- Strengthening data analysis, integration, and interpretation. Continued development of data products and cyberinfrastructure will be guided by the recent report *A Preliminary Strategic Plan for EarthScope Cyberinfrastructure* (Gurnis et al., 2012). Open access to higher-level data products that build on the expertise of community members will provide information that is easily accessible to an increased number of users.

EarthScope Beyond 2018

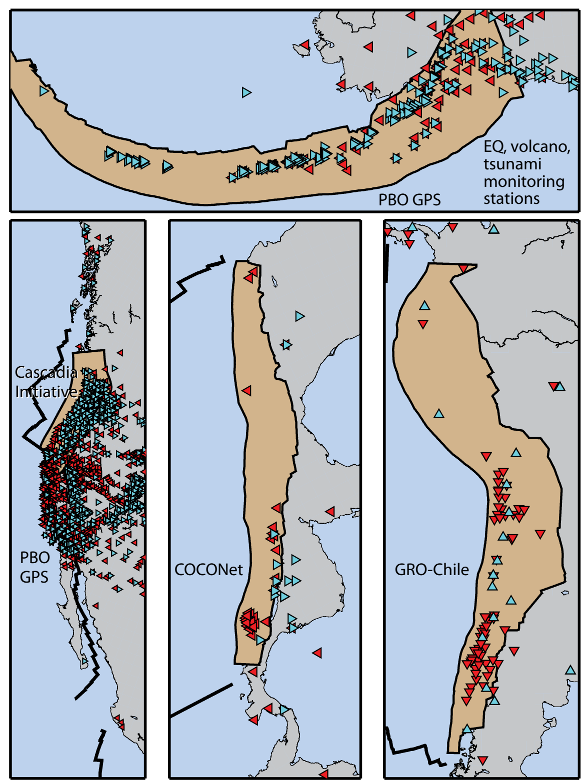
EarthScope has become the global standard for a broad-based, community-driven, integrative research facility that provides a nexus for interdisciplinary science. The Earth system processes of relevance to the EarthScope scientific community operate on time scales longer than the originally planned 15-year lifespan of the facility, and we expect that a legacy of EarthScope observing systems will continue to sample time-varying phenomena beyond the 2018 horizon. Tectonic deformation is a predominately slow process, and commonly does not occur in a steady state. Earthquake cycle deformations, which are both subject to and offer insight into the rheology of the Earth, can vary over decades to centuries. Just as new and unexpected mechanisms of plate boundary deformation such as ETS were discovered when precise geodetic observations became available at interannual periods, and were better understood in light of high resolution seismic mapping, additional new, interesting, and important modes of deformation related to hydrogeodesy are revealed as interdecadal records become available. In addition, managing, mining, visualizing, and integrating very large, disparate datasets are now coming of age with enhanced cyberinfrastructure, driven by such new initiatives such as *EarthCube* at NSF and *COOPEUS* in Europe.

Beyond 2018: A Subduction Zone Observatory?

The success, knowledge, and experience of EarthScope provide an unprecedented launching point for IRIS and UNAVCO to collaborate on the creation of a planetary-scale Subduction Zone Observatory (SZO). This observatory, stretching 18,000 km along the eastern Pacific Ocean, from the Aleutians in the north, to the tip of Tierra del Fuego in the south, will provide an integrated, interdisciplinary approach to understanding the entire subduction zone as a system. SZO research will have enormous societal relevance, given the population centers all along the coast that are subject to earthquake-, tsunami-, and volcano-related hazards.

Existing geophysical networks and observatories will provide the SZO's starting backbone (see Figure). The Plate Boundary Observatory (PBO) core—the set of GNSS sites that will form the post-EarthScope backbone in North America—will be one among an anticipated federation of geodetic networks that will overlap with new SZO. Current NSF-funded IRIS and UNAVCO activities, such as the GRO-Chile seismic network, the COCONet GPS network, and the onshore and offshore stations of the Cascadia Initiative will provide key infrastructure. The SZO will grow through infill with strategic deployments of broadband seismometers and high-sample-rate GPS. Small, flexible PI-led projects can be designed and performed within this larger framework.

An SZO will be a major international initiative, and IRIS and UNAVCO propose to begin now to collaborate on bringing together the necessary geographic, organizational, and disciplinary representation to develop the SZO concept and articulate the science benefits.



The SZO, showing locations of present GPS (red) and seismic (blue) stations that report data in near-real time. (top) Aleutians-Alaska Peninsula. (left) US-Canada west coast. (center) Central America. (right) South America. The brown shading indicates the lateral extent of the seismogenic portions of subducting slabs, illustrating the tremendous variability in subduction processes and other plate boundaries along the length of the SZO. At present, the availability of observations along the SZO varies widely.