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Characterization of seismic swarms in the Punta Galera area (Ecuador) and their relationship with seismic and aseismic processes

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The Punta Galera-Mompiche zone (PGMZ) is a low inter-seismic coupling area located along the northern Ecuadorian margin (latitudes 0.3 ° N and 1. 2 ° N and longitudes between 80.4 ° W and 79.7 ° W). The PGMZ separates two zones of strong coupling, with significant earthquakes occurring in 1942 and 2016 to the South and in 1958 to the North (Chlieh et. al., 2014; Nocquet et. al., 2014; Vaca et. al., 2018). The PGMZ is affected by recurring seismic swarms which are associated with the occurrence of slow slip events (SSEs). An analysis of continuous data from the IU-IRIS station OTAV recorded over the course of 15 years determined a recurrence interval of ~2 years for seismic swarms and SSEs (Vaca et. al., 2018). Within a month after the Mw 7.8 Pedernales earthquake of April 16, 2016, both a large number of aftershocks and post-seismic displacements characteristic of an SSE were observed within the PGMZ (Rolandone et. al., 2018).

In this study, we extend the approach of Vaca et. al. (2018) and cross-correlate template waveforms from the PGMZ as recorded at OTAV for the period 2016 - 2018. We obtain multiple families of similar events, and, via an analysis of the temporal distribution of these events, determine that a new seismic swarm occurred in June 2017.Additionally, this new swarm appears to be associated with a possible SSE based on GPS time series located in Esmeralda (ESMR) and Punta Galera (PTGL). This work combines sensitive template matching techniques with GPS time series analysis and identifies the occurrence of a new SSE coincident with swarms of seismicity located within the PGMZ posterior to the 2016 Pedernales earthquake.

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