



Seismic Recording Station

TA_109C

Summary Report

Thank you for hosting station TA_109C on your property. We hope that you find the enclosed report interesting.

Your station is one of the 2000 USArray seismic stations being installed as part of the National Science Foundation's EarthScope initiative. Research scientists are analyzing the data that was recorded at your station to learn how earthquakes are initiated and to gain a better understanding of our deep earth's dynamic structure and processes.

This station detected 3433 regional earthquakes and 1972 distant earthquakes (occurring over 10 degrees or 1100 km from the station). The magnitudes of these earthquakes ranged from very small (magnitude < 2.0) which are not felt by humans anywhere, to large events which can result in significant destruction. (On the following pages, we present a summary report of the data we obtained from this station.)

We invite you to continue following the progress of USArray by visiting the USArray web pages at <http://www.earthscope.org/usarray> and <http://www.iris.edu/usarray>

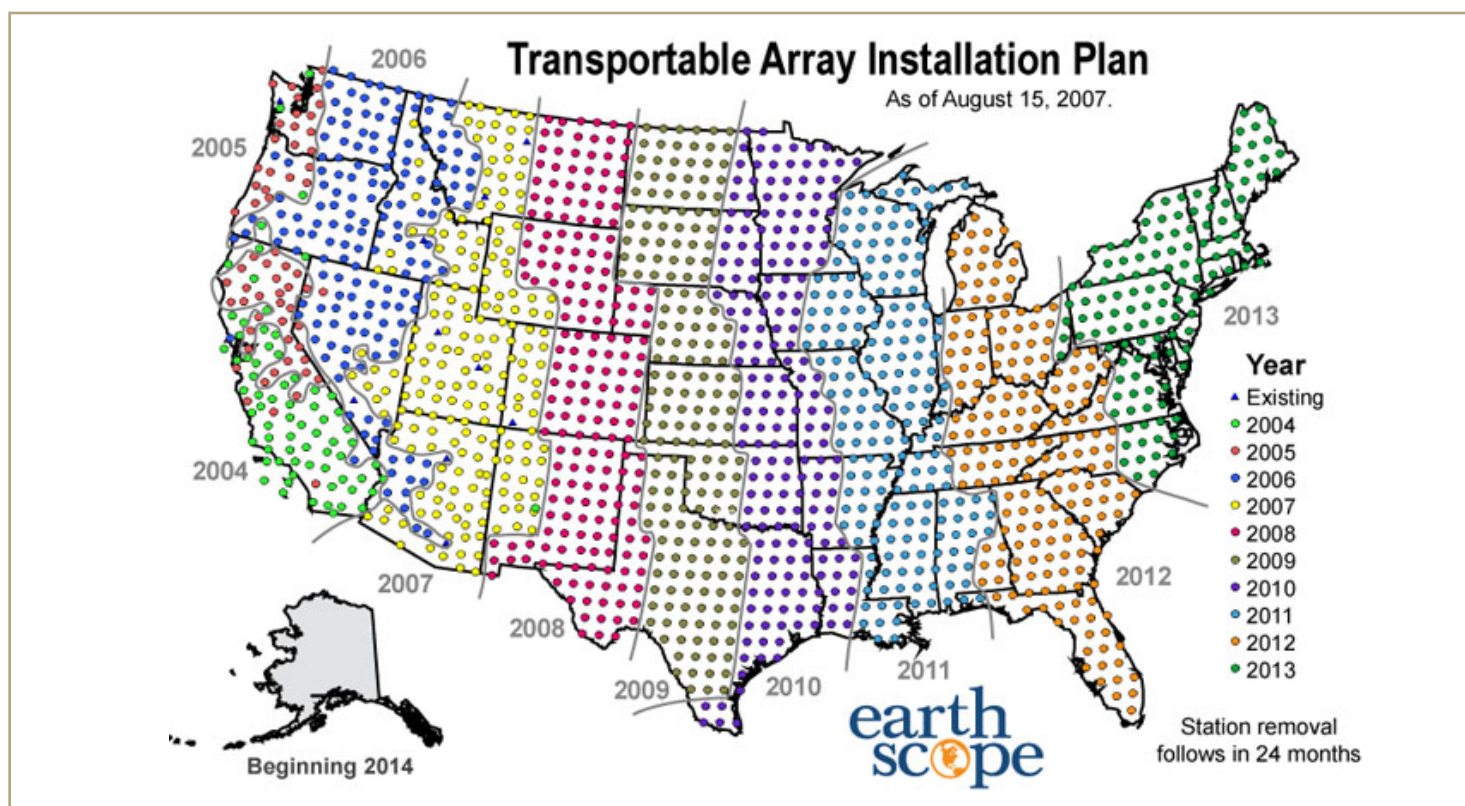
Once again, the scientific community is grateful for your willingness to participate in this research initiative and thank you for contributing to the success of EarthScope and the USArray project.



