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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Anthropogenic aerosol radiative forcing in Asia derived from regional models with atmospheric and aerosol data assimilation" *by* C. E. Chung et al.

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We thank this reviewer for a very careful review. We would like to address most of his/her concerns in the final authors' comments. Currently, interactive discussion is still open, allowing us to respond interactively. Using this opportunity, we would like to ask the reviewer a clarification question, hoping the reviewer to respond to our question before the interactive discussion is closed on March 12. We believe that by doing so we can reduce the possibility of being subject to 2nd time peer-reviewing process.

The reviewer stated "3. Forcing. The reported forcing values are for all sky, while the assimilated AOD, SSA, etc. are for clear sky only. This is certainly not consistent. At

least the clear sky forcing value should be reported. Also, the forcing values are break down to “anthropogenic forcing” and “BC forcing”; is BC not a part of anthropogenic aerosol?”

We think that offering clear-sky forcing values will enhance the paper and so we will include these results in the manuscript. However, we are not sure if our all-sky forcing calculation is inconsistent.

As the reviewer pointed out, AOD, SSA, etc. are obtained for clear sky only. Specifically, MODIS AODs are computed over cloud free pixels (Engel-Cox et al. 2004). In our study, we calculated forcing averaged over a grid that is $0.45^\circ \times 0.4^\circ$ in the horizontal. Also, our forcing is monthly average. Over a gridbox and a month, there are almost always enough cloudy free pixels to give AOD while over the same gridbox and the same month cloud exists. Similarly, at each AERONET site, up to 50 attenuation and 10 sky-radiance measurements are taken during a day [Kinne et al., 2003]. Cloud-contaminated data are removed. Again over a month, there are enough cloudy free measurements to give AODs while over the same month cloud exists. Thus, it is a reasonable acceptable assumption to use these AODs and cloud observation to calculate all-sky forcing. Clear sky forcing, to our knowledge, is a forcing estimate assuming that there is no cloud at all everywhere at all times. Either all-sky estimates or clear-sky estimates make a comparable assumption. Can the reviewer elaborate on the consistency issue?

C.E. Chung.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 821, 2010.