

Interactive comment on “Unified observation co-existing volcanic sulphur dioxide and sulphate aerosols using ground-based Fourier transform infrared spectroscopy” by Pasquale Sellitto et al.

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Review of Sellitto et al., Unified observation co-existing volcanic sulphur dioxide and sulphate aerosols using ground-based Fourier transform infrared spectroscopy. Hereafter Sellitto et al. are referred to as “auth.”

Reviewer: Mike Fromm

Auth have presented an analysis of high spectral-resolution IR data from a ground-based setup in close proximity to venting emissions from Masaya volcano. Their aim is to quantify abundances and composition of a volcanic plume that exhibits combi-

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nations of SO₂ gas and sulphate particles. In doing so they find that the co-retrieval reveals the potential for substantial systematic errors in stand-alone retrieval of SO₂ when sulphates are mingled in the plume. The implications for and applications to other similar data sets (both ground-based and satellite-based) and volcanic events are made evident by auth. Their findings are a first and merit consideration in AMT.

The manuscript is very well written. It is a model for high-quality science reporting. It is concise. Its organization is logical, argumentation is clear and meaningful, and the analysis is robust. Auth fairly describe the parameters and the uncertainties involved. And they make the important point that many volcanic plumes need to be assessed by considering the co-presence of sulphate aerosol and SO₂.

I have only a few minor and technical concerns, elaborated on below. It seems to me that the title doesn't adequately capture the over-arching thrust of the research. The title only refers to "observations" when actually the value of this work lies in the quantification of properties sensed by the observations of co-present sulphate particles and SO₂ gas. If I am on the right track, I would encourage auth to revise title accordingly.

In case auth reject this suggestion, it is still necessary to amend the title by inserting "of" between "observation" and "co-existing".

Would auth be able to provide or cite a photograph of the plume that was analyzed? If there are SA particles in the plume, a photo cementing the idea of a sulfate feature would be strategic.

P2, L31. "Direct air masses sampling" is awkward to my eye. "Direct" seems to suggest that there may be a form of sampling that is "indirect," which is hard to understand. "In situ" may be clearer if that is what auth have in mind. Suggestion for rewording: "In situ air-mass sampling and subsequent laboratory analysis..."

Technical Issues:

Figure 1. . Label each panel with "a)" and "b)" correspondingly with the caption.

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Figure 1b. The most visible difference between the lines for “Measured” versus “Modeled- SSA-Only” is solid versus dashed. The legend guides the reader to look for black versus dark blue; that color difference is difficult to see. Please consider changing dashed line to a gray shade as in 1a.

Figure 1b. In the legend, change “SSA” to “SA”.

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