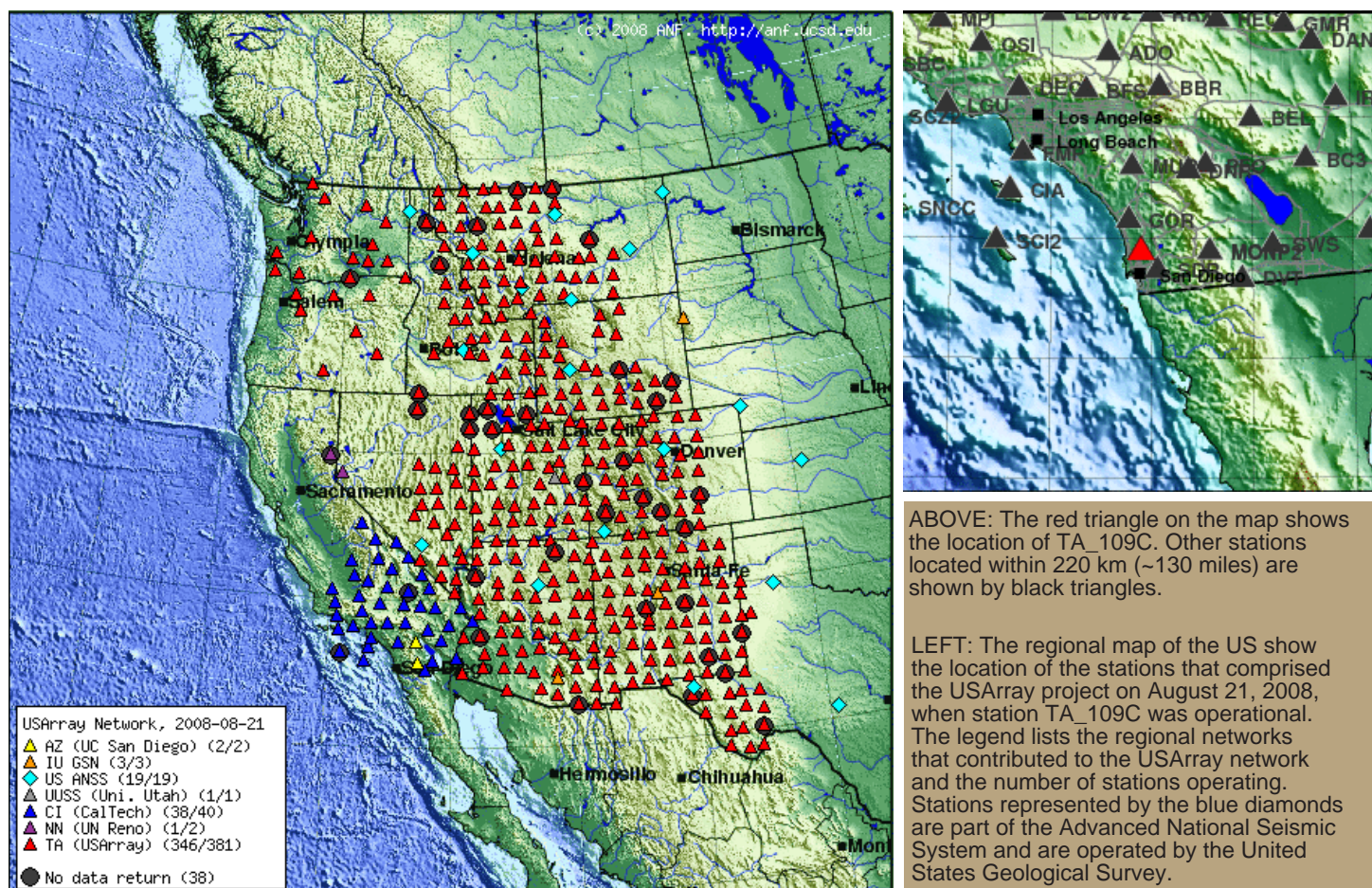
Station summary

Network	TA
Station ID	109C
Location	Camp Elliot, Miramar, CA, USA
Latitude	32.89
Longitude	-117.11
Elevation	0.15 km
Installation Date	2004-05-04
Removal Date	Not available
Communications Type	vsat
Datalogger Model	Quanterra
Sensor Model	Streckeisen STS-2

USArray Deployment Plan

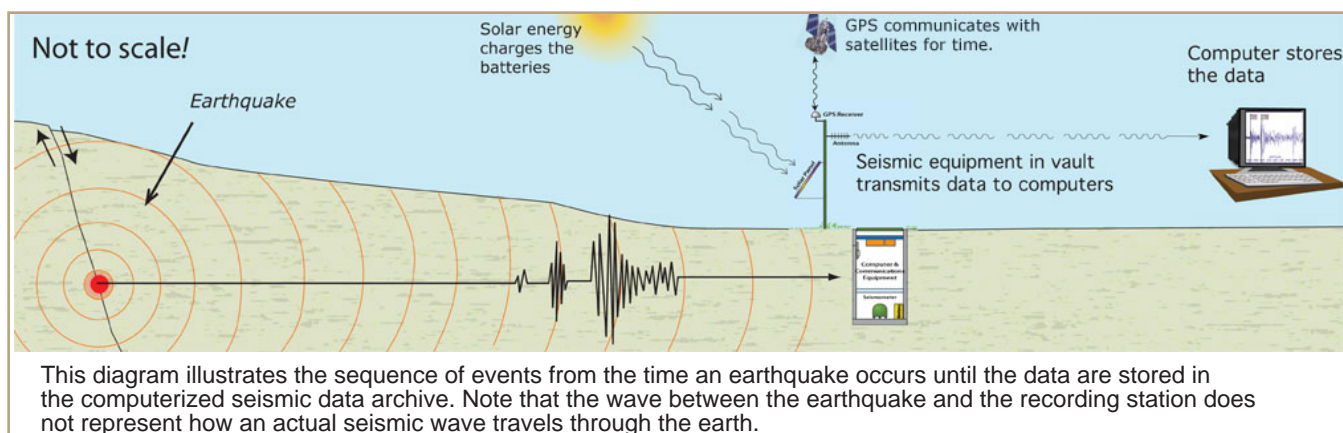


The Transportable Array network was started in California in June 2004, and will move eastward, reaching the east coast of Maine in 2013. Following the installation of the 400th station in August 2007, the westernmost stations are being removed and the seismometers shipped for re-installation on the next portion of the array.



How are Earthquake Data collected?

