

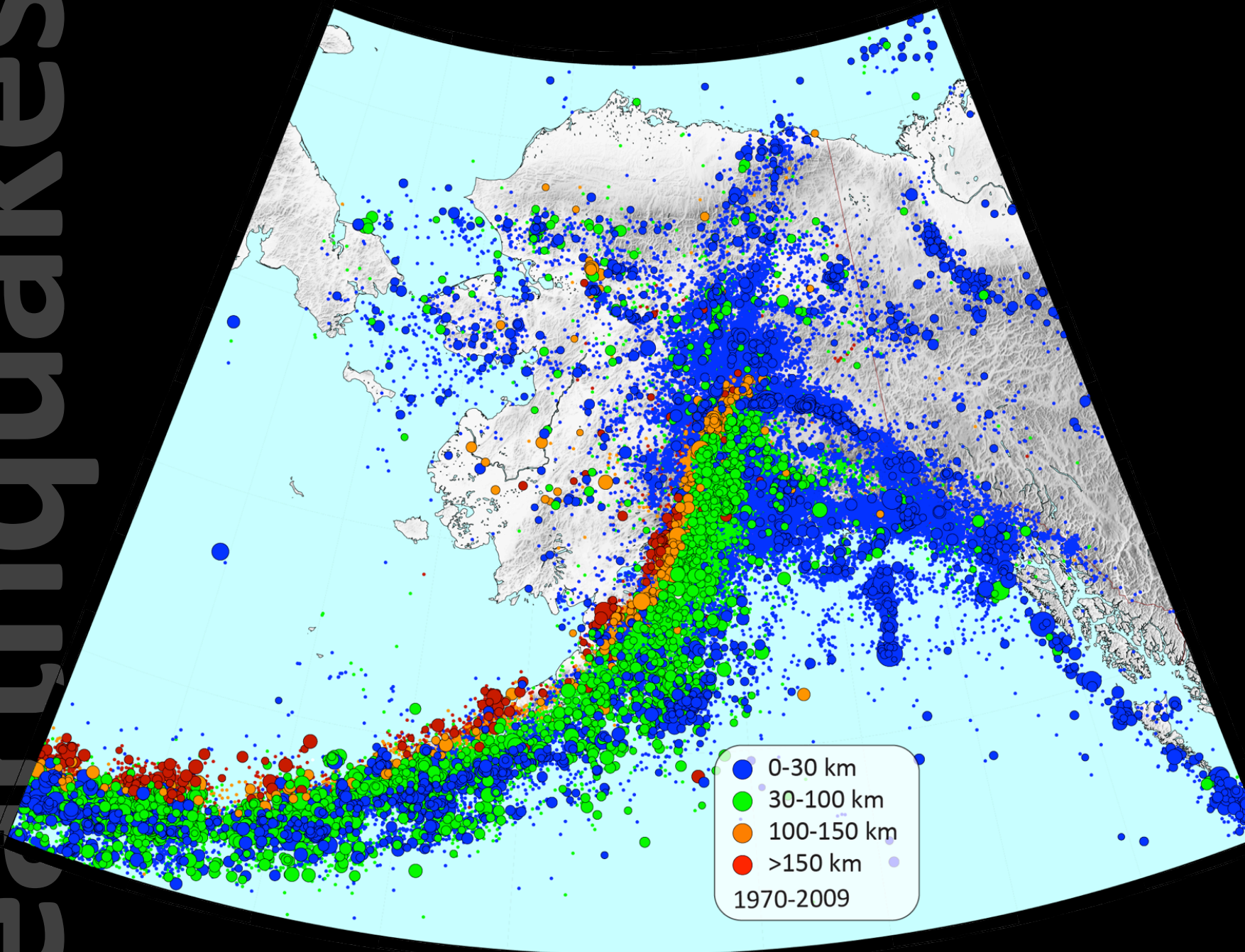
Tidbits from Alaska (with hopeful relevance to Antelope community)



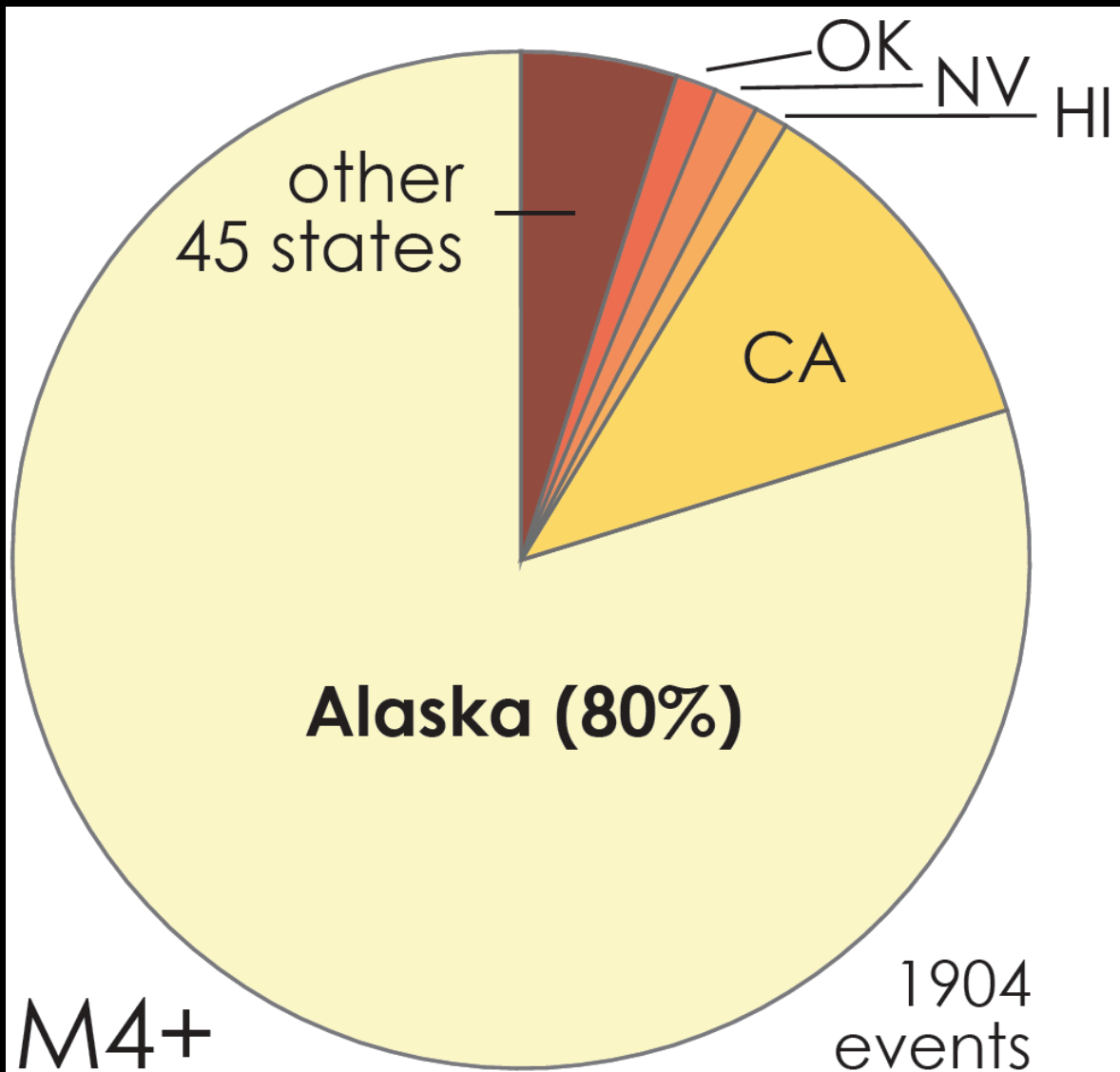
**ALASKA
EARTHQUAKE
CENTER**

Seismicity

earthquakes



earthquakes



M4+

1904
events

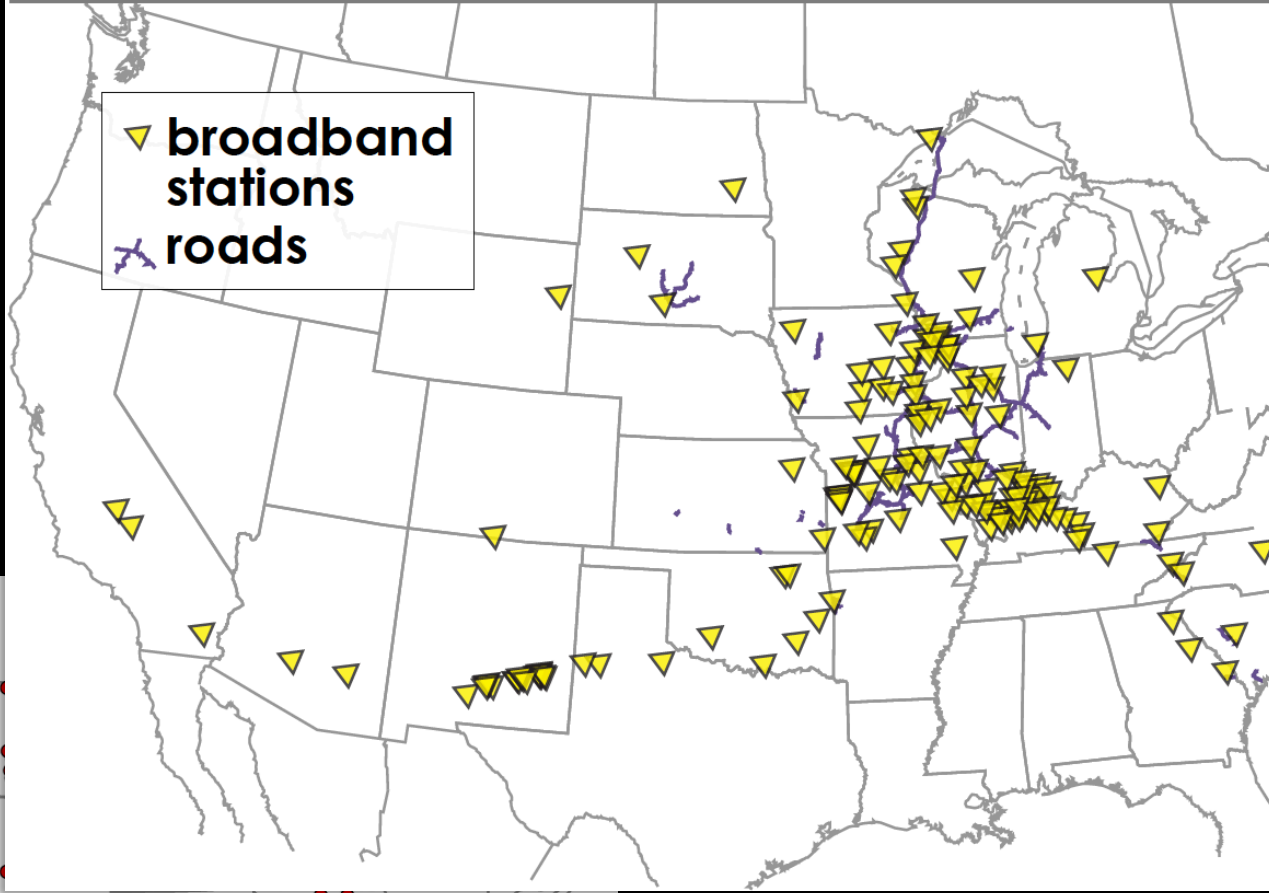
2009-2014

RELATIVE SIZE OF ALASKA AND THE CONTIGUOUS U.S.

