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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Evaluation of black carbon estimations in global aerosol models" *by* D. Koch et al.

Anonymous Referee #2

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This paper assesses the performance of the AEROCOM models to simulate black carbon. This is a very thorough intercomparison of the state-of-the-art GCMs with a variety of different observations. As shown in the paper, while surface observations are generally overpredicted by the models, absorption aerosol optical depth and column BC burden are underestimated. Thus, the models either partition the BC wrongly or the different observational data sets are inconsistent with each other. I recommend publication of this paper after the following minor comments have been addressed.

Page 15776, line 1: I suggest using either present or past tense in this sentence.

First line of 2.2.1, 2.2.2 and 2.2.3: Add "GISS" between "standard" and "model"

Page 15778, line 5: I don't understand why primary elemental carbon can be larger

than BC, as I thought that primary elemental carbon is only C.

Page 15778, line 22: increases –> increase

Page 15779, last line: less –> small

Page 15782, line 27: If Schuster et al. assume a larger specific absorption than the models, shouldn't this bias their estimate of the BC burden low? I.e. if they used a lower value, then the comparison with the models would be worse, correct? If so, please add.

Page 15783, 2nd para: Any idea why the model underestimate the BC column burden particularly over the Americas?

Page 15783, 3rd para: None of the sensitivity simulations with the GISS model seem to improve the model to observation ratio for the BC column burden. What conclusions do you draw from this?

Page 15793, line 12: I suggest discussing the estimates of a higher BC radiative forcing also in the context of the recent papers that suggest a higher BC radiative forcing than estimated in the IPCC AR4 report (see Ramanathan and Carmichael, 2008)

Table 2: Either use GFED 1998 or BB 1998 consistently in this table and in the figures.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 15769, 2009.