

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 #1

Received and published: 16 June 2017

Wu et al. present a case study of the dispersion of the volcanic plume from the Mt. Sarachev eruption in 2009. They effectively demonstrate the use of AIRS SO₂ observations and a back-trajectory methodology to provide time- and altitude-dependent volcanic SO₂ emission rates for their transport simulations. The authors make good use of AIRS and MIPAS observations to judge the fidelity of their trajectory based transport simulations, which demonstrate the role of the Asian monsoon anticyclone in steering a small but significant contribution of the Sarachev plume to stratospheric aerosol in the tropics.

The paper is generally well written, and will be a useful addition to the literature on this

C1

subject. I have some minor points of clarification, below, which should be addressed.

p.3, line 23: ref “NASA operational data products” Please clarify what products are referred to (OMI?), and why the SO₂ index used here is considered “better”.

p.4, line 16: what about Dx in the stratosphere and Dz in the troposphere? I note that Hoffman et al. (2016) uses the same values in the stratosphere and troposphere.

p.4, line 19: do you mean constituent (i.e. SO₂) mass here?

p.5, line 16: Units of emission rate are given in kg m⁻¹ s⁻¹. Why m⁻¹, not m⁻³?

p.5, line 36: split (sp)

p.7, line 15: the ASM anticyclone

p.7, lines 19-20: sentence is unclear. Many more aerosol detections are found N of the subtropical jet between 360-400K.

Figures 8, 9, 10, and 11: the PV (black) and geopotential height (red) contours shown appear to be identical for July 10th, July 20th and July 31st. This would appear to be a mistake. The flow fields should change.

p.8, lines 24-25: I see very few MIPAS aerosol detections south of 30N in Fig. 11 (number of detections above 400K), or for the simulated air parcels (Fig.10) so where is “the increased aerosol in the tropical stratosphere above 400K” the authors referring to here?

p.8, lines 28-37, ref - Figure 13: as above, none of the earlier figures demonstrate Sarachev aerosol in the tropics above 400K. Is this then, the first evidence shown of Sarachev aerosol ascending in the tropics? Maybe Fig.13 should be introduced earlier.

p.9, line 18, ASM anticyclone

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2017-425, 2017.

C2