



Estimates of CO₂ concentration released at the Lusi eruption site (Indonesia): a drone and GasPro CO₂ monitoring probe experiment.

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The spectacular Lusi eruption started in northeast Java, Indonesia, on May 29th, 2006, continuously erupting mud, water, gas, oil, and clasts ever since. Lusi is a hybrid system between a traditional sedimentary volcano and a pure hydrothermal system fuelled by magmatic heat (Mazzini et al., 2007). Estimates of gas released from the Lusi vent represent a challenging goal. The 100 m sized active crater expels 100 °C mud breccia and a dense vapour plume that erects for several tens of meters in the air. This vent is located at the center of a 600 m diameter inaccessible hydrothermal pond. In addition Lusi is characterized by a geysering activity with periodical violent burst of mud reoccurring every ~20 minutes (Karyono et al., 2017).

In March 2017 remote controlled drone missions were completed in order to quantify the total CO₂ output released from the central active area. The equipment used was a in house-designed and assembled esacopter (Lusi drone) to which was mounted a GasPro CO₂ monitoring probe designed to measure, together with temperature, the concentration of CO₂ (1 measurement per second, up to 5%) and equipped with a GPS. An internal pump with a flow rate 1.4 l/min and a small measuring chamber of the Non-Dispersive infrared sensor of only 6 cm³ allows it to have extremely fast response time. Numerous flight profiles were performed intersecting the crater plume during the various activity phases of the eruption site. The flight height was kept constant at ~8 m over this flat area. In order to minimize the effects of the propellers turbulence, a 5m long silicon tube was attached at the CO₂ sensor's gas input resulting in a final sampling height at 3 m above the vent. This design slowed the sensor response by 10 seconds, but allowed a more realistic quantification of the CO₂ readings. The elaborate data collected during the two weeks experiments reveal CO₂ values ranging from 0.1%vol to 1.9%vol, depending on the phases of activity.