



EarthScope's Transportable Array: Current State of Evolution

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The Transportable Array (TA) element of EarthScope/ USArray is a large deployment of 400 high quality broadband seismographs. The TA is operated by the Incorporated Research Institutions for Seismology (IRIS), and is part of the EarthScope Program sponsored by the National Science Foundation. The construction of this array began in September 2003 and the 400th station was installed in September of 2007. The full array of 400 stations is now continuously rolling from west to east across the continental US, requiring the installation (and removal) of approximately 18 stations each month for a ten-year period. By now, the TA has collected seismic data from over 1,000 station sites, stretching from the Pacific coast to the Mississippi River. During the first half of 2011, new stations are being installed in a north-south swath extending from Wisconsin to Louisiana and Alabama in the south. Stations will be removed from Texas northward to North Dakota.

TA stations use a very uniform design, which facilitates both efficient operations and utilization of the data. However, the station design is carefully evolved to enhance performance and acquire new observations. Recent equipment improvements at the stations now include power regulation for sensors and the availability of data channels for temperature, barometric pressure, and infrasound. TA stations deployed in the central US include environmental monitoring sensors as part of the refined vault infrastructure. These channels include barometric pressure (SEED code EP-LDM), temperature, and humidity, all measured inside the TA station vaults. Precision barometric pressure and high-quality infrasound sensors will be added to every TA station deployed after February 2011. Previous research has highlighted the direct effect of atmospheric pressure fluctuations on very-long-period vertical seismometers. The relationship to pressure observed on horizontal seismometers is more complex. However, a large number of uniform installations is allowing further progress.

All sites have real-time telemetry and all data are openly available at the IRIS Data Management Center (DMC) within seconds of recording. On-site data recording hardware has been improved to reduce the time required before the final archival data are available at the DMC. Previously, the final data archiving for a TA station took place a few months after the station had been removed. Now, the final archival data are available at the IRIS DMC within a few months after real-time acquisition.

Additional activities have derived from the TA success. 27 TA-type stations have been "redeployed" along the length of Cascadia, at the western edge of the continent, as part of a coordinated onshore/offshore facility funded by NSF. The installation of these stations was completed in August 2010, with each station including strong motion sensors in addition to the standard broadband sensors. A backbone of ten TA-type stations is planned for Chile. The TA deployment is also leaving behind legacy stations, as a number of TA stations remain operational under the Station Adoption program, and numerous seismic vaults have been transferred to other institutions for further studies.