

# ***Interactive comment on “On the assimilation of optical reflectances and snow depth observations into a detailed snowpack model” by L. Charrois et al.***

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I read with great interest the manuscript “On the assimilation of optical reflectances and snow depth observations into a detailed snowpack model” by Charrois et al.

In the model set-up for the Crocus model the authors used an explicit description of the radiative transfer inside the snowpack instead of the albedo parameterizations used in the standard version. The radiative transfer simulations require the concentrations of absorbing impurities to derive realistic albedo values. In this case “equivalent black carbon content” is used. Since the impurity concentrations in the snow are not constant over time, dry deposition is implemented assuming a constant flux of the impurity from

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the atmosphere to the snowpack. Furthermore, the deposited amounts are distributed in the top five centimeters of the snowpack.

I have a couple of questions regarding this approach.

Do the authors use the term “equivalent black carbon” as defined regarding atmospheric black carbon measurements (i.e. linked to aethalometer measurements) or do the authors imply that all absorbing impurities in the snow are represented by black carbon?

What are the simulated impurity concentrations in the snowpack? What are the calculated dry deposition fluxes? Do the concentrations and fluxes agree with what can be expected from observations? What atmospheric concentrations are required to maintain the assumed fluxes?

What is the basis for distributing the deposited impurities in the top 5 cm?

Since the absorbing impurities can have a large impact on the albedo, can the MODIS data be used to constrain the parameters used for the deposition?

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