Improved Understanding of Triggered Seismicity in the Salton Sea Geothermal Field with Waveform Matching Method

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Microseismicity can be easily triggered in volcanic and geothermal regions by stress perturbations from earthquake waves hundreds to thousands of kilometers away. Geothermal fields are seismically active with intensive microseismicity, and highly sensitive to external stress perturbation, making them ideal "natural laboratory" for studying earthquake triggering. The Salton Sea Geothermal Field (SSGF) is one of the most seismically active and geothermally productive fields in California. It lies close to major active faults such as the Southern San Andreas Fault, Imperial Fault, Brawley Seismic Zone (BSZ) and San Jacinto Fault. Previous studies already found evidence that seismicity in SSGF was triggered by 1999 M7.1 Hector Mine Earthquake and 2010 El Mayor-Cucapah Earthquake. Here we present a systematic investigation of triggered seismicity in SSGF from 2007 to 2014 utilizing the Calenergy Borehole Network (EN). We apply the recently-developed GPU-based waveform matched-filter technique (WMFT) to detect missing microearthquakes and analyze the seismicity change in SSGF around some regional and remote earthquakes with predicted dynamic stress above 5 KPa. Our result shows triggered seismicity following a few regional earthquakes, such as the 2009 Mw6.9 Baja California and 2010 Mw5.7 Ocotillo Earthquakes, and it tends to be less sensitive to remote large earthquakes (e.g., 2010 Mw8.8 Chile and 2011 Mw9.1 Tohoku earthquakes). Our next step is to apply the same procedures to mainshocks that are even closer, such as the 2012 BSZ earthquake swarms that are ~20 km south of SSGF, to examine whether the SSGF respond to stress perturbations from nearby earthquakes. Updated results will be presented in the meeting.