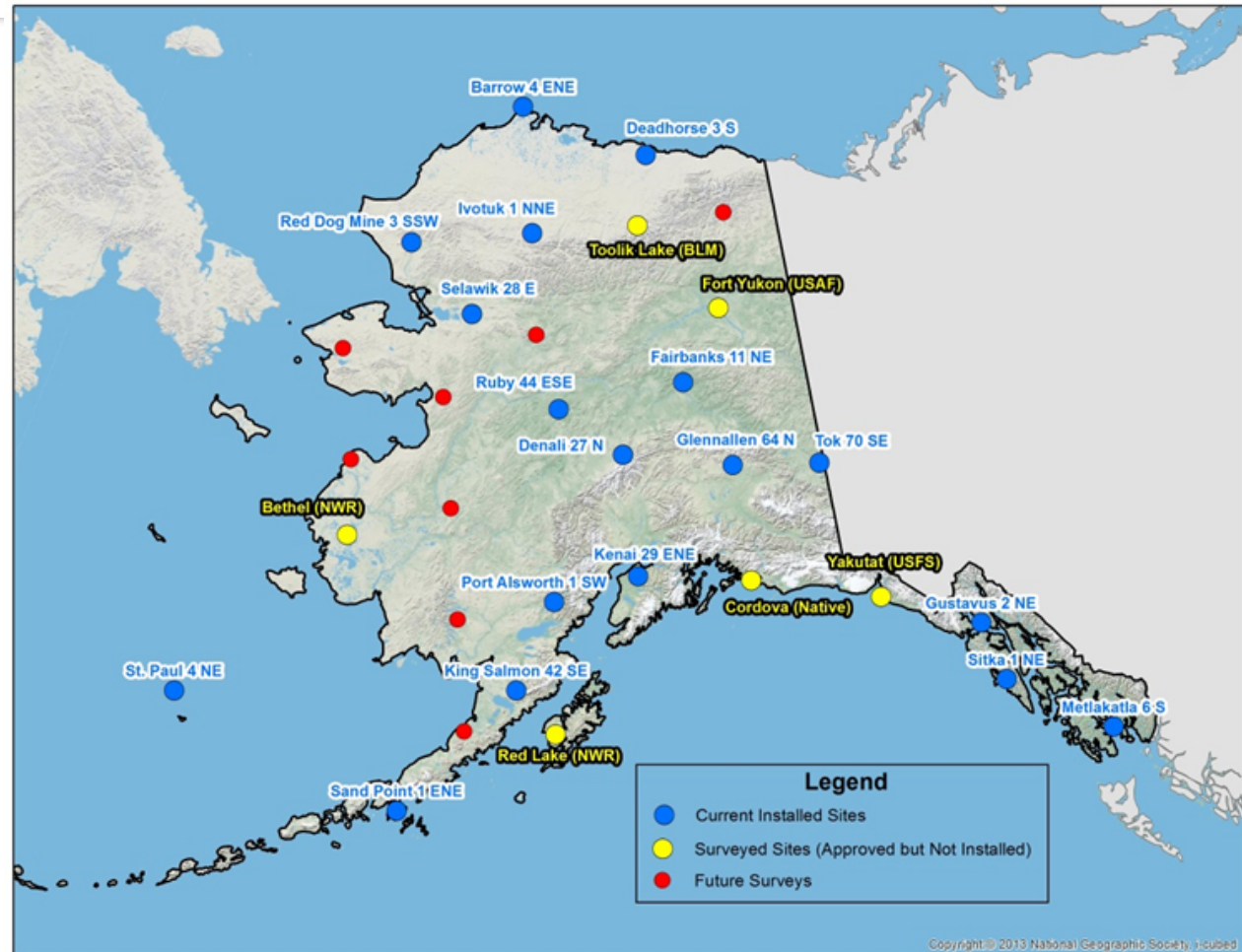




# Partnerships: Climate Reference Network

## Partnerships

- NOAA/NCEI
- High quality temperature and precipitation, and redundant sensors, pristine locations
- 29 Alaska sites planned (18 installed)
- 50-100 year program lifetime

