EGU2020-11146
https://doi.org/10.5194/egusphere-egu2020-11146
EGU General Assembly 2020

Using Seismic and Geodetic Observations in a Simultaneous Kinematic Model of the 2019 Ridgecrest, California Earthquakes

Dara Goldberg[1], Diego Melgar[1], Valerie Sahakian[1], Amanda Thomas[1], Xiaohua Xu[2], Brendan Crowell[3], and Jianghui Geng[4]

[1]Department of Earth Sciences, University of Oregon, Eugene, Oregon, United States of America
[2]Scripps Institution of Oceanography, University of California San Diego, La Jolla, California, United States of America
[3]Department of Earth and Space Sciences, University of Washington, Seattle, Washington, United States of America
[4]Wuhan University, Wuhan, China

The July 4, 2019 Mw6.4 and subsequent July 6, 2019 Mw7.1 Ridgecrest Sequence earthquakes in California, USA, ruptured orthogonal fault planes in the Little Lake Fault Zone, a low slip rate (1 mm/year) dextral fault zone in the region linking the Eastern California Shear Zone (ECSZ) and Walker Lane. This region is tectonically interesting because it accommodates approximately one fourth of plate boundary motion and has been proposed to be an incipient transform fault system that could eventually become the main tectonic boundary, replacing the San Andreas Fault. Additionally, large ruptures of such low slip rate faults are important to understand from the context of seismic hazard. We investigate the interaction within this fault system and demonstrate a novel kinematic slip method that inverts for both earthquakes simultaneously, allowing us to use Interferometric Synthetic Aperture Radar (InSAR) data that spans both earthquakes, along with seismic (strong-motion accelerometer) and geodetic (high-rate Global Navigation Satellite Systems (GNSS) and GNSS static offset) datasets that recorded each earthquake separately. We also present results of Coulomb stress change modeling to evaluate how the Mw6.4 earthquake may have affected the subsequent Mw7.1 event. Our findings suggest a complex rupture process and interactions between several fault structures, including dynamic and static triggering between splays involved in the July 4th Mw6.4 and July 6th Mw7.1 events. The integration of seismic and geodetic datasets provides constraints on rupture continuation through stepovers, as well as important context for regional models of seismic source characterization and hazard.