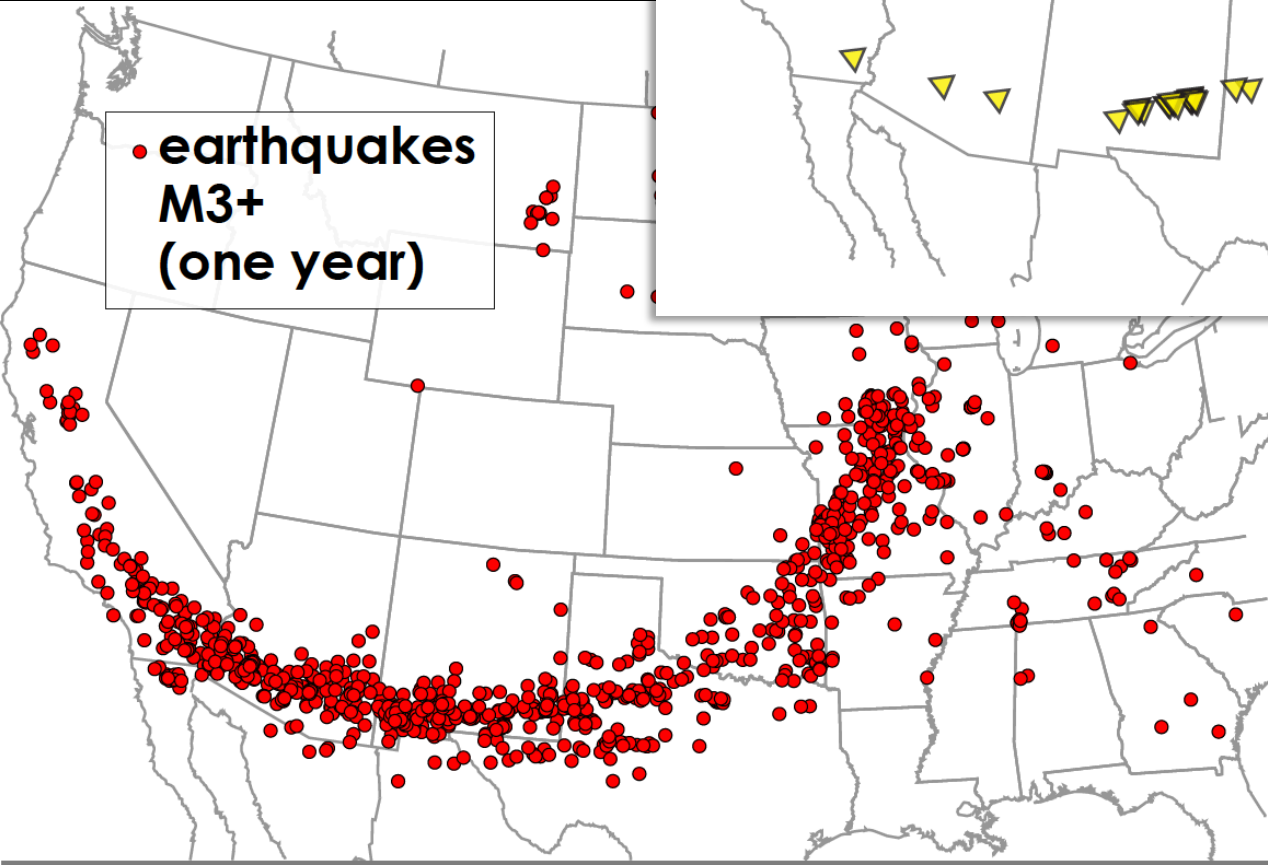
At 591,000 square miles, Alaska is as wide as the lower 48 states and larger than Texas, California, and Montana combined.



▼ broadband stations
✚ roads



• earthquakes
M3+
(one year)



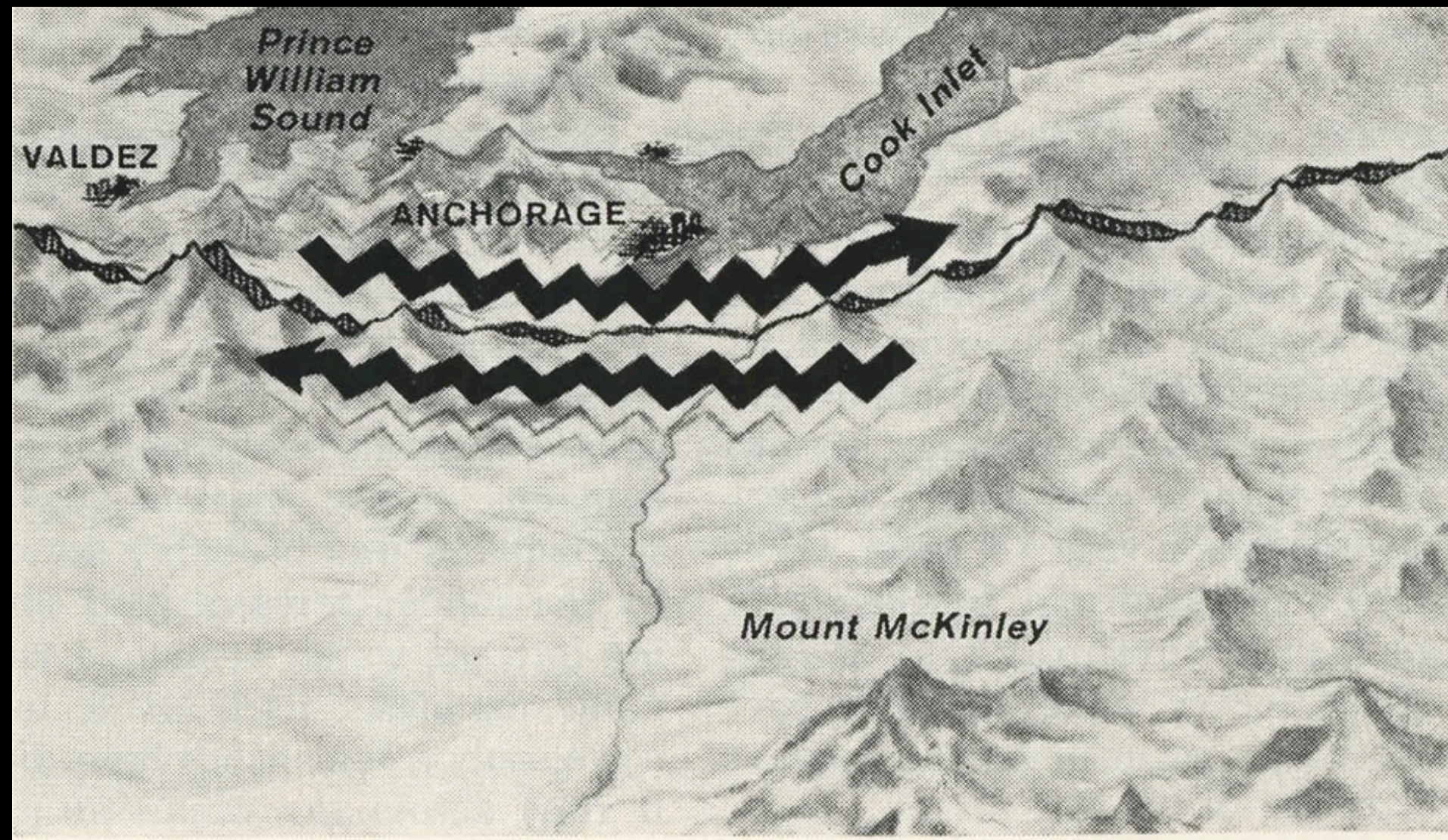
Seismicity

emphasis on efficiency

need flexibility across network

need to think teleseismic

big earthquakes



Life Magazine, April 10, 1964

1964

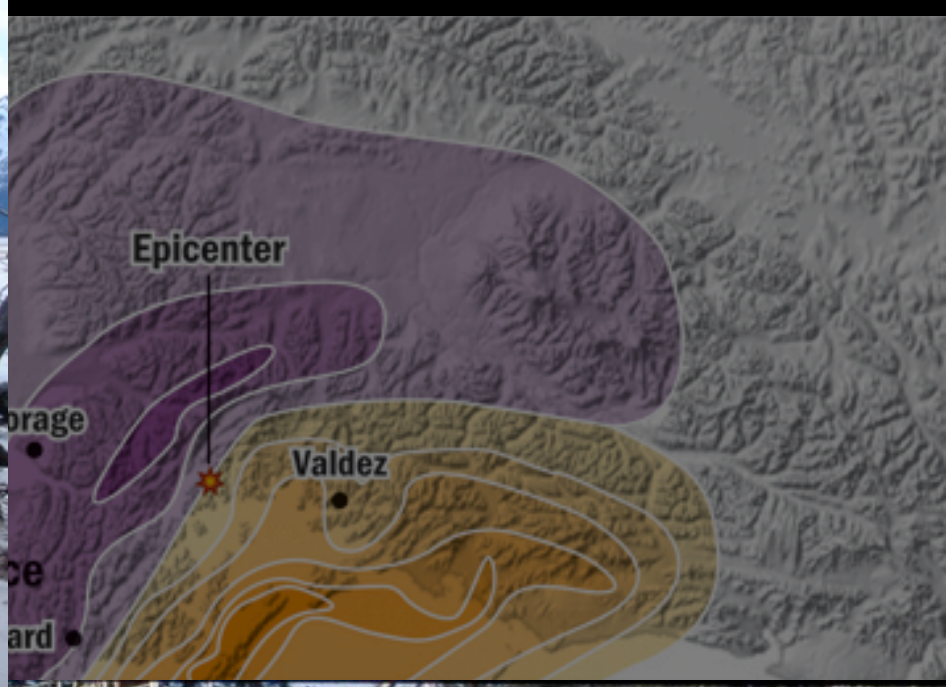
rupture zone

500 kilometers
300 miles

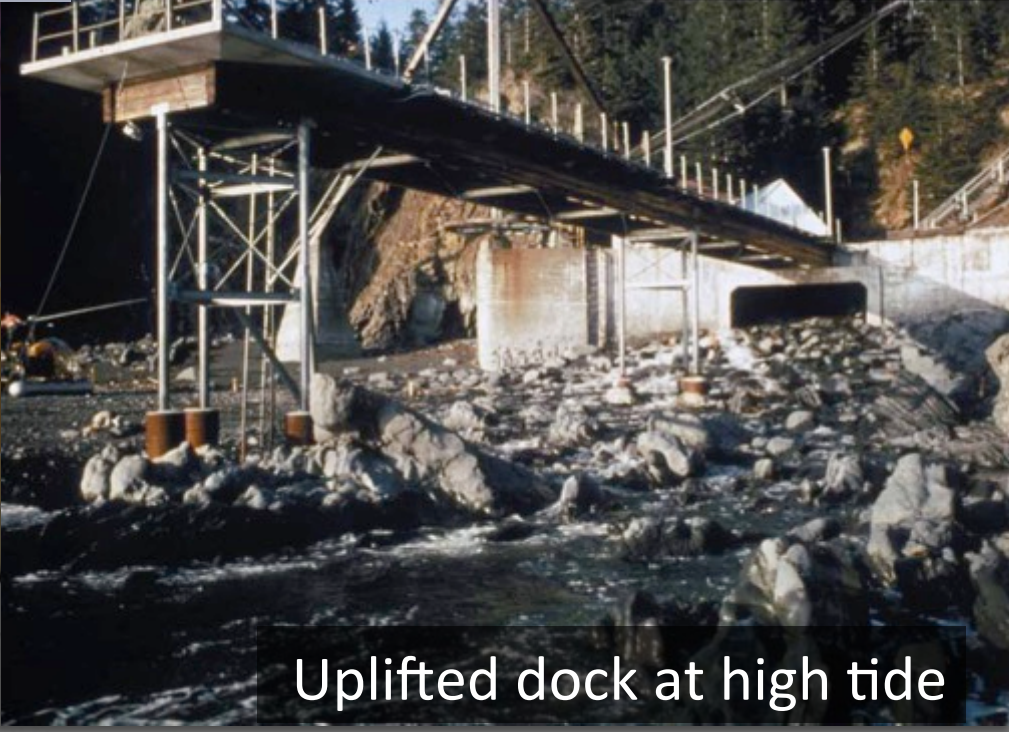
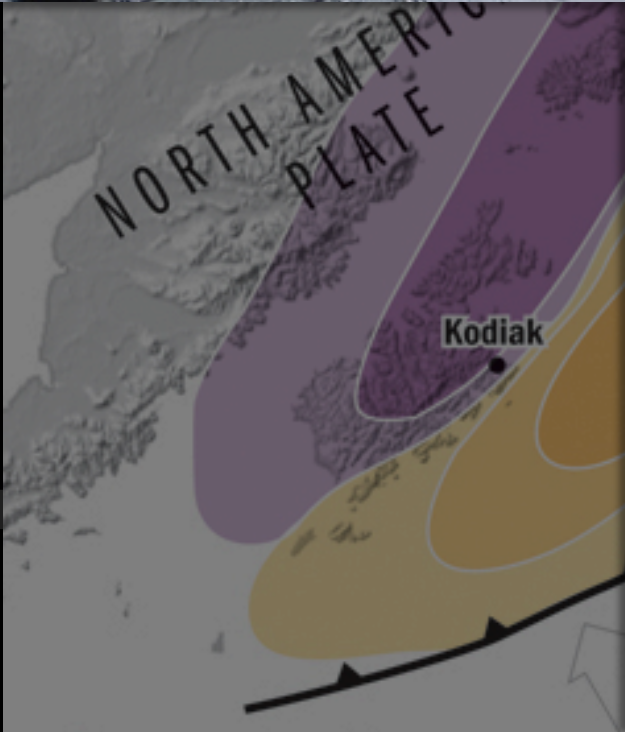




'ghost forest'

