Alaska Earthquake Monitoring Working Group Study

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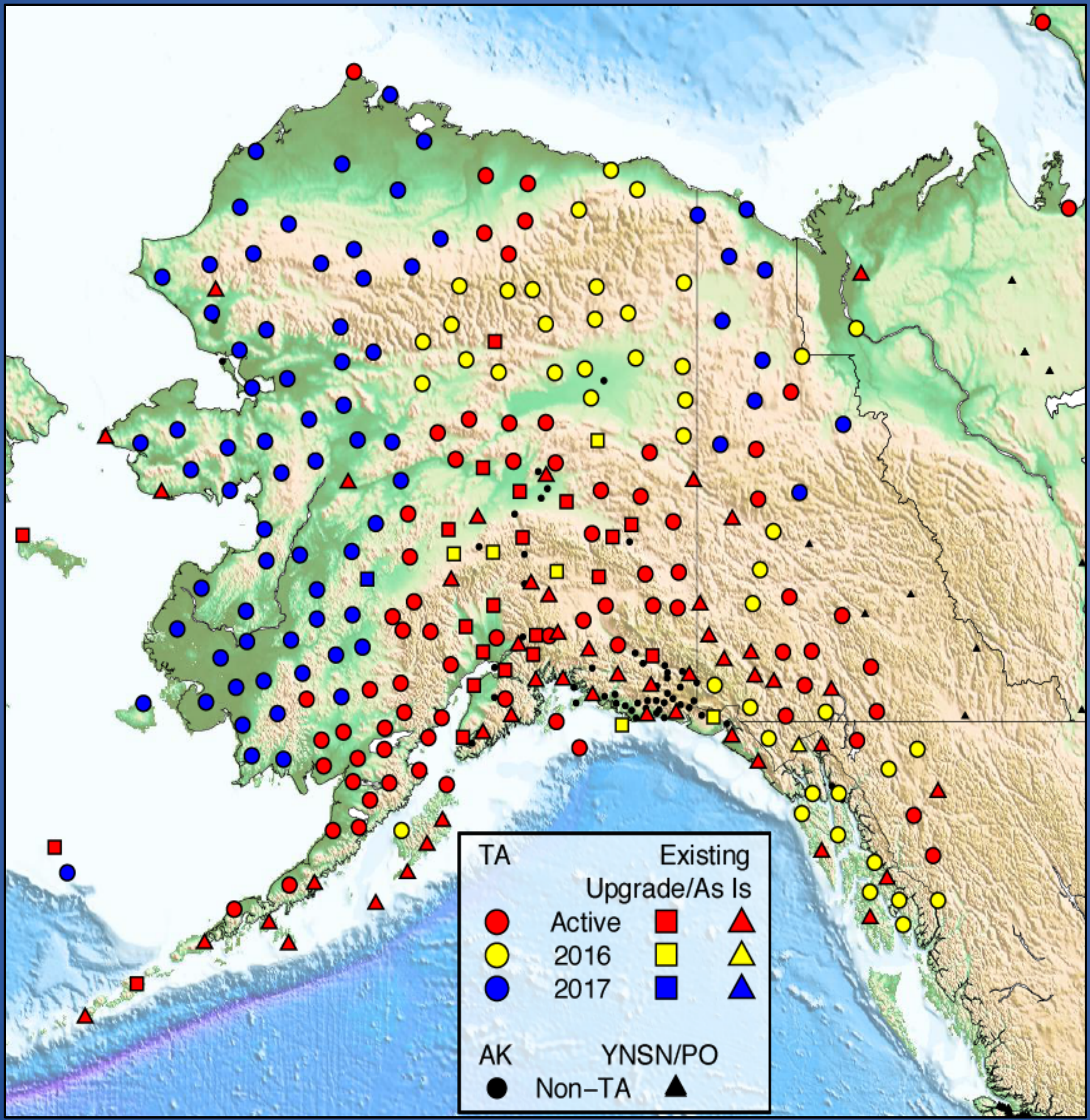
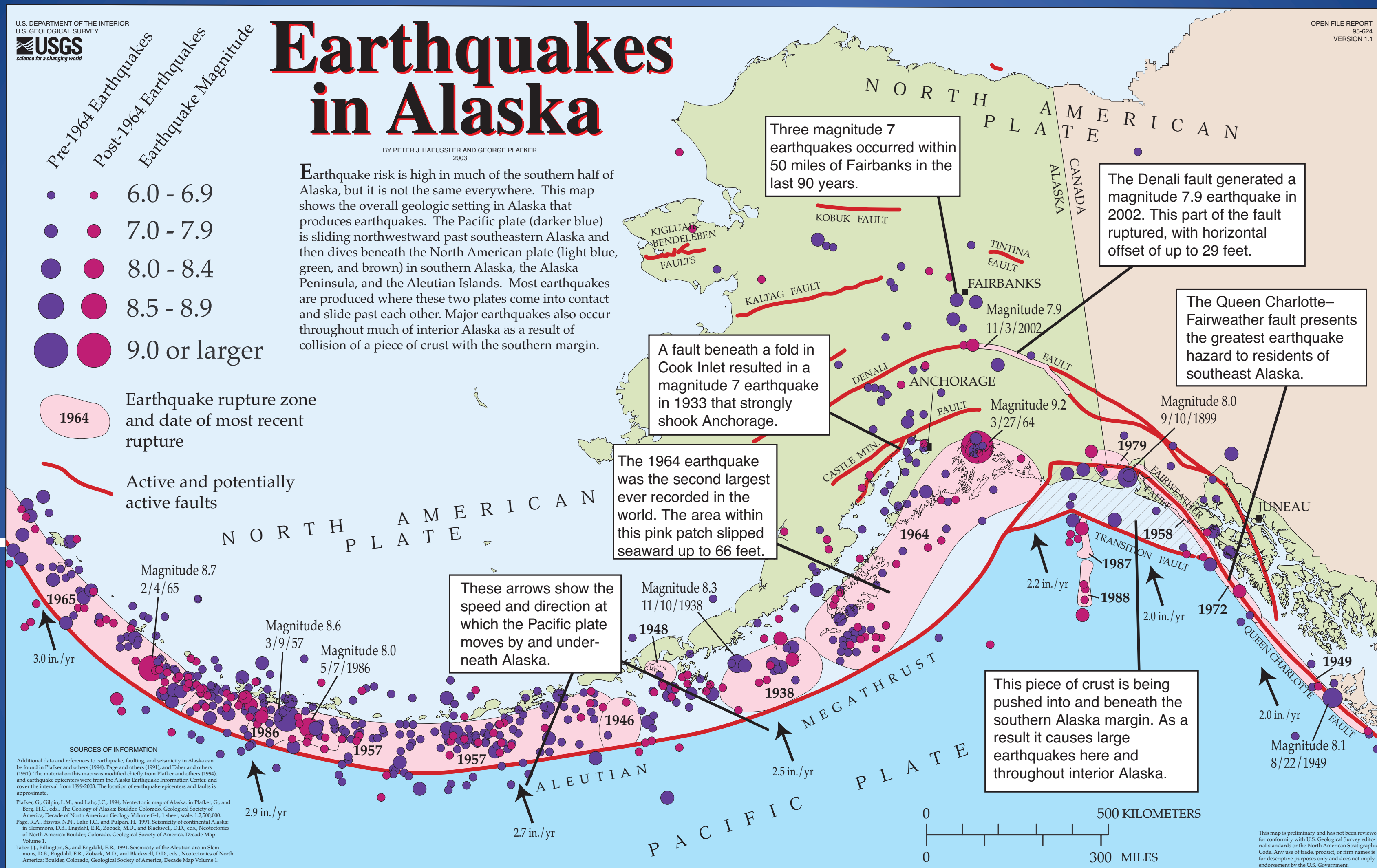
Congressional Direction