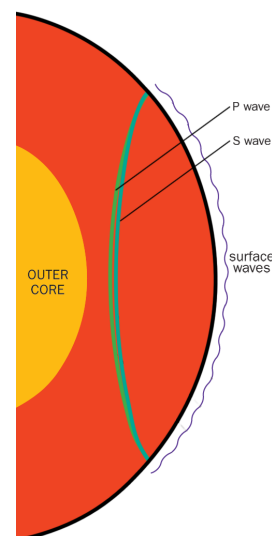
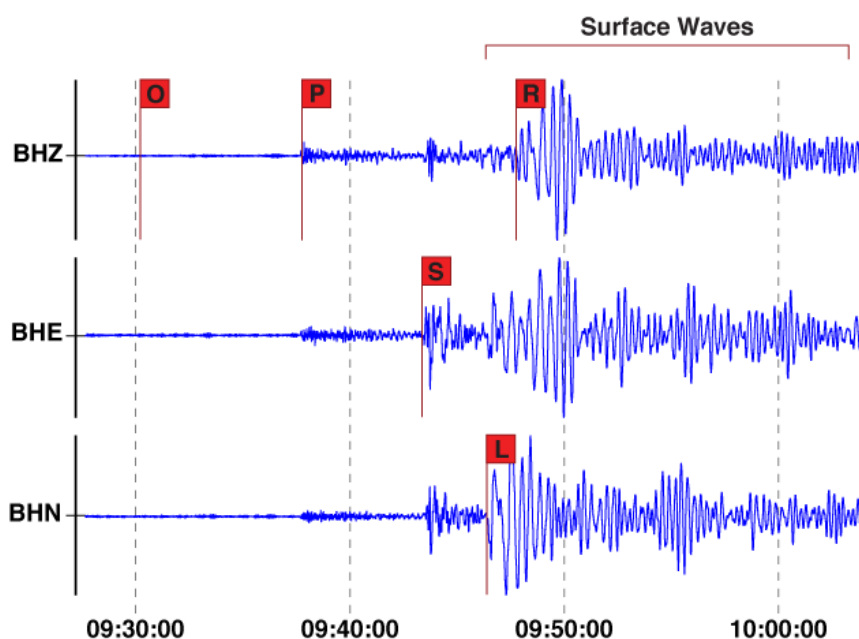
An earthquake generates seismic waves that travel via many paths through the earth to the recording station (see figure lower right below). Seismic waves are recorded using a seismometer, which is linked to a data acquisition system which records and also transmits the data in real time to the Array Network Facility in San Diego, California, via satellite, cell phone, or the Internet. The data are archived, indexed, and then processed by computers. Trained seismologists conduct final analyses and interpretations of the seismic data. The resulting seismic data products are studied by the seismological community for many research endeavors.



What are seismograms?

Seismograms show how the Earth moves at a specific location as time passes, and are used to determine the location and magnitude (size) of an earthquake. Three-component seismometers, like that used at your seismic station, simultaneously record motion in the vertical and horizontal directions. Seismograms show how the Earth moves at a specific location as time passes. The horizontal axis of the seismograms below show time. In this case time marks are shown every 10 minutes. The vertical axis shows the direction of ground movement, i.e. vertical movement is shown on BHZ, horizontal motion in the north/south direction on BHN and horizontal motion in the east/west direction on BHE. The example below shows ground motion recorded at another USArray station (TA_C07A) from a magnitude 7.2 earthquake that occurred on December 19, 2007, in the Aleutian Islands at a depth of 56 km. The origin time of the earthquake (O) and the arrival of the P, S and Surface waves are indicated. Note that Surface waves can be of two types, horizontal Love waves (L) and Rayleigh waves (R) which move both in the horizontal and vertical planes. Damage to structures usually occurs from shaking of the ground due to S or Surface waves which produce the largest motion.

When the seismograph does not detect any movement caused by an earthquake, the seismogram shows a relatively flat line. However, these instruments are extremely sensitive and ground motion from local sources such as wind, traffic, animals, people, and ocean waves, will often be recorded and appear as small wiggles or noise in a seismogram.