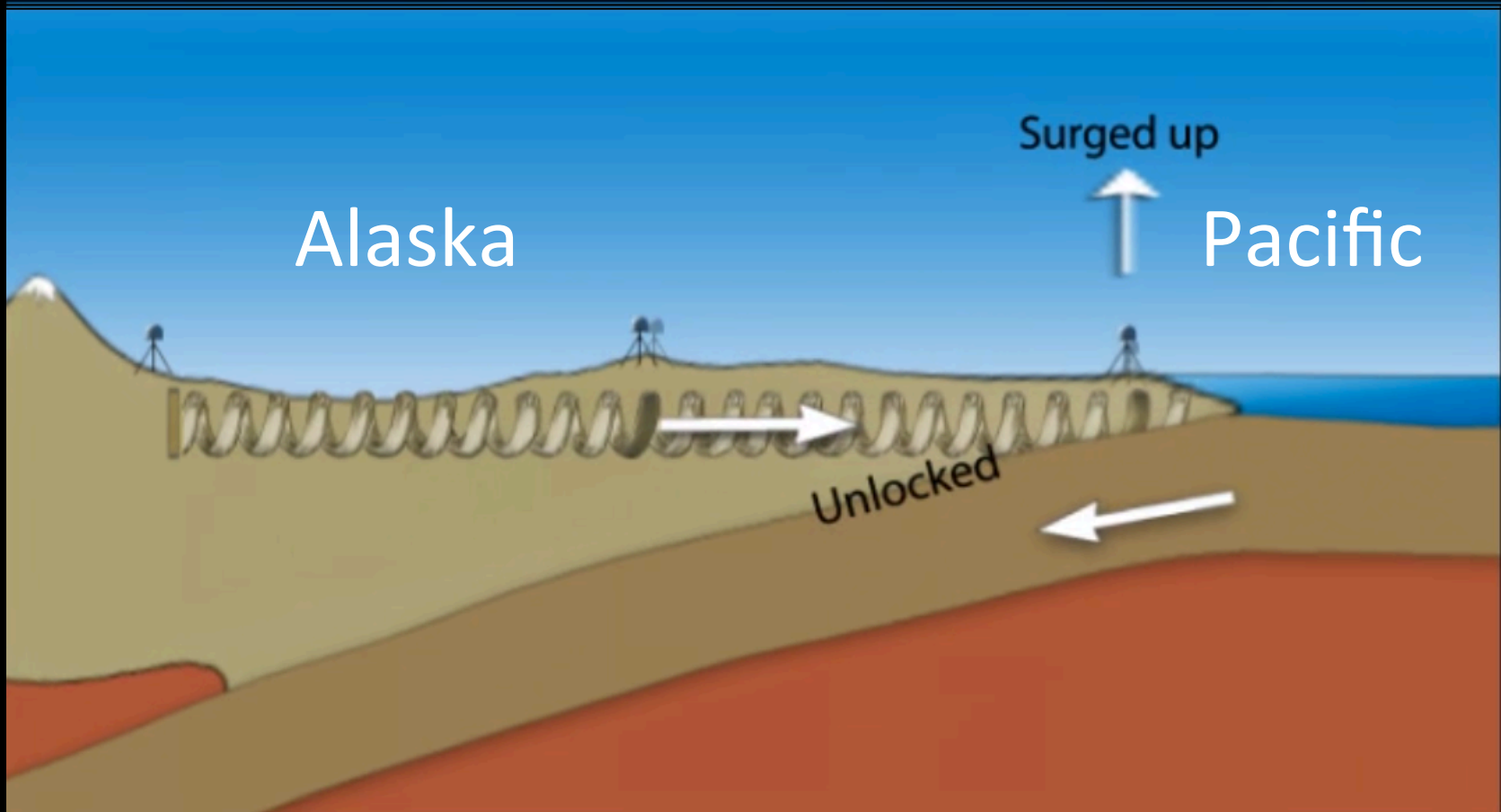


Up & down



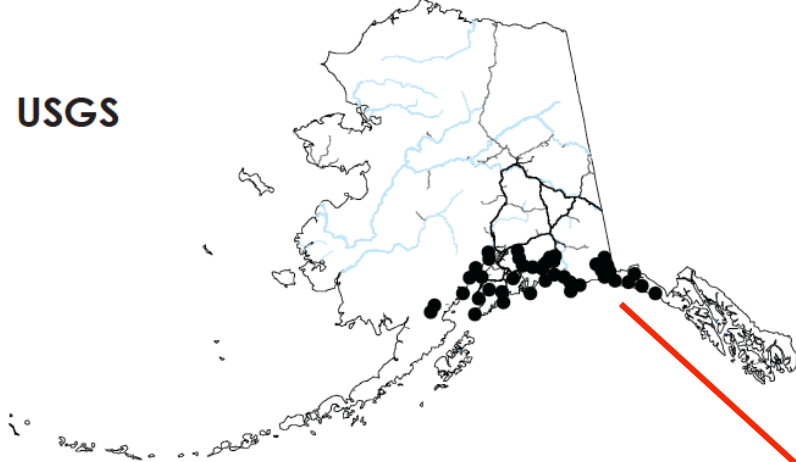
Uplifted dock at high tide

compression



history

USGS

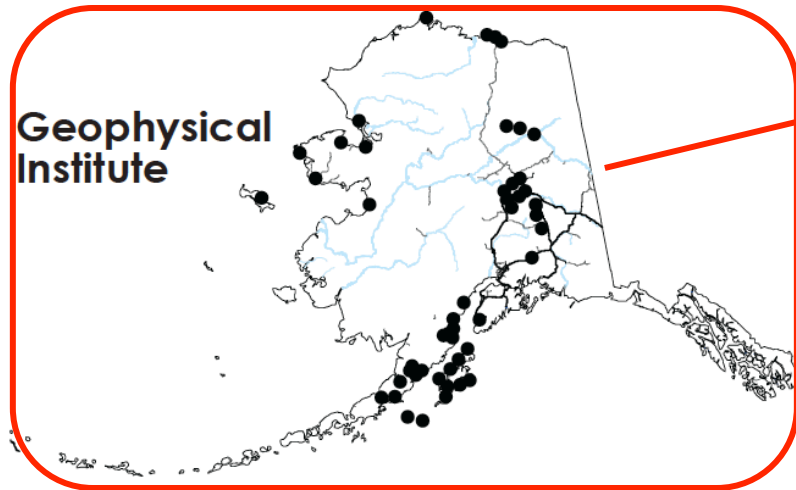


today

**ALASKA
EARTHQUAKE
CENTER**

*AVO, ANSS
ARRA, STEEP, ...*

**Geophysical
Institute**



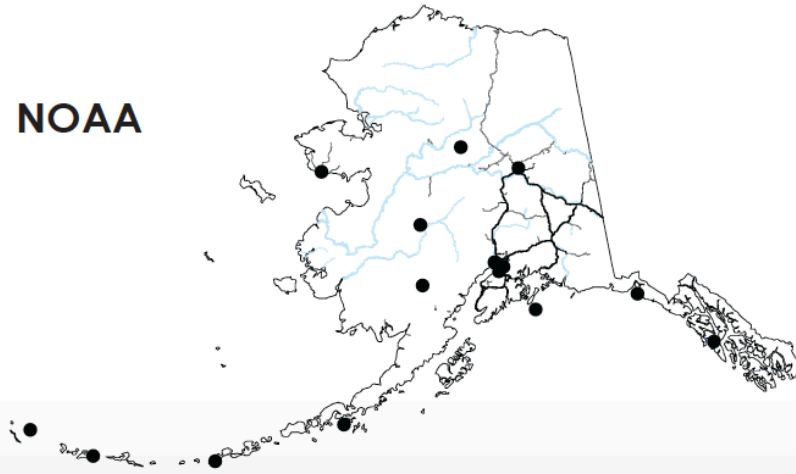
1989

MOU between
GI & USGS

1987

earthquake/volcano
hazards program
AS 14.40.075

NOAA



1980

Adapted from Gedney, 1980

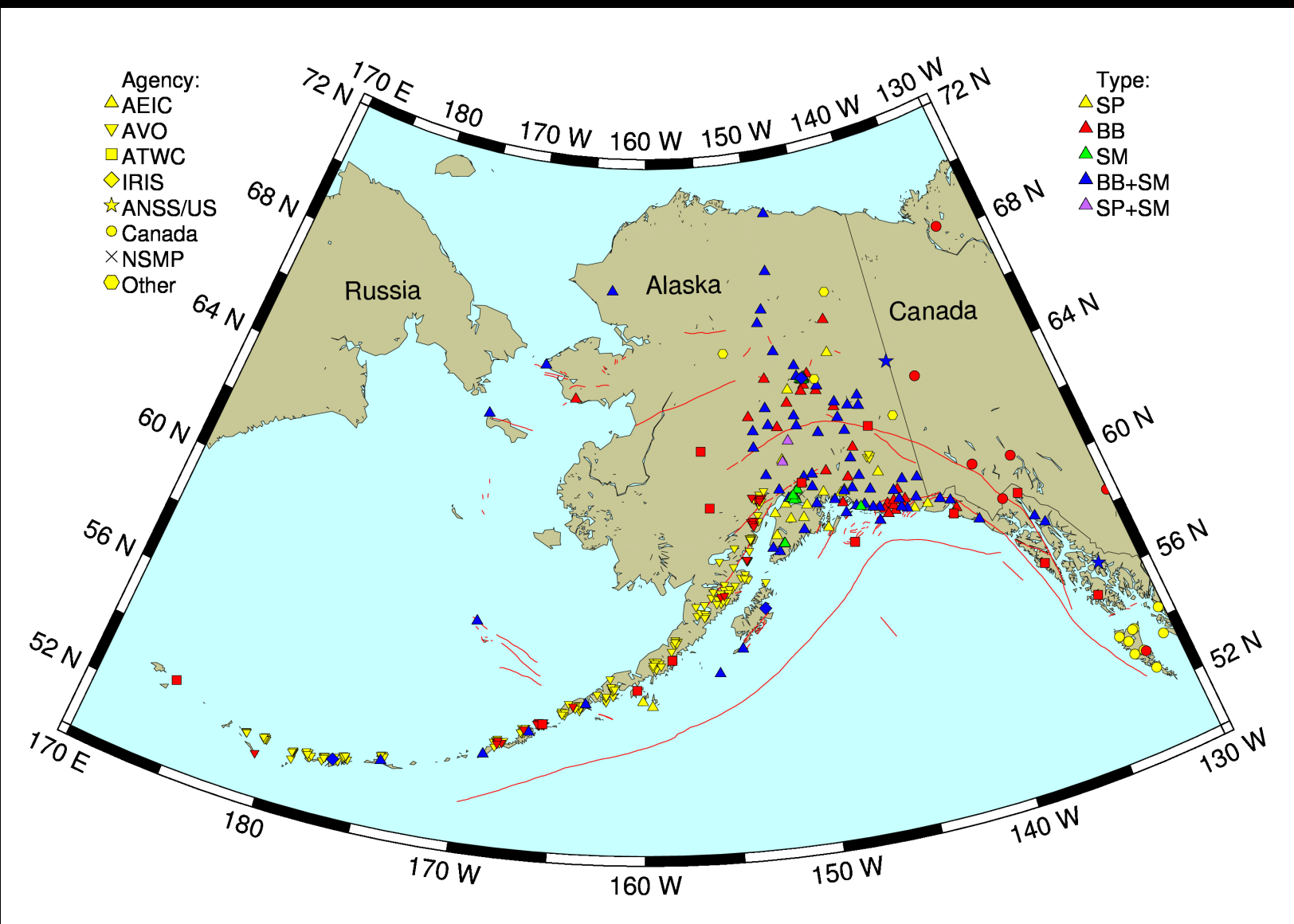
big earthquakes

need capabilities at large magnitudes

moment tensors

GPS integration

collaboration



sharing

Alaska Volcano Observatory
EW + AQMS (Winston wave servers)

National Tsunami Warning Center
EW + earlybird (--> Seiscomp3)

NEIC
Hydra + ComCat

Generally in good shape

Platform neutral protocols such as Seedlink are positive development

parametric

Tedious at times but fine

QuakeML is positive step

metadata

Fine at present, though no one loves it.

