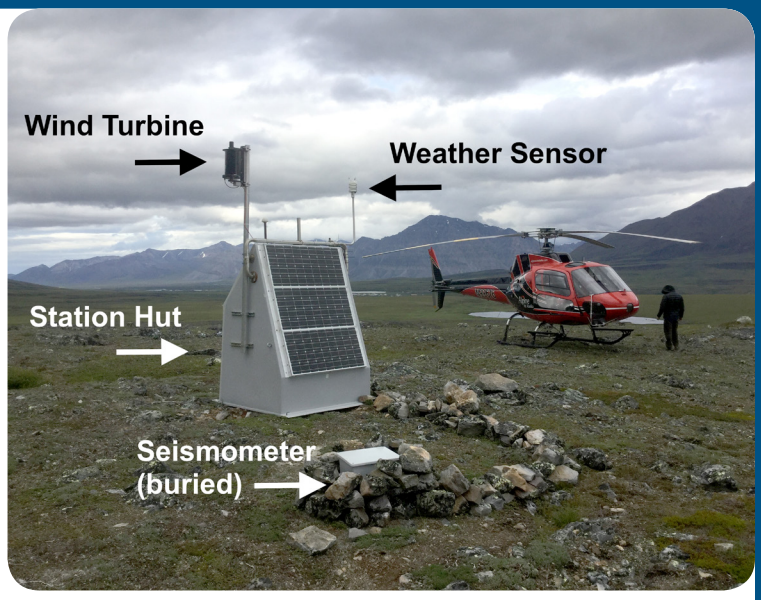
EarthScope's Transportable Array Spans Alaska, the Last Frontier

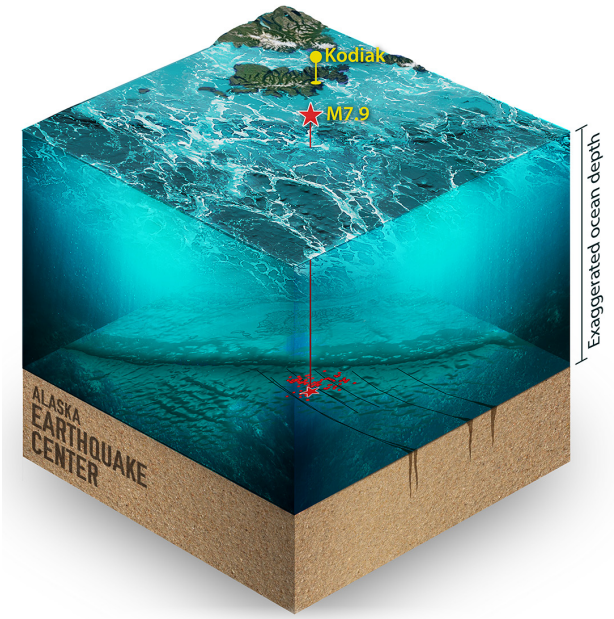
Excellent Network Performance and Improved Power System

The Transportable Array (TA) network in Alaska has now operated at capacity for a full year. Routine reviews in 2018 revealed only a few service issues for engineers to address, allowing the majority of efforts to be directed toward improving the durability and reliability of stations, such as the installation of small wind turbines in the north to supplement the lack of solar charging during the dark winter months. The Alaska Earthquake Center reports that the TA has recorded over 30,000 earthquakes in Alaska in the first eight months of 2018 and many more globally.

View recordings from a TA station near you using the IRIS Station Monitor at **www.iris.edu/app/station_monitor** or download the free Station Monitor app for iOS and Android devices from the Apple or Google Play stores.



