



Imaging early postseismic slip in the hours to days following the 2016 M_w 7.8 Pedernales earthquake: where does it occur relative to longer-term postseismic slip?

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Major earthquakes along the Ecuadorian subduction zone



- The Ecuadorian megathrust hosts a range of seismic and aseismic slip behaviour
- How does afterslip release and redistribute stress following the earthquake?

Rupture areas from Nocquet et al. [2017]; Font et al. [2013], Chlieh et al. [2014], SSE areas from Collot et al. [2017], Rolandone et al. [2018]

Why study the early postseismic period?



Please also visit poster: Cedric Twardzik et al. The early postseismic slip (i.e., on the first day): a significant contribution to the postseismic slip budget

Why study the early postseismic period?



Models estimated in this study



27 GPS stations of IGEPN-IRD network used to estimate early afterslip



- Invert time series to estimate spatiotemporal distribution of afterslip using PCAIM [Kositsky and Avouac, 2012]
- Incorporated sensitivity-modulated smoothing scheme [Ortega-Culaciati, 2013]
- Fixed rake direction consistent with Nazca-North Andean block relative plate motion

"72-hour" afterslip model



Updip peak afterslip patches are well resolved, while afterslip in coseismic rupture area less resolved



The magnitude of early afterslip is significant



~42-54 % of the "72-hour" model RENSIG catalog M3.5+ aftershocks in first 72 hours in regions around updip peak afterslip patches, colocated with afterslip in coseismic rupture area



Geodetic moment of afterslip in first 72 h represents ~38 % of that in 30 days



→ Continued afterslip in updip peak afterslip patches
 → Growth of afterslip in downdip patch where previous SSEs occurred

Imaging early afterslip is important

 Promising results from imaging afterslip using postseismic time series of HR-GPS positions

For the Pedernales event:

- The spatial signature of early afterslip is consistent with that of longer-term afterslip estimated using daily GPS data
- If we don't account for early afterslip, we would underestimate the postseismic geodetic moment by ~40-55%
 → implications for postseismic slip budgets on megathrusts

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