The value of the TA in monitoring volcanic hazards in Alaska

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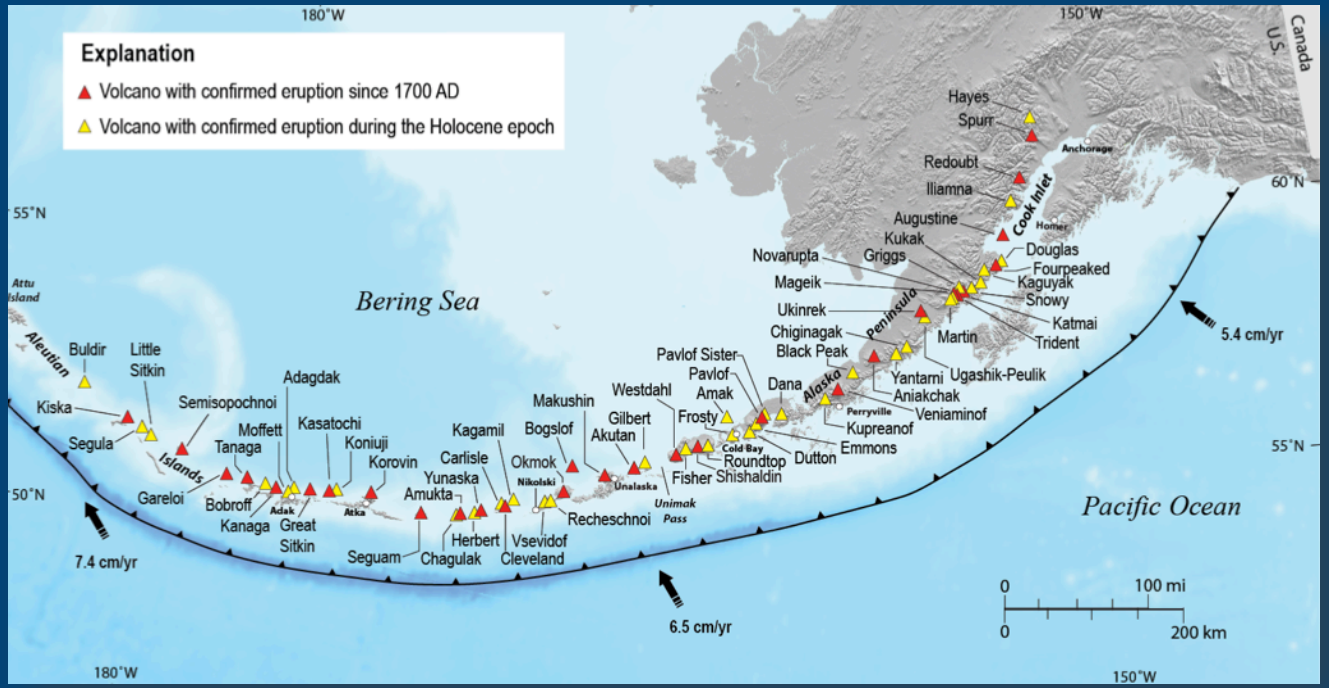
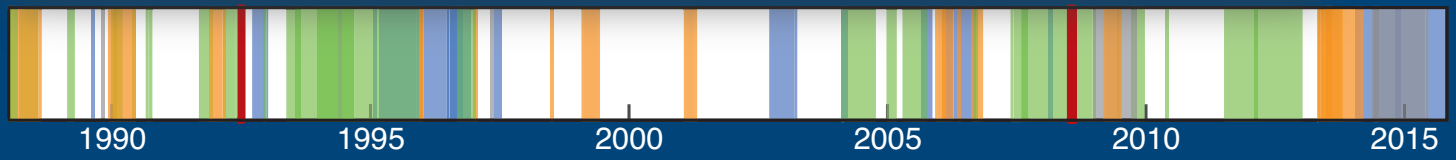
Alaska's Volcanoes

