

## ***Interactive comment on “A new spatially and temporally variable sigma parameter in degree-day melt modelling of the Greenland Ice Sheet 1870–2013” by A. E. Jowett et al.***

### **Anonymous Referee #1**

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I am sorry for not being specific enough in my review. I understand the scientific relevance, but it is in my opinion not of broad significance in the area of SMB studies of the Greenland ice sheet required for publication in TC. Having said this, I really like the study and would like to see it published elsewhere.

Firstly, this study deals with one parameter in the well-established PDD-method, which is an inferior model when compared to a physically based surface energy balance model e.g. regional climate models (something the authors also state in their manuscript). So this study is mainly about improving a parameter in a method, and not inter-compare SMB results of Greenland. The implication for SMB of the new sigma value is very important to establish, and something this study should undertake especially if the authors aim for a broad significance of their SMB results. Otherwise, this study is just about improving one parameter in a SMB-model and nothing else.

Secondly, the authors claim, that sigma is important for the PDD-method, and I agree, which several other studies also claims before this study. However, the PDD-method constitutes of more parameters, for example, degree day factors. What implications will this new sigma dataset have on the other parameters in the PDD-method? Also, as the authors points out, other studies suggest, that it might have large implications for SMB and surface melt area, but who knows, if the PDD-method including this new sigma parameter the authors plan to use, is not calibrated, validated and quantified in this study.

Before, I actually see the results of the SMB study, I will hesitate to deem this study of broad significance. In principal, you cannot claim something is of broad significance without quantifying and verifying it. The authors state, that the they want to save this for a different study, but that statement just does not do it for me. This is one of the reasons why I suggest, that the authors should seek to publish their results in a more specialized journal (maybe data/method journal, see review for suggestions), and then use the new sigma value in their PDD-model in a SMB inter-comparison study for Greenland, which could be of broad significance and relevant to publish in TC, if you ask me.

Lastly, I do not think I could be convinced that this TCD study is of broad significance in the area of SMB studies of the Greenland ice sheet, but hey, this is for the editor to decide, not me.

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Interactive comment on The Cryosphere Discuss., 9, 5327, 2015.