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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Extended observations of volcanic SO_2 and sulfate aerosol in the stratosphere" *by* S. A. Carn et al.

S. A. Carn et al.

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General comments

In response to the referee's general remarks, we would like to point out that the purpose of the paper is to demonstrate that high quality satellite observations of volcanic clouds are now available, not to address the climate impact of the Soufriere Hills eruption. To address this would require application of climate modeling, which is outside our expertise. Clearly, the eruption was minor in terms of stratospheric SO2 loading ($\sim$0.2 Tg) and the climate impact is expected to be negligible. However, the cumulative effect of several similar eruptions may be more significant. Given that the 1991 Pinatubo eruption injected $\sim$20 Tg of SO2 into the stratosphere and resulted in an average surface cooling of 0.5K, we may hypothesize that the effect of the Soufriere Hills eruption would be two orders of magnitude lower and unlikely to be measurable. We

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do not think that radiative forcing calculations are necessary to show this.

We will address the conversion of SO2 gas to sulfate aerosol in the revised manuscript.

Specific comments

1. Referee 2 also requested modification of this statement in the abstract. We will reword it according to the comments of both referees. However, the statement as it stands is not apocryphal, and we also do not believe that we are in a position to state 'how large the cloud has to be' in order to cause a climate anomaly, given the complexity of the climate response to volcanic eruptions.

2. The discussion of the VEI will be amended (see also the response to referee 2).

3. We agree wholeheartedly with the referee on this point. This is one of the goals of our paper; to report that measurements of SO2 and sulfate loading can now be made for a range of volcanic eruption sizes, and that indices previously used to infer the impact of eruptions are redundant.

4. The reference will be updated in the revised manuscript.

5. The mention of geoengineering will be removed from the revised manuscript.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 2857, 2007.