StationXML is positive

a huge undertaking

Poorly directed in ANSS

Needs leadership (IRIS?)

collaboration

*Good to embrace platform independent protocols
(at least the good ones!)*

stationXML should not be in-house development

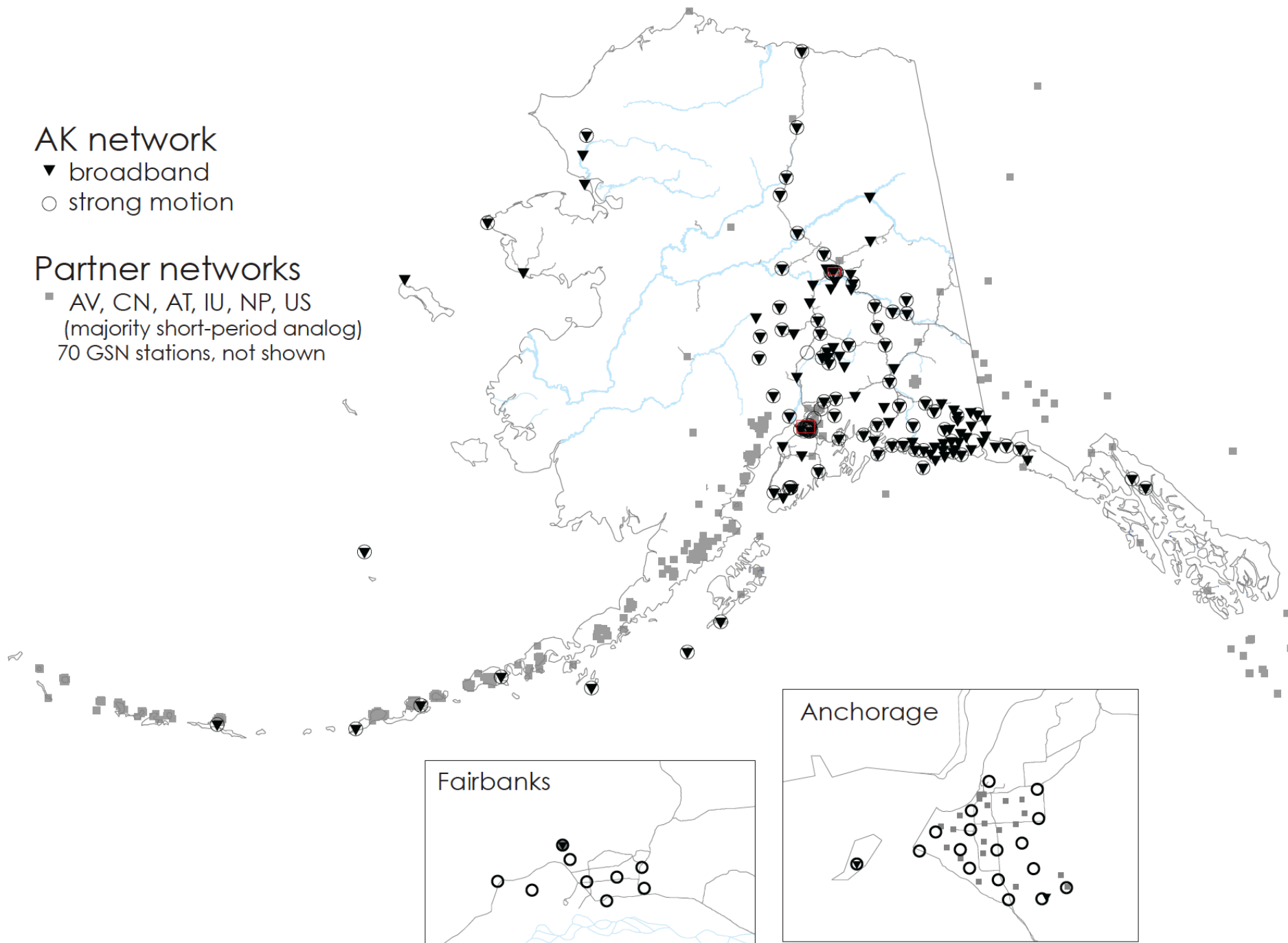
network

AK network

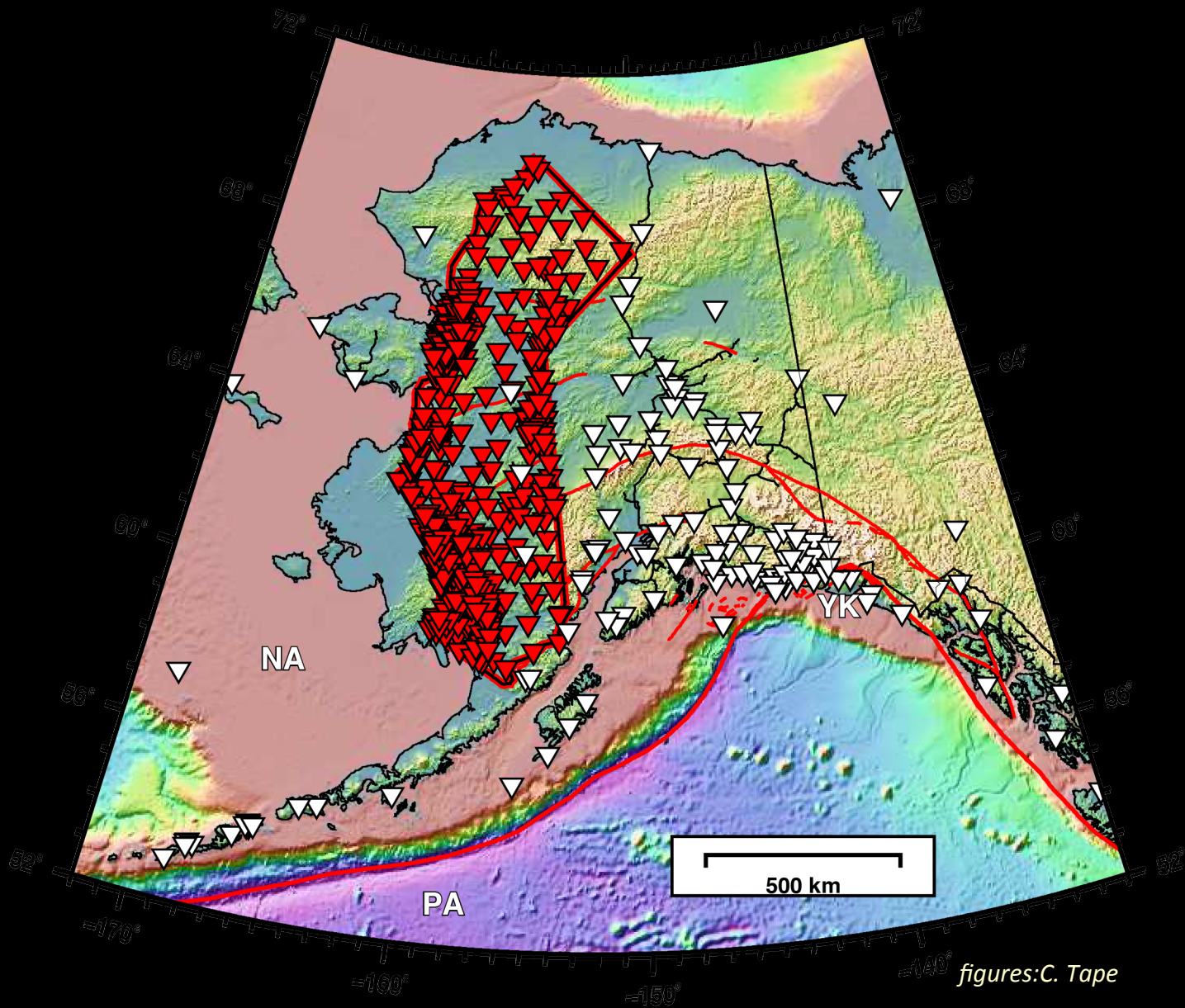
- ▼ broadband
- strong motion

Partner networks

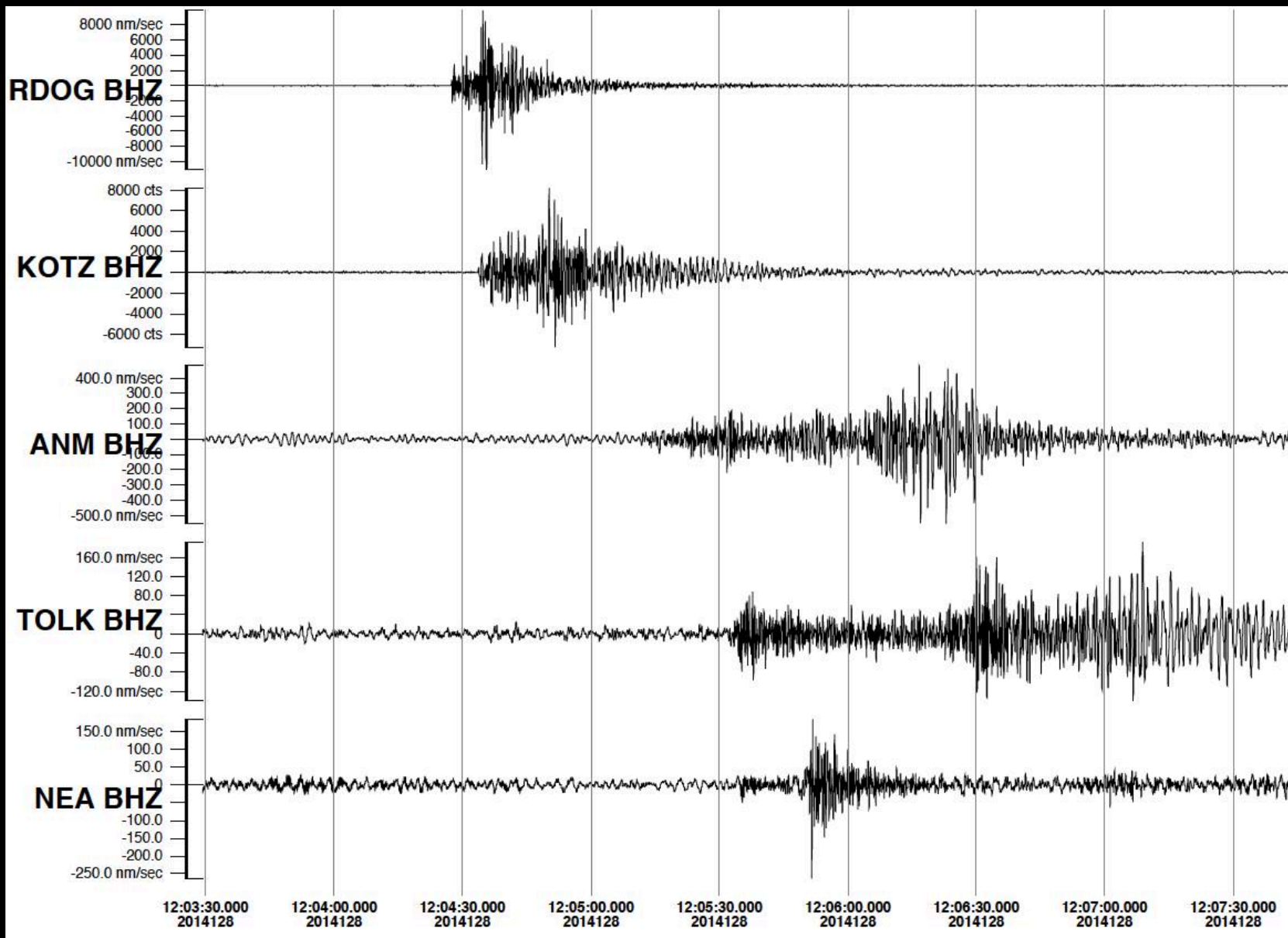
- AV, CN, AT, IU, NP, US
(majority short-period analog)
70 GSN stations, not shown



coverage



data



posthole



LunDrill at Piñon Flat Observatory

network

huge variation in station density

benefit greatly from Q330-Antelope integration

AUG should be proactive about “dirt to desktop”

Hardware

- 3x Dell PowerEdge R720 servers
 - 2x Xeon 6-core CPU
 - 192GB RAM
- 2x Dell EqualLogic SAN devices
 - 7.2TB high-speed 15k drives
 - 96TB high-capacity 7.2k drives



- Virtualization through VMWare ESXi hypervisor and vSphere Enterprise v5.5
- Located in UA Data Center on UAF campus
- Seismically isolated racks, building-wide UPS protection

Next-Gen Infrastructure

Short-term Goals

- Mirror existing acquisition and processing onto virtual machines
- Streamline database processing
- Integrate Datascope databases with web-facing MySQL databases
- Improve website performance to handle high-volume of public hits following a notable earthquake

Long-term Goals

- Place servers in facility with backup generator capacity
- Plan for off-site secondary systems in case of catastrophic failure (earthquake, internet outage, long duration power outage, etc.)

Hardware

Significant AUG input into design

hardware transition has been fairly smooth

software transition is bigger opportunity

earthquake early warning

early warning

CISN ShakeAlert User Display Version 2 (Build 20130501)

Settings Play Event Show Log Disclaimer View News Silence Mute

Light Shaking Expected

Event Playback 15178
OriginTime Sun Aug 24 03:20:44 PDT 2014
Location is 23 miles (37 km) V/NW of your location

Remaining Time

5

Expected Intensity **IV** Estimated Mag **5.7**

Probability of Correct Alarm High

地震情報
The Last 10 second

到着まで **27**秒

所在地
推定震度 1

earthquake early warning

None at present. None planned.

