

Interactive comment on “Influences of in-cloud aerosol scavenging parameterizations on aerosol concentrations and wet deposition in ECHAM5-HAM” by B. Croft et al.

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Author response to referee #2 (supplement)

Point 5) of the original referee comment was truncated. The referee has now provided this comment in full, and the author comment is updated here.

The referee comment is labeled with RC, and the author comment is labeled with BC.

RC: 5) I found the results of the different scavenging parameterizations on sulfate and black carbon burdens (p. 22069, lines 23-24) to be significant with 22% and 30% changes between parameterizations. It should be stressed as a major conclusion, but

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it would be useful to know its relevance – that is, the model predictions of BC vertical profiles were significantly different than observations.

BC: We have modified the text to provide a clearer connection between our discussion of these burdens changes in Section 3.3, and our discussion of the modeled vertical profile changes and comparisons with observations presented in Section 4. The text in the last paragraph of Section 3.3 is modified. In particular, we added that “To further examine the relevance of the impaction parameterization, Section 4 will present a comparison of model predictions of black carbon vertical profiles with observations.” To better illustrate the relevance of the finding that inclusion of an impaction scavenging parameterization reduced predicted black carbon burdens by 30% for the prognostic simulations (PROG-AP versus PROG-AP-noimp), we have modified the discussion of the modeled and observed black carbon vertical profiles in paragraphs 5 and 6 of Section 4. We do point out that the predicted black carbon profiles differ from observations and between each other by up to two orders of magnitude. In particular, the text now states that “For the simulation PROG-AP, black carbon concentrations are lower by up to a factor of five, and two in the middle and upper troposphere, respectively, as compared to the simulation PROG-AP-noimp. Thus, the parameterization of impaction scavenging is particularly relevant for black carbon in mixed and ice phase clouds. For black carbon, the parameterization of impaction scavenging is of importance since this aerosol has considerable mass in the insoluble Aitken mode, which is scavenged only by impaction processes.”

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 22041, 2009.

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