UC **SANTA BARBARA**

Department of Earth Science

Yes, 3:30! TIME CHANGE

Speakers Club

WEBB 1100 • THURSDAY APRIL 5th.• 3:30 PM

Subject-Oriented Finite Fault Inversions and its Applications

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Detailed mapping of the spatial and temporal slip distribution of large earthquakes is one of the principal goals of seismology. In the last few decades, many methods have been developed that use observed seismic waveforms and static deformations, such as GPS and InSAR data, to constrain the spatiotemporal rupture evolutions of large events. The results have led to theoretical breakthroughs in earthquake physics and have been used to predict the damage of future large earthquakes. These methods, which are classified as finite-fault inversions, involve finding the values of fault parameters, such as displacement and rupture velocity, which can minimize a misfit or objective function. Despite the principle goal of retrieving the slip history of a particular rupture event, the ingenuity of the finite fault inversion method is its flexibility and versatility. Analogous to subject-oriented programming, this method can be molded slightly differently based on the data types available and the types of operations applied to these data structures. In other words, my research involves the development of novel approaches or modifications of this particular inversion approach to further the investigation into certain properties of earthquake physics.

Earthquakes lead to the overall reduction of stress, force per unit area, across the ruptured fault plane. Stress drop is a key parameter in accurately estimating the strong ground motion. Uncertainties in stress estimation lead to uncertainties in predicting seismic hazards. Thus, we aim to develop a new procedure to determine if it is possible to robustly constrain an uncertainty range for the co-seismic stress drop of large earthquakes. First, we examined the 2014 Mw 7.9 Rat Islands earthquake using far-field data and discovered that only the lower bound of the average stress drop could be well constrained. To investigate whether such a conclusion also holds for near field data, the slip distribution and the stress drop of the 2015 Mw 7.8 Gorkha, Nepal earthquake was studied using GPS and InSAR data. Furthermore, one of the important uses of stress drop for earthquake physics is in the study of energy partitioning. The average stress drop is equivalent to twice the ratio of apparent available energy to the total seismic potency, and so our result has a direct impact on the study of the earthquake energy budget.