66 eruptions at 22 volcanoes since 1988

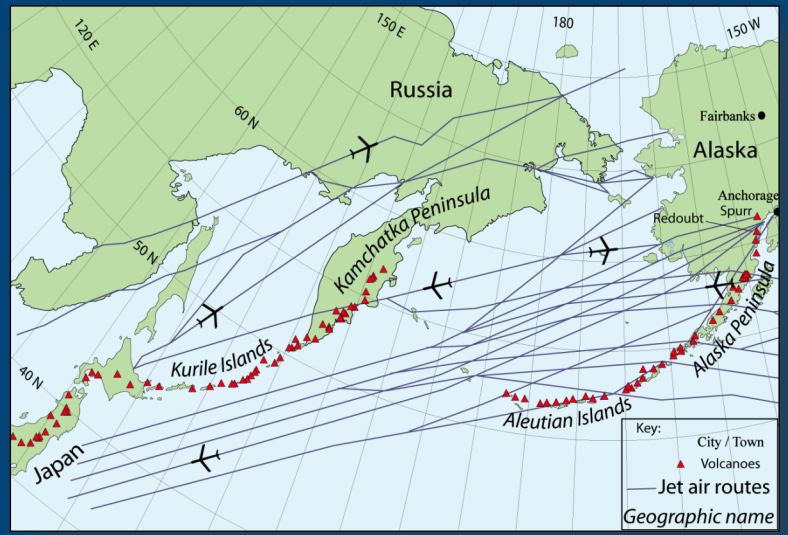




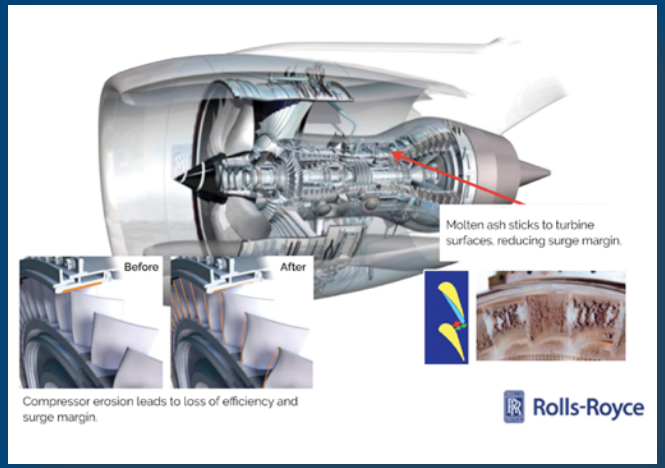
VEI 4
VEI 3
VEI 2
VEI 1
VEI ?, small

Volcanic Hazards in Alaska

- Up to 50,000 passengers per day fly over the North Pacific
- Over 60% of Alaska's population lives within 300 km and downwind of Cook Inlet volcanoes

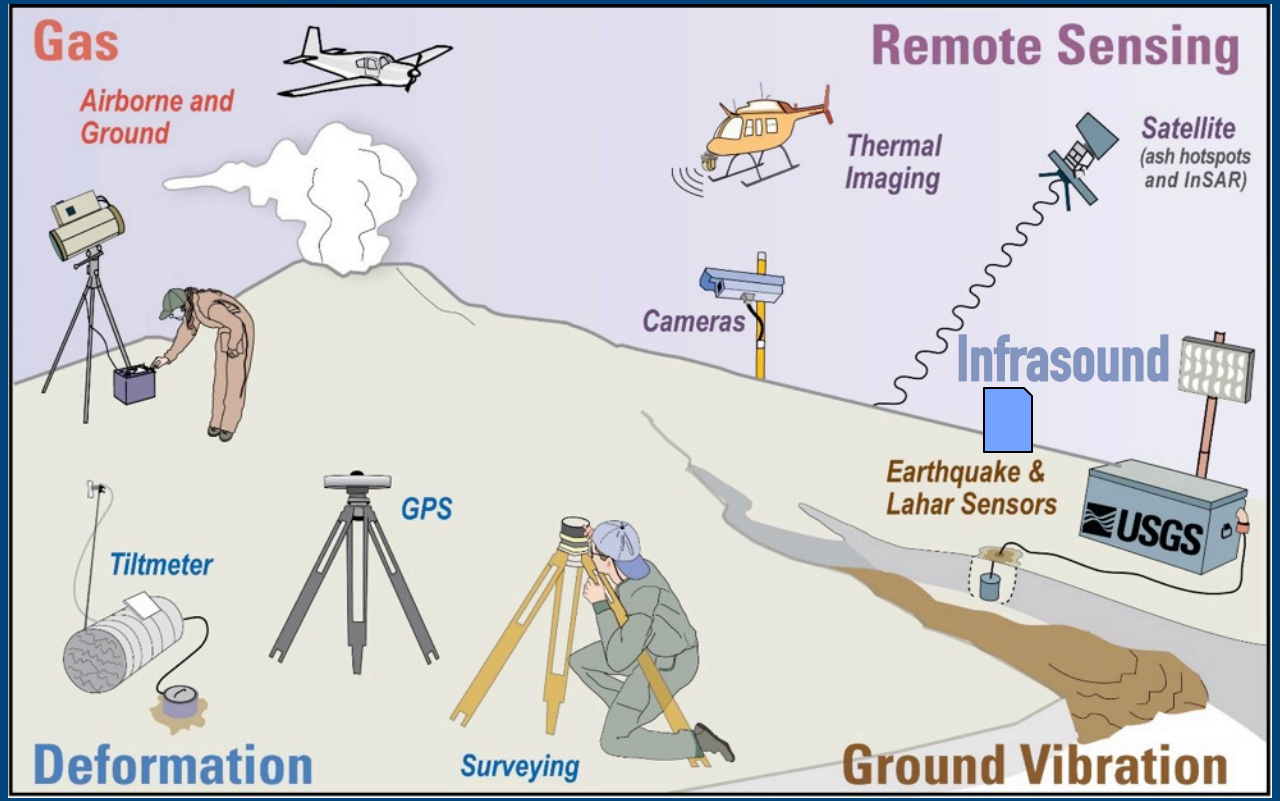


North Pacific air routes (blue lines) pass over or near more than a hundred potentially active volcanoes (red triangles).



