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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Climatology of the aerosol optical depth by components from the Multiangle Imaging SpectroRadiometer (MISR) and a high-resolution chemistry transport model" *by* H. Lee et al.

Anonymous Referee #1

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The authors inter-compared aerosol speciation from the MISR JOINT_AS product and the SPRINTARS model. The authors show that the MISR JOINT_AS product can be used to assist model validation, which shall be interesting to modelers. However, there are some major issues I would hope the authors can address.

(1) Comparing an 8-day model run (July 1-8, 2006) with a 15 year (July only) climatology bothers me. To justify their study, the authors assume that AOD distributions don't change from year to year. As shown from Figure 5, however, AOD distribution does have a yearly variation (also mentioned by the authors). Therefore, the comparison

between the 8-day model data and 15 year MISR climatology is less meaningful as I/readers do not know if the similarity and/or the differences are introduced by the real difference between the model and observations or simply caused by the temporal variability in the MISR JOINT_AS data. I would suggest the authors also show the MIST JOINT_AS data from July 2006, which should not be a difficult thing to do.

(2) As shown in Figure 3, both non-absorbing and absorbing aerosols are significant over East Asia. However, for the model and MISR data comparison, only non-absorbing aerosols are shown. What about adding sulfate, dust and carbonaceous aerosols from the SPRINTARS model to Figure 3 as well?

(3) The authors need to justify the reason why only East Asia, Eastern Atlantic and Western Africa regions are selected. Aerosol events are also significant over regions such as India, the Middle East and South America during the study period.

(4) To my understanding, the comparison between the 8-day model data and the 15 year MISR climatology seems to serve two purposes: (1) raise the awareness of the MISR JOINT_AS product; and (2) demonstrate the usage of the MISR JOINT_AS product through inter-comparing with the SPRINTARS model. To really make this study publication-worthy, it might be useful to show comparisons between the MISR JOINT_AS data and other observations. For example, using space-borne or surface-based lidar data, which also includes aerosol speciation.

(5) Or is it possible that the authors can compare MISR JOINT_AS data with AERONET-based climatology (e.g., fine mode fraction)?

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 33897, 2015.