Atmos. Chem. Phys. Discuss., 15, C5702–C5703, 2015
www.atmos-chem-phys-discuss.net/15/C5702/2015/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Simulation of black carbon in snow and its climate impact in the Canadian Global Climate Model" *by* M. Namazi et al.

Anonymous Referee #1

Received and published: 6 August 2015

This paper concerns a new parameterization of BC in snow that was implemented in the climate model CanAM4.2. First, the authors verify their model by comparing simulations of BC snow mixing ratios and forcing with a broad set of measurements and with other models. Then, the authors focus on two periods 1950-1959 and 2000-2010 and looks at trends in BC concentrations and the impact of BC emissions on surface albedo, snow cover and surface temperature between these periods. They find that changes in BC concentrations in snow since 1950 have had a much smaller impact on the cryosphere compared to the rise in surface temperatures.

How much BC have affected snow melt during the last decade is an important re-

search question and I think this study makes a significant contribution to the field. The manuscript is clearly written and the authors have done a careful job in comparing their work with others. The authors describe their model and parametrization in detail. The figures are clear and concise and the authors present and discuss their results thoroughly.

I recommend this paper for publication, and I have only a couple of questions/editorial changes.

P18845: The CanAM model is compared with the SNICAR model with the same configuration. Here it is shown that CanAM produces 25 % less albedo response to BC in snow, and the authors attribute this to the choice of BC optical properties that produces a MAC 550 nm of 4.9 m2g-1, compared to 7.5 in SNICAR. Line 15: '.. result in similar albedo responses ..' compared to SNICAR? Or to CanAM? Would this change your conclusions do you think?

P18853,L11: missing '()'

P18853, L22: You have run the model with 8 ensembles, but show only one ensemble, since the others 'are similar'. Why don't you show the ensemble mean instead of picking one ensemble?

P18853,L28: 'A relatively small number of sites in Siberia causes localized model underestimates for Russia.' Why?

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 18839, 2015.