Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2019-778-RC2, 2019

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Trends and source apportionment of aerosols in Europe during 1980–2018" *by* Yang Yang et al.

Anonymous Referee #3

Received and published: 13 November 2019

This study examined source apportionment of aerosols in Europe over 1980-2018 using the Community Atmosphere Model version 5 with an Explicit Aerosol Source Tagging technique (CAM5-EAST). They found that the near-surface total mass concentration of sulfate, black carbon and primary organic carbon had a 62% decrease and aerosols from foreign sources became increasingly important to air quality in Europe. They also estimated that contributions to the sulfate radiative forcing over Europe from both European local emissions and non-European emissions would decrease at a comparable rate in the next three decades. The CAM5-EAST model showed its advantage in simulating the aerosol source-receptor relationship within one model simulation. The topic is interesting and the manuscript is well organized. I suggest it published in the journal after addressing my minor comments below.

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Discussion paper

The authors examined sulfate, black carbon and organic carbon aerosols in this study. Why did the author exclude other aerosols like nitrate in the simulation?

There seems a lot difference between the source attribution to near-surface concentration and column loading, as demonstrated in Figure 6. Thus, it would be more clear to directly show the transport pattern and source contributions near surface as well as those at higher altitude.

In Figure 11, the areas represent minimum-to-maximum ranges. Is there a possibility that one SSP scenario produces a minimum decrease in EUR contribution and a maximum decrease in Non-EUR contribution?

What is the advantage of using CAM5-EAST rather than CAMx or CMAQ mentioned in the introduction section?

The author analyzed annual averaged source contributions in this study. How is the source-receptor relationship in different seasons? Are they the same as the annual mean results?

Page 11: What is temporal resolution of the observational data?

Fig.5: specify the abbreviations in the figure

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