ASHSC Alaska Seismic Hazards Safety Commission

POLICY RECOMMENDATION 2019-1

ENHANCED SEISMIC MONITORING IN ALASKA

The Alaska Seismic Hazards Safety Commission recommends the Alaska Legislature approve funding for the Alaska Earthquake Center (AEC) through the University of Alaska Fairbanks to adopt and incorporate a portion of existing EarthScope stations into the state's permanent seismic monitoring network.

As part of National Science Foundation's EarthScope project, 157 state-of-the-art seismic stations were deployed across the entire state to collect data between 2014 and 2017. These are scheduled to be decommissioned and removed beginning in 2020 and their absence will result in blind spots in Alaska seismic monitoring capability.

If instead these stations can be adopted by the AEC, our state will continue to benefit from significantly improved seismic monitoring capabilities. This is a unique opportunity to improve the safety of all Alaskans without having to fund new equipment or installations.

EARTHSCOPE'S TRANSPORTABLE ARRAY PROJECT

280 new, upgraded, and cooperative seismic instruments of the Earthscope's Transportable Array (TA) currently span Alaska and western Canada at a nominal spacing of 50 miles. The seismometers record earthquakes and other seismic events (e.g., volcanic eruptions, landslides, explosions) that occur locally, regionally, and throughout the world. This array collects a unique dataset due to the dense, uniform distribution of high-quality seismometers over a large area. The typical TA station is silent, motionless, and occupies a footprint less than 20 x 10 feet. To protect the sensor and reduce interference from surface noise, the seismometer is placed in a cased hole 3 to 15 feet below ground. Most TA stations have autonomous telecommunications and power systems that are housed in small, above ground enclosures. A number of stations are also equipped with weather sensors, strong motion accelerometers, and/or soil temperature profilers. These additional sensors provide valuable observations for weather and wildland fire monitoring. Most of the new TA sites are in areas of southwestern and northern Alaska that have never before been seismically monitored. These regions are difficult to reach and if stations are removed, there is not likely to be another opportunity to install seismic instrumentation there.

BENEFIT AND VALUE TO ALASKA

The Commission emphasizes the immediate and long-term value of incorporating TA stations into the statewide network in four areas: (1) improved characterization of Alaska earthquake sources (i.e., location, magnitude), (2) better understanding and assessment of earthquake hazards (e.g., previously unknown active faults, strong ground shaking, earthquake-induced ground failures), (3) assessing post-earthquake damage to infrastructure (e.g., buildings, bridges, ports, utilities, pipelines, railroads) for emergency response, and (4) earthquake early warning.

See additional information in a report[1] prepared by the Commission in 2017, available at www.seismic.alaska.gov.

1. ***Improved Characterization of Earthquake Sources*** **-** Better earthquake characterization is the most basic benefit from improved earthquake monitoring in Alaska. The state's permanent seismic monitoring network falls short of providing enough coverage to characterize even the basic parameters of earthquake location, depth, and magnitude for the entire state. These shortcomings contribute to uncertainties regarding the structure and behavior of fault systems—information critical to safely planning infrastructure and developing resources. Comprehensive coverage in western, northern, and southeast Alaska leads to speedy detection and assessment when significant earthquakes occur. The AEC has already demonstrated that improved TA station coverage has resulted in more accurate and timely earthquake and aftershock detections and notifications.
2. ***Better Assessment of Earthquake Hazards*** **-** Understanding and anticipating hazards associated with earthquakes (e.g., ground shaking intensities, slope failure, soil liquefaction, etc.) is typically more difficult in Alaska than the rest of the nation. Challenges that complicate these assessments include: multiple significant tectonic sources; limited fault mapping and paleoseismic studies; and an earthquake catalog of variable completeness and accuracy. The impact of these factors, combined with complicated Alaska geology, means that in much of Alaska there may be a significant discrepancy between estimated and actual earthquake hazards, which can have economic impacts on planned infrastructure and resource developments. While the need to assess earthquake hazards will always be a part of living and doing business in Alaska, enhancement of the seismic monitoring network is arguably the most significant step Alaska could take toward ensuring the availability of accurate, location-appropriate earthquake hazard assessment in the years and decades to come.
3. ***Post-Earthquake Damage Assessment and Emergency Response*** **-** Following a significant earthquake, the confidence, cost, and timeliness of assessing potential damage to infrastructure (e.g. schools, buildings, bridges, ports, runways, pipelines, dams, etc.) can all be improved with actual measurements of strong ground motion. While it is not realistic to expect all critical infrastructure to include seismic instrumentation, there are tools (e.g. ShakeMaps) that produce estimates of regional ground motions based on available seismic data from nearby recordings. The ShakeMaps for Alaska are produced by the AEC and are now routinely used by emergency responders, engineers and others for directing post-earthquake response teams to areas with highest shaking intensities, as was successfully demonstrated following the M7.1 November 30, 2018 Anchorage earthquake. However, the validity of these regional shaking estimates is a direct function of the proximity and distribution of nearby seismometers. Including EarthScope's seismometers into Alaska's permanent network would improve the validity of the ground shaking estimates, which should then increase confidence and timeliness of future emergency response and damage assessments.
4. ***Earthquake Early Warning*** **-** Alaska is still in a preliminary stage of earthquake early warning considerations. However, it's not a question of if, but a question of when and how earthquake early warning will be implemented in Alaska. The ultimate success and usefulness of the system will depend on an adequate distribution of seismometers across the entire state. Permanently incorporating some of the EarthScope instruments into the Alaska network, especially in the western, northern, central and southeast regions will be a valuable start.

[1] The Benefits of Enhanced Earthquake Monitoring and Potential Earthquake Early Warning in Alaska. Prepared for the Governor's Office, by the Alaska Seismic Hazard Safety Commission. 2016.

INTERNAL SECTION

IMPLEMENTATION & ASSESSMENT

The Commission will send this policy recommendation to Alaska Legislature (Senate and House), as well as the Governor's Office for their implementation.

Assessment of this recommendation will be based on the Alaska Legislature and Governor approving funds for the State to purchase and incorporate some of the EarthScope seismometers into the state's permanent network.

HISTORY

The Commission originally drafted and approved PR 2019-1 in 2019.