

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

A. J. Prata et al.

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Response to Referee #2

We are sorry that the Referee feels this way about our paper. The *Abstract* states that we have used satellite measurements and a dispersion model to quantify and track the gases and particles in a stratospheric cloud of volcanic origin. We estimate the

mass loadings of the gases and then try to address the question of the radiative impact (perhaps too simplistically). We do say that it is the measurements that are useful (not the methodology). We will try to re-word our paper to make it less of a "ramble". We do appreciate the Referee's time, insights and comments on our work.

General comments

1. Two of the Movie files will be re-formatted to the same projection and some discussion of the comparison between model vs. observations will be added.
2. Good.
3. We agree with this statement and believed we had argued correctly that this eruption would have no climate impact. There is no doubt that to properly assess the effects of this eruption on climate one would need to run a GCM simulation. However, we believe that the first step is to estimate the mass of SO₂. Our satellite measurements seem to suggest it is much too small to have any effect.
4. We agree that the sulphate burden is not the sole cause of the climate perturbation. SO₂ and ash both have radiative impacts. We will add a comment on this.

Specific comments.

1. The point being addressed here is whether or not the cloud contained ice. The SEVIRI and MODIS data strongly suggest the presence of ice. We agree that the "whiteness" of the cloud cannot be used alone as proof that the cloud contained ice and we will modify our comment accordingly.

2. Thanks.
3. See Prata (1989), Wen and Rose (1994) and Prata and Grant (2001) for Mie calculations for ash, water droplets and ice particles.
4. The data identifies SO₂ (from 3 different sensors), HCl and ice. There is a large amount of literature devoted to the use of multispectral infrared measurements for identifying and quantifying ice in clouds. It seems difficult to ignore this volume of knowledge, with which our data agrees.
5. Thanks.
6. We will add this to the paper as suggested by the Referee.

Technical

1. Will do.
2. –.
3. I think we may have to respect each others views on this and agree to disagree. The OED definition in no way excludes our use of the word pollution. Smoke from a forest fire is a contamination to the “normal’ state of the atmosphere. If the fire was deliberately lit then it seems this would strictly meet the OED definition of pollution. If it was caused by a lightning strike then does this mean it is no longer pollution? In any case, this largely semantic argument does not affect the scientific content of the paper (we hope!)
4. Thanks.

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References

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Prata, A. J. and I. F. Grant, 2001, Retrieval of microphysical and morphological properties of volcanic ash plumes from satellite data: Application to Mt Ruapehu, New Zealand, *Quart. J. Roy. Meteorol.Soc.*, **127**, 2153–2179.

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