The 2017 Slow slip event in Guerrero Area (Mexico), seen by spatial geodesy

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Abstract

Slow slip events (SSEs) are transient slips observed since the early 2000s, they are mainly located along the fire belt (subduction area). They play an important role in the seismic cycle, as they contribute to strain accommodation, participate to stress redistribution and can also be related to earthquake triggering

Along the Mexican subduction zone, in the region of Guerrero, the SSEs observed are among

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the largest recorded in the world, with equivalent Mw 7.5 and duration between 6 and 9 months. Their recurrence time is about 4 years. The existing data to monitor the deformation during the seismic cycle in that region consist in a network of GPS stations.

In this study, we investigate the latest SSE in Guerrero, that occurred between May and October 2017. In addition to the GPS network, we conduct an InSAR study using data from the Sentinel-1 satellite (one image every 12 days since 2015) in order to obtain an InSAR time series of the deformation over the studied area. The InSAR data are processed thanks to the NSBAS software (*Doin, M-P. et al*). In addition to the available GPS data, InSAR data allow to increase the spatial resolution of the observations of this last event. The surface displacements for SSEs being generally low (a few centimeters maximum), and occurring over several month, the extraction of the tectonic signal associated to SSEs can be quite challenging and there are few study of this type. In particular, in the Guerrero area two difficulties arise: first the strong seasonal signal (amplitude of up to 20cm), and second the high topographic gradient (close to the coast) which makes the unwrapping of interferograms difficult. From the time series in descending and ascending orbit, we deconvolve the SSE and the seasonal signal. Our preliminary result is a map of the amplitude of the surface displacements associated with the SSE. We validate these results with a comparison to the GPS time series.
These time series will allow for a joint slip inversion at the subduction interface during this SSE. It will also be possible to study the relationship between this SSE and the seismicity in the region.