

## ***Interactive comment on “Enhanced solar energy absorption by internally-mixed black carbon in snow grains” by M. G. Flanner et al.***

### **Anonymous Referee #1**

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There has been several publications investigating the effect of black carbon on absorption of solar radiation by snow when black carbon and snow from an external or an internal mixture. A special feature of Flanner et al work is to show an additional effect of the size of black carbon inclusion in internal mixture on absorption. This is accomplished by using an extended effective medium approximation which leads to an effective refractive index of snow-black carbon mixture as a function of black carbon inclusion size distribution. The snow-black carbon effective approximation model is then incorporated into sea-ice component of the NCAR Community Earth System Model. I find the results interesting and suitable for publication in the ACP.

Comments and suggestions: (1) p. 2073: What is the reason for excluding the first year of simulation from the analysis? (2) p. 2075: The given range of the BC to ice

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volume ratio is extremely wide and provides no useful information. Perhaps you can provide separate values for Antarctica, Arctic and typical continental values. (3) In eqs. (13) and (14) what are the limits on the wavelength? (4) p. 2077: Why not to specify where is the peak at 550 nm wavelength? (5) In general the paper is too long and not easy to read and enjoy. It may be worth to consider shortening the main text and to present the technical details in an appendix

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Interactive comment on Atmos. Chem. Phys. Discuss., 12, 2057, 2012.

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