

## **Continuous dome collapse producing long runout block and ash flows: the exceptional example of the July 2015 eruptions at Colima (Mexico).**

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On July 10–11, 2015 an eruption occurred at Colima volcano produced 10.5 km long pyroclastic density currents (PDCs) along the Montegrande, and 6.5 km long along the San Antonio ravines. A marked increase in rockfall events and degassing activity was observed on the 8th and 9th of July. On the 10th at 20:16 h (Local time=UTM+6 h) a partial collapse of the dome generated a series of pyroclastic density currents (PDCs) that lasted 52 min and reached 9.1 km to the south of the volcano. The Montegrande and San Antonio ravines mostly channelized the PDCs. Nearly 16 h after the first collapse, a second and larger collapse occurred which lasted 1 h 47min. The Montegrande PDCs represent the longest and hottest flow of this type recorded during the past 30 years. Data obtained from field reconnaissance, lahar monitoring stations, and satellite imagery suggest that PDC generation progressed through at least six pulses. The two largest PDCs were able to surmount topographic barriers and overflowed at bends. Based on field reconnaissance and digital elevation models extracted from SPOT satellite imageries a minimum volume for the valley-pond and distal fan deposits of  $4.5 \times 10^6$  m<sup>3</sup> was assessed. After one week, the deposits were still hot with burning trees on the surface and diffused degassing. The unusual sustained mechanism of collapse for both July 10 and 11 PDCs produced runouts comparable with those of PDC from the 1913 sub-Plinian eruption. This behaviour highlights how the sustained dome collapse resembles the continuous feeding of a current similar to that of a column collapse. This is a mechanism for the first time observed during the July 10 – 11, 2015 eruptions at Colima volcano, which represent exceptional case studies for better understand this unusual mechanism for generating PDCs.