Huge 'disruptive' potential

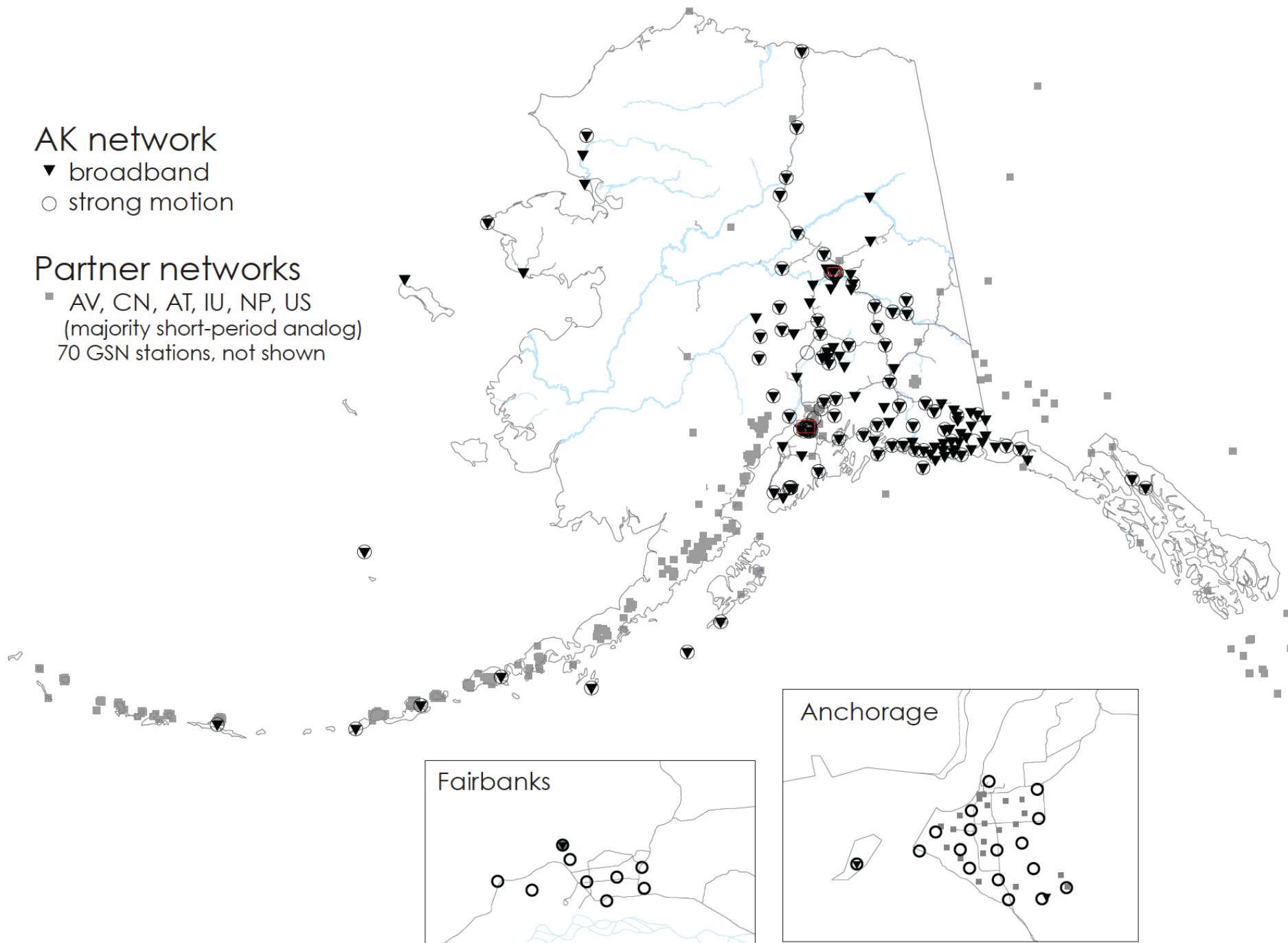
strong motion

AK network

- ▼ broadband
- strong motion

Partner networks

- AV, CN, AT, IU, NP, US
(majority short-period analog)
- 70 GSN stations, not shown

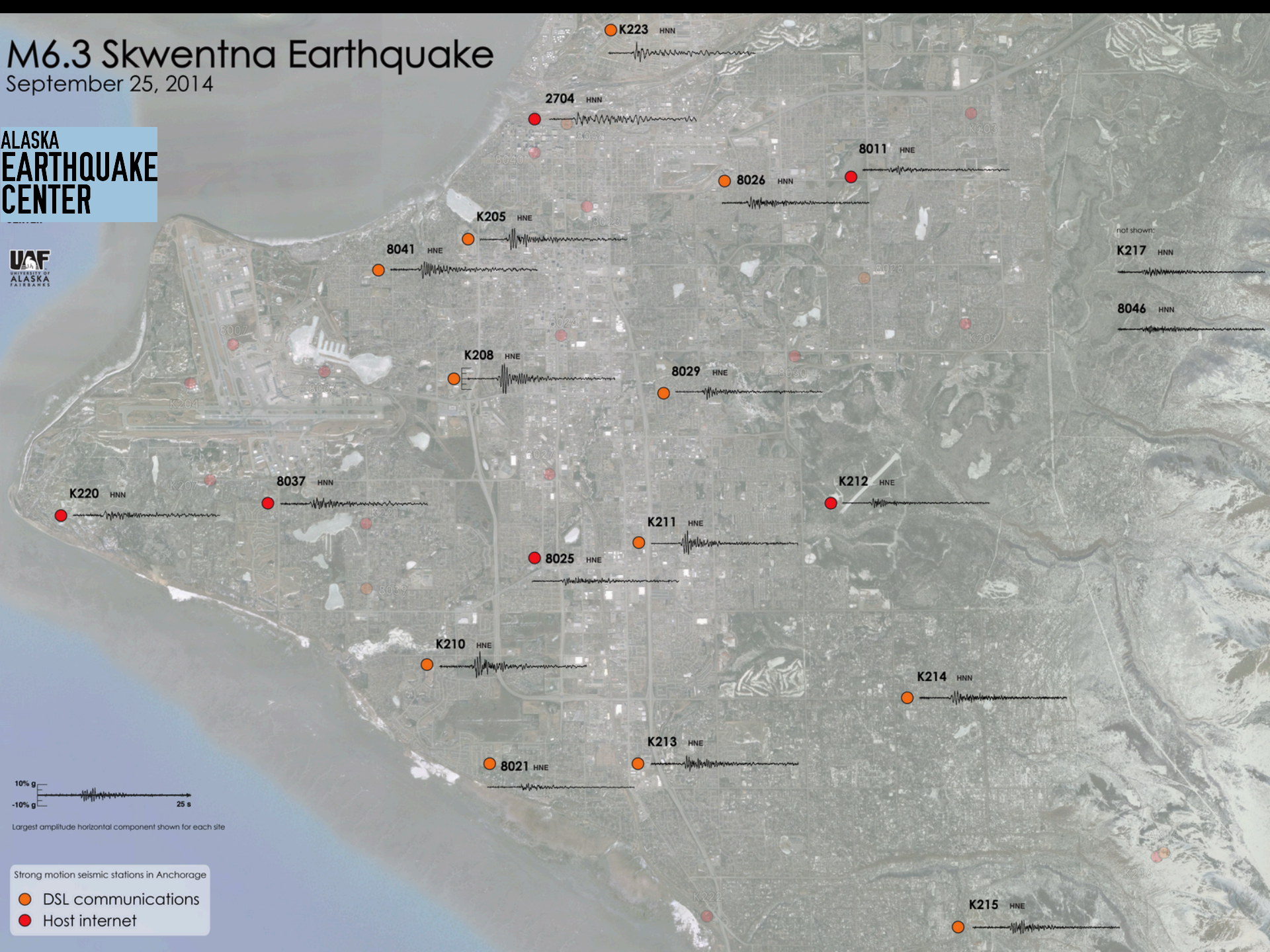


M6.3 Skwentna Earthquake

September 25, 2014

ALASKA
EARTHQUAKE
CENTER

UAF
UNIVERSITY OF
ALASKA
FAIRBANKS

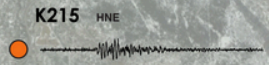


Largest amplitude horizontal component shown for each site

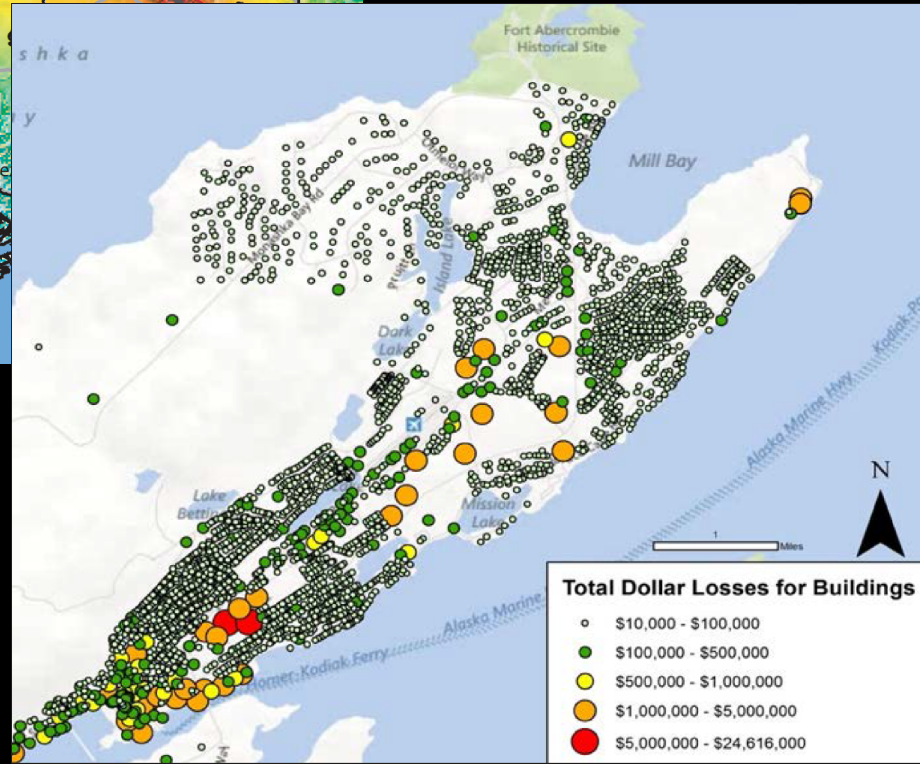
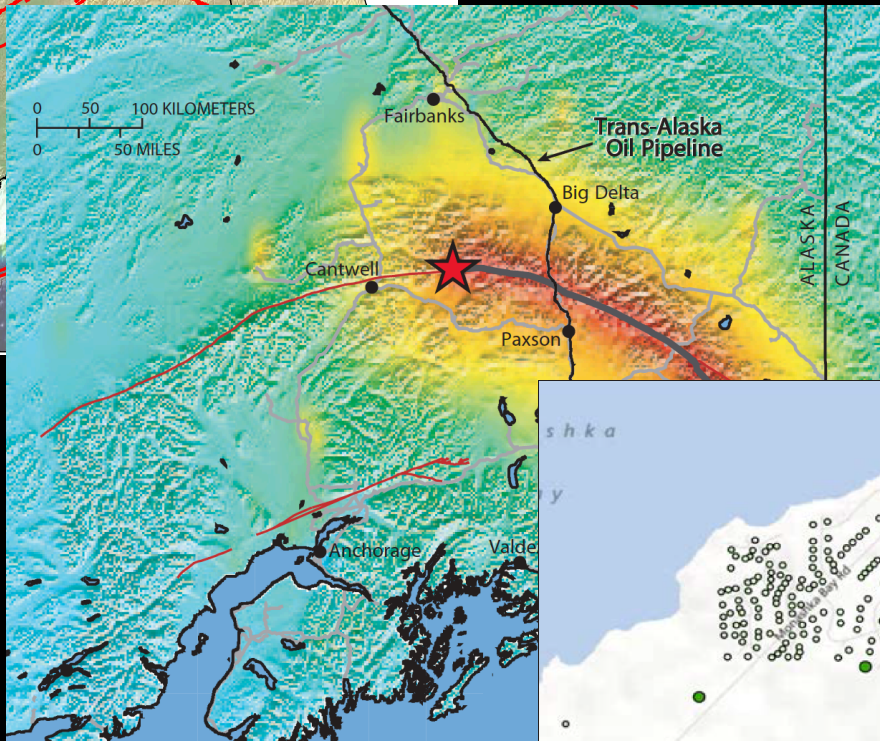
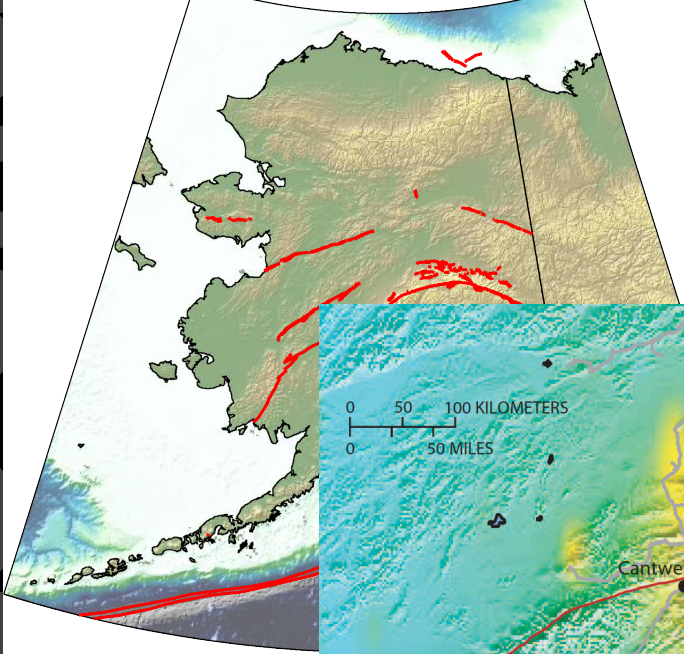
Strong motion seismic stations in Anchorage

