



photo by Ned Rozell

## EarthScope in the Arctic Slope Region

The eight communities within the Arctic Slope Regional Corporation region, northern Alaska, experience more than 25 earthquakes per year. The earthquakes occur down to depths of about 28 miles. Most of these earthquakes go unnoticed, but occasionally larger events are felt. Since 1900, six events have had a magnitude greater than 5.0. The two largest events within the region were two magnitude 5.3 events on Jan. 22, 1968. Events with magnitude greater than 5.0 and other noteworthy events are shown on the map.

EarthScope plans to install 34 Transportable Array temporary stations during the project's 5-year deployment. The proposed stations are shown with red triangles. The causes of seismicity in the region are not well known, beyond the activity on the Camden Bay faults off the northern coast. The absence of monitoring stations in the region inhibits study of the earthquakes. The Transportable Array stations will help to uncover clues to the origins of these earthquakes.

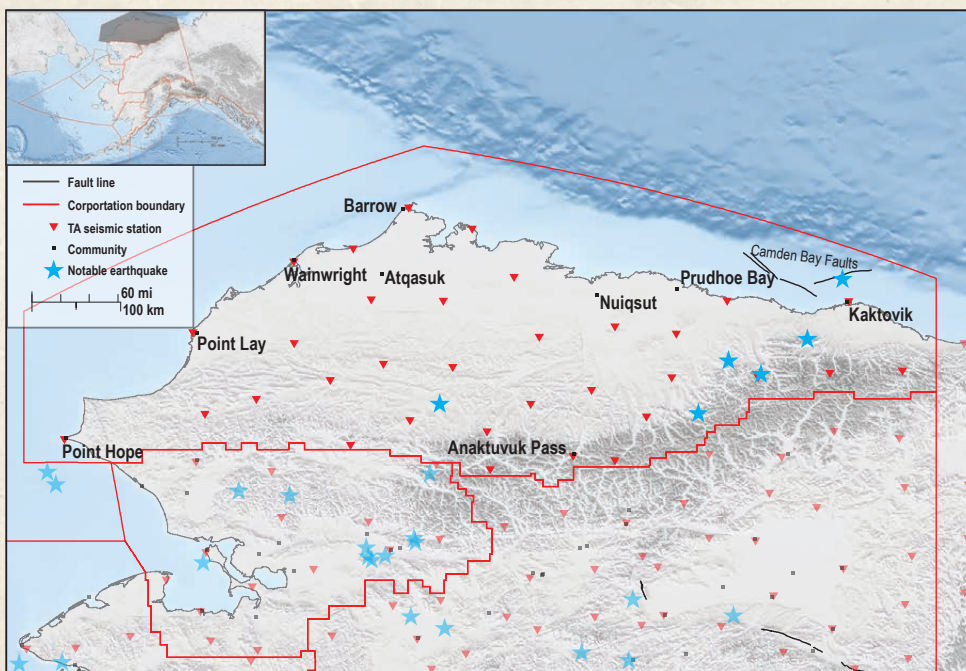


photo by Alan Wilson, naturespicsonline.com

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### Top 15 Earthquakes Worldwide:

- 1) M9.5 Chile, 1960
- 2) M9.2 Prince William Sound, Alaska, 1964
- 3) M9.1 Northern Sumatra, Indonesia, 2004
- 4) M9.0 Honshu, Japan, 2011
- 5) M9.0 Kamchatka, 1952
- 6) M8.8 Maule, Chile, 2010
- 7) M8.8 Ecuador, 1906
- 8) M8.7 Rat Islands, Alaska, 1965
- 9) M8.6 Northern Sumatra, Indonesia, 2005
- 10) M8.6 Assam - Tibet, 1950
- 11) M8.6 Northern Sumatra, Indonesia, 2012
- 12) M8.6 Andreanof Islands, Alaska, 1957
- 13) M8.5 Southern Sumatra, Indonesia, 2007
- 14) M8.5 Banda Sea, Indonesia, 1938
- 15) M8.5 Kamchatka, 1923



