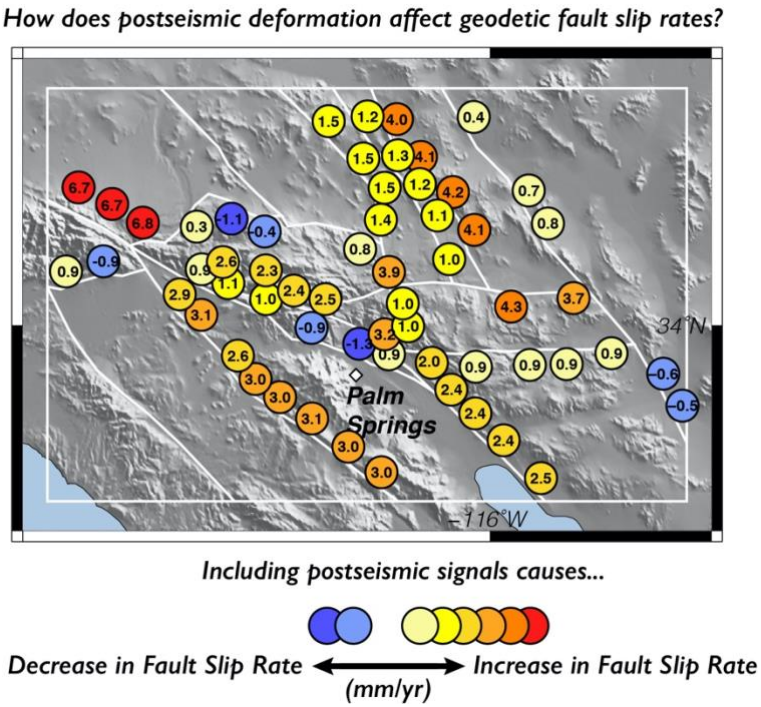
IGPP Virtual Seminar Series

Katherine Guns
IGPP

Exploring the effect of post-seismic deformation on geodetic fault-slip rates in southern California: Untying the San Gorgonio Pass Knot

Date: Tuesday, October 6, 2020
Time: 12:00 pm, Pacific Time
Host: El Knappe (eknappe@ucsd.edu – if you have questions)
Zoom link and password: *seismic*
https://ucsd.zoom.us/j/92035394192?pwd=bzlCQWJwUGdUdEMybWEyeDB1NEV3UT09
Meeting ID: 920 3539 4192
Please note that this meeting will be recorded and eventually posted to the IGPP YouTube



Assessing fault slip rates in diffuse plate boundary systems such as the San Andreas Fault in southern California is critical both to characterize seismic hazards and to understand how different fault strands work together to accommodate plate boundary motion. In places like San Gorgonio Pass, the geometric complexity of numerous fault strands interacting in a small area adds an extra obstacle to understanding the rupture potential and behavior of each individual fault. To better understand partitioning of fault slip rates in this region, we build a new set of elastic fault block models that test sixteen different model fault geometries for the area. These models build on previous studies by incorporating updated campaign GPS measurements from the San Bernardino Mountains and Eastern Transverse Ranges into a newly calculated GPS velocity field that has been removed of long- and short-term postseismic displacements from twelve past large-magnitude earthquakes to estimate model fault slip rates. These twelve events were identified through the modeling of the viscoelastic postseismic deformation caused by 217 historical and recent ≥M6.0 earthquakes in California, Nevada, and northwestern Mexico. Using this new postseismic-reduced GPS velocity field produces a best-fitting model geometry that resolves the long-standing geologic-geodetic slip rate discrepancy in the Eastern California Shear Zone when off-fault deformation is taken into account, yielding a summed slip rate of 7.2 ± 2.8 mm/yr. Our models additionally indicate that two active strands of the San Andreas system in San Gorgonio Pass are needed to produce sufficiently low geodetic dextral slip rates to match geologic observations. Lastly, results suggest that if included in the analysis, postseismic deformation increases estimated geodetic fault slip rates for nearly all faults in our model, and may have more of a role to play in affecting the loading of faults in southern California than previously thought.