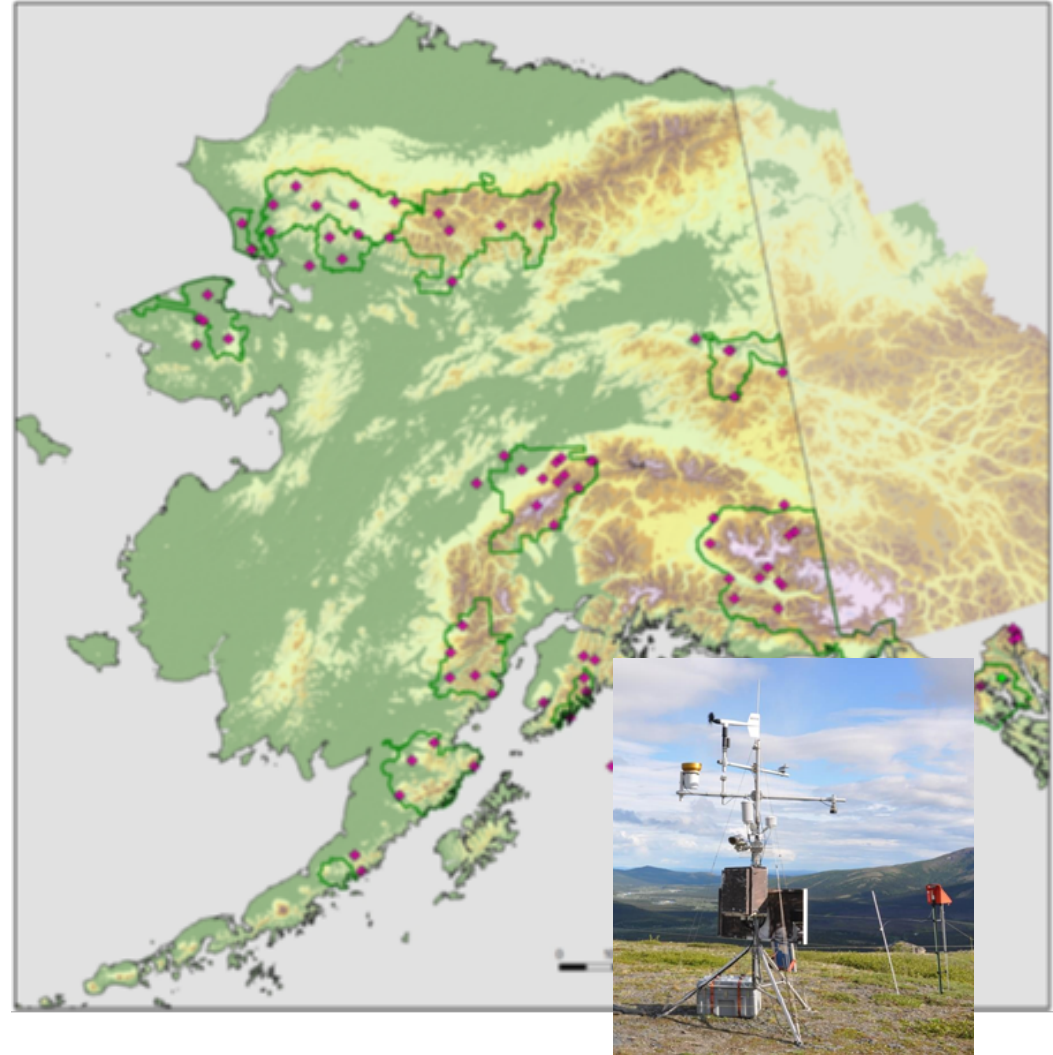




# Partnerships: National Park Service

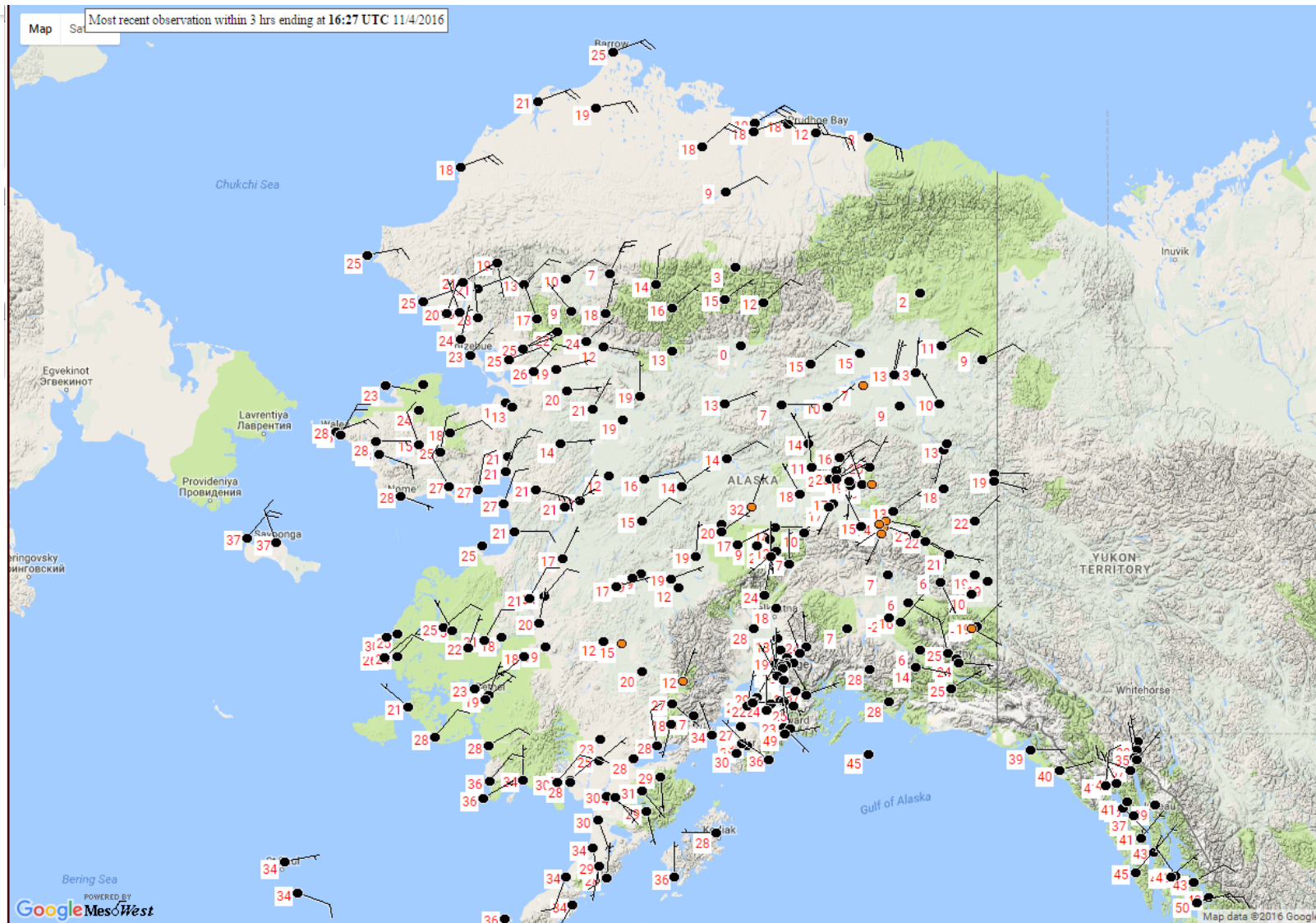
## Major Gaps

- Strong focus on higher elevation NPS lands
- High quality, regular sensor swaps
- More than 40 stations installed & operational past 10 years
- 50+ year planned lifetime