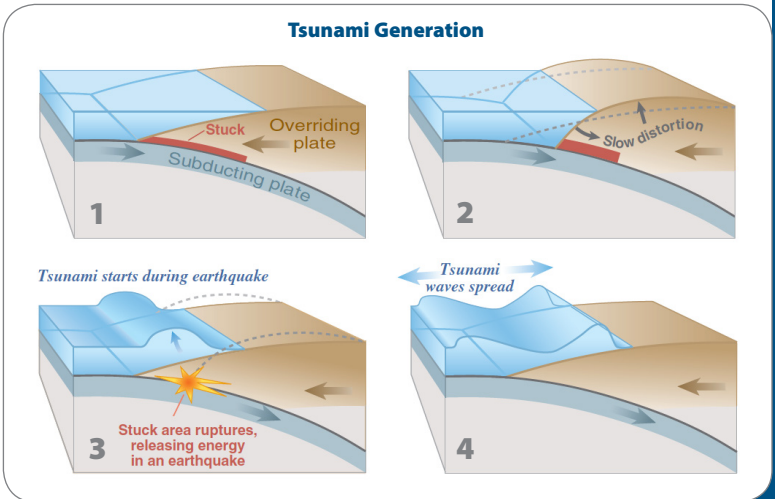
ABOVE. Turner Pahl, helicopter pilot for Alpine Air, on a service trip to station E22K near Anaktuvuk Pass, Alaska, in July 2018 to install two additional lithium batteries and a wind turbine for power. Photo credit: Max Enders



ABOVE. Artistic rendering of the seafloor where the offshore Kodiak M7.9 event occurred. The main earthquake and aftershocks (the red star and dots on the ocean floor) are spread across several large strike-slip faults. The depth of the ocean is exaggerated to show the aftershocks better. Kodiak Island is about 66 times longer than the water depth shown here.

Major M7.9 Earthquake Recorded Offshore Alaska in 2018

On January 23, 2018, just 30 minutes after midnight, a magnitude 7.9 earthquake ruptured along a fault offshore of Kodiak Island in the Gulf of Alaska. The earthquake occurred beneath the ocean floor, with significant shaking felt across communities in Alaska, and there was great concern that it generated a tsunami. Because the fault motion was primarily horizontal, rather than having a large vertical component, displacement of the ocean water above the fault was minimal. With more seismic stations across the state, experts can improve the rapid characterization of earthquakes and help emergency response managers assess the risk and issue more accurate and timely alerts.

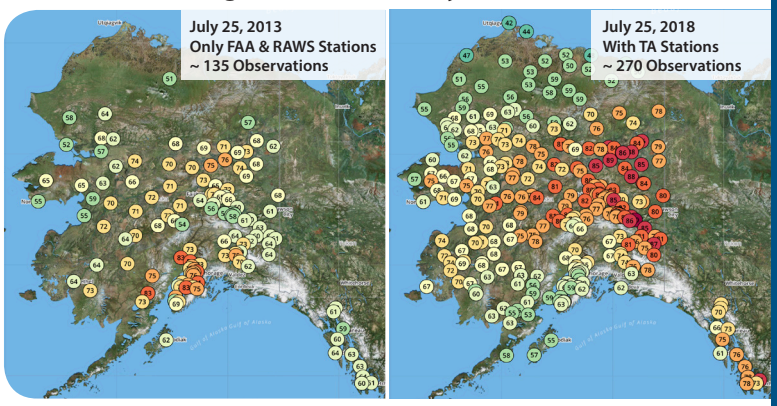


RIGHT. Earthquakes on subduction zone thrust faults are capable of producing large tsunami waves by pushing up the entire water column. Because the 2018 Alaska earthquake ruptured strike-slip faults within the plate and not in the subduction zone, the earthquake did not cause a significant tsunami. Source: USGS Circular 1187

