USArray Transportable Array Deployment



Since 2003, the EarthScope project has been installing a dense array of seismometers, known as the USArray Transportable Array, across the continental United States and Southern Canada. Beginning in the summer of 2014, USArray will deploy up to 294 seismic stations in Alaska and western Canada. The EarthScope project is supported by the National Science Foundation and is operated by a group of university research consortia.

The seismometers record earthquakes that occur locally, regionally, and throughout the world to produce high-resolution images of the Earth's interior and to study the origin and characteristics of earthquakes and earthquake faults. Over the next four years, instruments will be placed across Alaska and western Canada with a grid spacing of approximately 85 km (51 mi). The target locations will supplement or enhance existing seismic stations and when possible will be co-located with existing GPS stations, weather stations, etc., to reduce impacts and share resources and data. The grid spacing of the stations is ideal for studying the Earth's active tectonics and geologic history of the North American continent, but is much too large for detailed mineral and reservoir prospecting at depths shallower than 5 km (3 mi). All of the data are free and available to anyone with an Internet connection and are used by hundreds of researchers worldwide.



Hosting a station

EarthScope is seeking participation and consent from federal, state and territory agencies, as well as from Native Corporations, First Nations and private landowners to accomplish this university-based research experiment.

EarthScope will:

- Respect the property and privacy of landowners throughout the experiment, notifying the landowner whenever access is required.
- Be responsible for the security and operation of the station.
- Assume liability if the equipment is damaged or stolen, and hold the landowner harmless for any loss or injury.
- Provide the landowner with updates about the project and sample recordings from their station.

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Seismic station description

USArray seismic stations have a low profile. There is no noise or motion associated with the equipment. A 20 cm (8 in), or "post hole" sized, hole is augured or downhole hammered 1 m (3 ft) to 5 m (15 ft) below the surface, in which the sensor is placed. This hole will be cased in either PVC or steel, to keep the hole open, then capped to protect the hole. The seismometer is placed below the surface to minimize interference from surface vibrations and to protect the sensor. At certain sites, a soil temperature probe will be installed between the seismometer and hut, within a 2.5 cm (1 in) diameter hole at 1 m (3 ft) to 5 m (15 ft). deep. This collaborator science activity is contingent upon funding and approvals from NASA. A fiberglass hut with solar panels on the roof is placed about 3.5 m (~10 ft) from the sensor to house the batteries, data collection computer, and communication electronics. Cables contained within a conduit connect the sensor to the equipment in the hut. Data is transmitted to the USArray data processing center via cellular, broadband, or satellite communication systems. When satellite systems are used, a 30 cm (3 ft) dish and a smaller electronics enclosure will be placed near a power source and linked by radio to the seismic station. All enclosures can be painted to blend with the surroundings.

Installation, maintenance and removal

Installation of an EarthScope station is expected to take one to two days. Many of the locations in Alaska and Canada will use helicopters to sling equipment into position at installation time to minimize ground disturbance. A specialized drill, weighing less than 500 kg, was developed to disassemble for transport via fixed wing aircraft or sling loaded by helicopter other equipment operate continuously and routine maintenance is performed remotely. Removal of

was developed to disassemble for transport via fixed wing aircraft or sling loaded by helicopter. The seismometer and other equipment operate continuously and routine maintenance is performed remotely. Removal of stations would occur in 1 day, and involves the removal of the hut enclosure (and contents), sensor cable conduit, and borehole seismic sensor. The PVC or steel casing would be left in place, but cut about ~30 cm (~12 in) below the surface and buried/covered with local sediments/native materials.



Drill being loaded onto truck bed.



Drill in operation in Barrow, Alaska.



Road accessible site in Minto, Alaska.



Relevant Links

EarthScope project overview www.earthscope.org Transportable Array in Alaska & Canada www.usarray.org/alaska

National Park Service and EarthScope www.nature.nps.gov/geology/earthscope

