Tectonic Plate Boundary Observatory Station Installed in South-Central North Dakota

Fred J. Anderson

A new high-precision GPS station has been installed adjacent to the Stumpf Natural Area near Huff in eastern Morton County. This new station is a part of a 1,120-station GPS geodetic array called the Plate Boundary Observatory (PBO) that covers the entire United States from southern California to New Hampshire (fig. 1) and operated by the University NAVSTAR Consortium (UNAVCO). These geodetic stations monitor with millimeter accuracy the tectonic plate motion and deformation of Earth's crust as a result of earthquakes and plate tectonic motions that occur across the North American continent. UNAVCO is a non-profit university-governed consortium that facilitates geosciences research and education using the science of geodesy* (UNAVCO, 2012). The PBO is the geodetic (or global surveying) component of the EarthScope project that, over the past five years, had broadband seismic monitoring stations deployed across North Dakota imaging the structure of the continent through the collection of earthquake data from around the world (Anderson, 2010).

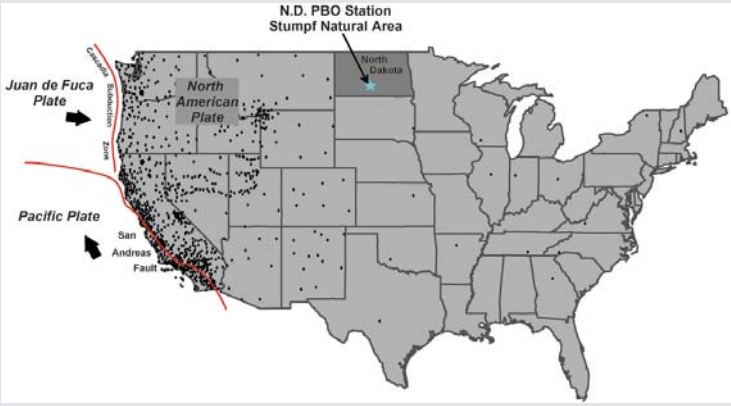

Figure 1. Locations of geodetic GPS stations across the conterminous United States comprising the UNAVCO tectonic Plate Boundary Observatory (PBO). The recently installed station in the stable portion of the continent in North Dakota at the Stumpf Natural Area southeast of Huff in eastern Morton County is highlighted (light blue star). The high density of stations along the western seaboard is reflective of this dynamic interplate tectonic setting and the need for the acquisition of high-resolution data along the San Andreas Fault and Cascadia Subduction Zone.

***Geodesy** – The science concerned with the determination of the size and shape of the Earth and the precise location of points on its surface (AGI, 1997).*

The new PBO GPS station was installed just southeast of Huff on October 19, 2012, as a deep-drilled, braced monument (DDBM) station. The instrumentation installed at the site was drilled and cemented into bedrock and consists of a Trimble NetR9 receiver, a Trimble choke-ring antenna (which reduces multi-path signal reception errors) and SCIGN radome, a SunWize Premium F-Series weather-proof battery and instrumentation enclosure, dual solar panel power array (for dual battery and solar power), and cellular modem for data communications (fig. 2). This station is considered to be a permanent installation and is planned to remain in place for the foreseeable future.

Figure 2. Drilling and installation of one of the monument braces for the new PBO GPS station near the Stumpf Natural Area southeast of Huff, in eastern Morton County, south-central North Dakota. Components installed include a high-precision GPS receiver and antenna, along with power and data communications equipment, housed in a weather-tight enclosure.

References

AGI, 1997, Glossary of Geology, Fourth Edition, Jackson, J.A. ed., American Geological Institute, 769 p.

Anderson, F.J., 2010, EarthScope Transportable Seismic Array Operational in North Dakota: Geo News, v. 37, no. 1, p. 23-25.

UNAVCO, 2012, Plate Boundary Observatory, http://pbo.unavco.org