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A Bayesian analysis of the 2016 Pedernales (Ecuador) earthquake

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A Mw 7.8 earthquake struck Ecuador on April 16, 2016, causing significant damage and casualties. Long period W-phase and Global CMT solutions suggest that fault slip for this event agrees with the convergence obliquity of the Ecuadorian subduction. We present a new co-seismic kinematic slip model obtained from the joint inversion of multiple observations in an unregularized and fully Bayesian framework. We use a comprehensive static dataset composed of several SAR interferograms, GPS static offsets, and tsunami waveforms from two nearby DART stations. The kinematic component of the rupture process is constrained by an extensive set of high-rate GPS and seismic data. Our solution includes the ensemble of all plausible slip models that are consistent with our prior information and fit the available observations within data and prediction uncertainties. We analyze the source process in light of the historical seismicity, in particular the Mw 7.8 1942 earthquake for which the rupture extent overlaps with the 2016 event. In addition, we conduct a probabilistic comparison of co-seismic slip with a stochastic interseismic coupling model obtained from GPS data. This analysis gives new insights on the processes at play within the Ecuadorian subduction margin.