Report language for the Interior and Environment portion of the FY2016 Omnibus appropriations legislation directed the USGS to "*conduct a cost benefit analysis and spending plan for the adoption of any remaining seismic stations, including stations in final deployment, if included as part of the Survey's Advanced National Seismic System for Research.*"

Implied in this wording is the Transportable Array (TA) deployment in Alaska, 2016-2018

EarthScope TA in Alaska

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Earthquakes in Alaska
BY PETER J. HAEUSSLER AND GEORGE PLAFKER
2003
Earthquake risk is high in much of the southern half of Alaska, but it is not the same everywhere. This map shows the overall geologic setting in Alaska that produces earthquakes. The Pacific plate (darker blue) is sliding northwestward past southeastern Alaska and then dives beneath the North American plate (light blue, green, and brown) in southern Alaska, the Alaska Peninsula, and the Aleutian Islands. Most earthquakes are produced where these two plates come into contact and slide past each other. Major earthquakes also occur throughout much of interior Alaska as a result of collision of a piece of crust with the southern margin.
Pre-1964 Earthquakes
Post-1964 Earthquakes
Earthquake Magnitude
6.0 - 6.9
7.0 - 7.9
8.0 - 8.4
8.5 - 8.9
9.0 or larger
1964
Earthquake rupture zone and date of most recent rupture
Active and potentially active faults
Three magnitude 7 earthquakes occurred within 50 miles of Fairbanks in the last 90 years.
The Denali fault generated a magnitude 7.9 earthquake in 2002. This part of the fault ruptured, with horizontal offset of up to 29 feet.
The Queen Charlotte–Fairweather fault presents the greatest earthquake hazard to residents of southeast Alaska.
A fault beneath a fold in Cook Inlet resulted in a magnitude 7 earthquake in 1933 that strongly shook Anchorage.
The 1964 earthquake was the second largest ever recorded in the world. The area within this pink patch slipped seaward up to 66 feet.
These arrows show the speed and direction at which the Pacific plate moves by and underneath Alaska.
This piece of crust is being pushed into and beneath the southern Alaska margin. As a result it causes large earthquakes here and throughout interior Alaska.
NORTH AMERICAN PLATE
NORTH AMERICAN PLATE
PACIFIC PLATE
ALASKA
CANADA
KIGLUAIK
BENDELEBEN
FAULTS
KOBUK FAULT
TINTINA FAULT
KALTAG FAULT
DENALI FAULT
CASTLE MTN. FAULT
FAIRWEATHER FAULT
TRANSITION FAULT
QUEEN CHARLOTTE FAULT
ALEUTIAN MEGATHRUST
FAIRBANKS
ANCHORAGE
JUNEAU
Magnitude 7.9
11/3/2002
Magnitude 9.2
3/27/64
Magnitude 8.0
9/10/1899
Magnitude 8.7
2/4/65
Magnitude 8.6
3/9/57
Magnitude 8.0
5/7/1986
Magnitude 8.3
11/10/1938
Magnitude 8.1
8/22/1949
1965
1986
1957
1957
1946
1948
1938
1964
1979
1958
1987
1988
1972
1949
3.0 in./yr
2.9 in./yr
2.7 in./yr
2.5 in./yr
2.2 in./yr
2.0 in./yr
2.0 in./yr
0
500 KILOMETERS
0
300 MILES
SOURCES OF INFORMATION
Additional data and references to earthquake, faulting, and seismicity in Alaska can be found in Plafker and others (1994), Page and others (1991), and Taber and others (1991). The material on this map was modified chiefly from Plafker and others (1994), and earthquake epicenters were from the Alaska Earthquake Information Center, and cover the interval from 1899-2003. The location of earthquake epicenters and faults is approximate.
Plafker, G., Gilpin, L.M., and Lahr, J.C., 1994, Neotectonic map of Alaska: in Plafker, G., and Berg, H.C., eds., The Geology of Alaska: Boulder, Colorado, Geological Society of America, Decade of North American Geology Volume G-1, 1 sheet, scale: 1:2,500,000.
Page, R.A., Biswas, N.N., Lahr, J.C., and Pulpan, H., 1991, Seismicity of continental Alaska: in Slemmons, D.B., Engdahl, E.R., Zoback, M.D., and Blackwell, D.D., eds., Neotectonics of North America: Boulder, Colorado, Geological Society of America, Decade Map Volume 1.
Taber J.J., Billington, S., and Engdahl, E.R., 1991, Seismicity of the Aleutian arc: in Slemmons, D.B., Engdahl, E.R., Zoback, M.D., and Blackwell, D.D., eds., Neotectonics of North America: Boulder, Colorado, Geological Society of America, Decade Map Volume 1.
This map is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards or the North American Stratigraphic Code. Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Alaska critical facilities map

Alaska Earthquake Monitoring Working Group:

C.B. Crouse, AECOM (representing ANSS Steering Committee)
Jeffrey Freymueller, University of Alaska, Fairbanks
Doug Given, USGS EEW Coordinator
Peter Haeussler, USGS Alaska Coordinator for EHP
Steve Masterman, State Geologist, Alaska
Michael O'Hare, AK Div. of Homeland Security and EM
David Oppenheimer, USGS (Chair)
Susan Schwartz, UC California Santa Cruz
Paul Somerville –AECOM
Paul Whitmore NOAA NWC
David Wilson USGS (representing NEIC)

AEMWG contained expertise in earthquake research, seismic monitoring, emergency management, earthquake engineering, tsunami warning, geology, and geodesy.

