

Interactive comment on “Direct radiative effect of aerosols emitted by transport: from road, shipping and aviation” by Y. Balkanski et al.

Anonymous Referee #3

Received and published: 17 March 2010

This paper describes model simulations of aerosol radiative forcings for subsectors of the transport sector based on two models using three different radiative transfer codes. Evaluating impacts of sectors and subsectors is an important activity, and the use of multiple models strengthens the results. I recommend publication following the relatively minor revisions requested below.

The current study is compared with one other that has considered transport subsectors, Fuglestad et al. (2008), and finds the new radiative forcings to be much larger than the previous results. However more effort could be made to explain the difference. It seems to occur mostly in the road subsector. Please explain whether the difference is due to emissions, burden (lifetime), or optics/radiative forcing.

Note however that there is a recent publication by Unger et al. PNAS (2010) that
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includes these subsectors as well. How do results here compare with that study? An older study from that group also estimated total transport sector forcing by aerosol species (Koch et al., JGR 2007), so the net aerosol transport-sector direct forcing could be compared.

Line 85. Is the Fuglestad estimate direct effect only? Then here you should change to: “are much more negative than the direct forcing estimated by Fuglestad et al. [2008]”

In the Introduction, which study corresponds to the +3mWm⁻² mentioned in the Abstract? Presumably it is Fuglestad again, however this should be clarified, probably in line 85.

Lines 93-94 Here please add some clarification of what “the three models” are: “This paper is organized as follows: section 2 gives a description of the emission inventories, the aerosol parameterisations and of the radiation codes used by each of the three models.”

Lines from 133: The Novakov and Bond discussion probably does not belong in the road traffic discussion and certainly not with the Kohler study description. They seem to pertain to fossil fuel more broadly.

Lines 144-146: Clarify in the text: Are the loads total species or BC?

Lines 155-156: You compare fuel consumption in the inventories, how do emissions for the species compare?

Section 2.3 How do the IEA-based emissions compare with Hendricks et al?

Lines 225-227 are out of place in this paragraph. Recommend moving them to the previous paragraph.

Section 2.4 Again there should be some brief introductory mention of the models and radiation schemes that are being used before the descriptions.

Line 270. Please end this section with a brief summary of the comparison of the two radiation treatments.

Line 284. Please include the conversion time for BC.

Line 295. What are the assumed emitted sizes for BC? Perhaps a different size assumption would allow consistency among density, refractive index and absorption.

Line 353 Fix this sentence.

Line 409 Clarify, respective to what?

Line 417 Would the narrower range be due to a single emission inventory?

Lines 456, 458, property rather than properties

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 1659, 2010.