- DSL communications
- Host internet

not shown:
K217 HNN
8046 HNN

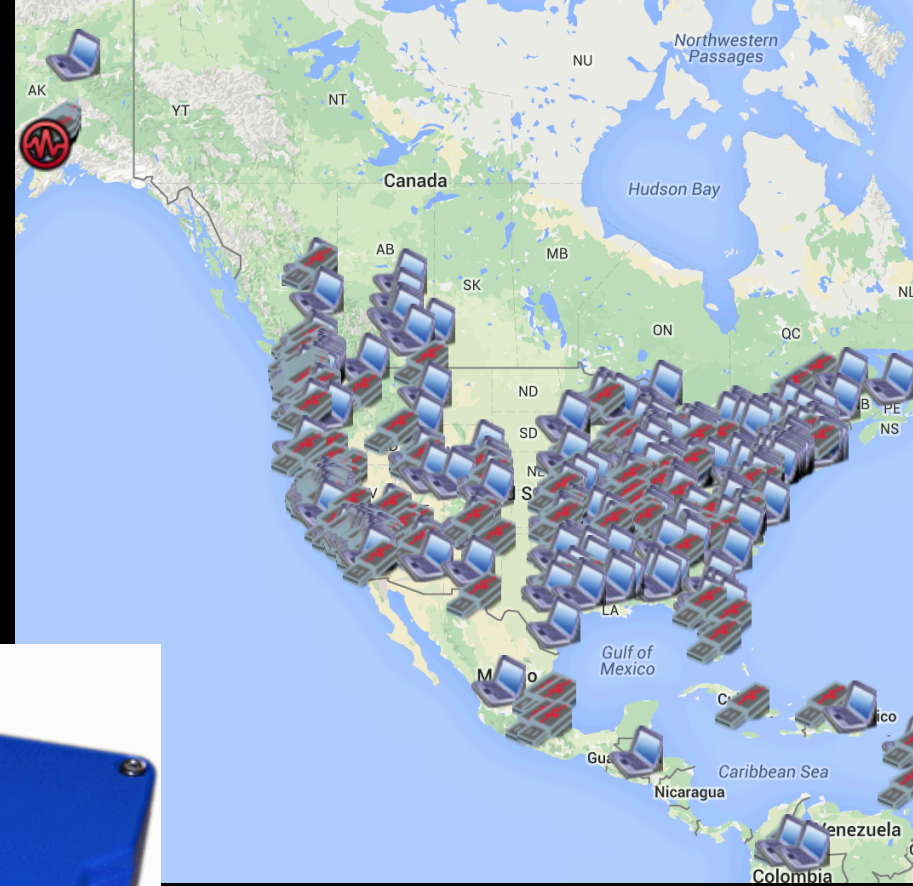


means to eno



low grade

'Community'
networks
are important



QCN

NetQuake

strong motion

strong motion connects us to people and mission

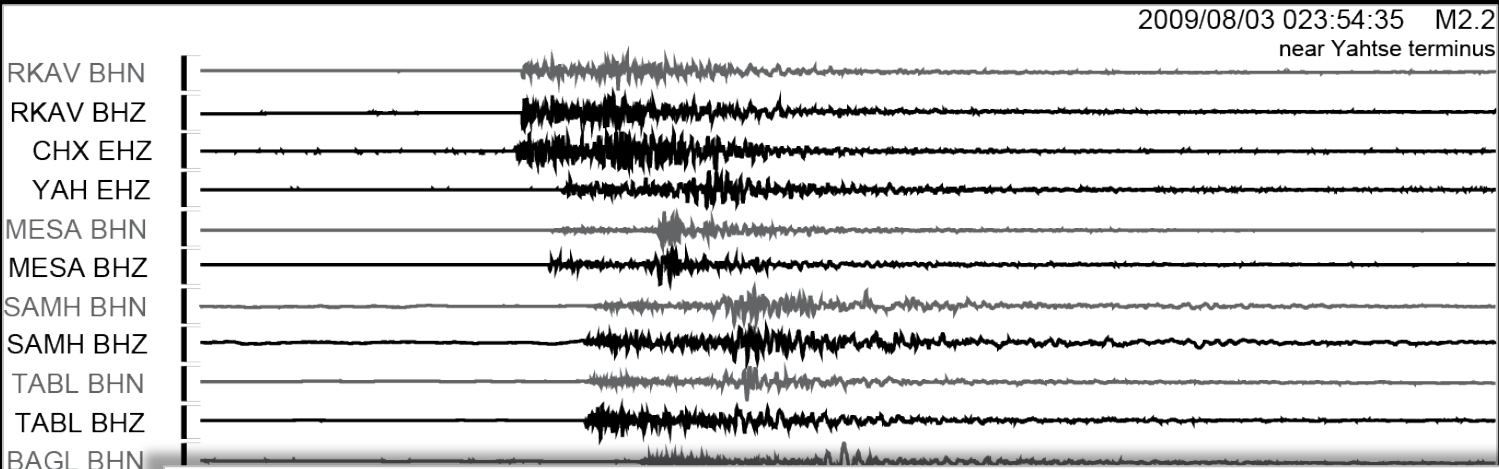
current strong motion data handling is messy

*Strong motion and c-class (?) sensors have
'disruptive' potential*

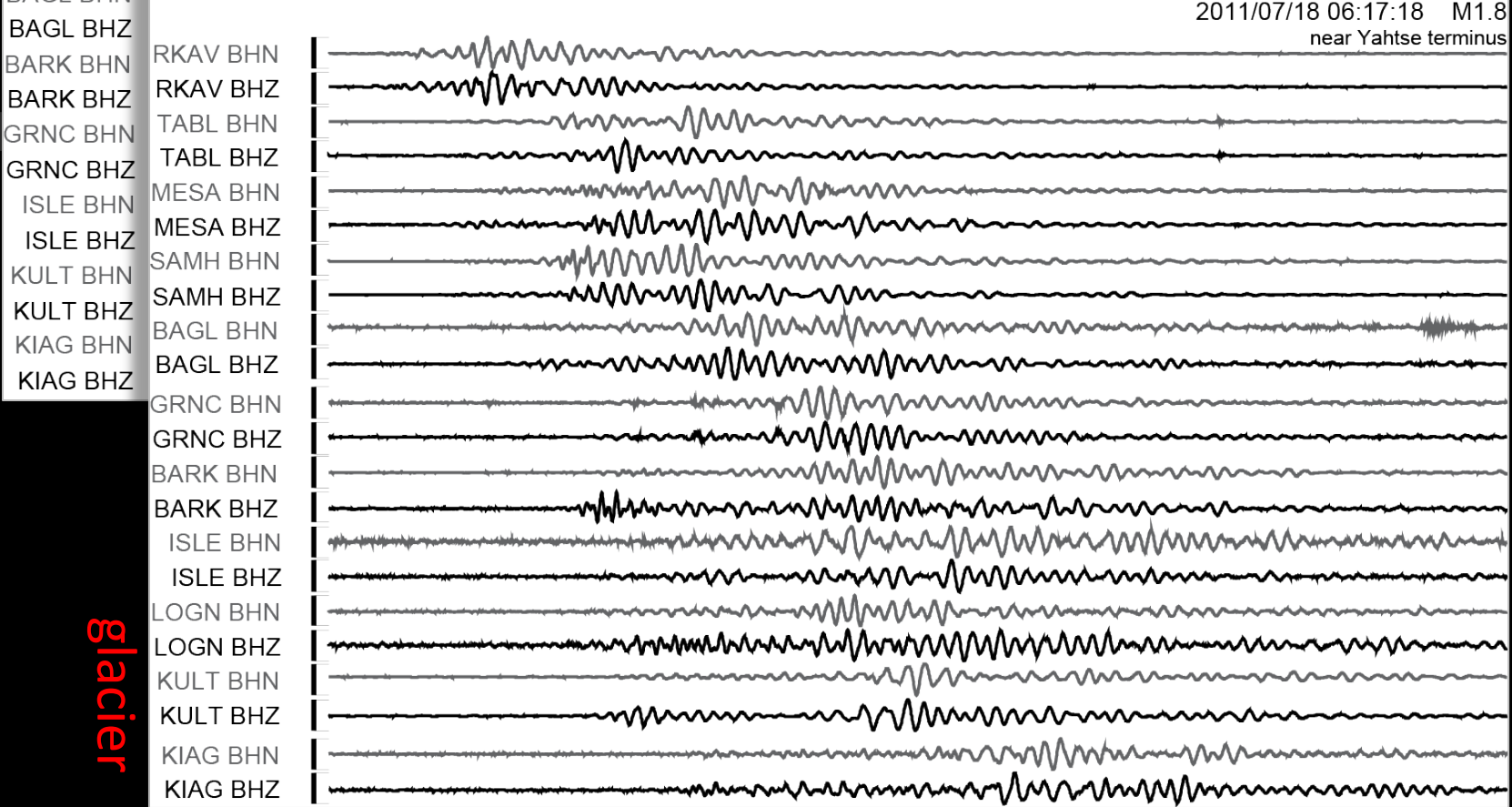
ice and glacier quakes

compare

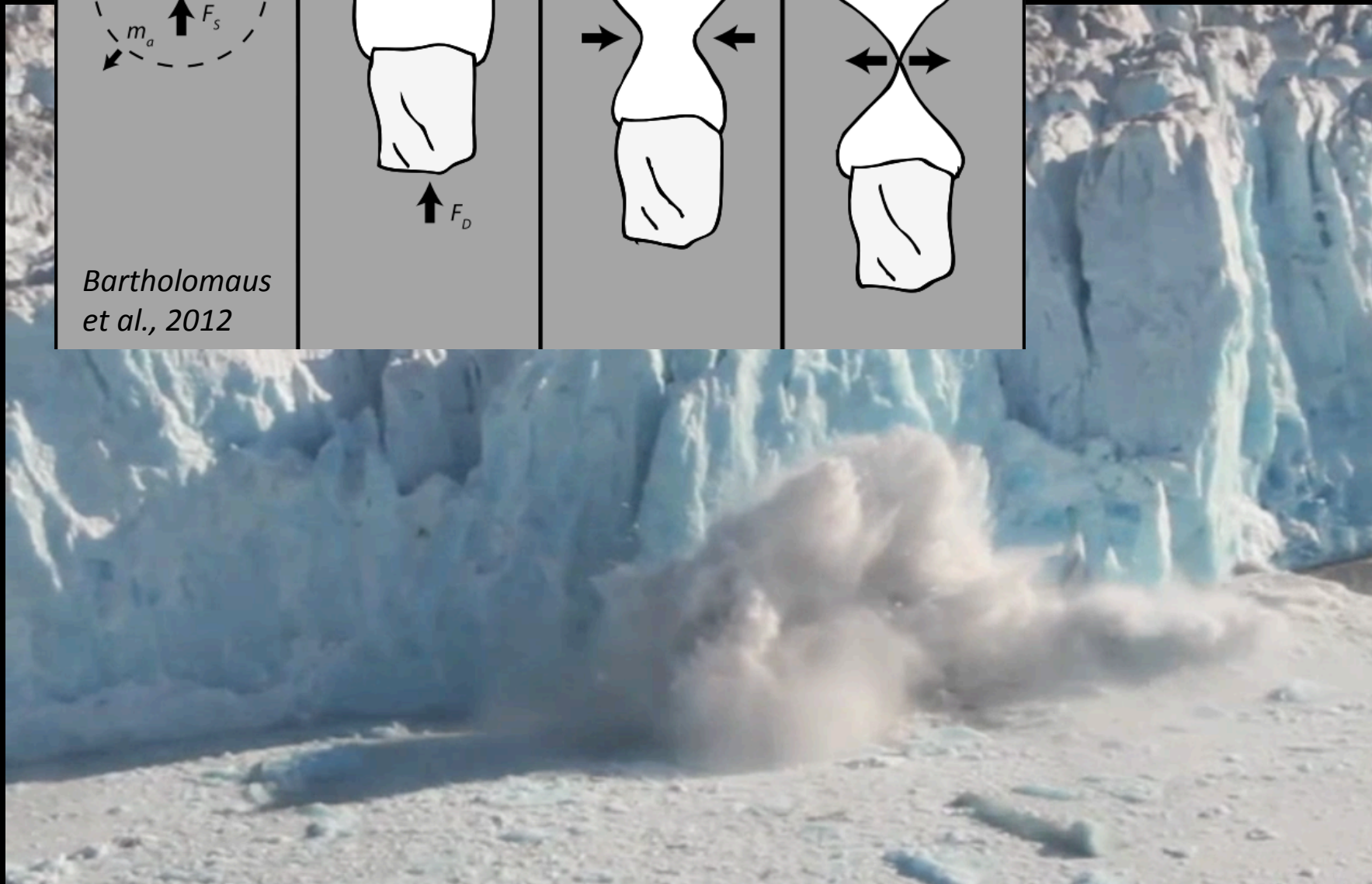
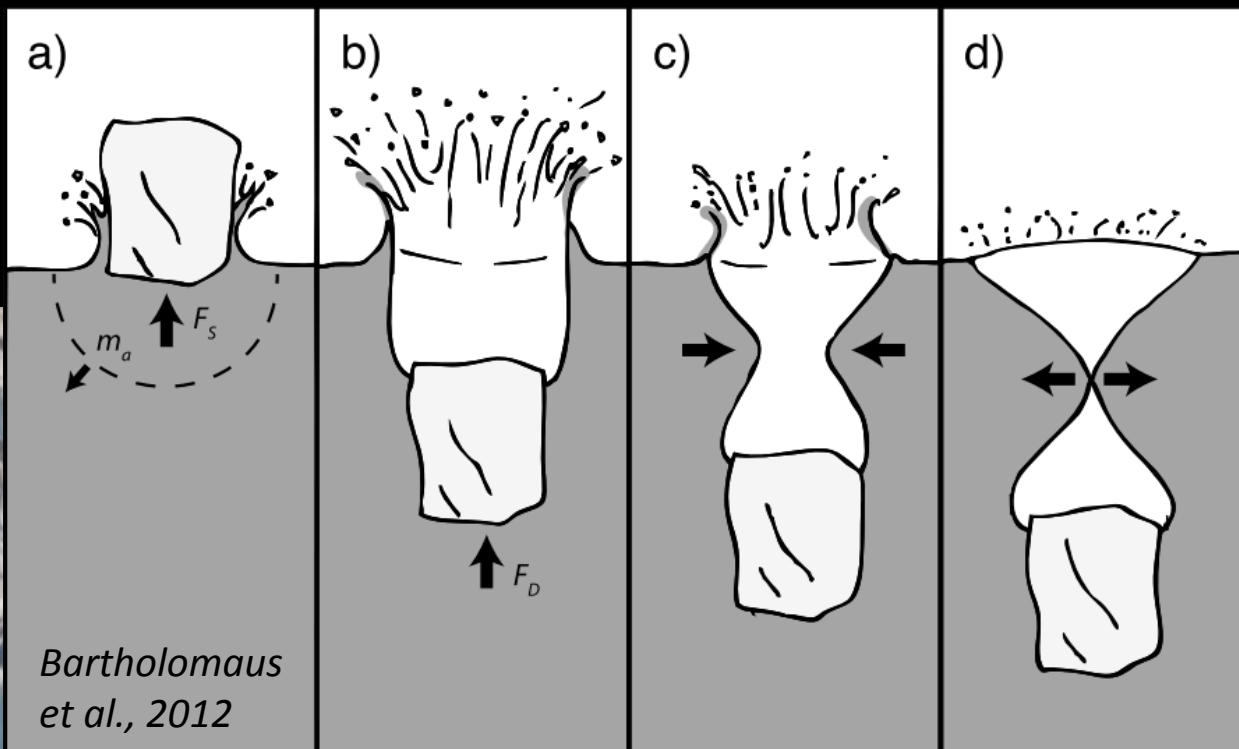
← 60 s →