Committee Charge: Cost benefit study for ANSS

AEMWG was asked to broadly consider and prioritize any improvements to earthquake monitoring which are aligned with the priorities ANSS, including:

Transportable Array (TA) adoptions

Earthquake Early Warning (EEW)

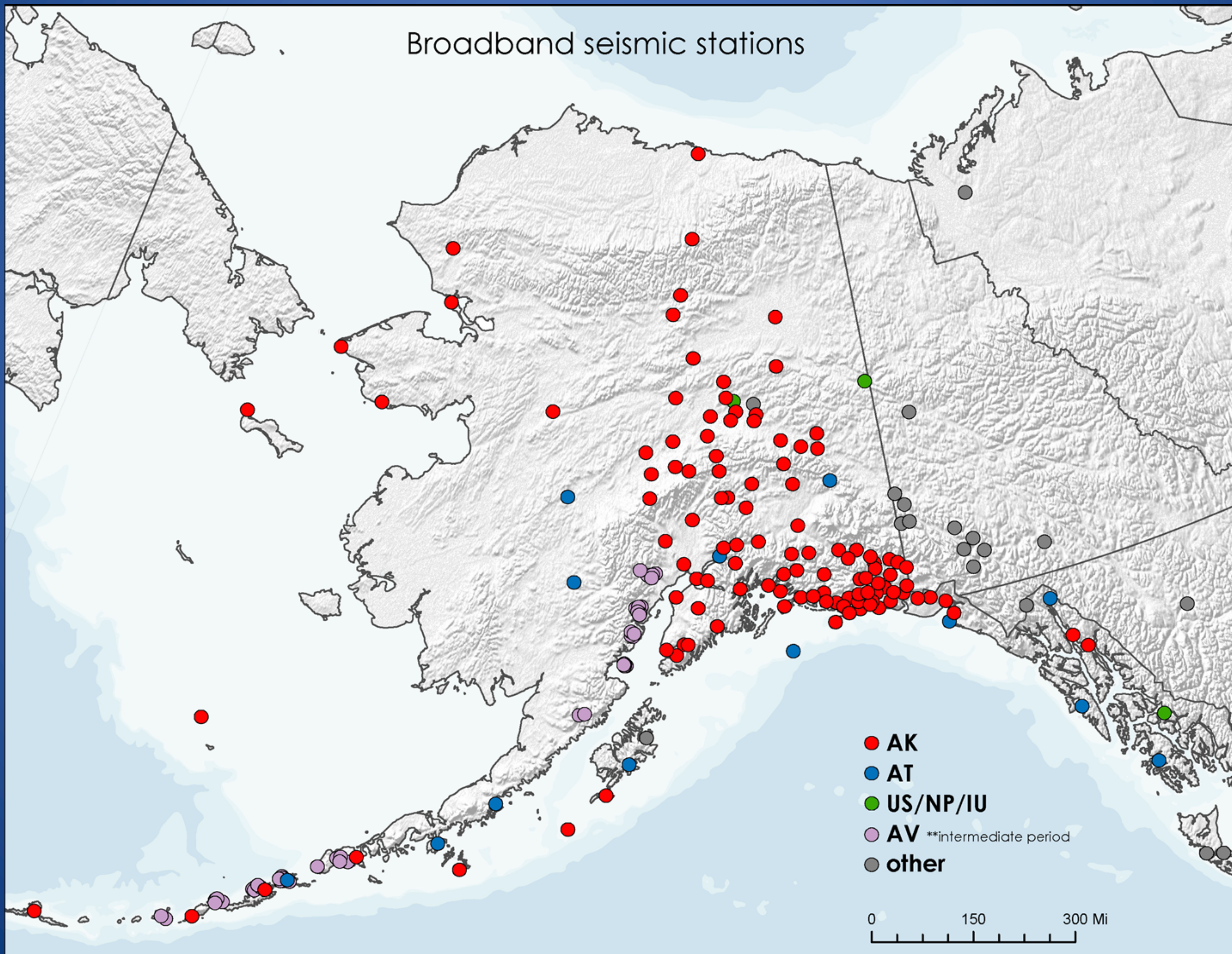
Alaska Earthquake Center improvements

Strong motion network improvements

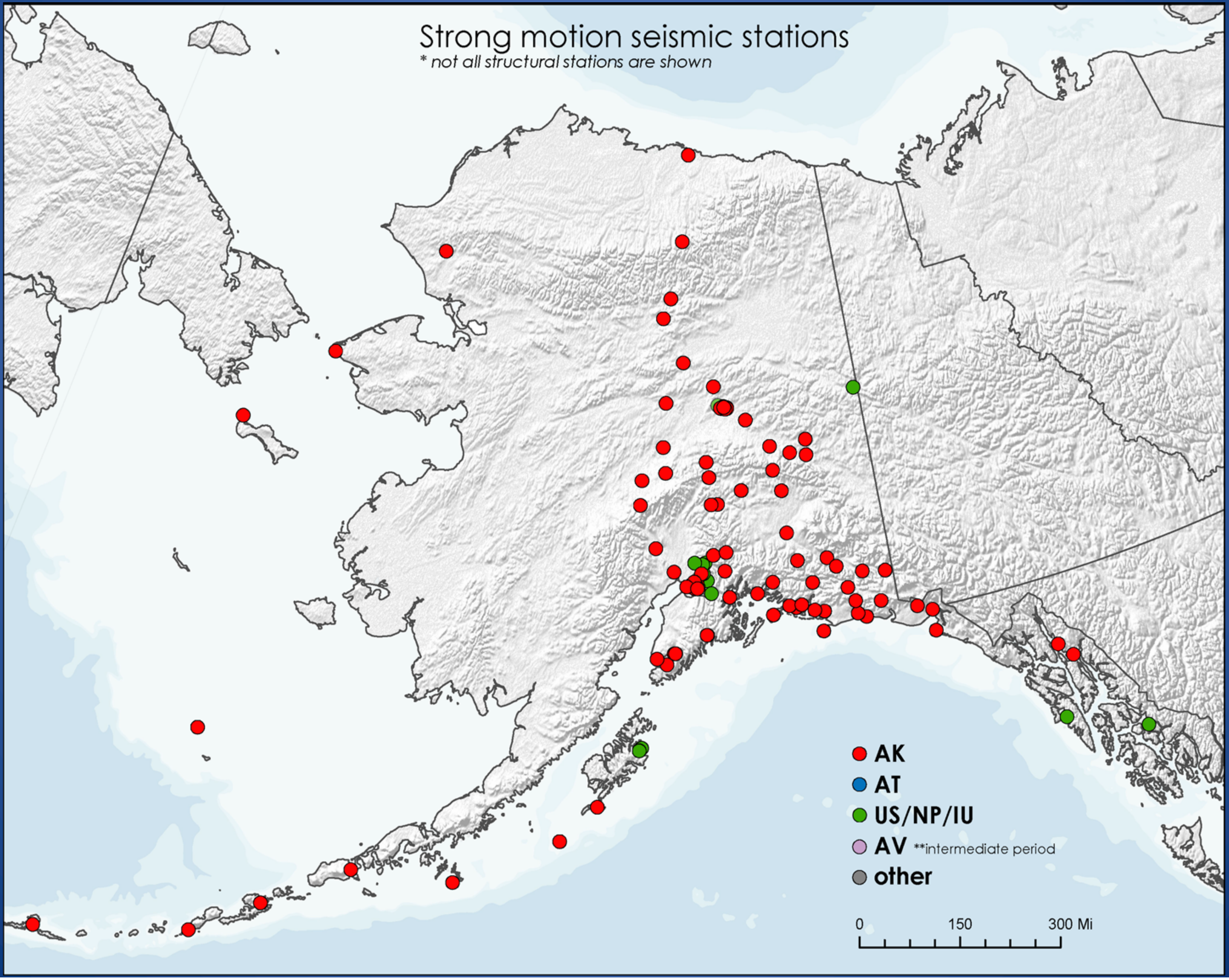
Geodetic monitoring capabilities

Additionally, the committee was instructed to consider coordination with the NOAA tsunami warning centers

Current broadband seismometer stations



Current strong motion stations



PBO geodetic (GPS) stations

AEMWG established the following benefit types of improving earthquake monitoring in Alaska:

- improving earthquake hazard assessments (the basis for the seismic provisions of building codes)
- improving engineering designs for buildings, bridges and other infrastructure
- earthquake early warnings for population centers
- improved tsunami warning
- improved public safety, and post-earthquake response, and recovery
- research on the causes and consequences of earthquakes

From the NRC 2006 study: "Full deployment of the ANSS offers the potential to substantially reduce earthquake losses and their consequences."

Next steps (assuming Congressional approval to publically release report)

To obtain broader context and help with prioritization, this plan will be sent to the USGS Earthquake Hazards Program's external advisory committee, the SESAC. As a FACA, the SESAC alone can make recommendations to the USGS on the importance of the items identified in this study relative to other national needs.

The AEMWG only considered Alaska relevant needs. The USGS must assess this study in the broader context of national priorities for ANSS and other earthquake loss reduction activities. Nationally, ANSS is only partially built, and most of its component regional seismic & geodetic networks have resource challenges.

USGS Earthquake Hazards Program does not currently have funding available to devote to such Alaska improvements.

USGS would need to obtain new long term funding by FY2019 to avoid NSF decommissioning the TA stations in Alaska.

Long term funding would require two steps:

1. The President seeks such funding in his/her annual budget request for the USGS and
2. Congress then appropriates funding for that request.

USGS remains in a planning stage and would like to stay coordinated with other entities.