

Interactive comment on “Quantification of water vapour transport from the Asian monsoon to the stratosphere” by Matthias Nützel et al.

Anonymous Referee #2

Received and published: 29 March 2019

This work aims to quantify the contribution of H₂O transport from the Asian monsoon (AM) to the global stratosphere, based on calculations from CLaMS. Quantification of this influence is a long-standing question in the research community. The calculations are performed using tagged tracers from several different regions, including the monsoons, global tropics and the western Pacific. The model is compared to satellite observations and shown to simulate global stratospheric H₂O in a realistic manner. The budget calculations are straightforward and the results seem reasonable, with the AM contributing ~14% to the tropics during the summertime moist phase of the tape recorder, and ~29% to NH summer high latitudes. The calculations also include estimates of the H₂O transport ‘efficiency’, namely H₂O scaled by mass transport, showing that the AM has relatively higher efficiency compared to other regions (because it is

C1

moist to begin with, with strong transport pathways to the global stratosphere). The paper includes detailed comparisons to two previous publications (Bannister et al, 2004 and Wright et al, 2011) with apparently different conclusions, and explains the differing results as depending on the specific questions that are posed. Overall the calculations are clearly described, the paper is well written and the figures are clear and simple. The paper is appropriate for ACP, and this will be a well-referenced standard quantifying the monsoon contribution to global stratospheric H₂O. This is an excellent paper – well done. I have only a few minor comments for the authors to consider:

- 1) P. 2, line 7: ‘annual’ seesaw instead of ‘semiannual’
- 2) p. 13, line 30: omit ‘supposed to be’
- 3) The units of efficiency are not very intuitive (10-13 or 10-14 % / m² in Figs. 10 and 12). Could this be normalized to the area of the AM or global tropics (TS), to give a more physically meaningful value?

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2019-169>, 2019.

C2