# IGPP Virtual Seminar Series


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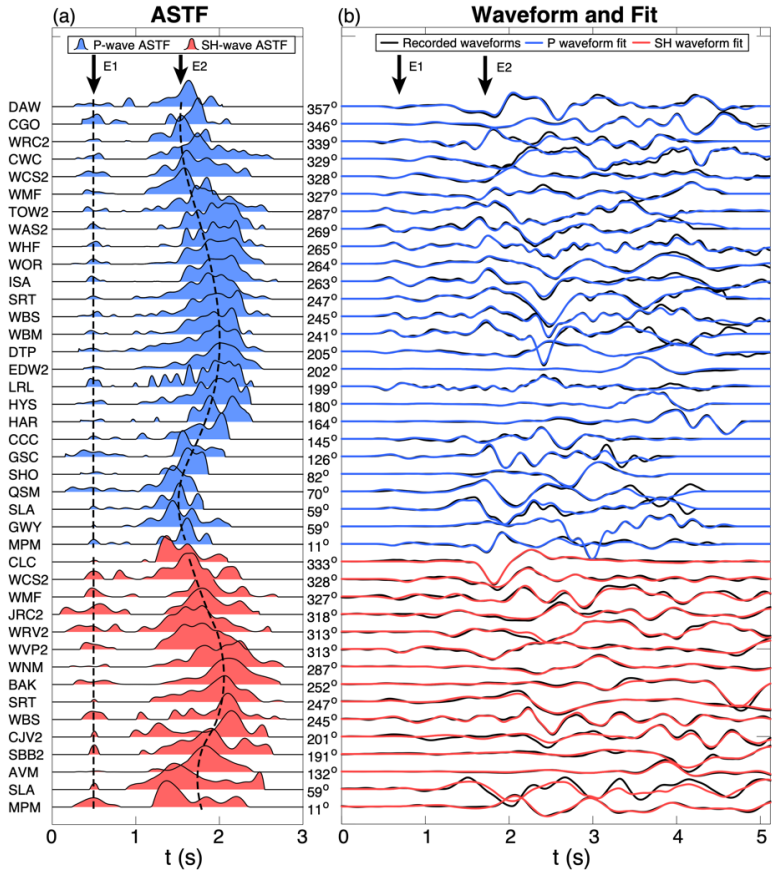
**IGPP**


## Resolving finite-source attributes of the 2019 Ridgecrest earthquake sequence using second-moment method

**Date: Tuesday, Mar 16, 2021**
**Time: 12:00 pm, Pacific Time**
**Host: Tianze Liu (tianzeliu@ucsd.edu)**
**Zoom link:**
https://ucsd.zoom.us/j/94401153815?pwd=L0tUcnZWaFc1Nm5QN0thOWtYeFVodz09
**(Meeting ID: 944 0115 3815; Password: ridgecrest)**



Resolving earthquake rupture process is essential to understand earthquake physics and mitigate seismic hazards. Such processes of moderate and small seismic events are usually resolved using spectral fitting methods with pre-assumed physical rupture models. In this study, we apply a model-free method to estimate the second-degree seismic moments of 39 M 3.8 to 5.5 earthquakes in the 2019 Ridgecrest sequence using local broadband seismic networks. The second moments of an earthquake describe the finite source attributes including rupture length, width, duration, and directivity. Our observations show weak and moderate rupture directivities with propagation directions both parallel and perpendicular to the rupture strike of the Mw 7.1 mainshock. Interestingly, there is a lack of spatial clustering of rupture directivities in this previously unmapped fault system. With the resolved rupture lengths and widths, we also estimate the stress drops ranging from 2 to 200 MPa with a median of 47 MPa. This probably indicates these resolved earthquakes released a large portion of the shear stress on the faults considering the estimate on the order of 25-40 MPa in previous studies.

**For those who are interested in second-degree seismic moment, please feel free to check out the following publications.**

McGuire, Jeffrey J. "Estimating finite source properties of small earthquake ruptures." Bulletin of the Seismological Society of America 94.2 (2004): 377-393.

Fan, Wenyuan, and Jeffrey J. McGuire. "Investigating microearthquake finite source attributes with IRIS Community Wavefield Demonstration Experiment in Oklahoma." Geophysical Journal International 214.2 (2018): 1072-1087.

Meng, Haoran, Jeffrey J. McGuire, and Yehuda Ben-Zion. "Semiautomated estimates of directivity and related source properties of small to moderate southern California earthquakes using second seismic moments." Journal of Geophysical Research: Solid Earth 1