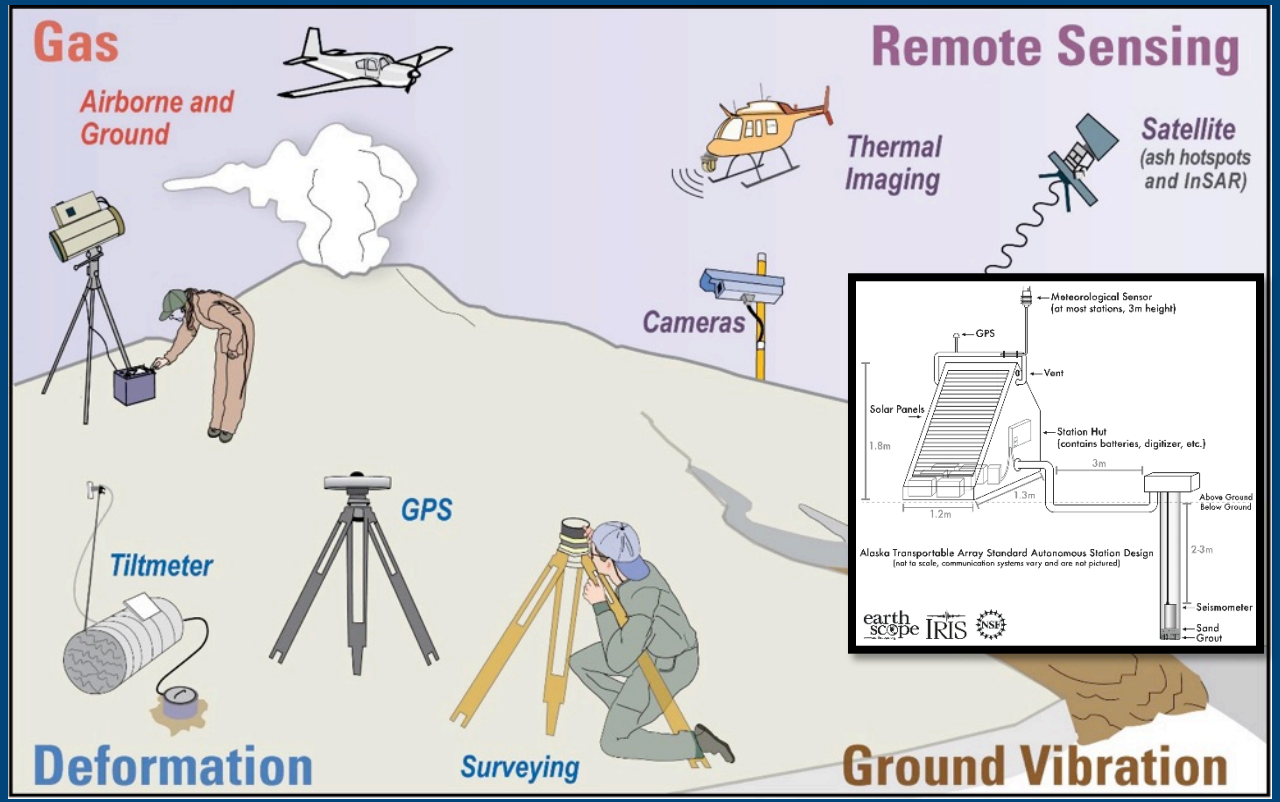
When ash enters jet engines, it can wear down and even mangle blades in the turbines and reduce airflow as it builds up.