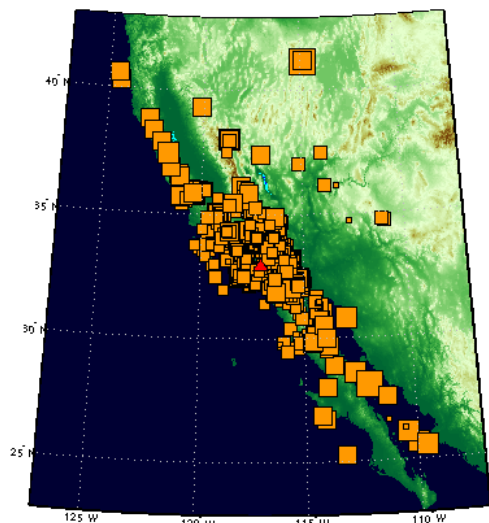


Cross-section of the Earth, showing the propagation of seismic waves indicated in the seismograms to the left.

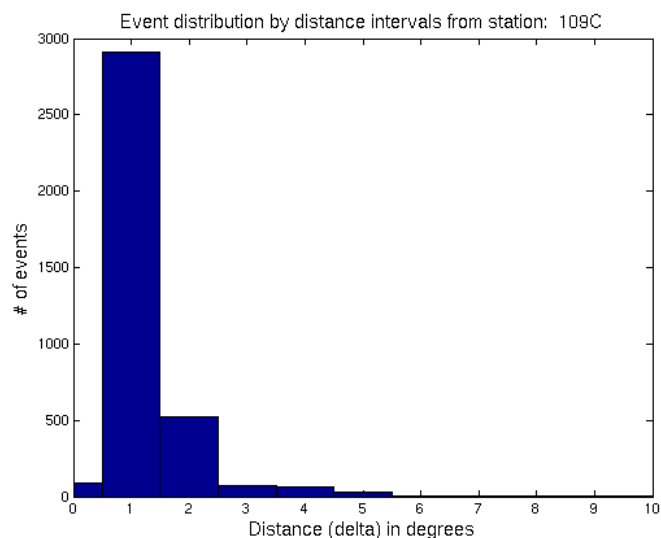
Regional Events Recorded at Station TA_109C

Station TA_109C recorded 3433 regional (within 1100 km) events during its operation. The graph shows how many earthquakes occurred within given distances from this station. The seismograms at the bottom of the page are an example of a regional earthquake recorded by this station.

Regional Events

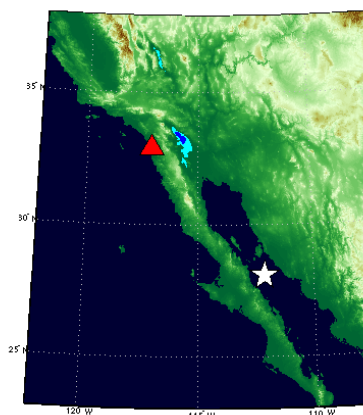


Regional events detected by station TA_109C. The size of the orange squares is proportional to the magnitude of the event. Station TA_109C is shown by the red triangle.

