

Interactive comment on “Ice sheet mass loss caused by dust and black carbon accumulation” by T. Goelles et al.

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This paper shows the importance of taking into account black Carbon and dust in future projections of the GrIS mass balance with the help of conceptual simulations. The topic of this paper is clearly original and deserves to be published in TC. It is well written, clear and fits well with TC. However, as the authors use conceptual simulations and as everything is not linear, the absolute values of the impact of BC/dust to the GrIS depletion should be less highlighted. The uncertainty is too high.

For example, the sentence (in the abstract):

The effect of aerosols in the year 3000 is up to 12 % of additional ice sheet volume loss in the warmest scenario

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could be reformulated as this:

The effect of aerosols in the year 3000 could induce an additional ice sheet volume loss of more than 10 % according to our conceptual model highlighting the importance of taking into account BC/dust produced now in future projections of the ice sheet mass changes.

In addition to the remarks of reviewer 1, I notice that nothing is said about rainfall. With warmer climates, rainfall events over ice sheet should increase and could become dominant in summer over the ablation zone. If such events favour a cleaning of the ice sheet surface, could they reduce the impact of BC/dust ? What is the impact of heavier rainfalls to dust/BC retention by the ice sheet?

Interactive comment on The Cryosphere Discuss., 9, 2563, 2015.

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