Volcano monitoring



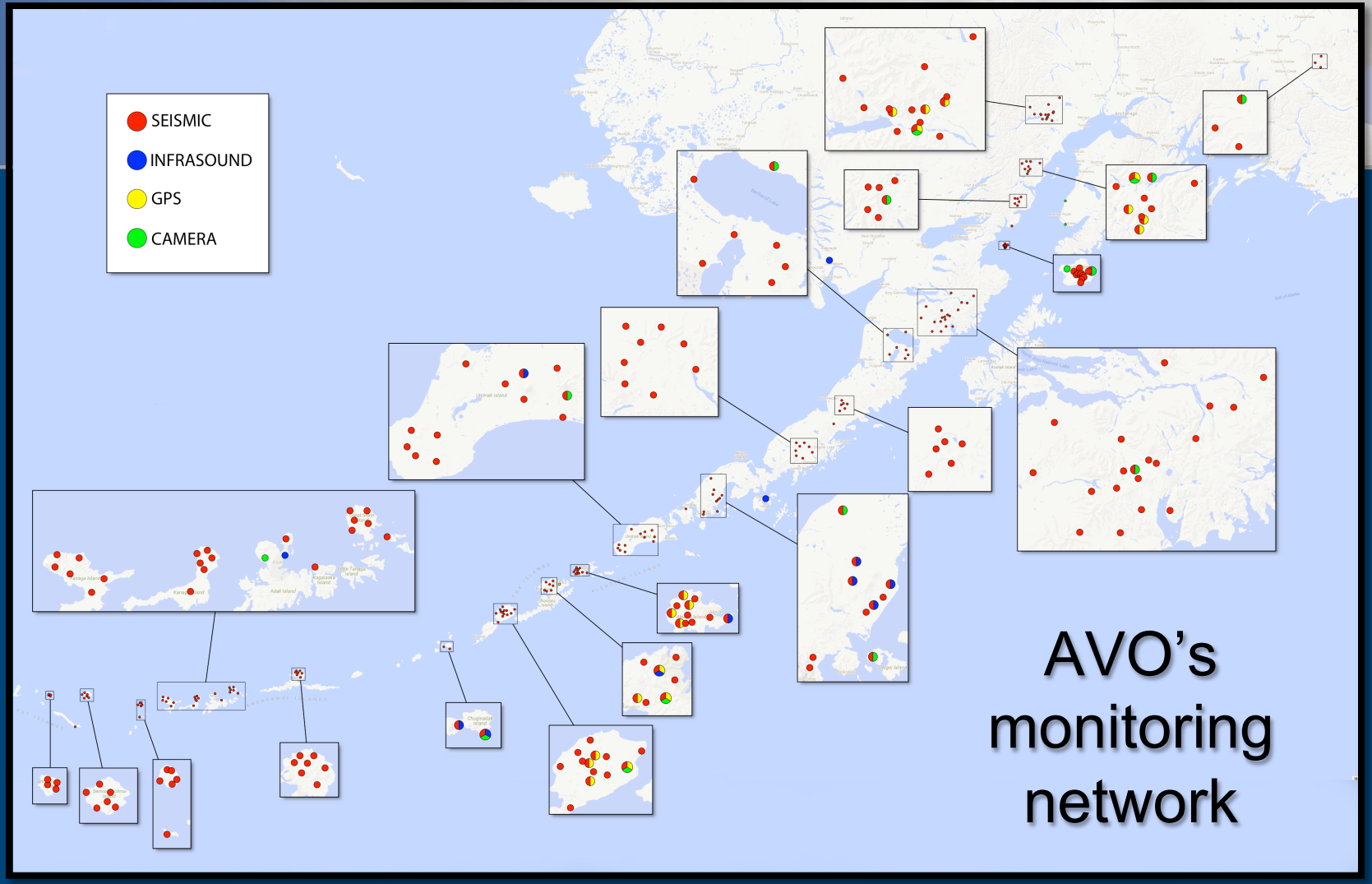
USGS Volcano Hazards Program

Volcano monitoring



Alaska TA sites: Seismic plus infrasound

USGS Volcano Hazards Program


SEISMIC
INFRASOUND
GPS
CAMERA
AVO's monitoring network

Affiliated agencies, partners & collaborators

