



Tracking the hidden growth of a lava flow field: the 2014-15 eruption of Fogo volcano (Cape Verde)

Sonia Silva (1), Sonia Calvari (2), Pedro Hernandez (3), Nemesio Perez (3), Gaetana Ganci (2), Vera Alfama (1), José Barrancos (3), Jeremias Cabral (5), Nadir Cardoso (1), Samara Dionis (3), Paulo Fernandes (1), Gladys Melian (3), José Pereira (1), Hélio Semedo (5), German Padilla (3), and Fatima Rodriguez (4)

(2) Istituto Nazionale di Geofisica e Vulcanologia, (1) University of Cabo Verde, (3) Instituto Tecnológico de Energias Renovables de Tenerife, (4) Instituto Volcanológico de Canarias, (5) National Protection Service of Cabo Verde

Fogo volcano erupted in 2014-15 producing an extensive lava flow field in the summit caldera that destroyed two villages, Portela and Bangaeira. The eruption started with powerful explosive activity, lava fountaining, and a substantial ash column accompanying the opening of an eruptive fissure. Lava flows spreading from the base of the eruptive fissure produced three arterial lava flows, spreading S (Flow 1), N-NW (Flow 2) and W (Flow 3). By a week after the start of the eruption, a master lava tube had already developed within the eruptive fissure and along Flow 2.

When Flow 2 front stopped against the N caldera cliff, the whole flow field behind it inflated, and eventually its partial drainage produced a short tube that fed Flow 3, but no lava tube formed within Flow 1. Here we analyze the emplacement processes on the basis of observations carried out directly on the lava flow field and through satellite image, in order to unravel the key factors leading to the development of lava tubes. These tubes were responsible for the rapid expansion of lava for the ~ 7.9 km length of the flow field, as well as the destruction of the Portela and Bangaeira villages. Comparing time-averaged effusion rates (TADR) obtained from satellite and Supply Rate (SR) derived from SO_2 flux data, we estimate the amount and timing of the lava flow field endogenous growth, with the aim of developing a tool that could be used for risk mitigation at this and other volcanoes.