Geosci. Model Dev. Discuss.,
doi:10.5194/gmd-2016-83-RC2, 2016

Geoscientific Model Development Discussions
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Interactive comment on "Easy Volcanic Aerosol (EVA v1.0): An idealized forcing generator for climate simulations" *by* Matthew Toohey et al.

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Received and published: 10 August 2016

The EVA product is a much needed addition to doing long-term simulations that include volcanoes. It is an intermediary between having a full-scale (and computationally expensive) aerosol microphysics module and a highly parameterized sulfate aerosol forcing – or worse, alterations in solar constant or similar as a stand-in for actual volcanoes.

This paper is well-written and well-thought out. My main suggestion is how the considerable uncertainty in the measurements of volcanic aod/reff etc. influences the principal results of the EVA product.

Also, N.B., I am not the best person to comment on the radiation tables and methods applied, etc. – I leave it to other reviewers to provide commentary as necessary.

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Discussion paper

There are quite a few acronyms. It would be useful to have a small table / glossary.

Abstract

The abstract could be changed a small bit to make this more than a summary of the methods: A sentence or two at the top for motivation might illustrate why this is such a useful tool (as in the first paragraph of the intro). A sentence at the end to say its results fall within the spread of sophisticated modules (i.e., as in Zanchettin 2016) would emphasize this.

Intro

I think maybe a short summary of how models approximate volcanoes would be helpful. (And show how this is many-steps better than the altered solar-constant variety of 'volcano'.)

Line 20: the volmip paper is Zanchettin et al 2016, is this what you mean?

Section 3.1

18 Tg for Pinatubo SO2 is totally reasonable – but some use estimates as low as 14 Tg. Can you acknowledge this uncertainty here and address later on.

Depending on when you downloaded the Sato / GISS strataer files, the Reff and AOD may not include the most recent updates to the SAGE II estimates. Probably it is best to ask Makiko directly about when the update was of the data you downloaded. It is important because, for instance, the shape of 91Pinatubo AOD, for instance, is considerably different in [Vernier et al., 2011]. The shape looks more like an exponential increase with slow decay – reaching max AOD much more quickly than in the previous SAGE II interpretations (eg Sato93). This SAGE II does feed into Makiko's updates. The Vernier group redid its Reff estimates, too.

It is likely that the Sato method or CU13 method is capable of getting Reff for eruptions larger than Pinatubo (>0.15aod), and this uncertainty should be explored here as well.

Perhaps taking Reff from some previous full aerosol microphysics simulations? (Which I know has its own problematic spread).

Hemispheric Asymmetry

For the 91Pinatubo case – is the Cerro Hudson contribution considered? (Maybe it helped give extra aod to the SH).

Section 3.6

This uncertainty for large eruptions is important and needs to have more mention up top. It is not clear that a single threshold is the appropriate way to implement the 2/3 power. Can there be a continuous function.

Section 4

I am surprised that the [Carn et al., 2016] paper isn't used in here. It is new, but it is comprehensive, and has emerged as one of the principal papers used for volcanic so2 from measurement.

Carn, S. A., L. Clarisse, and A. J. Prata (2016), Multi-decadal satellite measurements of global volcanic degassing, Journal of Volcanology and Geothermal Research, 311, 99-134,doi:10.1016/j.jvolgeores.2016.01.002.

Vernier, J. P., L. W. Thomason, J. P. Pommereau, A. Bourassa, J. Pelon, A. Garnier, et al. (2011), Major influence of tropical volcanic eruptions on the stratospheric aerosol layer during the last decade, Geophysical Research Letters, 38(12), n/a-n/a,doi:10.1029/2011gl047563.

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