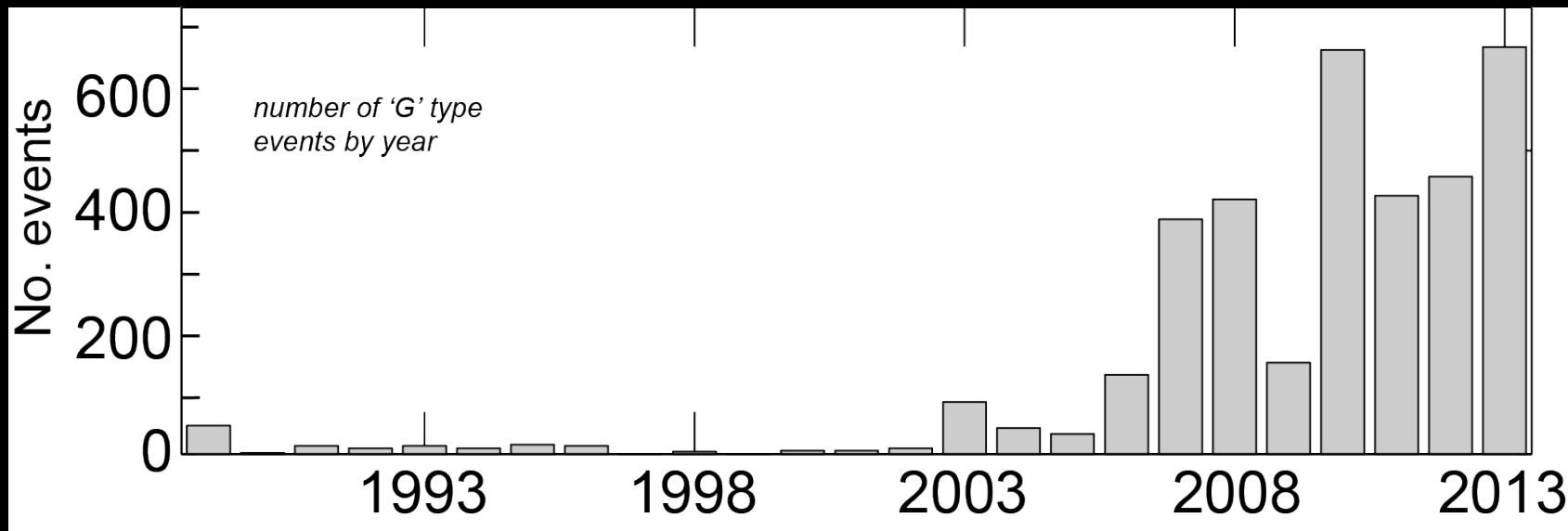
earthquake



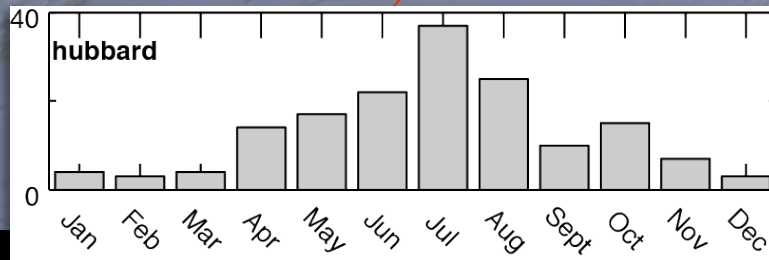
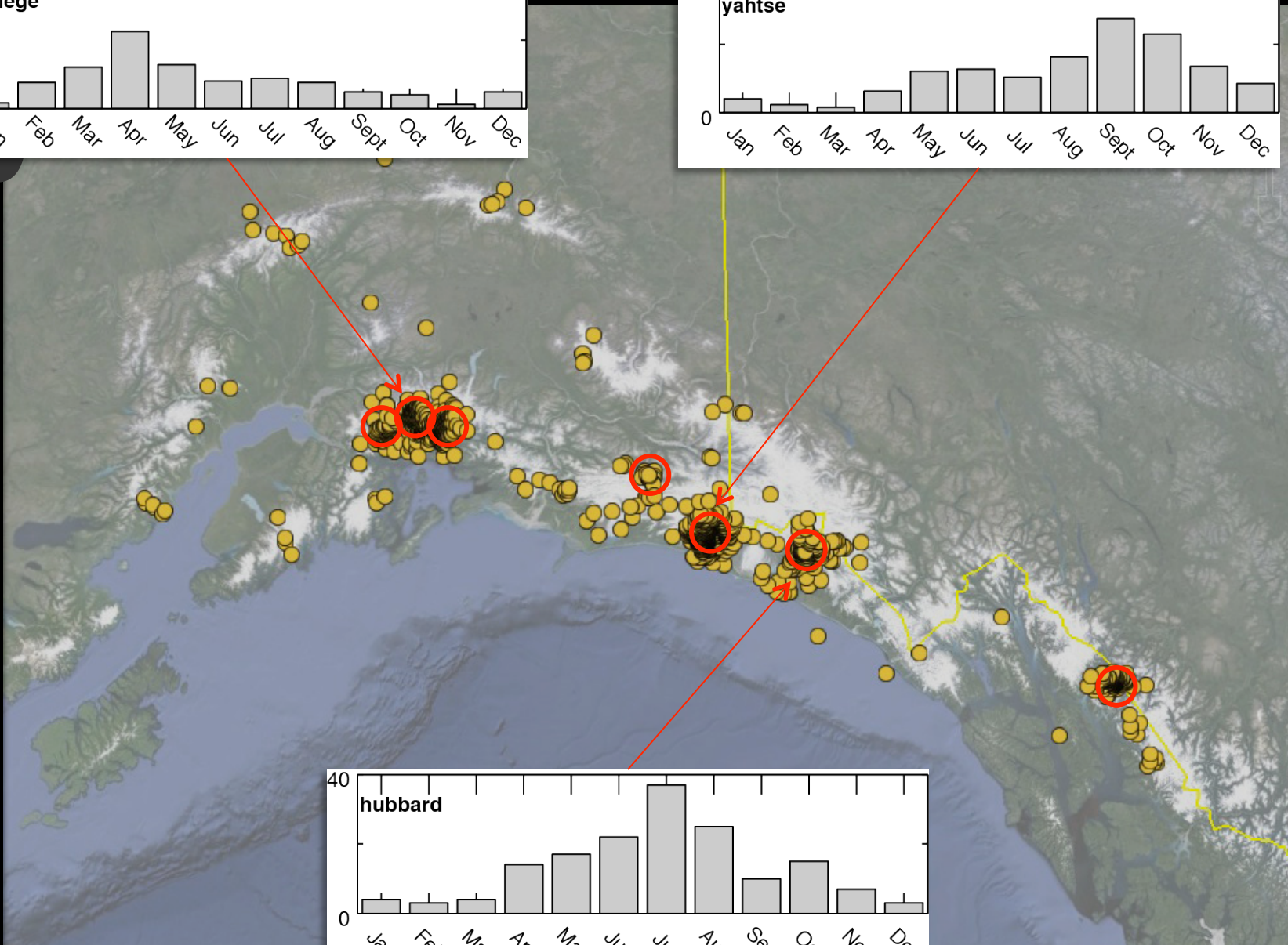
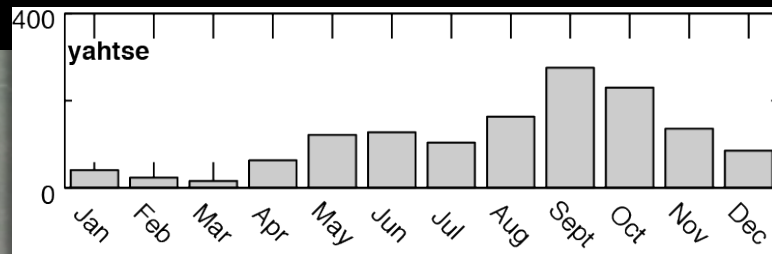
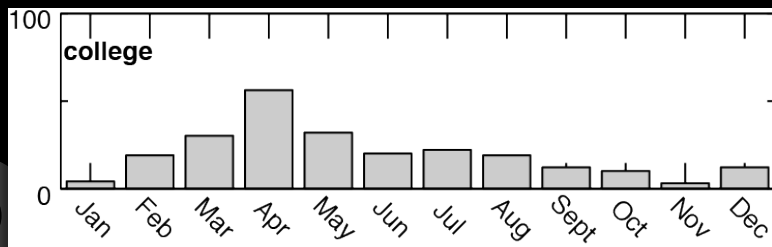
glacier