USGS
science for a changing world

UNAVCO

UAF UNIVERSITY OF ALASKA FAIRBANKS
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NATIONAL WEATHER SERVICE
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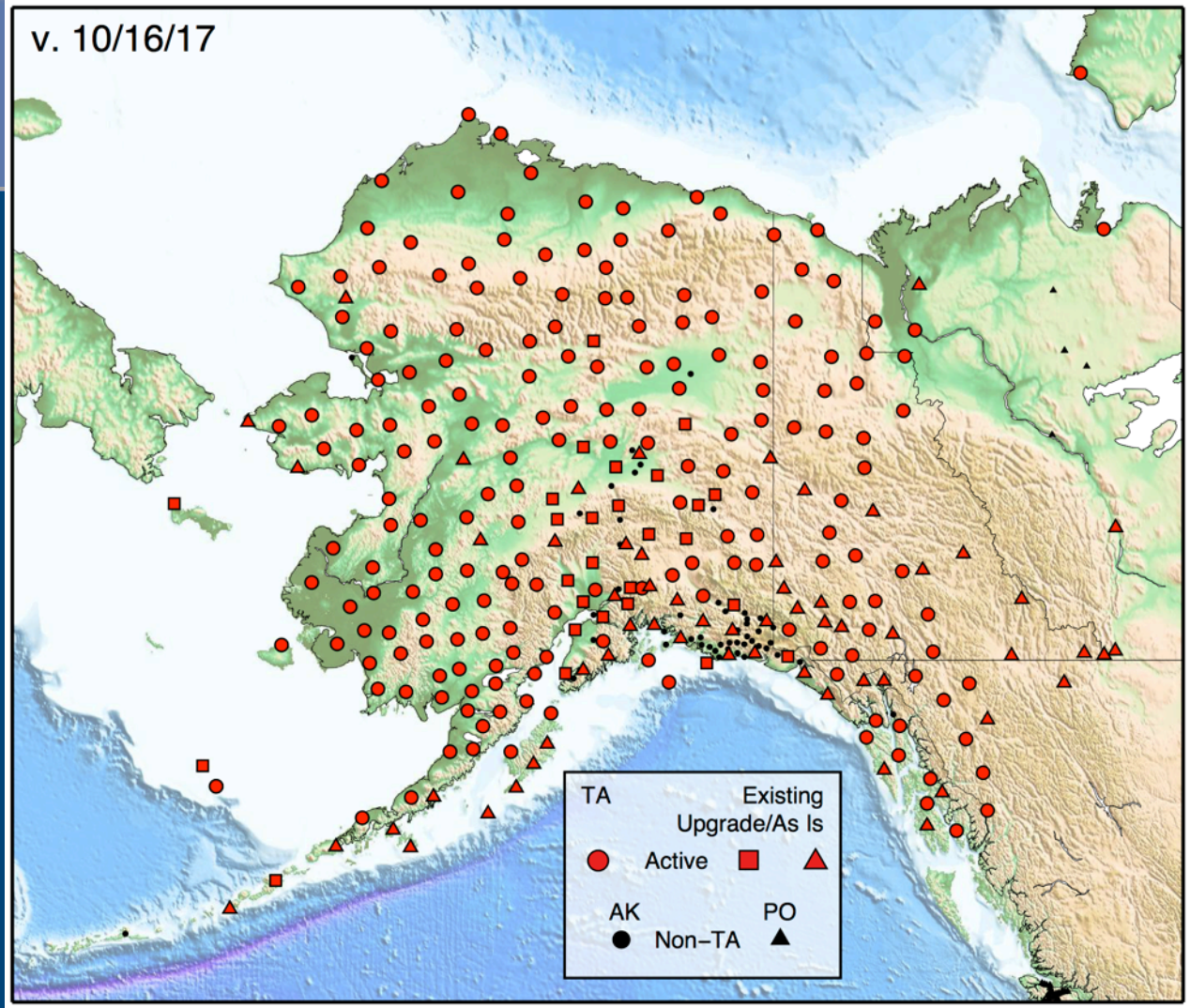

