

The 2012-2013 Slow Slip Event at La Plata Island in the Central Subduction Zone of Ecuador

M. Segovia¹, J.-M. Nocquet², Y. Font², M. Régnier², Ph. Charvis²

¹Instituto Geofísico, Escuela Politécnica Nacional, Quito, Ecuador

²Université Côte d'Azur, IRD, CNRS, Observatoire de la Côte d'Azur, Géoazur, Valbonne, France

The highly coupled patch centered at La Plata Island undergoes frequent seismic swarms (Font et al., 2013). In the last years, two seismic swarms have been linked to slow slip events (SSE) thanks to permanent (continuous) GPS observations.

The first SSE in 2010, with a 6.3 Mw equivalent magnitude and a seismic swarm lasted around one week (Vallée et al., 2013).

In mid-January 2013, a significant increase in the seismicity rate around La Plata Island was detected by the temporal onshore-offshore network of the OSISEC Project. The permanent GPS station at la Plata Island registered a reverse movement gradually increasing from the end of November 2012 and shows its maximum amplitude at the same time of the seismic swarm (Segovia et al., 2018).

The kinematic modeling of GPS network observations describes a two-stage SSE lasting 1.5 months with a total 6.3 Mw equivalent magnitude. In the first stage, the slip developed in a small patch at ~25 km to the south of the island (10 km in depth) and was characterized by a lack of seismicity. In a second stage, the slip occurred both in this first patch location and also in a second shallower patch at ~20 km to the south-west of the island (5 km in depth) (Segovia, 2016).

The seismicity registered during the second stage occurs in sub-vertical faults in the oceanic crust that delineate the contours of an inferred oceanic massif (Proust et al., 2016). The synchronous increase of the seismicity seems to be related to the slip migration between these two patches and the observed seismicity migration, in turn, seems to be related with acceleration of the slip at both patches (Segovia, 2016).

Font, Y., M. Segovia, S. Vaca and Th. Theunissen (2013), Seismicity patterns along the Ecuadorian subduction zone: new constraints from earthquake location in a 3-D a priori velocity model, *Geophys. J. Int.*, doi: 10.1093/gji/ggs083.

Segovia M. (2016), Imagerie microsismique d'une asperité sismologique dans la zone de subduction Équatorienne, Thèse de doctorat, Université Côte d'Azur, Valbonne, France, <https://tel.archives-ouvertes.fr/tel-01477549>.

Segovia, M., Y. Font, M. Régnier, Ph. Charvis, A. Galve, J.-M. Nocquet, P. Jarrín, Y. Hello and A. Pazmiño (2018), Seismicity distribution near a subducting seamount in the central Ecuadorian subduction zone, space-time relation to a slow-slip event, *Tectonics*, 10.1029/2017TC004771.

Proust, J.-N., C. Martillo, F. Michaud, J.-Y. Collot and O. Dauteuil (2016), Subduction of seafloor asperities revealed by a detailed stratigraphic analysis of the active margin shelf sediments of Central Ecuador, *Marine Geology*, 380, 345-362.

Vallée, M., J.-M. Nocquet, J. Battaglia, Y. Font, M. Segovia, M. Régnier, P. Mothes, P. Jarrín, D. Cisneros, S. Vaca, H. Yepes, X. Martin, N. Bethoux and Chlieh, M. (2013), Intense interface seismicity triggered by a shallow SSE in the Central Ecuador subduction zone, *J. Geophys. Res.*, Vol. 118, 1-17.