



EarthScope: A distributed, multi-purpose geophysical observatory for the structure and dynamics of the North American continent

Mike E. Jackson and R. Woodward

Jackson, M.E., UNAVCO Plate Boundary Observatory, Boulder CO, Jackson@unavco.org, Woodward, R, IRIS USArray, Washington D.C., woodward@iris.edu

EarthScope, a broad-based geophysics program funded by the US National Science Foundation, takes a multi-disciplinary approach to studying the structure and evolution of the North American continent and the physical processes controlling earthquakes and volcanoes. The integrated observing systems that make up the EarthScope facilities provide data streams that address fundamental questions at a variety of scales including the active nucleation zone of earthquakes, individual faults and volcanoes, the deformation along the plate boundary, and the structure of the continent and planet. EarthScope data are freely and openly available to maximize participation from the national and international scientific community and to provide ongoing educational outreach to students and the public.

EarthScope facilities include the San Andreas Fault Observatory at Depth (SAFOD), the Plate Boundary Observatory (PBO), and the USArray. With leadership from the U.S. academic research community, consortium members, and through collaboration with other national and international organizations, IRIS operates, maintains, and manages the USArray facility and UNAVCO manages the PBO and SAFOD facilities. USArray consists of a portable array of 400 broadband seismometers that traverse North America and Alaska over a 15- year period; a pool of broadband, short-period, and active source seismometers available for deployment in areas where a denser observations are required; and seven permanent and 20 portable magnetotelluric (MT) instruments. SAFOD consists of a 3.1 km instrumented and core-sampled borehole that crosses the seismogenic zone of the San Andreas fault, designed to directly reveal the physical and chemical processes controlling earthquake generation. The PBO is a permanent network of continuous Global Positioning System (CGPS) stations, borehole tensor strainmeters, long baseline laser strainmeters, and a pool of campaign GPS units that provide deformation data for fundamental studies of the dynamics of plate motions, earthquakes, and volcanoes. Distributed EarthScope data management systems ensure that all data collected by the USArray, PBO, SAFOD, and partner organizations are archived and distributed to the science community, educators, and the public free of charge and without delay.

Our presentation will review the construction and operations of the EarthScope facility and provide science highlights that illustrate the transformational power of openly available, integrated community data sets. We will compare and contrast the EarthScope facility with other international geographically distributed Earth science observatories such as GEONET, AUscope, and EPOS.