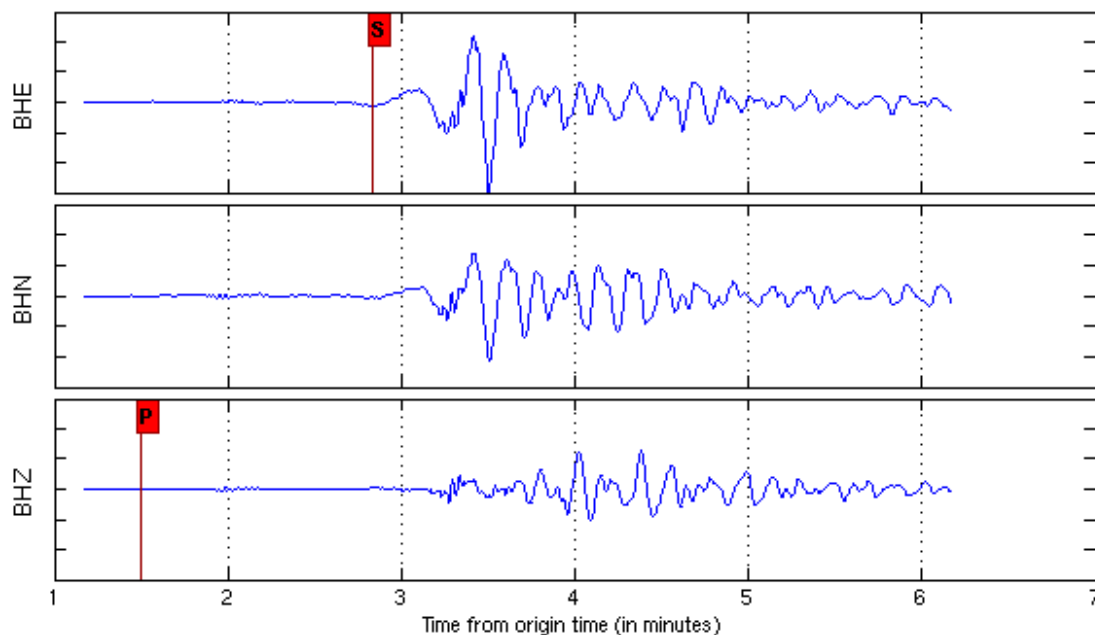


This chart shows the number of regional earthquakes that occurred at a given distance from station TA_109C. The distance is given in 1 degree increments which corresponds to a distance of 110 km.

Seismogram of a Regional Event



The location of station TA_109C is shown by the red triangle; the white star depicts the location on the surface directly above the earthquake.



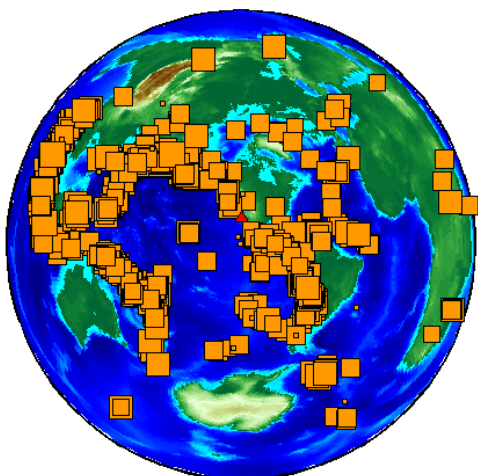
Three components recorded from the magnitude 6.2 regional event detected by station TA_109C on 1/04/2006 (8:32:31.570 UTC). This occurred approximately 719 km from the station. The first seismic waves (P waves) arrived at this station 90.1 seconds after the event occurred.

Distant Events Recorded at Station TA_109C

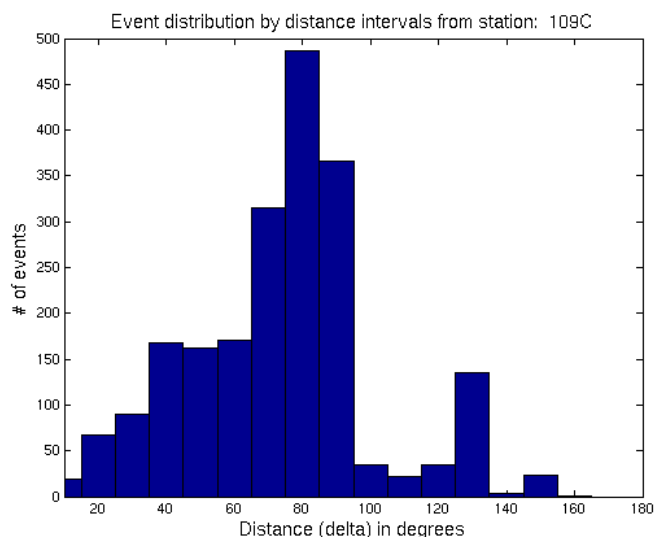
The seismograph at station TA_109C recorded 1972 distant events (occurring over 10 degrees or 1100 km from the station) during its operation. These events are shown on the map below. The graph to the right shows how many earthquakes occurred within given distances from this station. At the bottom of the page are seismograms from a distant earthquake recorded at your station. The map to the left of the seismogram shows the location of the station and the earthquake.

