

Sulphur dioxide (SO₂) emissions during the 2014-15 Fogo eruption, Cape Verde

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Fogo is an active stratovolcano located SW of Cape Verde Archipelago and rising over 6km from the 4,000 m deep seafloor to the Pico do Fogo summit. Since settlement in the 15th century, 27 eruptions have been identified, with average time intervals of 20 yr and duration of two months. On November 23, 2014, a new volcanic eruption started at Fogo volcanic island. During the eruptive process, more than 350 measurements of SO₂ emission rate by means of a ground-based mobile mini-DOAS were carried out on a daily basis by ITER/INVOLCAN/UNICV/OVCV/SNPC research team. During the first days of the eruption, the estimated SO₂ emission rates exceeded $12,000 \pm 1000$ tons/day, and were decreasing significantly to 380 ± 100 tons/day in the last days of the eruption (February, 2015). According to the measures of lava output rates, around 80% of the lavas were emitted during the first month of eruption and the other 20% until the end of the eruption (Cappello et al., 2016). Selecting these two periods for lava output rates, we divided the eruptive period in two episodes: a) from November 24 to December 20, 2014, with daily emission rates $\approx 7,500$ tons/day; and b) from December 20, 2014 to February 7, 2015, with emission rates $\approx 1,550$ tons/day. Assuming a range of S content in the magma of 1,000–1,200 ppm and a density ~ 2.5 t/m³, the emitted magma was estimated between 35 and 42 Mtons and 11 to 13 Mtons for the first and second period, respectively. These amounts of emitted magma represent 76% and 24%, respectively and are of the same order than direct estimations (Cappello et al., 2016). These results show that measurement of SO₂ emission rates become a powerful tool to determine the emission rate of magma during eruptive process. Cappello et al. 2016. J. Geophys. Res. Solid Earth