

Editor report for tc-2019-255: Inter-comparison of surface meltwater routing models for the Greenland Ice Sheet and influence on subglacial effective pressures; Kang Yang, Aleah Sommers, Lauren C. Andrews, Laurence C. Smith, Xin Lu, Xavier Fettweis, and Manchun Li

Dear authors,

Thank you for your patience in the long review process of the revised version of your article. As you will see, the initial reviewers disagreed on the best course of action for the article following your changes. The reviewer with supraglacial expertise recommended acceptance, whereas the reviewer with subglacial modelling expertise was not convinced of the validity of some of the subglacial experiments. I therefore sent the paper on to an extremely experienced subglacial modeller for a third opinion. They also share the concerns of the second reviewer, but agree with myself and the first reviewer on the elegance and importance of the supraglacial work. They suggest a number of different options, as you will note in their comments.

I would like to invite you to resubmit the paper with minor corrections, which are suggested by all three reviewers. Referee #2 gives some minor technical corrections which are easily addressed. Reviewer #1 suggests some amendments to the Figures. Reviewer #1 also has some significant concerns regarding the setup of the subglacial modelling. Reviewer #3 has considered this section in detail, and offers the following three solutions in their review:

1. Omit the subglacial drainage modelling from the paper. I can imagine most or all of the reasons the authors might argue strongly against this.
2. Perform additional model tests (see text in the review) to assess the role of parameter choices and boundary conditions in determining the model results and revise accordingly. One would like to see that the similarities/differences between the tests with different surface water routing schemes is robust to uncertain model parameter values and treatment of boundary conditions on the subglacial drainage model. This may involve replacing the current results in the paper with updated results.
3. Change none of the model results but revise the text to dial-down results/conclusions about subglacial hydrology. This option would still benefit from additional model tests being done (even if not shown), to increase the readers' confidence in the robustness of the results/conclusions. As I imagine this is the most appealing option, I will be specific (examples given in the review).

I invite you to consider these options. If you chose Option 3, I would like to recommend paying close attention to the wording of the subglacial modelling results, especially when exploring the impact of boundary conditions on the modelled results. The changes you made following the previous review have certainly improved the validity, but both subglacial modelling experts have minimal confidence in the results as they are now presented. Reviewer #3 offers constructive options that will also address some of the concerns of Reviewer #1. Please consider the comments of all reviewers in your response.

Yours sincerely,

Dr Liz Bagshaw

Editor, The Cryosphere