

Following a year of above-average precipitation in 2011, the western United States entered into drought in late 2012 and has yet to emerge. The severity of the current drought is focusing public attention on known water resource challenges in the West and is changing assumptions about how water use should be monitored and regulated. Despite this new interest in water management, key water reservoirs such as mountain snowpack and groundwater aquifers are sparsely instrumented and cannot yet be characterized from space at the requisite spatial and temporal resolution. As a result, a new paradigm is emerging for monitoring water in the western US. Because the solid earth responds elastically to hydrological loading, changes in water storage can be inferred from surface displacements measured by GPS, and the Plate Boundary Observatory (PBO) continuous GPS network has proved to be an exceptional tool for monitoring the spatiotemporal evolution of the hydrological cycle. Seasonal changes in water loading have long been known to drive annual cycles of GPS site motion, but changes over both longer and shorter periods are detectable and can yield insights into weather and climate phenomena from individual storms to multiyear drought. Scientific GPS networks such as PBO, originally built to study crustal displacement from plate tectonics and volcanic processes, could soon become an important extension of the global hydrological observing system.