v. 10/16/17
TA
Existing
Upgrade/As Is
Active
AK
PO
Non–TA

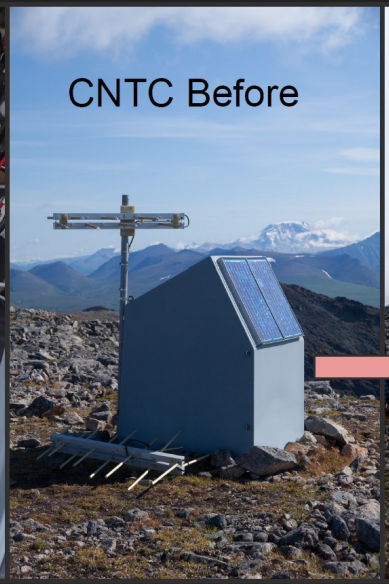
Katmai: Transportable Array Collaboration (June 2016)

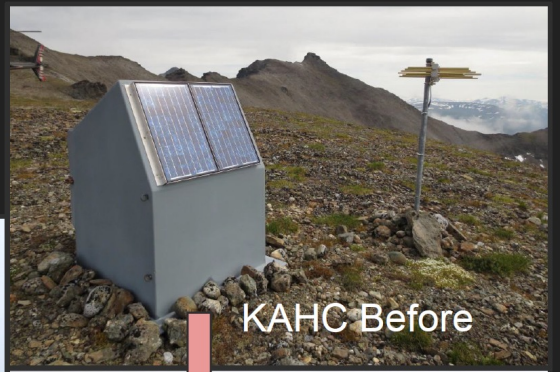
Bore hole seismic & infrasound
Installed at Katmai sites:
KAHC & CNTC

Photos by Dane Ketner, USGS-AVO

Katmai: Transportable Array Collaboration (June 2016)

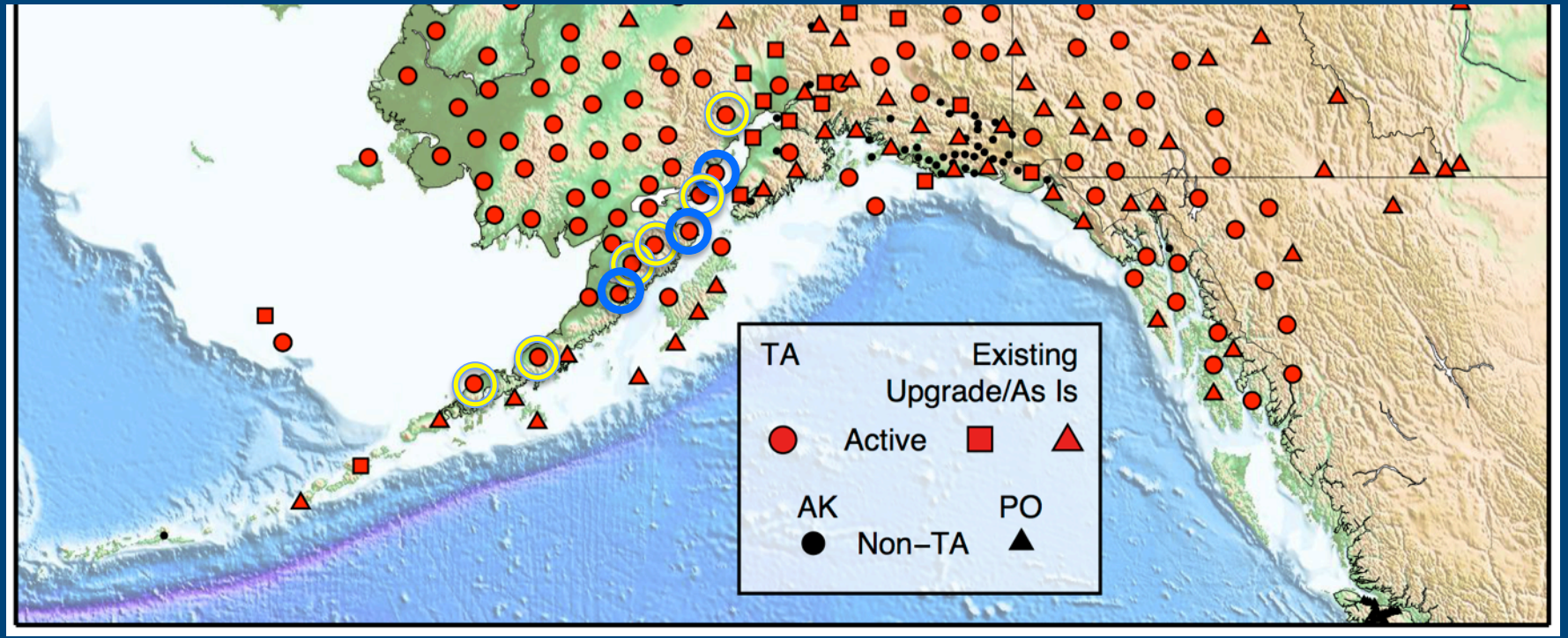
KAHC & CNTC expansion of solar power system, instrumentation, communication





