Geophysical Research Abstracts
Vol. 16, EGU2014-3009, 2014
EGU General Assembly 2014

The anatomy of a lahar: deciphering the 15th September 2012 lahar at Volcán de Colima, México

Rosario Vázquez (1), Lucia Capra (1), Lizeth Caballero (1), Raúl Arámbula (2), and Gabriel Reyes (2)

(1) Centro de Geociencias, Universidad Nacional Autónoma de México, Querétaro, Mexico (rvazmor@geociencias.unam.mx), (2) Universidad de Colima, Colima, México

Volcán de Colima is one of the most active volcanoes in Mexico where lahars area common phenomenon. Since the reactivation of the volcanic activity in 1991, lahars have become more frequent during the June-October rainy season, in this region. Therefore, Volcán de Colima represents a natural laboratory, ideal for the constant monitoring of lahars and to study factors controlling their origin, flow transport and deposition.

Since 2007 the systematic detection of lahars in Volcán de Colima has been carried out using seismic data from the broadband stations of the RESCO network, the seismological network of Colima University, along with three rain gauge stations located on the southern ravines of the volcano. In 2011 a new monitoring station was built at 2000 m.a.s.l. along the Montegrande ravine, which consists of a geophone, a video camera and a rain gauge station coupled with a moisture sensor, transmitting in real time to the RESCO facilities at Colima University.

With all the instrumentation currently installed on the volcano flanks, we could monitor and describe the lahar that occurred on 15th September 2012 along the Montegrande ravine, and correlate the monitoring data with information gathered by the field campaign conducted two days after the event. The high quality of collected data enabled us to describe the "anatomy" of this lahar. The event consisted of a lahar that lasted 40 minutes, triggered by 20 mm of accumulated rainfall with a maximum intensity of 95 mm/h. The lahar was characterized by three main surges at 4-5 minutes intervals that formed a 80 cm-thick terrace. The first surge was a debris flow with a block-rich front followed by the main body that progressively diluted to an hyperconcentrated flow, from which a 40 cm-thick massive unit was emplaced (33 wt% gravel and >60 wt% of sand); it was followed by a more dilute hyperconcentrated flow that left a massive 10 cm-thick sandy layer (80 wt% of sand); the third surge deposited a 30-cm thick upper massive unit texturally similar to the first.

Laminated layers separate the two first units. Subsequent surges were confined to the inner portion of the channel by the newly formed terrace. Based on flow depth estimation and difference in arrival times between geophones, a mean velocity of 3 m/s and a maximum peak discharge of 48 m3/s were estimated. Segregation processes that promote the upwelling of the largest clasts (20-30 cm) on the flow surface were also observed, resulting in a clast-rich levee on top of the depositional units. A sedimentation rate of $\sim$5-7 cm/min was also determined. The results here obtained are useful to better understand textural features of lahar deposits from which important information on flow behavior can be interpreted.