

Interactive comment on “A global modeling study on carbonaceous aerosol microphysical characteristics and radiative forcing” by S. E. Bauer et al.

Anonymous Referee #2

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Review of the manuscript “A global modeling study on carbonaceous aerosol microphysics characteristics and radiative forcing” by S. Bauer et al.

The paper addresses the estimation of uncertainties in modeling BC radiative forcing, uncertainties that are related to the assumed dimension of the emitted BC and the assumptions made for the calculation of the radiative transfer. It also evaluates the effects of BC mitigation on aerosol radiative forcing. The manuscript addresses important issues which are relevant for the broad scientific and policy maker community. There are minor changes that are necessary for the paper to be published and are listed in the following.

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2. Model description

Aerosol water is listed as tracked species. In the processes listed in page 5 there is condensational growth but not evaporation. If aerosol water is transported the exchange between particle and surrounding air should be calculated. Although the aerosol module is described in BAU08 it is necessary to include some basic information here: which are the gaseous species that condense on the particles? Which is the chemical composition of the nucleating particles? How is the aerosol water calculated?

Nitrate is included in the aerosol particles, how is this calculated taking into account that ammonia and ammonium seem to be absent in the system?

2.1 Aerosol radiative coupling

I don't see the necessity to include the reference to Table 1 at line 27

2.2 Model configuration

Explain better how the indirect effects are calculated.

3. Effect of chosen particle size for emissions

Line 20 pag 9 What is “dry and wet” condensation? Line 29 pag 9 The reference is to Figure 2 and not 3 Line 7 pag 10 “ARF increases over land. . .” Is it ARF or ARI? The text refers to ARF but the figure to ARI. There is a general confusion between ARI and ARF, check the consistency of using the two quantities throughout the paper. Line 11 pag 10 Explain better the sentence “If all 7 species are mixed together, or none of the other 15 populations can be used, MXX is populated”?

Discussion and conclusions

It is necessary to give an evaluation of the overall uncertainty related to the values of the total net radiative change due to the choices of BC mitigation paths. These results are important for policy makers but are affected by large uncertainty that are important to stress in the manuscript.

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References

The reference list must be carefully checked there are many listed papers that do not appear in the text, and references in the text that do not appear in the list.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 4543, 2010.