Atmos. Chem. Phys. Discuss.,
doi:10.5194/acp-2017-303-RC2, 2017

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Global source attribution of sulfate concentration, direct and indirect radiative forcing" *by* Yang Yang et al.

Anonymous Referee #2

Received and published: 30 May 2017

The manuscript by Y. Yang et al. examines the source of sulfate concentration and its direct and indirect radiative effect based on a novel source-receptor analysis technology embedded in CESM. Sources from both anthropogenic and natural emissions are identified for different regions over the globe. The model results comply with the expectation from common knowledge and provide qualitative and comprehensive understanding. This research addresses an important and interesting question of where the sulfate aerosol comes from globally and provides some implication for pollution alleviation. But in terms of scientific significance I would not rank this research in the highest catalog because this method has been used in previous studies (Wang et al., 2013; Yang et al., 2017) with different chemical species and regions. Considering that this research provide large amount of detailed and solid analysis that improves our knowledge on the question, I would like to recommend the publication of this manuscript.

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Discussion paper

Some comments are given below Line 151: Tagging sulfate is “for the first time”, however, not the first time used in CESM. Suggest not emphasizing the novelty. Line 156 to 159: The same reason as above. Suggest just elaborate the method and avoid using phrases such as “In contrast”. Line 215: why using 20% reduction to evaluate the indirect effect? Although 20% reduction was used in a previous study (Stjern et al., 2016), this increment of emission is arbitrary to me. Moreover, it hinders comparison with the magnitude of DRF, which compares the forcing with and without 100% aerosols. Line 449: is this 1% difference a coincidence?

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2017-303, 2017.