

## ***Interactive comment on “Black carbon vertical profiles strongly affect its radiative forcing uncertainty” by B. H. Samset et al.***

**Anonymous Referee #2**

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Review of Samset et al “Black carbon vertical profiles strongly affect its radiative forcing uncertainty”

This paper quantifies the relative contribution of diversity in burden, vertical profile and spatial variability to the overall diversity in radiative forcing due to black carbon, utilising the AEROCOM models. It is a concise and well written paper, with clear messages that firstly the vertical profile contributes substantially to radiative forcing uncertainty, secondly that aerosol above 5 km plays a substantial role in providing radiative forcing, and finally that more observations of upper tropospheric aerosol are needed in order to constrain the models. These are important findings for both modelling and observational communities. I therefore recommend that the paper is suitable for publication subject to consideration of a few minor issues, mostly relating to clarification of text or

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figures.

Specific points: Page 28936, lines 17-24. Whilst I am sure that you are right in the calculation of the contributions, I cannot quite understand how the 20% variability due to vertical distribution comes from. Please make this clearer.

Figure 1. I was puzzled as to why the present study which uses AEROCOM 1 and AEROCOM 2 models can produce a mean BC RF greater than that for either Aerocom 1 or Aerocom 2 alone, but I presume this is because only a subset of AEROCOM models have been used in this study? Please add some text to clarify (possibly to caption?)

Figure 4: Please change the colour scheme as I found it very difficult to distinguish the different shades or yellow/brown. This was made even more of a challenge by the small size of the legend.

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Interactive comment on Atmos. Chem. Phys. Discuss., 12, 28929, 2012.

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