

Interactive comment on “Volcanic forcing for climate modeling: a new microphysics-based dataset covering years 1600–present” by F. Arfeuille et al.

Anonymous Referee #2

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The new volcanic data set is calculated based on the existing estimates of volcanic injections. The novelty of the approach is in using a zonal mean 2D aerosol microphysical transport model for producing latitude/altitude dependent set of aerosol optical characteristics since 1600. Potentially this work has important implications for simulating volcanic climate impacts and better quantifying the natural and forced climate variability. Unfortunately in the current version of the data set both total optical depth and latitudinal distribution in some important cases are unrealistic and using this data set in climate simulations would be misleading. See below the detailed comments.

Comments:

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P971, L14: Change “1 km-1” to “km-1”

P977, L1-5: It is misleading. We do not know how well the AER-2D model produces vertical distribution of aerosols in particular cases. Coarse observations, when available, might be better. In the current configuration the vertical structure is very sensitive to the altitude of the injection. The authors did not explain how did they use the volcanic plume model to estimate the altitude of injections and how reliable those estimates are.

P978, L6: It is not consistent with Thordarson and Self (2003).

P979, L1-3: What is the temperature change? Did you model it?

Section 4.3: AER-2D model is a core of this study. It has to be better described.

L983, L2: Optical depth of 2.76 for a Pinatubo size eruption is too much by an order of magnitude.

P984, L4: What does it mean?

Section 5.3: The AER-2D model does not have QBO, uses prescribed climatological winds, does not account for aerosol heating, does not have wave structure. It cannot skillfully calculate what hemisphere the equatorial volcanic cloud will go. It is a very sensitive process that critically depends on all mentioned factors.

P984, L.21-24: I do not think the Tambora’s cloud was that asymmetric. Could you please compare with other sources, not only with Crowley.

P985, L25-30: Compare with SAGE.

P986, L1-5: We know that the AVHRR strat optical depth is contaminated by the effect of tropospheric aerosols. AVHRR overestimated the Pinatubo optical depth, and have to be used with caution.

P986, L26-29: I do not think you can claim this. The Pinatubo optical depth of 0.7 in tropics does not sound realistic to me. It 2-3 times more than expected.

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