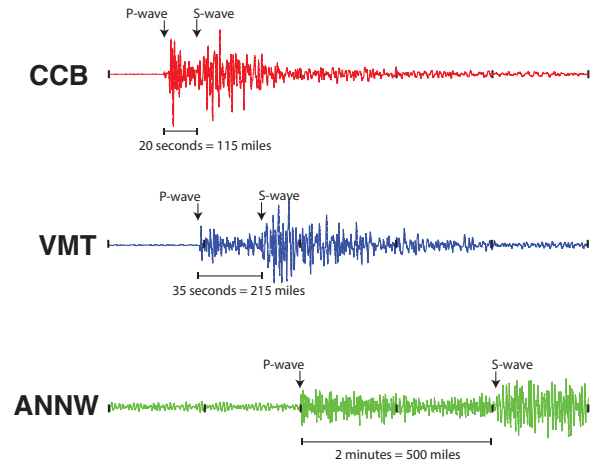
# EarthScope stations can help us understand Alaska

How parts of Alaska behave are still somewhat unknown. Scientists use earthquakes and the energy waves they produce to get an idea of what is happening below our feet. More stations spread across Alaska will increase our understanding of unmonitored parts of the state. Earthquakes can be located in two steps. Two waves of energy are released when an earthquake occurs. The P-wave, or primary wave, behaves like a pulse. The S-wave, or shear or secondary wave, behaves like a snake with the energy vibrating from side to side, or up and down, as the wave moves forward traveling slower and arriving later. Since these waves travel at different speeds and arrive at a seismic station at different times, the time difference between the two arrivals can be measured.

## Step 1.

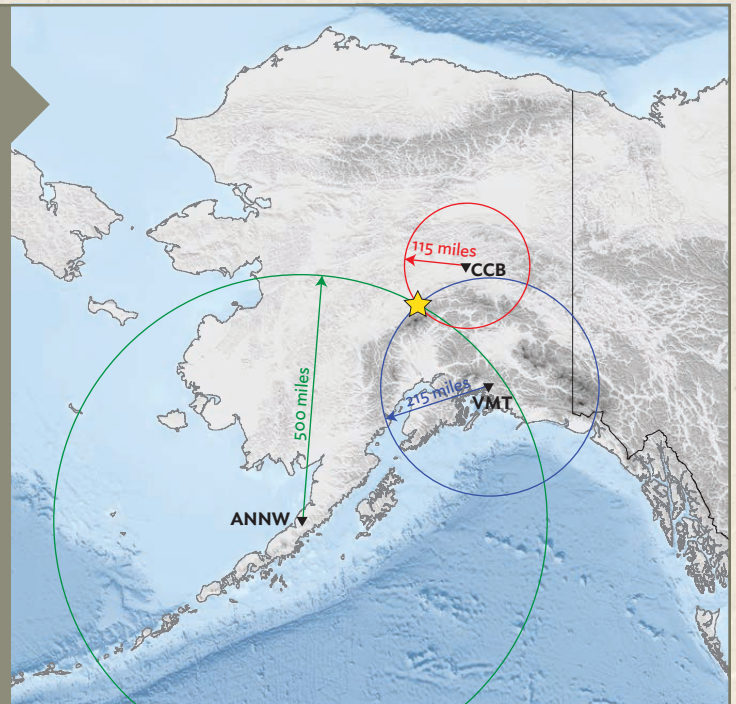
Seismologists measure the time between P- and S-wave arrivals. From numerous observations, scientists know the relationship between the S-P time and the distance between an earthquake and the station recording it. They convert this time difference into a distance for each station that recorded the earthquake.

*Waveforms from a magnitude 5.4 earthquake in central Alaska. CCB is the Clear Creek Butte station. VMT is a station in Valdez. ANNW is a station on Aniakhak Volcano.*



## Step 2.

Once the distance is calculated for three stations, the earthquake's location can be calculated. A circle centered on each station is drawn with the circle's radius equal to the distance the station is from the earthquake. The point where all three circles intersect is the location of the earthquake. If a fourth station is used and the circles become spheres, a depth can be calculated in the same process. Seismologists use computers to get the most accurate earthquake location possible by analyzing data from all stations that recorded the event. To locate the station nearest you, view waveforms at that station or view waveforms from located earthquakes visit [rev.seis.sc.edu](http://rev.seis.sc.edu).



EarthScope facilities are funded by the National Science Foundation and are being operated and maintained as a collaborative effort by UNAVCO Inc. and the Incorporated Research Institutions for Seismology (IRIS) with contributions from the US Geological Survey and several other international organizations. This material is supported by the National Science Foundation under Grant No. EAR-0733069. UAF is an AA/EQ employer and educational institution.