

Interactive  
Comment

## ***Interactive comment on “Sulfur dioxide emissions from Papandayan and Bromo, two Indonesian volcanoes” by P. Bani et al.***

**P. Bani et al.**

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We thank the anonymous referee #2 for reviewing this paper and we are happy to provide additional information in respect to comments.

1)Referee: Introduction: In lines 10-15 the authors should mention that the scarcity of SO<sub>2</sub> flux data also depends on the fact that DOAS measurements can only be carried out in volcanoes having a plume, which are a minority of the active volcanoes in the world.

Response: We consider plume as a cloud of gases and aerosols (+ solids during eruptive activities) formed following a passive and/or explosive discharges into the atmosphere. Volcanic plume can thus be formed from a wide range of volcanic activities.

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One of the main advantages of the DOAS is its lightweight associated to its low power consumption, making it an ideal tool for remote and less accessible volcanoes (Galle et al., 2003; McGonigle et al., 2004; Bani et al., 2012).

2) Referee: Results: L2, author should report the data uncertainties.

Response: Uncertainties are introduced and the text L2 is modified as follows: “Results indicate that SO<sub>2</sub> emission rate on Papandayan fluctuates between  $0.4 \pm 0.1$  and  $2.8 \pm 0.8$  t d<sup>-1</sup> with a mean value of  $1.4 \pm 0.5$  t d<sup>-1</sup>”.

3) Referee: section 3.1: it is not clear how the authors can assess the variations of SO<sub>2</sub> fluxes measured in Papandayan are due to subsurface magmatic-hydrothermal processes (which type?). Instead of other causes such as different inclinations of the telescope, as invoked to explain the variations of Bromo measurements.

Response: As we stated in the paper (p 1899 L9-L11) the telescope was pointing to the zenith, so no telescope inclination in the case of Papandayan in this work. This was possible because the plume drifted to the northwest at time of measurements (see p 1899 L11-L12). The variation in the SO<sub>2</sub> fluxes is strongly correlated to the SO<sub>2</sub> column amount recorded on a fixed position (p 1900 L3-L6). Thus the changes in SO<sub>2</sub> fluxes may not be induced by traverse measurements approach but most likely related to the dynamics of degassing, which in turn depend on the subsurface processes. It was not possible in this work to provide solid arguments into the subsurface magmatic-hydrothermal processes, but further works (e.g., study the changes in the plume chemistry) are required to constrain the subsurface processes.

4) In table 1, please express the SO<sub>2</sub> fluxes in the traverses and the average value in the same unit, consistently with the text.

We have modified the flux unit (to t/d) in table 1.

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Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 1, 1895, 2013.

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