

PROJECT UPDATES — July 2017

Summary — Project personnel at the Bureau, along with our UT-Austin, SMU, and TAMU research partners, continue to make progress on this highly successful program, as highlighted below.

Network Installation and Operations:

- Testing and feature enhancement continues for the TexNet Earthquake Portal web site. The estimated release date of the public version of the portal is end of September.
- Land use contracting for the remaining permanent TexNet sites is complete and the final phase of station installation began on July 21st and is expected to finish by mid-August. Permanent stations in Monahans, Muldoon and San Augustine are complete and on-line.
- The first portable station in the Eagle Ford play area is deployed and on-line (EF01).

Synopsis of July 2017 Seismicity in Texas:

- *TexNet* cataloged 86 events in Texas, most occurring in West Texas and the Snyder area. Two events were recorded at $M_L \geq 2.5$. The highest local magnitude event ($M_L = 3.1$) occurred July 2nd near Karnes City.
- The *SMU North Texas earthquake catalog* recorded two earthquakes ($M_L < 1.0$) associated with the ongoing Venus earthquake sequence.

Partnership:

- *SMU Ft Worth Basin Earthquake Characterization* team maintained the SMU network and real-time archiving of continuous waveform data to IRIS and provide updated SMU earthquake catalogs, upon request.

Research:

- *Bureau Fault Reactivation, Geomechanics* team incorporated detailed injection well data into the 3D fully coupled poroelastic model for the Azle area to examine the individual contributions of fluid injection and production to pore pressure change, stress change, and fault reactivation.
- *Bureau Hydrogeology* team continued development of the fluid flow model of the Fort Worth Basin and successfully carried out full model runs with simplified input parameters.
- The *SMU Ft Worth Basin Earthquake Characterization* team's research efforts focused on: 1) calculation of near surface (<1 km) phase velocities using ambient noise; 2) finalizing local stress field orientations and total effective stress states of seismogenic faults in the FWB; and 3) continued work on stress drop/moment.
- *TAMU Fluid Flow, Geomechanics* team built a simple 2D Azle model using Abaqus for coupled fluid flow and geomechanics runs and qualitatively compare the results with CMG. The results show agreement when plastic displacement occurred at the basement fault in both simulators.
- *UT PGE* team continued analyzing injection control on magnitudes and frequency of earthquakes and is considering regions of differing background seismicity (e.g. areas of California vs. areas of Texas).
- *UT Seismic Hazard and Risk Assessment* team performed field testing at 9 sites around the Permian Basin, including Pecos, to measure V_s30 .

Outreach:

- P. Hennings presented TexNet-CISR progress to the Society of Independent Professional Earth Scientists and the Permian Basin Petroleum Association Water Committee and was interviewed by Midland's NewsWest9 which ran on 11 additional media outlets.
- C. Lemons presented "Protocols and Common Pitfalls in Data Compilation for Induced Seismicity Assessment" at the 2017 Unconventional Resources Technology Conference (URTeC) 2017 in Austin, TX.
- E. Rathje was a keynote speaker on earthquake ground motion and G. Zalachoris presented V_s30 mapping at the 3rd International Conf. on Performance-Based Design in Earthquake Geotechnical Engineering in Vancouver, BC.