



Structural evolution of the South-East Crater at Mt. Etna (Italy) during the 2004-2006 period

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Since 1971 the South-East Crater (SEC) is the most active summit crater at Mt. Etna. Volcanological and structural data are here used to understand its evolution in the frame of the recent volcanic activity. The SEC cone is surrounded by incipient gravity fractures, lying on an unstable area parallel to the upper slope of the Valle del Bove, developed mainly during the 2004-2005 eruption. In July 2006, a ten-days long eruption occurred from the eastern base of the SEC cone, opening severe fracturing. Subsequent hydrothermal activity affected the E flank of SEC, possibly as a consequence of the shallow rise of the new magma batch within. Eruptive activity resumed on 31 August 2006 to the summit of SEC, leading to lava overflows and repeated collapse on the E side. Discontinuous Strombolian episodes occurred in September-November 2006, and new vents, associated with fracturing, opened at 3050-2800 m above sea level (asl), towards the W rim of the Valle del Bove. The westernmost fractures, parallel to the slope, affect the whole cone, suggesting a gravity control. The emplacement of a lateral dike fed a lava flow, propagating towards the Valle del Bove and reaching a maximum length of about 4 km, from vent at 2800 m asl. On 27 October 2006 a further dike propagated laterally towards SW, feeding a lava flow active until 27 November, reaching a maximum distance of ~3 km. The arcuate propagation path of this dike, highlighted by fractures and faults, was influenced by the morphology of the nearby Bocca Nuova crater, suggesting an interplay between magma emplacement and cone morphology. These fractures then enlarged, turning into faults with displacements of several meters, suggesting a control of gravity. On 16 November 2006 the SE flank of the SEC cone partially collapsed, forming hot and debris avalanches reaching a maximum length of ~1 km eastward. During the last part of the eruption, in late

November - early December 2006, a further set of fractures formed outside the base of the cone, suggesting the enlargement of the area characterized by the gravitational instability. The described events highlight a complex interplay between magma emplacement, morphology and gravity centred on the recent evolution of the SEC cone, at the summit of Mt. Etna.