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Quantitative characterization of lahars at Volcán de Colima, México

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Since 1991 Volcán de Colima has presented intermittent magmatic, that resulted in the accumulation of loose material on the volcano slopes, which is gradually removed as lahars during the rainy season, from June to October for this region. Lahar formation is more frequent just after a main magmatic phase (dome growth and collapse) and decreases gradually during the following years This process became evident during 2012 because the size and magnitude of the lahars developed during that season was diminishing according to the data gathered by the instrumentation installed in Montegrande ravine, one of the most active gullies forming lahars, located in the southern slope of Volcán de Colima.

The laharic activity in Montegrande ravine has been monitored since 2011 from a main station installed at 2000 m.a.s.l., and other instruments located along the ravine. The actual monitoring process also counts with the seismic data of RESCO broadband station situated 500 m away from the main monitoring site.

During the 2012-2013 rainy season, Montegrande ravine developed 7 lahars, 3 during the 2012 and the other 4 in 2013, when the explosive activity of the volcano was renewed. Regarding this aspect, the lahars formed in 2012 were similar in magnitude, duration and velocity, and presented a depositional regime on the medial reach of the ravine, while the flows developed during the 2013, were bigger, larger and more erosive. This feature was also due because of the meteorological events presented in the rainy season of 2013.

By coupling visual and seismic data with field observations, a quantitative characterization of the studied events was performed, mainly focused to correlate changes in flow behavior, as well as the estimation of downflow volume variations.