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Seismic analysis of the July 2015 eruption of Volcán de Colima, Mexico

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Colima is an andesitic stratovolcano located in western Mexico. It is considered the most active volcano in Mexico, with activity characterized mainly by intermittent effusive and explosive episodes. On July 10th-11th 2015, Colima underwent its most intense eruptive phase since its Plinian eruption in 1913. A partial collapse of the dome and of the crater's wall generated several pyroclastic flows, the largest of which reached 10.3 km to the south of the volcano. Lava flows along with incandescent rockfalls descended through various flanks of the volcanic edifice, and the ashfall affected people up to 40 km from the volcano's summit. Inhabitants from the small villages closest to the volcano were evacuated and authorities sealed off a 12 km area. We present an analysis of the precursory, eruptive and post-eruptive seismicity related to the July 2015 volcanic crisis at Colima. In particular, we focus on the search of temporal information within the spectral content of volcanic signals. We employ common time-frequency representations such as Fourier and wavelet transforms, but also more recent techniques proposed for the analysis of non-stationary signals, such the synchrosqueezing transform. We present results of their performances and discuss the potential use of each technique to characterize and quantify spectral changes which could be used to forecast future eruptive events and to evaluate the course of volcanic processes during ongoing eruptions.