# Aviation and RAWS Real-Time Land Data

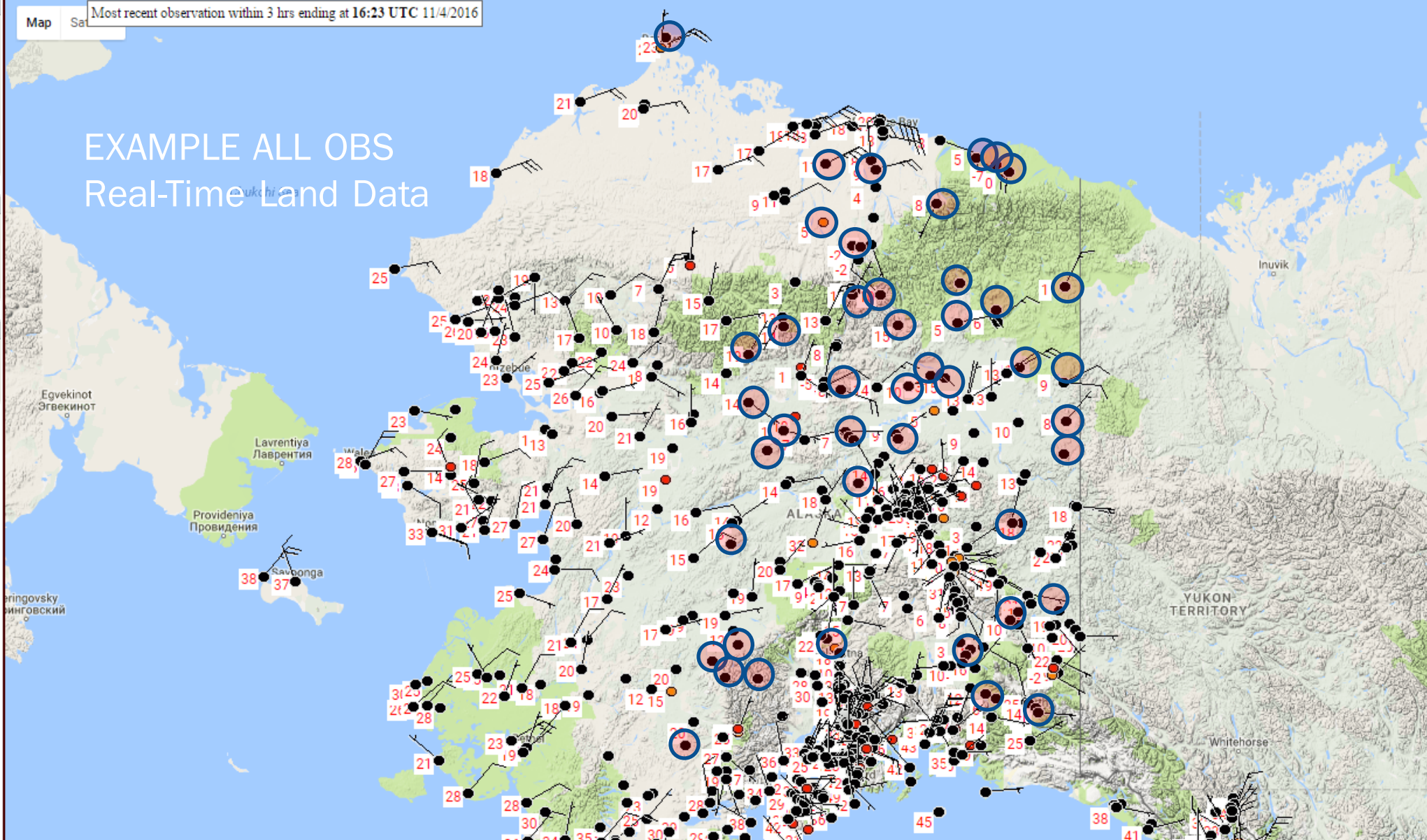




# All Obs Including Transportable Array

Map Sat Most recent observation within 3 hrs ending at 16:23 UTC 11/4/2016

EXAMPLE ALL OBS  
Real-Time Land Data



# Space Weather Interest in Transportable Array



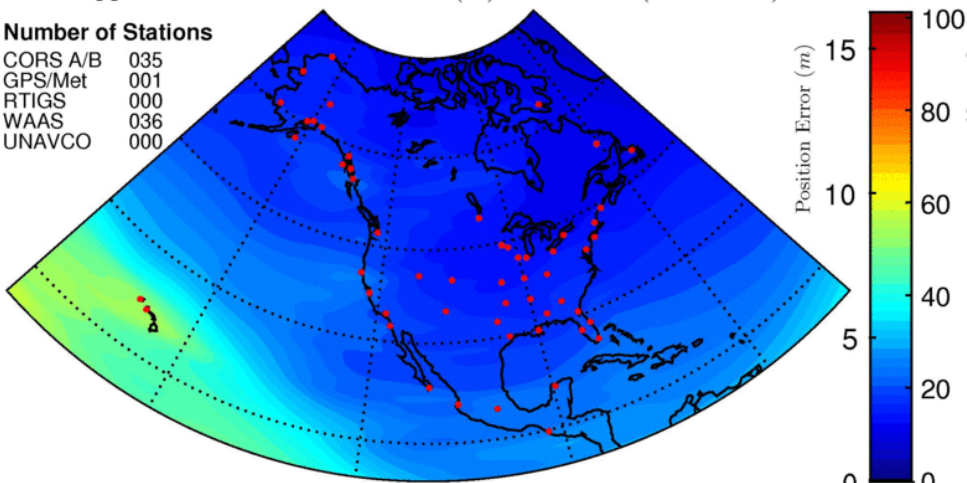
- **SWPC interests are Position, Navigation, & Timing (PNT) and High Frequency (HF) communication**
  - PNT
    - Ionosphere disturbances impact GPS accuracy
    - NATEC model - driven by GPS data
  - HF
    - D-RAP model - driven by GOES data

