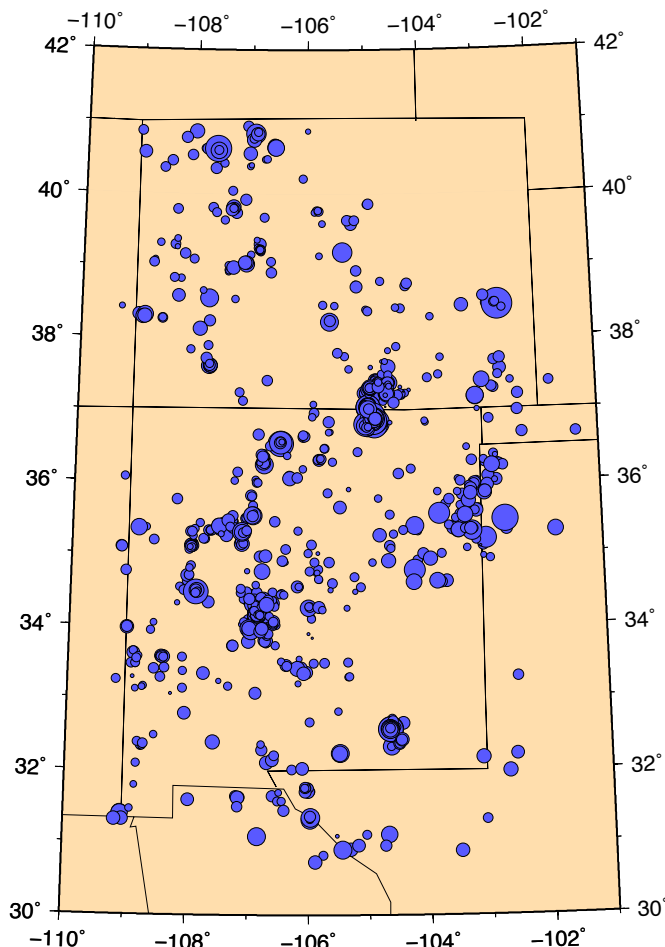


We present a catalog of over 3,100 earthquakes ranging from magnitude 0 to 4.9 from 2008-2010 in Colorado and New Mexico. The estimated magnitude completeness is 1.2. Our study area encompasses the Rio Grande Rift, southern Rocky Mountains, and Jemez Lineament. The Transportable Array (TA), PASSCAL CREST (Colorado Rockies and Seismic Transect), and ANSS backbone stations provided data for earthquake association and locations. The average station spacing for the TA is ~70 km and ~20 km inside the CREST network. Earthquakes were located with P and S arrivals and relocated with a Bayesian event locator. A separate catalog of 2,800 mine blasts was developed based on waveform identification, coincidence of event location with active mines, and daily daytime occurrence. The Rio Grande Rift is an active continental rift characterized by north-south trending basins extending from northern Colorado to southern New Mexico, where the rift meets the Basin and Range. Several large earthquakes have occurred in the last 150 years, a magnitude 6 in Colorado, a magnitude 6.3 in New Mexico, and a magnitude 7.2 in Sonora, Mexico, demonstrating the potential for large earthquakes. The small magnitude earthquakes from our new catalog help illuminate seismicity associated with active faults, recent volcanism in the Jemez Lineament, inherited structures, and human activity. Historic seismicity had not previously shown an obvious connection with the active Quaternary faults bounding the rift basins. The Raton Basin earthquakes, likely related to wastewater fluid-injection, make up 60% (over 1,800 earthquakes) of the catalog. The relocated earthquakes show a distinct 16 km long feature we interpret as a fault. We find a



cluster of earthquakes at the Socorro magma body in central New Mexico, as well as earthquakes in areas with recent volcanism such as the El Malpais volcanic field, Mt. Taylor, and the Datil-Mogollon volcanic field, all in New Mexico. A small cluster of earthquakes is located at Paradox Valley, where injection of saltwater is taking place. Earthquakes also occur in southeastern New Mexico and are potentially related to wastewater injection. First motion polarities are used to find the best-fit fault plane solutions for select events greater than magnitude 3. Smaller earthquakes will contribute our knowledge about stress orientations from the World Stress Map, moment tensors, and geodetic results. Small earthquakes do not appear to be exclusively related to recent fault activity, but to a broad range of volcanic activity, induced seismicity, and enigmatic earthquakes in the Great Plains.