

## ***Interactive comment on “Modelling the optical and radiative properties of freshly emitted light absorbing carbon within an atmospheric chemical transport model” by M. Kahnert***

**M. Kocifaj (Referee)**

kocifaj@savba.sk

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General comments This is a novel and worthy piece of simulation work which addresses problems with radiative forcing of light absorbing carbon particles. The methodology used is well acceptable and the author has made a good attempt to put the work in context. The mathematical workings are clear and concise.

Here is a set of minor comments: 1. The author evaluates the radiative forcing using the Eq. (7). Is the diffuse radiation explicitly incorporated into  $F_{\text{diff}}$ ? 2. The simpler version of the code by Xu & Gustafson enables to calculate the optical properties of a particle in a fixed orientation. If so, the formulation at page 7, line 8, column 2

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needs to be corrected. 3. As for the representativeness of the results: how these can change with particle's morphology? Is the chosen morphology typical for LAC? 4. The range of size parameter in Figs. 6-7 doesn't fit with size classes  $[0.02, 0.1] \mu\text{m}$ ,  $[0.1, 1.0] \mu\text{m}$ ,  $[1.0, 2.5] \mu\text{m}$  and  $[2.5, 10.0] \mu\text{m}$ . Note that  $x=0.15$  corresponds to the particle diameter about  $0.02 \mu\text{m}$ , so the particles with  $x < 0.15$  become smaller than a monomer. 5. The cubical fit (Eq. 3) is well-founded for cross sections of strongly absorbing particles (refers e.g. to well-known book of Bohren & Huffman). Is there some reason for using such a fit for asymmetry parameter too?

In spite of these minor comments, I strongly recommend the paper for publication in ACP after the comments will be answered.

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