

Earthquake - Slow Slip Interactions: a 2017 example from Costa Rica

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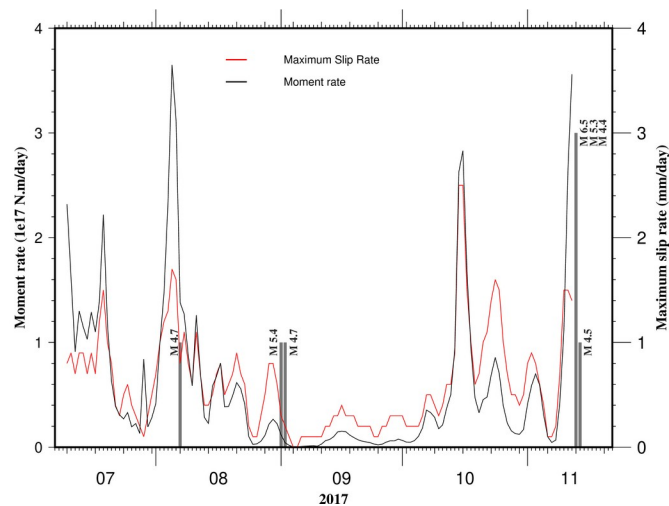
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GPS displacement time series in northern and central Costa Rica between 2015 and 2020 are used to identify SSEs and calculate their surface displacements and corresponding stress changes on the plate interface. Key observations are:

- The 2015 and 2019 events are characterized by large slip patches focused near the ~40 km depth contour on the plate interface, with maximum slip of ~130 and 125 mm, respectively.
- There are strong spatial and temporal correlations between the 2017 SSE and the November 13 Mw 6.5, Esterillos, Costa Rica earthquake. The 2017 SSE initiated before the earthquake, and was first recorded by coastal stations in the Nicoya Peninsula in late May - early June 2017. Deep slip (~ 40 km depth), closer to the earthquake, is first detected in early October.
- Mohr-Coulomb stress changes associated with the SSE are negligible (~ 0.001 Mpa).
- Higher slip and moment rates are observed beginning four days before the 2017 earthquake and extending at least until the day before the earthquake, focused on patches near the nucleation point of the earthquake.



Moment release and maximum slip rate for 4 months before the 2017 earthquake. Red and black solid lines show maximum slip and moment rate, respectively. Earthquakes are shown by gray bars. Higher slip and moment rates are observed beginning four days before the 2017 earthquake and extending at least until the day before the earthquake.