

Interactive comment on “Synoptic Analysis of a Decade of Daily Measurements of SO₂ Emission in the Troposphere from Volcanoes of the Global Ground-Based Network for Observation of Volcanic and Atmospheric Change” by Santiago Arellano et al.

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Received and published: 27 January 2021

Response to Interactive Comment by Referee #2 to our manuscript submitted to ESSD: “Synoptic Analysis of a Decade of Daily Measurements of SO₂ Emission in the Troposphere from Volcanoes of the Global Ground-Based Network for Observation of Volcanic and Atmospheric Change”

Santiago Arellano on behalf of all co-authors.

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We thank Referee #2 for the detailed review of our manuscript and valuable suggestions. Below are our responses to questions and suggestions posed by Referee #2.

“This is a very good and well-written paper.”

Thank you!

“This will be useful during a major eruption to help determine the dynamics of any plumes and could direct air traffic around them.”

Indeed, the technique employed in our network provides real-time detection of the amount and spatial location of SO₂ plumes at a few km away from the vent. At such distance it is likely that SO₂ is well mixed with the rest of components of the plume, including eventually ash in the case of explosive emissions. Gas emission rate and plume altitude are key pieces of information of the source conditions required to initialize volcanic plume dispersion models. These models, together with additional observations from satellite, are used by Volcanic Ash Advisory Centers (VAACs) set up by the International Civil Aviation Organization (ICAO). These centers are groups of experts responsible for coordinating and distributing information on volcanic ash clouds that may pose a danger to aviation.

Although our paper focuses on presenting historical data, the statistics provided of gas emission rate, plume altitude and velocity, can be used to define most likely scenarios of plume dispersion that could be considered to plan air traffic.

“On line 172, you say “angle of view” but you really mean “field of view”?”

Yes, thanks for pointing out this unusual use of the term. We changed it.

“In section 4.2, line 431 you reference figure 4 when I think you mean figure 5.”

Yes, thanks for pointing out this error, which is now corrected.

“Line 437, you should not include Sangay and Sinabung that you are providing new information for. NASA’s Global Sulfur Dioxide Monitoring pages have been monitoring

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those volcanoes since 2004.”

We have included Sangay and Sinabung in the list of volcanoes for which there is no previous estimates of gas emission neither in the compilations from Andreas and Kasgnoc (1997) and Carn et al. (2017).

We recognize that NASA's Global Sulfur Dioxide Monitoring service (<https://so2.gsfc.nasa.gov/>) has global coverage and therefore it has detected emission from these volcanoes. However, emission from the mentioned volcanoes is more recent and was not included in the compilation published in 2017, which has been peer-reviewed. We therefore decided to keep the text unchanged.

“On Figure 1, the red triangles can override the yellow squares. Maybe make the triangles a little smaller.”

Thanks for the suggestion. We have remade all figures including yours, and Referee #1's comments. It is now possible to distinguish the locations of volcanoes listed in the GVP, OMI and NOVAC databases.

“Figure 2 has 2 part a)s.”

Thanks! Corrected.

“In the Introduction you reference Sparks, et al., 2014, but I don't see it. Maybe 2012.”

Thanks! Corrected.

“Some references are out of sequence.”

Thanks! We have revised the entire list of references and sort them out correctly.

Interactive comment on Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2020-295>, 2020.