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Coupling and kinematic properties of slow slip events in the Guerrero Gap, Mexico.

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Large slow slip events (SSEs) occur in the so-called Guerrero Gap, a segment of the Mexican subduction zone where no large earthquake occurred for more than one century. Analyzing the relations between slow slip and earthquakes in this region is a key question to assess the seismic potential of this gap.
Permanent GPS networks (IG-UNAM, SSN, GGAP) supplied continuous recordings of three large SSEs in 2001-2002, 2006 and 2009-2010. Each event lasted about one year. Spaceborne radar interferometry (InSAR) is also used for the 2006 event, increasing the spatial constraint on the slip distribution.

We perform kinematic inversions of GPS time series for the three slow slip events, including InSAR data for the 2006 SSE. We are using a linearized least-squares inversion procedure assuming a functional form for the slip function. We can thus retrieve the time evolution of slip on the subduction interface. We compare the location and time evolution of the recurrent slow slip events in the Guerrero Gap. We also assess the inter-SSE coupling of this region, inverting the linear inter-SSE GPS displacements. Resolution analyses are performed to assess the reliability of our inversion results.

The three analyzed slow slip events have equivalent moment magnitude around 7.5, and stress drops of 0.1-0.2 MPa. The slip propagates with a velocity around 1km/day (2006 SSE). The slip also appears to be shallower than what is observed in most slow slip regions (Cascadia, Nankai…), propagating in the highly coupled part of the subduction zone.