For comparison, the large Sumatra earthquake that occurred on December 26, 2004, had a magnitude of 9.1. This was the second largest earthquake recorded in the last 100 years. The largest was a 9.5 magnitude earthquake in Chile in 1960. The great 1906 San Francisco earthquake had a magnitude of 7.9.

Distant Events

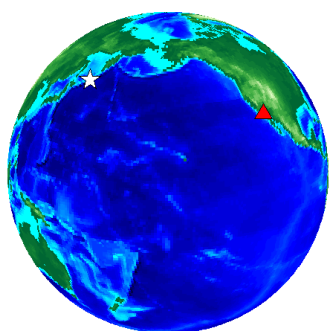


The map above shows the location of 1972 events occurring over 10 degrees or 1100 km from station TA_109C. The size of the orange squares is proportional to the magnitude of the event. Station TA_109C is shown as a red triangle.

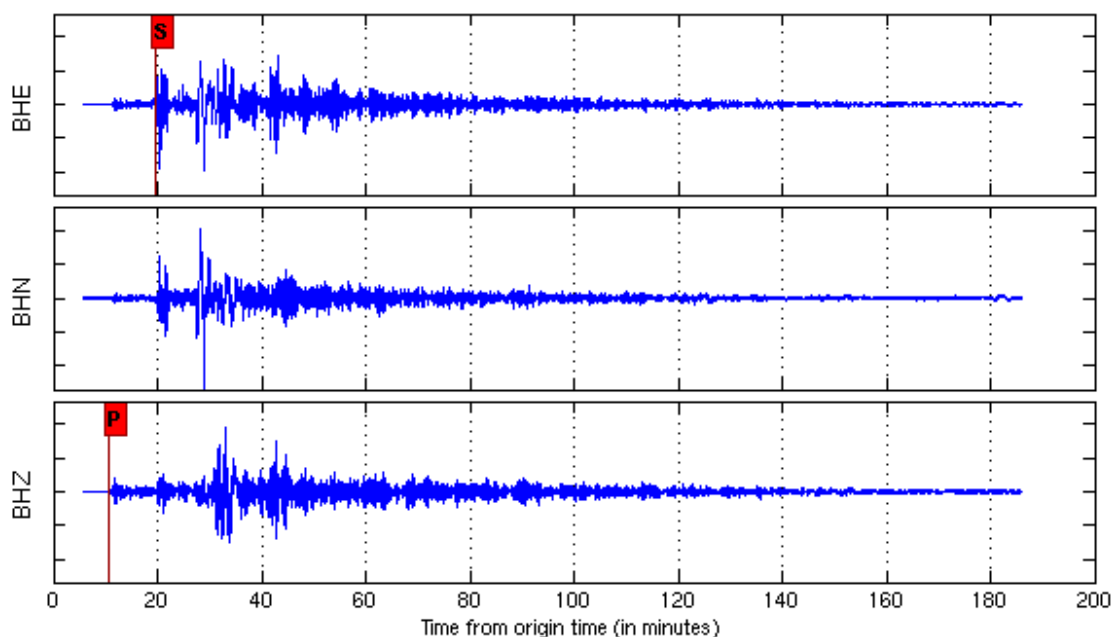


This chart shows the number of distant earthquakes that occurred at a given distance from station TA_109C. The distance is given in 10 degree increments which corresponds to a distance of 1100 km.

Seismogram of a Distant Event

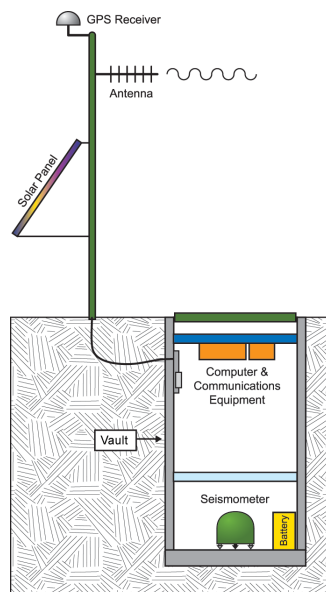


The location of station TA_109C is shown by the red triangle; the white star depicts the location on the surface directly above the earthquake.