history



tracking



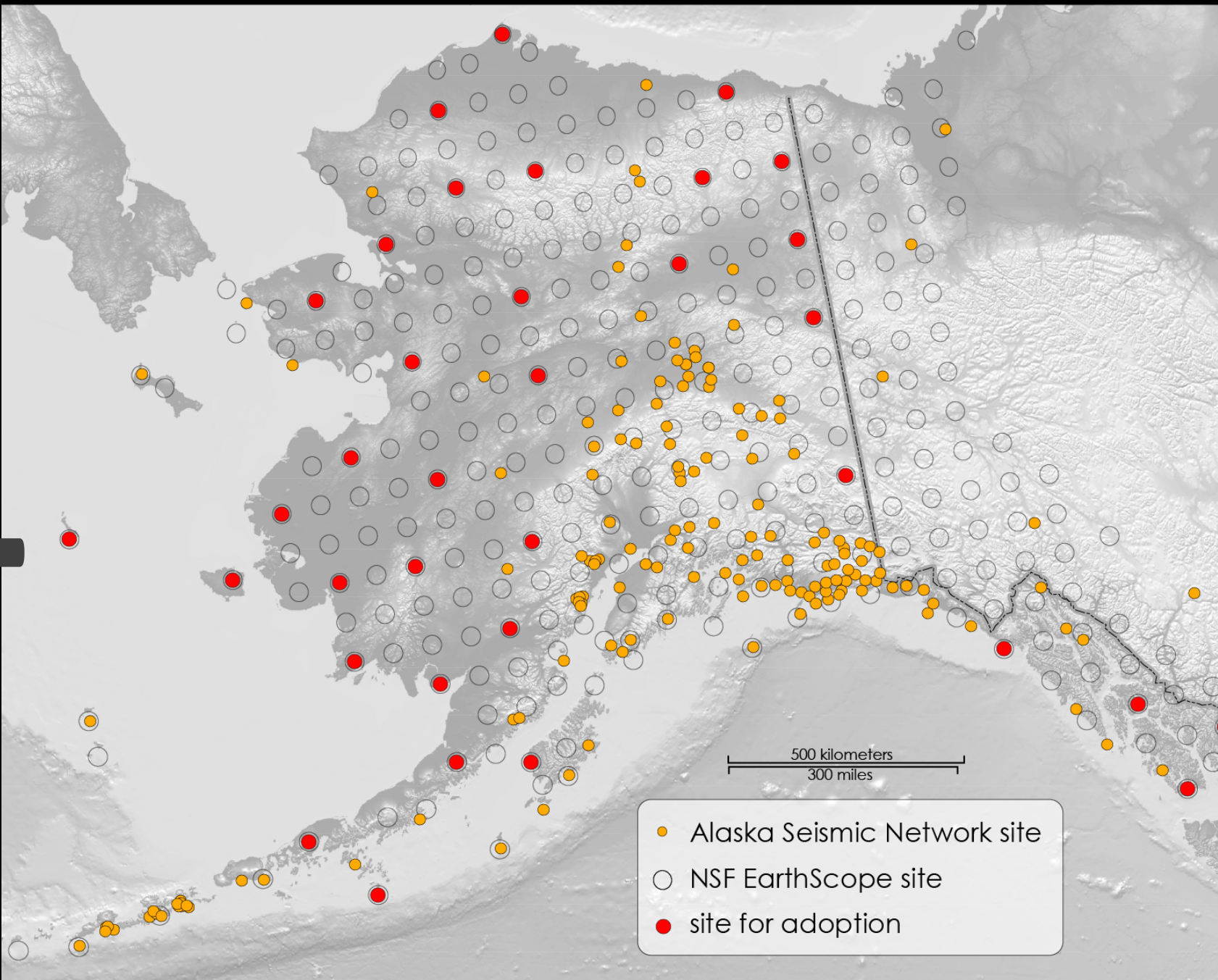
ice and glacier quakes

opportunity for a different kind of monitoring

alternate detection methods are best

NSArray

adoption

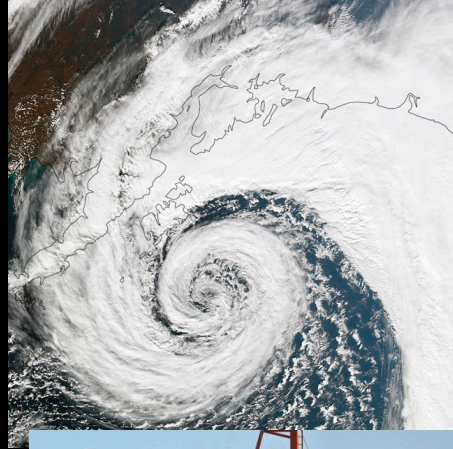




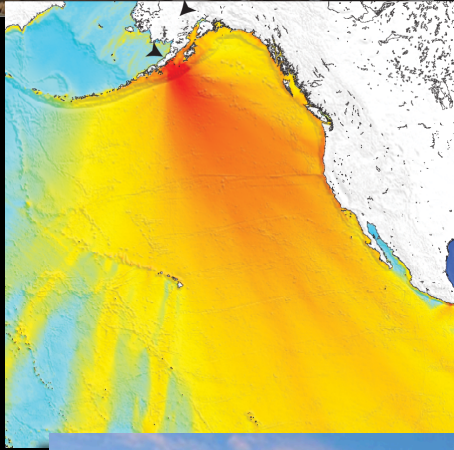
earthquake



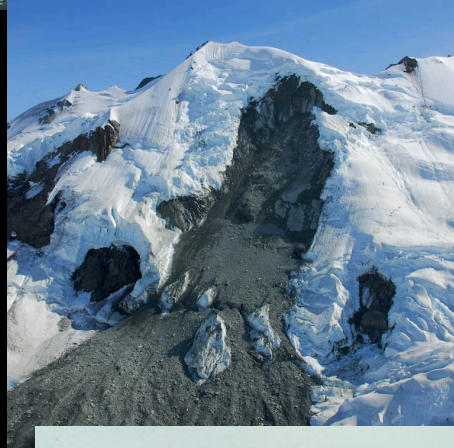
glacier



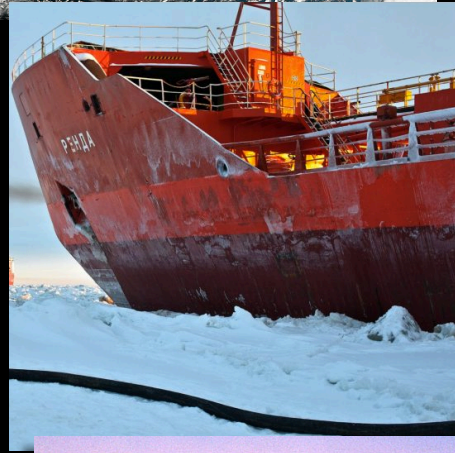
storm



tsunami



landslide



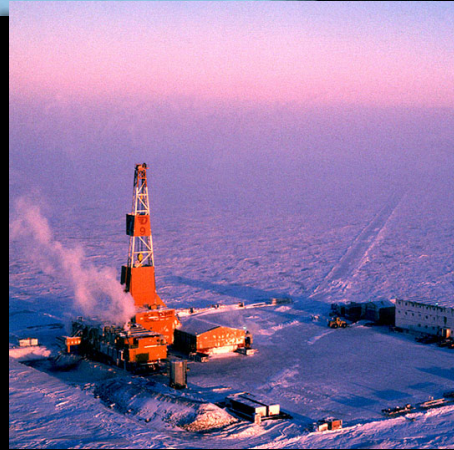
transportation



volcano

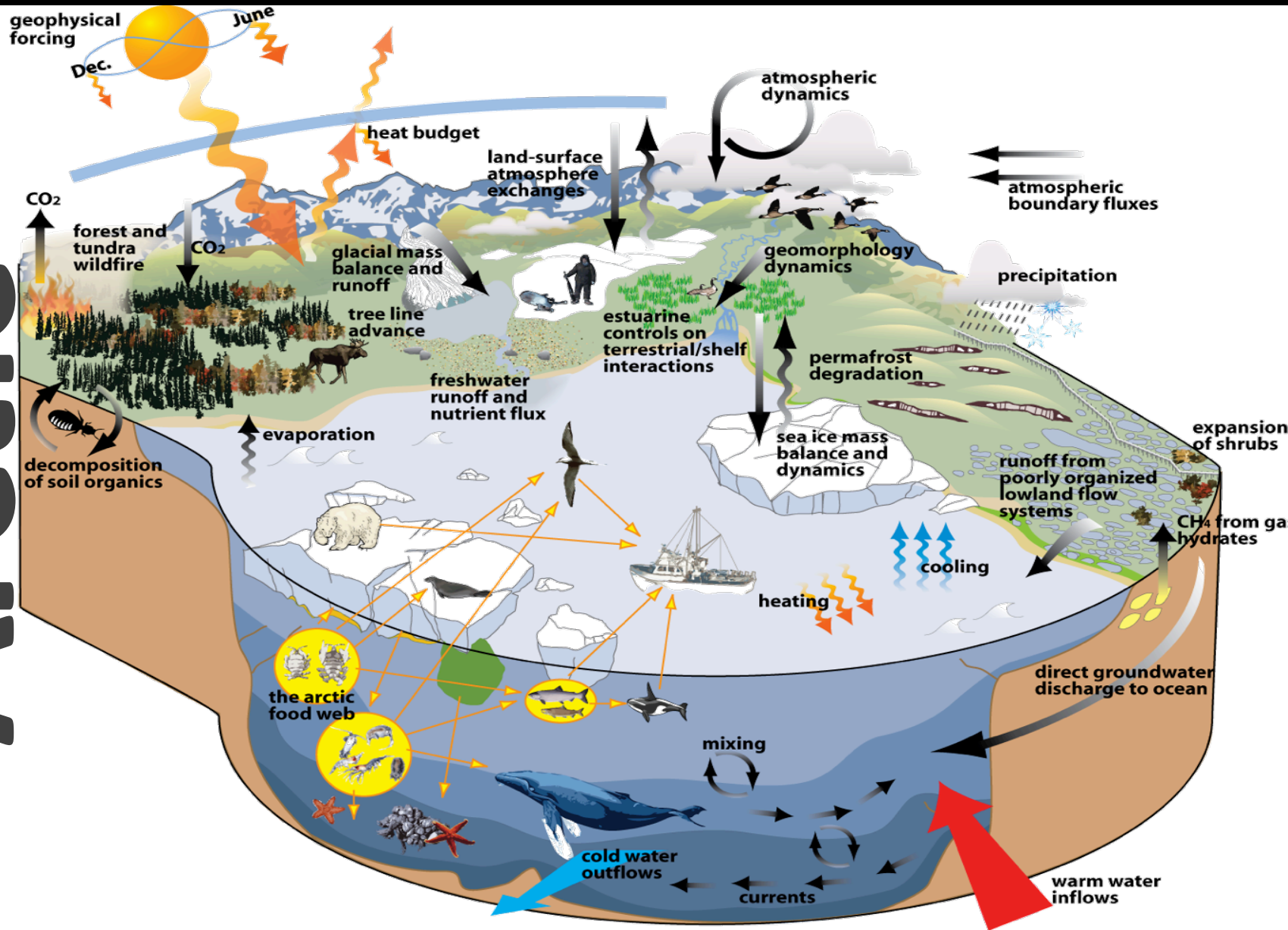


mining



oil/gas

Arctic





NATIONAL STRATEGY FOR THE ARCTIC REGION

MAY 2013



ARCTIC STRATEGY



DEPARTMENT OF DEFENSE

NOVEMBER 2013

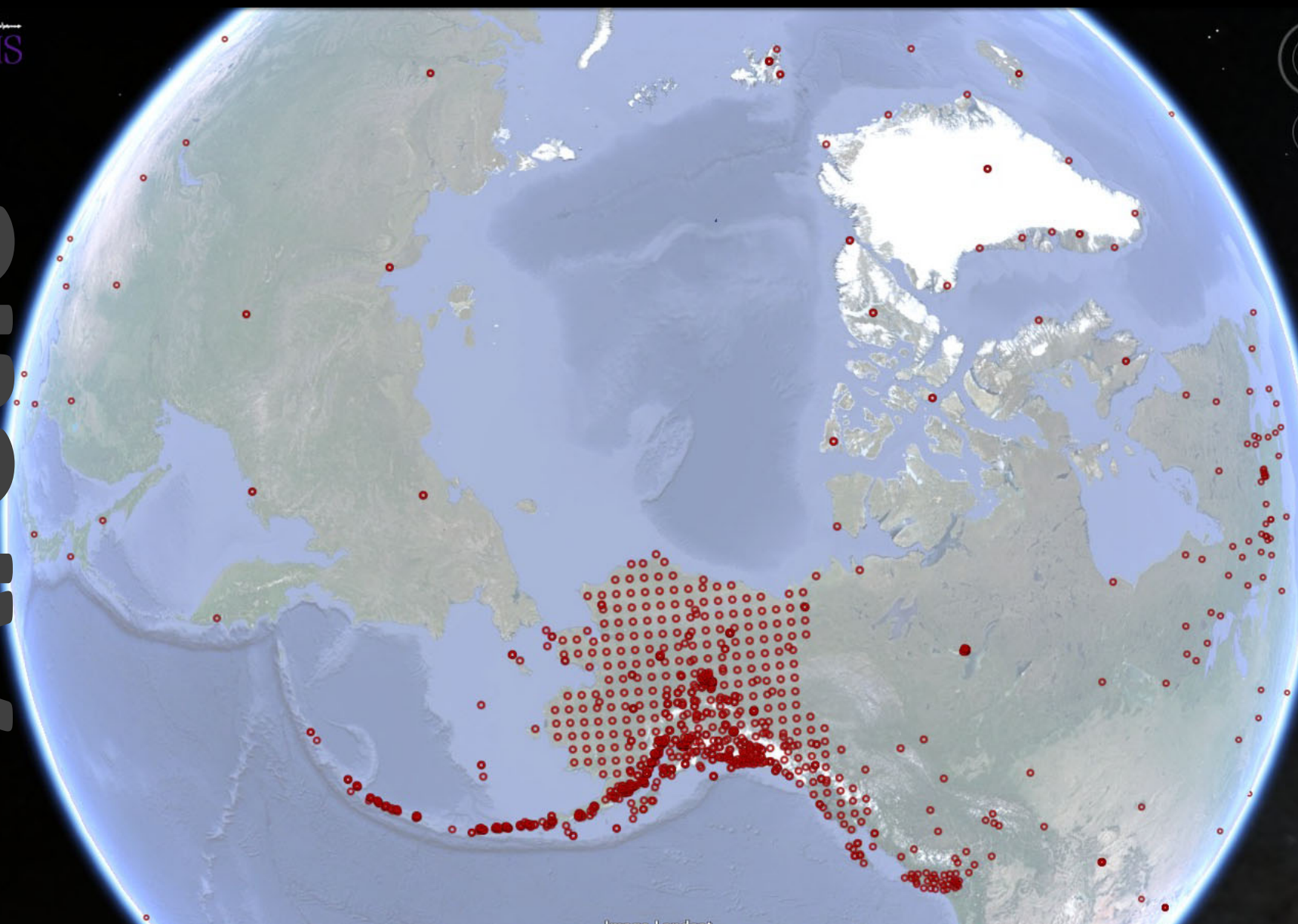
DEPARTMENT OF DEFENSE 2014 CLIMATE CHANGE ADAPTATION ROADMAP



Policy

Arctic

IS



USArray

Antelope lovefest!

Waveforms, hypocenters, metadata, ...

Opportunities in the Arctic (and a lot of Antelope)