## North American Total Electron Content (NATEC)

Approximate L1 Position Error (m) and TECu ( $10^{16} * m^{-2}$ )

**Number of Stations**

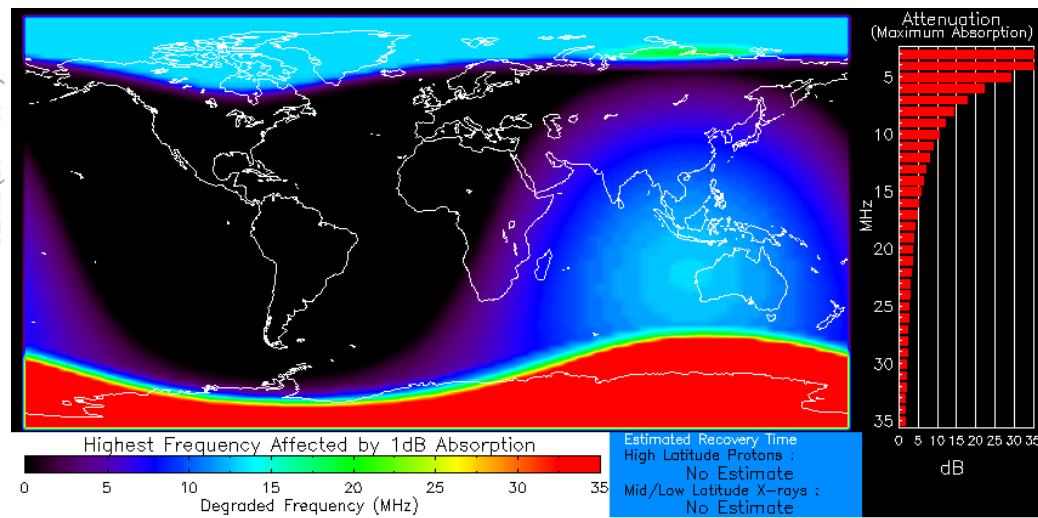
CORS A/B	035
GPS/Met	001
RTIGS	000
WAAS	036
UNAVCO	000



07-Nov-2016 from 21:00 to 21:15 UT

NOAA/SWPC Boulder, CO USA (op.ver: 2.0)

## D Region Absorption (D-RAP)



Elevated X-ray flux  
Product Valid At : 2016-01-02 04:40 UTC

Minor Proton Flux  
NOAA/SWPC Boulder, CO USA





# Space Weather Interest in Transportable Array

## **NATEC model is a data assimilative model**

- It is only as good as the data available within latency requirements
- Data Latency
  - Threshold: 15 minutes
  - Goal: 5 minutes

## **Scintillation is a future product area**

- Amplitude and phase scintillation
- Requires GPS receivers that keep track of the signal power (amplitude) and perform the right type of filtering (phase)
- Data Latency
  - Threshold: 5 minutes
  - Goal: 1 minute



# Tsunami Seismic Interest in Transportable Array

- Data from the USArray in Alaska speeds tsunami warning response for earthquakes which occur in Alaska and Canada
- The data also provide very high quality signal on which advanced techniques can be used to help quickly determine if the earthquake is tsunamigenic
- Given the high percentage of tsunami alerts which are triggered by earthquakes in Alaska versus other parts of the US, it makes sense to outfit Alaska with a comparably dense network of seismometers as other states
- The benefits of a high quality network, in by far the most seismically part of the country, can not all be laid out. There are many aspects yet to be learned about earthquakes and their relationship to tsunami generation and we'll only learn those with an improved observational network.





# Conclusion

- **Huge data gaps in Alaska**
- **Transportable Array provides mission critical information**
- **Provides unprecedented data for modeling...weather and tsunami**



# Questions?