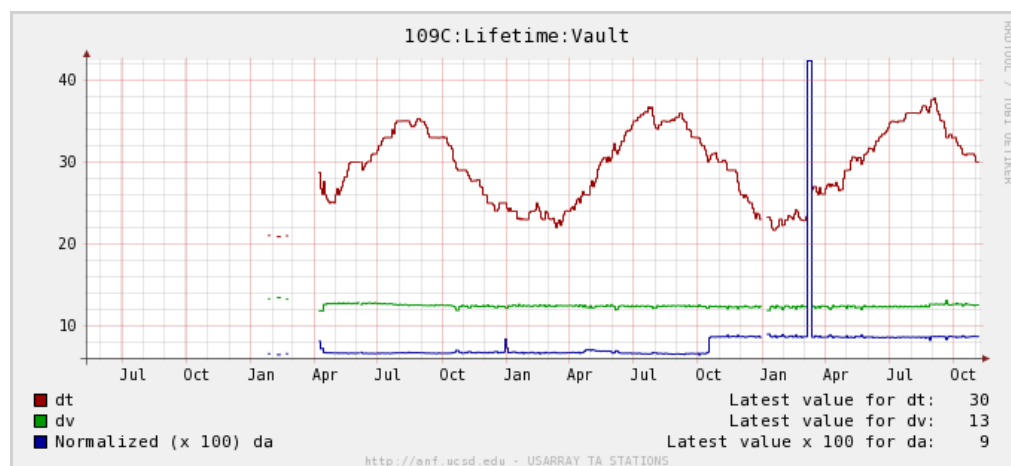


Three components recorded from a distant event detected by station TA_109C on 11/15/2006 (11:14:17.000 UTC). The magnitude of this event was 8.3, and was approximately 7408 km from the recording station. The first seismic waves arrived at this station 649 seconds after the event occurred.

What is inside the vault?



Cross-section of a typical seismic station



We monitor several diagnostic parameters recorded continuously. These allow us to monitor that the station is working properly. The red line represents the temperature in degrees Celsius (C) recorded inside the seismic vault during the lifetime of TA_109C. The power available (volts) and supplied (current in tenths of Amperes) to the station equipment are shown by the green and blue lines respectively.

Links to Additional Information

<http://www.earthscope.org>

Earthscope: A National Earth Science Program to Explore the Structure and Evolution of the North American Continent and Understand Processes Controlling Earthquakes and Volcanoes.

<http://www.iris.edu/USArray>

Description of the USArray component of EarthScope, which includes the Transportable Array (TA), of which your station was a part.

<http://anf.ucsd.edu>

The USArray Array Network Facility - in charge of the operational aspects of the TA, and where the data from your station were transmitted.

<http://www.iris.washington.edu>

The Incorporated Research Institutions for Seismology (IRIS) main web site, a gateway to many links related to seismology and earthquakes.

<http://hwpren.ucsd.edu>

Data communications for this site are provided by the High Performance Wireless Research and Education Network (HPWREN) project.

<http://www.iris.edu/seismon>

Seismic Monitor: Map of latest earthquakes, with locations provided courtesy of the United States Geological Survey.

<http://www.iris.washington.edu/about/ENO/>

IRIS Education and Outreach website with links to educational materials for K-12 schools as well as for the public.

<http://earthquake.usgs.gov>

The USGS Earthquake Hazards Program, with information and locations for earthquakes within minutes of their occurrence.

<http://www.nsf.gov>

The National Science Foundation, the federal agency which is the primary sponsor of EarthScope and USArray.



EarthScope is funded by the National Science Foundation. EarthScope is being constructed, operated, and maintained as a collaborative effort with UNAVCO Inc., the Incorporated Research Institutions for Seismology, and Stanford University, with contributions from the US Geological Survey, NASA, and several other national and international organizations.