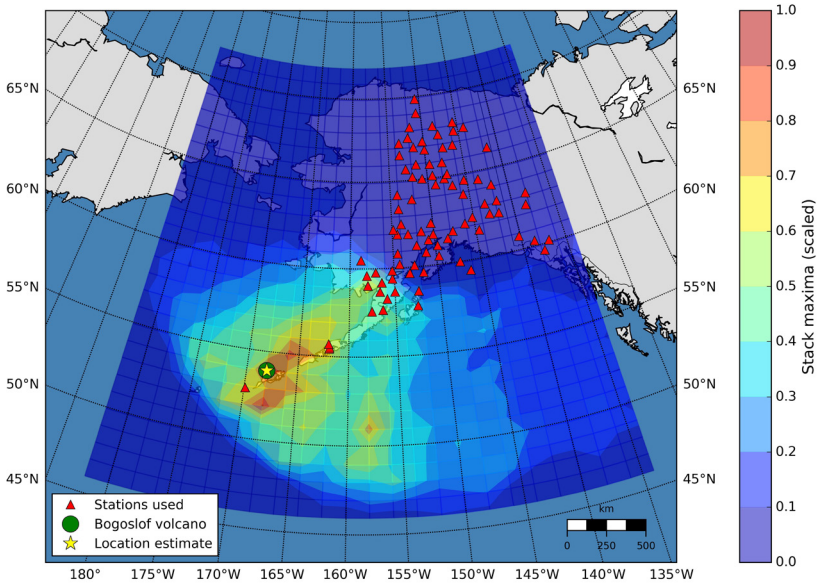
Strengthening Wildfire Preparation

By adding meteorological sensors to a majority of the seismic stations, the TA is able to provide weather data from many areas in Alaska that were not previously monitored. The sensors record temperature, wind speed and direction, humidity, pressure, and precipitation and are made available in real time so that they can be incorporated into National Weather Service regional weather forecast models. The Alaska Interagency Coordination Center (AICC) uses the precipitation data to make important decisions on positioning resources before the fire season begins. AICC is an interagency organization that includes the Bureau of Land Management, State of Alaska Department of Natural Resources, US Forest Service, National Park Service, Bureau of Indian Affairs, and the US Fish and Wildlife Service.

Meteorological Stations Used By Alaska Fire and Fuels



Numbers in the circles show temperature in °F recorded at meteorological stations across Alaska in 2013 compared to 2018 with the addition of USArray TA stations. Note that stations deployed in western Canada are not plotted. Figure from akff.mesowest.org/map.



Eruption of Bogoslof Volcano on December 21, 2016, located using infrasound data primarily from TA stations, and also from stations operated by the Alaska Volcano Observatory and the University of Alaska Fairbanks. From: Sanderson, R.W., R.S. Matoza, D. Fee, M.M. Haney, and J.J. Lyons. 2017, Remote explosive volcanic eruption detection, location, and characterization using the EarthScope Transportable Array in Alaska. EarthScope National Meeting.

Turn Up the Bass: Infrasonic Monitoring of Alaska's Volcanoes

Alaska is no stranger to volcanic eruptions and their impact on air traffic. In order to keep the public informed about any volcanic activity, the Alaska Volcano Observatory (AVO) monitors the 130 volcanoes across the state using a range of technologies. Enhancing the AVO network, each TA station includes an infrasound sensor that detects and records Earth's low-frequency subwoofer-like tones that humans cannot hear. This collaborative network of sensors uses the sonar waves generated from eruptions to calculate the location of the active volcano. These sensors are vital, as they can detect these sounds at night or in cloudy weather—times when satellite observations are not as useful. Researchers at the University of Alaska Fairbanks, University of California Santa Barbara, and AVO are developing an automatic detection and location system using infrasound and have had success with the recent eruptions at Bogoslof and Cleveland Volcanoes.

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

Staff at the IRIS Alaska Operations Center are supported by the Array Operations Facility at New Mexico Tech, the Array Network Facility at the University of California, San Diego, the IRIS Data Management Center in Seattle, Washington, and IRIS Headquarters in Washington, DC. Support from the Alaska Earthquake Center has also been invaluable, along with the cooperation of the Alaska Volcano Observatory, Alaska Tsunami Warning Center, UNAVCO, Canadian Hazards Information Service, Yukon Geological Survey, Government of Yukon Wildland Fire Management, and Natural Resources Canada.