

Interactive comment on “Equatorward dispersion of high-latitude volcanic plume and its relation to the Asian summer monsoon: a case study of the Sarychev eruption in 2009” by Xue Wu et al.

Anonymous Referee #2

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Wu et al. studied the dispersion of volcanic aerosols after Sarychev eruption in 2009. The study mainly uses trajectory model, and observations from AIRS and MIPAS. It shows a fairly good model-observation comparison on the SO₂ plumes. Wu et al. suggests a 4% of Sarychev aerosol goes to the Tropical Stratosphere with the help of ASM circulations. In general the topic is interesting, however many issues need to be resolved.

Main Concern:

1. Is your “4%” significant statistics? What is the confidence interval? How is the 4% of volcanic aerosols from Sarychev compared with local background aerosol? 2. I believe

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one of the evidence for your equator-ward is MIPAS aerosol detection number data (Figure 5C). The color scale make it quite difficult to tell the numbers, look like there is a factor of 5+ more detections between May.2009 and May.2010. Is it consistent with your estimate? 4% of volcanic aerosol vs. background? 3. Please also comment on uncertainties/noises from observations (MIPAS). Are the signals are robust? 4. Figure 13, you argue the gap between 2009.10 and 2010.2 is due to temperature perturbation. Are you suggesting H₂SO₄-H₂O aerosol gets evaporated? I don't think so, the reason is at such low temp, the vapor pressure is super low. Graves may leads to some evaporation, but I assume a few months gap is not expected. Any other reasons? What is the green in early 2009 and late 2010? Any more analysis/evidence suggest they are actually from Sarychev volcanic aerosols for the period of 2009.7-2010.5? 5. Any chance to expand your study to other high-latitude volcanoes? What is the equator-ward transport sensitive to? E.g. injection latitude, altitude, season, location (in/out of ASM), etc? If you move the location north/south, do you expect to get different higher/lower fraction than 4%? I assume if injection is too close to ASM, then you parcels will be trapped in ASM anticyclone instead of going further south? 6. I assume your trajectory model doesn't have aerosol microphysics. Will coagulation and some loss terms that happened in real atmosphere affect your results (i.e. 4%)?

Minor 1. Define latitude range for tropics in the abstract/beginning of the paper

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