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The UNAVCO Plate Boundary Observatory Borehole Network: A History and Update

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As part of the UNAVCO Plate Boundary Observatory (PBO) component of the NSF sponsored EarthScope program, the US based borehole strainmeter initiative was significantly expanded and is now one of the largest of it's kind in the world. The borehole network consists of 80 boreholes instrumented with strainmeters, seismometers, borehole tiltmeters, pore pressure transducers and various ancillary senors such as high frequency barometric pressure and meteorological sensors. The borehole sensors have sample rates ranging from 1 Hz to 200 Hz and return data in real-time to the UNAVCO PBO facility located in Boulder, Colorado. This project represents an example of the conception, scientific rational, funding, construction and on-going operations of a community driven US based borehole strainmeter network.

Since the end of the construction phase in 2008, the network has already made high resolution observations of strain transients and provided valuable scientific insights. Along the Cascadia subduction zone in the Pacific Northwest, recurring slow slip events are recorded, including small asperity events unresolvable with other ground based geodetic techniques, and the first observations of tidal modulation of the strain rate during slow slip events [Hawthorne,Rubin, 2010]. In the Parkfield area along the San Andreas Fault, very small creep events representing slip of less than 1 mm are repeatedly observed [Langbein, 2009] . In addition hydrologically driven geodetic strain events are observed in the form of seiches in Lake Yellowstone. Crustal loading associated with tsunamis created as a result of the 2010 M8.8 Chile earthquake and the 2009 M8.1 Samoa earthquakes are observed in strainmeters installed in the Pacific Northwest and Canada.