Photos by Dane Ketner, USGS-AVO

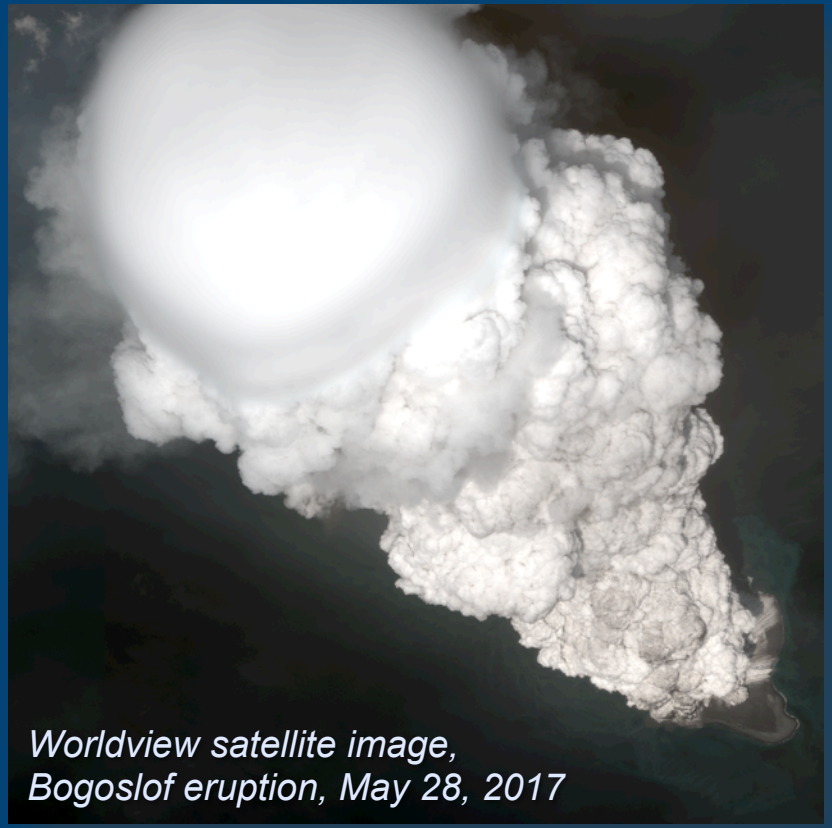
Alaska TA-AVO sites



6 AVO-TA co-located stations (in yellow): CNTC, KAHC, BLHA, VNFG, SPCR, OPT; others near volcanoes (e.g., in blue)

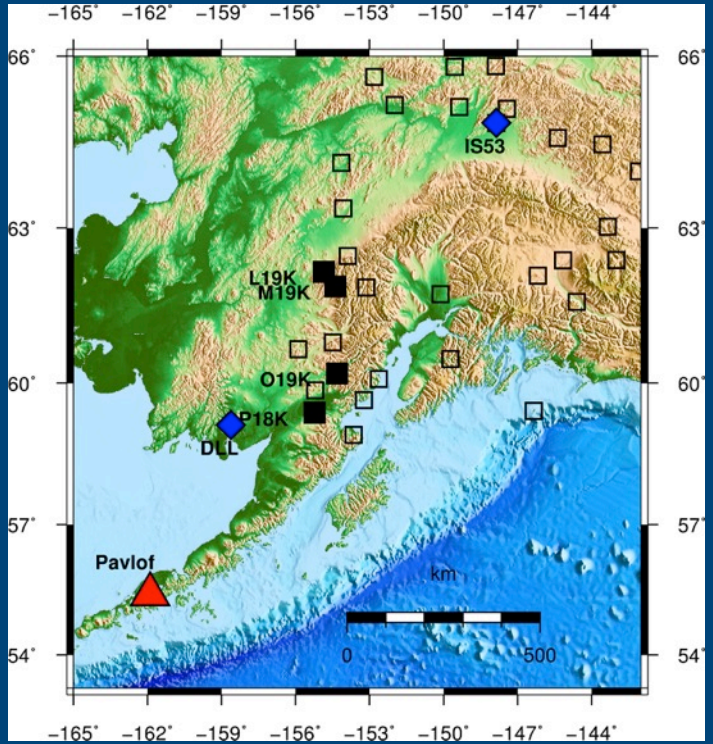
Volcanic infrasound

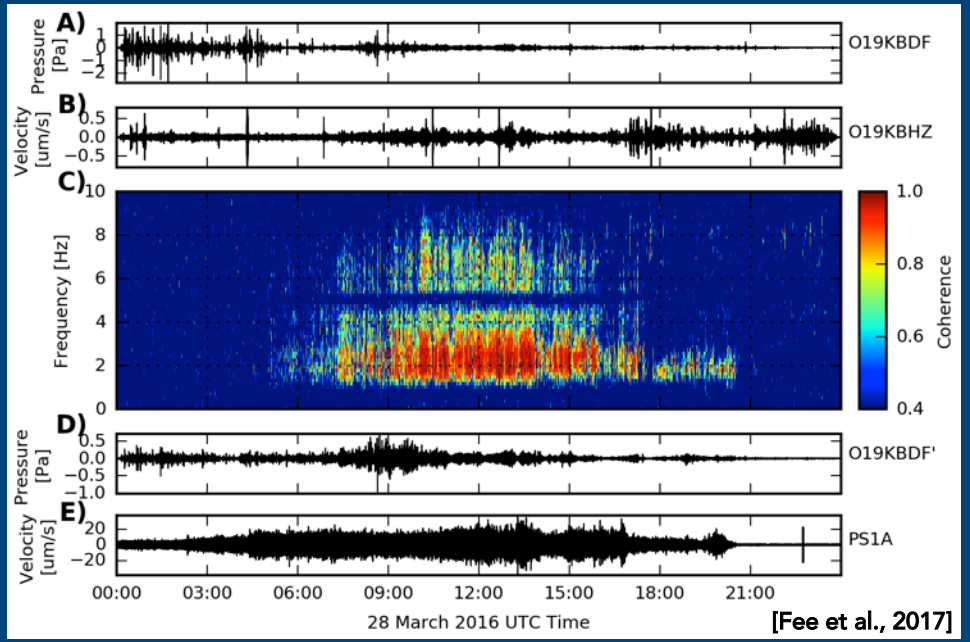
- Sound (pressure) waves at frequencies lower than humans can hear, causes by ejection of mass and gas into the atmosphere
- Propagates long distances with little attenuation
- Useful for detecting and confirming explosive volcanic activity



