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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Uncertainties in modelling the stratospheric warming following Mt. Pinatubo eruption" *by* F. Arfeuille et al.

Anonymous Referee #1

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1 General comments

The paper presents a significantly improved version of satellite data and its consequences for the climate modelling community. It points to bad short-comings in the old SAGE data set and derived quantities used in SPARC-assessments. Also an evaluation of the derived aerosol model against other satellite data is given. The wavelength range from 0.5 to 12μm is covered.

The paper would gain a lot if the parts on deficiencies in SOCOL are skipped or at least shortened, especially in the abstract, which is confusing now, because it is not clear what error is due to the retrieval and what is due to CCM artifacts. The parts on the satellite data are very important for the scientific community and should be the main

message. The analysis for the visible region should be extended.

2 Specific comments

In the abstract the main focus should be on the new SAGE dataset. If SOCOL is mentioned (might be not necessary there), model problems should be clearly separated from problems due to the old SAGE datasets.

For the comparison with HALOE and ISAMS it is important, to use appropriate refractive indices for the sulphur aerosol (these differ from the ones cited at the beginning of section 4). This issue might be addressed in the introduction or later (not essential). For CCMVal it might be also an issue that models discarded the worst heating rates based on old data below the tropopause in different ways.

The near infrared channel in section 4.2 is the most used SAGE channel but a more detailed discussion of the channels in the visible should be included here also, maybe moved from the previous section and expanded (split of Fig.4?).

The figure on the SOCOL results needs a better description or should be skipped. The reader is not interested in compensating errors. Isn't there also ERA-Interim available for comparison? ERA40 is known for biases. Why is there a bias before the eruption for all curves in Fig.11? The bias of SOCOL there causes most of the difference to ERA40 in the Pinatubo-period which is misleading. What is the zero line? If the figure is kept, also SOCOL results with the outdated SAGE data or Sato (1993) should be shown for separation of effects.

In the model section and/or the conclusions also the consequences of a bad heating rate at the tropical tropopause for stratospheric water vapour should be addressed.

3 Technical corrections

Please use a consistent spelling of the sulfur mass unit (case!).

What is the correct version of Fig.1? Please check symbols in Figure 2, the legends appear to be inconsistent. Better indicate months and years at x-axis of Figs. 4, 5, 7 and 11. Typos in caption of Fig. 8. Use λ (4 $\times$). In the caption of Fig. 10 better write 'horizontal lines in symbols'.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 4601, 2013.