Session 50

Earthquake Source Mechanics

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Recent high-quality seismic and geodetic observations provide large data volumes, which enable accurate determination of earthquake source parameters (locations, magnitudes, durations, moment tensors, etc.) and detailed imaging of spatio-temporal deformation processes. Further, techniques for extracting information using inverse problems and machine/deep learning techniques have improved substantially. Abundant information from these analyses is the basis for studying a variety of earthquakes to seek the governing laws and conditions for their initiation, growth, and arrest. In addition to traditional earthquakes including foreshocks, aftershocks, swarms, repeaters, volcanic and induced events, we now observe various slow earthquakes such as tectonic tremors, low-frequency earthquakes, and slow slip events. The stress state, fault geometry, and fluid movement around seismogenic regions are also important issues. The latest high-performance computing can numerically simulate the entire earthquake process from long-term tectonic loading and slow nucleation to rapid rupture propagation with strong motion radiation. The validity of assumptions in these simulations is tested by data analysis, data assimilation, laboratory experiments, and field observations including several drilling projects. In this symposium, we invite contributions on data analysis and interpretation of earthquake source mechanics, on improvement and validation of analysis techniques, on theoretical and numerical modeling of dynamic ruptures and earthquake sequences, and observational and experimental studies on the physics of earthquakes.