Atmos. Chem. Phys. Discuss., 12, C7950–C7951, 2012
www.atmos-chem-phys-discuss.net/12/C7950/2012/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Evaluation of preindustrial to present-day black carbon and its albedo forcing from ACCMIP (Atmospheric Chemistry and Climate Model Intercomparison Project)" *by* Y. H. Lee et al.

Anonymous Referee #4

Received and published: 10 October 2012

General comments:

Overall, this work is an important first step to understand how state-of-the-art global models treat black carbon and it's effect on snow albedo forcing. After addressing the questions herein, it should be published. There was a great deal of effort made to inter-compare models to observations of BC in snow, though as the first reviewer points out more description of the observational techniques is required.

One concern is the design of the experiments and some of the jargon you use. In line

19 of page 21720 you state that "Each timeslice ran for 4 to 10 years to obtain statistically significant results." First, what do you mean by "statistically significant"? Nowhere throughout the paper do you define this term. Secondly, if something is "statistically significant" it is relative to something else – and this something else is completely unclear. You do not present any hypothesis testing in the paper (e.g. t-test results). The only statistics presented are the multi-model mean and relative standard deviation. At any rate, your integrations are far too short to do any meaningful hypothesis testing.

Regarding the experimental design, you state that some models are driven by offline-meteorology, implying that others are GCMs that evolve their own meteorology. This presents an issue – if the evolved meteorology is very different between the models the differences in transport and precipitation may overshadow any differences due to the treatment of, for example, BC scavenging parameteriztions. Secondly, in the GCMs, does aerosol forcing feedback onto the model radiation fields? In this case, the aerosols may influence the meteorology of the model – something that does not happen in the offline-meteorology driven models. Thus, it seems less of an "apples to apples" comparison when the meteorology is offline or online.

Minor suggestions:

None

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 21713, 2012.

ACPD

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