

Interactive comment on “Long range transport and fate of a stratospheric volcanic cloud from Soufriere Hills volcano, Montserrat” by A. J. Prata et al.

Anonymous Referee #2

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General comments

In this paper the authors use satellite data and a Lagrangian particle model to investigate the eruption of the Soufriere Hills volcano. I found the paper more of a ramble through odd bits of data rather than a coherent exposition. For example I did not think the movies added anything to the paper - they are not discussed within the text - just referenced (I think because they are ‘pretty pictures’).

A better approach would be for the authors should either describe each volcanic product in turn (ash, possible ice, HCL, SO₂) and use all the available satellite data, or focus on one aspect - SO₂ being the obvious choice. I am also nervous the research

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uses data that has not been validated - a sure indication that the paper is premature. As it stands, the modelling aspect of the paper adds very little. It is good work and could have been used in a far better and quantitative manner.

Finally the weakest part of the paper concerns the discussion on climate effects. These type of small eruptions where the cloud remains localised offer little insight into global scale radiative effects from volcanic eruptions. The link from SO₂ to AOD to radiative forcing might be justifiable for large eruptions where the stratospheric AOD is relatively homogeneously enhanced. In the current case the spatial inhomogeneity makes such a link unjustifiable. Also that the aerosol optical depth should be inferred from SO₂ seems perverse when it can be measured directly e.g. by lidar or satellite. The paper offers no insight into the suggestion of injecting S into the stratosphere to combat global warming. In fact by referencing Crutzen and Wigley this paper gives this flawed concept some credibility.

Specific comments (page/line)

4660/22 The whiteness of the cloud shows the particles reflect sunlight evenly across the spectrum. One can not infer high ice content. Large particles can also produce this effect.

4661/10 & Fig2 - quantitative estimates are made of the amount of SO₂ and ice that is erupted yet not detail is provided of either the technique by which these values were derived nor the uncertainties on these estimates.

4661/12 A temperature difference between 11 & 12 μm is not 'strong' evidence for ice. Large particles can also produce this effect.

4661/15 Even if there is a lot of ice in this eruption this is not evidence of the ubiquity of ice in eruption clouds especially at equatorial regions. Large amounts of water/ice are associated with vents under or adjacent to water which was the case with this eruption.

4661/10 The use of SEVIRI data is premature. The algorithm that has produced the

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estimate has not been validated. What is the point of giving a value of 0.177 \pm 0.04 then state the error may be as large as 30%?

4663 No mention is made of the fact that that OMI and MLS measurements do not place the cloud at the same position. Why?

Technical corrections (page/line)

4658/3 quantify great heights

4658/21 This sentence does not make sense as written. Start a new sentence at the word 'trend'.

4661/14 Ash is not 'pollution'. Reword.

4670/Fig 1 This figure is not publication quality - The modis data is just an image without any geolocation data or scale. the trajectories discussed in the caption are not clear on the figure the axes and colour scales are unreadable.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 4657, 2007.

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