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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.

D. Koch et al.

dkoch@giss.nasa.gov

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We have revised the manuscript "Evaluation of Black Carbon Estimations in Global Models" as requested by the reviewers. Detailed responses are provided below, with each reviewer comment marked with a bullet, and each response with DK. Best Regards, Dorothy Koch

Review 2

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

DK: Past tense is now used throughout the paragraph when describing the previous studies. First line of 2.2.1, 2.2.2 and 2.2.3: Add "GISS" between "standard" and "model"

DK: Done.

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.

DK: Actually EC and BC amounts depend upon measurement technique. Tony Hansen invented the term BC years ago to operationally differentiate the aethalometer measurements (optical) from thermal measurements (of EC). We feel it is most accurate to change this statement as follows: "These data are primarily elemental carbon, or refractory carbon, which can be somewhat different than BC (Andreae and Gelencser, 2006)".

Page 15778, line 22: increases –> increase

DK: fixed.

Page 15779, last line: less –> small

DK: fixed.

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.

DK: That is correct. This phrase was added: "however a lower value would increase the retrieved burden and worsen the comparison with the models."

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

DK: We have removed that clause; I don't think this regional difference is so significant.

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?

DK: Actually I have added this: “Modest model improvements relative to the retrieval occur for the case with increased lifetime and for the IIASA emissions (Table 6).”

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).

DK: The following is added: “This enhancement would put the average model estimate close to the +0.55 Wm-2 model estimate of Jacobson (2001), who used a BC-core-shell configuration. However the enhanced estimate is smaller than some other recent high estimates such as +0.8 Wm-2 of Chung and Seinfeld (2002) for internally mixed BC, or the retrieval-based estimates +1.0 Wm-2 of Sato et al. (2003) and +0.9 Wm-2 of Ramathan and Carmichael (2008).”

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

DK: Table 2 now has BB 1998 like the other

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