Earthquake rupture processes revealed by dense array analyses

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Large seismic arrays have provided platforms for developments of earthquake source imaging techniques. The results from these data and techniques have improved our understandings of earthquake rupture propagations. For example, back-projection source models show that large earthquakes (M > 7) often rupture multiple faults and may contain a number of large subevents. The fault systems hosting these earthquakes are mostly in plate-boundary regions and they often interact with each other. In addition, small earthquake rupture dynamics can be resolved at great precision with the Large-N nodal arrays, suggesting future research directions. Moreover, abnormal slip events, including glacier quakes and landslides, can be detected with array analysis, which are missed by most of the standard catalogs because of their deficiencies in high frequency. These findings have demonstrated the power of large dataset, and have advanced our understandings of earthquake physics. We will discuss complex earthquake kinematics observed in a wide range of slip events from dense array analyses.