Worldview satellite image, Bogoslof eruption, May 28, 2017

Pavlof 2016 Eruption

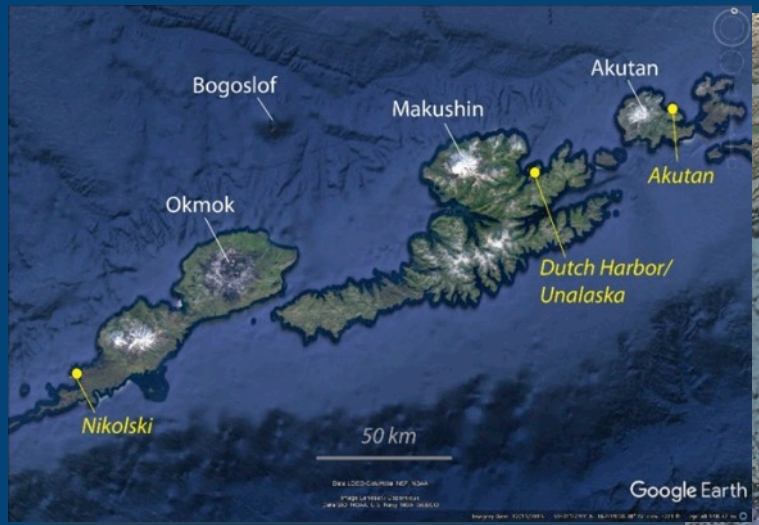


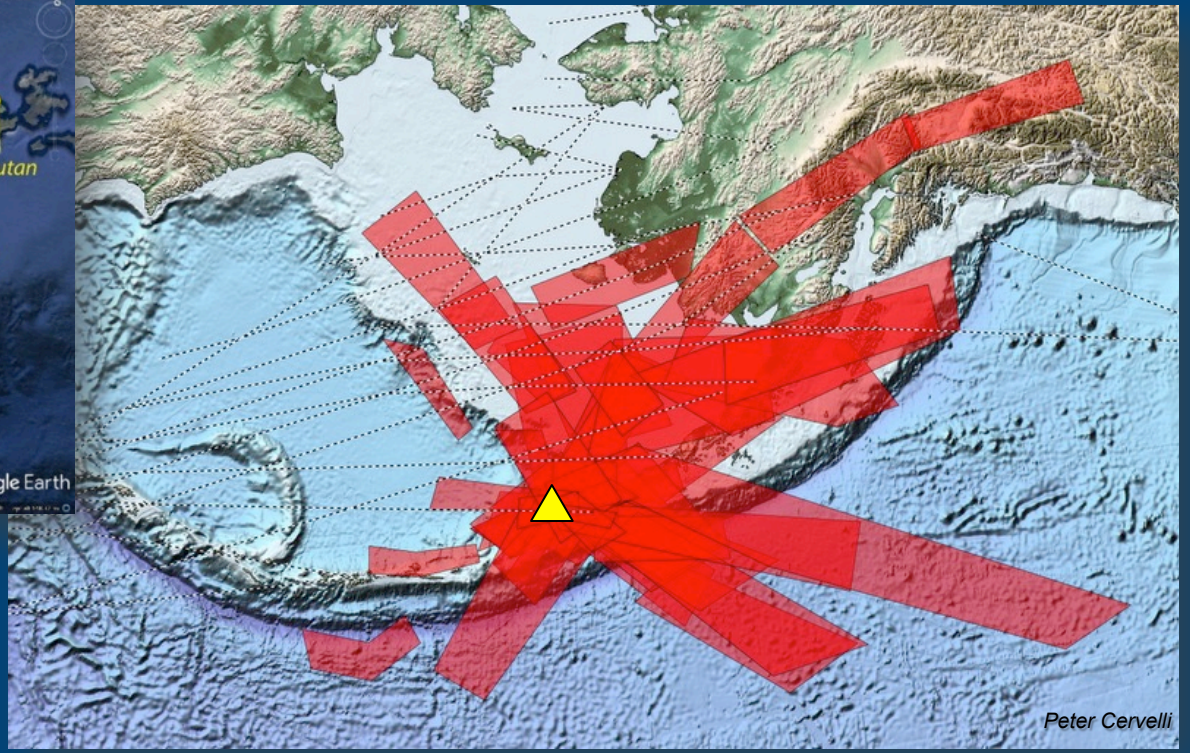


- 4 TA stations recorded the eruption (nearby site not installed yet)
- Recorded on infrasound channel and ground-coupled airwave on seismic
- First volcanic eruption recorded by the TA

Slide from David Fee, AVO/UAFGI

Bogoslof eruption: December 2016 to present(?)

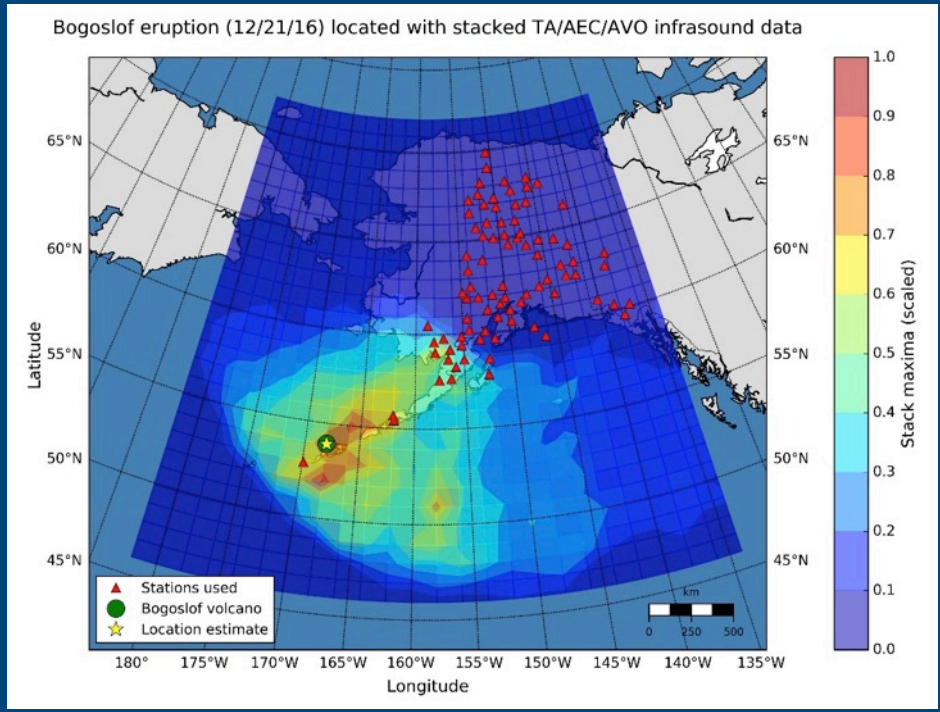




Volcanic Ash Advisories prompted by 2016-2017 Bogoslof activity

Eruption detection and location using infrasound

- Multiple Bogoslof eruptions detected and located using the TA infrasound data
- Collaborative NSF project between UC Santa Barbara, Univ. Alaska Fairbanks, and USGS-AVO
- End-goal: Develop operational eruption detection and location algorithm for use by AVO



Slide from David Fee, AVO/UAFGI

Concluding thoughts

- The TA enhances our ability to forecast and detect volcanic eruptions in Alaska
- Improved meteorological observations could benefit ash transport models
- The value of TA's high-quality seismic data and broad regional coverage would be seen during especially large eruptions (Novarupta 1912, for example)

Thank you!