## EarthScope's Transportable Array Spans Alaska, the Last Frontier

After covering the contiguous United States from coast to coast with a grid of nearly 1700 sites, the final seismic station of the EarthScope Transportable Array has been installed in Alaska.

The Alaska Transportable Array (TA) is a currently operating **280-station seismic network** that continuously records ground motion from local, regional, and global earthquakes, and broadcasts its data in real time from Alaska and northwestern Canada. The data will be used for many research applications such as imaging Earth's structure, detecting and locating regional earthquakes, and investigating ruptures of large global earthquakes.

> View recordings from a TA station near you using IRIS's Station Monitor: www.iris.edu/app/station\_monitor



Location of Transportable Array stations and existing seismic stations operated by collaborating networks (Alaska Earthquake Center, Alaska Volcano Observatory, Alaska Tsunami Warning Center, Yukon Northwest Seismic Network).



Field operations over the last three summers were executed safely despite poor weather conditions, fires, and occasional bears.

Maps of located earthquakes before (left) and after (right) the installation of Transportable Array stations in the Greater North Slope Region of Alaska. Maps include earthquake locations that are known accurately within three miles. Larger circles represent earthquakes with magnitude 3 and greater. Figure from Alaska Earthquake Center, earthquake.alaska.edu/earthquakes.

#### **More Earthquakes Detected**

Alaska is very seismically active. Of all the magnitude 5 or greater earthquakes in the United States, 75% occur in Alaska. The Alaska Earthquake Center (AEC) detects an earthquake every 15 minutes on average, or about 30,000 every year. Consistent and rapid reporting helps the public and emergency managers assess and respond to potential earthquake impacts.

With more stations in previously unmonitored areas of the state, the AEC is able to improve the detection, location, and size of earthquakes. The ability to detect smaller earthquakes will enable better understanding of active faults capable of larger, damaging earthquakes, and will help to characterize the seismic hazard in these regions.



### Weather Data Now Streamed from Previously Unmonitored Regions

Along with the seismometer, each TA station is equipped with a barometer and an infrasound sensor. An externally mounted sensor package that records 11 types of meteorological data, such as wind speed and rain intensity, is also installed at a subset of 132 stations. Weather data collected at TA stations are incorporated into National Weather Service regional weather forecasts and real-time interactive maps at MesoWest (mesowest.utah.edu).

These data are proving valuable for studying weather and atmospheric events in remote, sparsely monitored regions of the Arctic. There are also 78 TA stations that include a soil temperature probe as part of a NASA/Yukon Geological Survey effort to study permafrost and ground temperature.

The meteorological sensor package is mounted externally on the top of the station hut. The station also has a separate barometer and infrasound microphone. The seismometer is located in a posthole below the small box to the left of the hut. Photo by R. Bierma.



A subset of the Transportable Array seismic stations that recorded the September 2017 North Korean nuclear test as the ground motion propagated throughout the state from Nome to Juneau. Figure from Alaska Earthquake Center.

# North Korean Nuclear Test Recorded on Transportable Array

On September 3, 2017, the Comprehensive Nuclear Test Ban Treaty Organization and the US Geological Survey determined that North Korea conducted yet another nuclear test. Over the last few years, North Korean nuclear tests have increased in size and NORSAR calculated this event at an estimated yield of greater than 200 kT. Several of the recordings from TA stations were used to determine the location and size of the explosion.

The 2017 nuclear test was detected by seismic stations around the world. TA stations north of Nome were the closest to North Korea and recorded the first arriving waves. It only took a couple minutes for those waves to travel from Nome to Juneau.

#### Information about the Alaska Transportable Array is available at: www.usarray.org/Alaska

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