

## ***Interactive comment on “Sheet, stream, and shelf flow as progressive ice-bed uncoupling: Byrd Glacier, Antarctica, and Jakobshavn Isbrae, Greenland” by T. Hughes et al.***

**Anonymous Referee #1**

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General comments:

In a sense, the methodology presented is a form of “model emulation”, which is an accepted form of discourse in other branches of atmosphere/ocean/ice research. The novel method represents a set of rules that produce (arguably well or not so well, as the case may be) representations of the ice-sheet system that are “reasonable” and “expected” based on other information (e.g., observations and the large body of “other” types of model runs). In a sense, the terminology “holistic approach” could have been equally well named “experience-based emulation approach”.

The manuscript is quite clear about what is treated and what is not treated, and this is

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a good thing.

The material in sections 2, 3 and 4 present the “rules” that allow the “model emulation” method to produce a representation of the end-product (the state of ice geometry and flow over a flowband). For fulfilling this purpose, this material is neither correct nor incorrect, and hence the details are not important as far as a review is concerned. They are (or will be) important if some future researcher decides to use this methodology to investigate some process (e.g., in exoplanetology, Neoproterozoic glaciation?) in greater detail.

Specific Comments:

Abstract line 3: change “alone” to “along”

page 4274 line 8 and beyond: I’m not sure that it is correct to say “complex mathematics of continuum mechanics”. . . “complex mathematics” or “tedious mathematics” would be more appropriate. Risking sounding pedantic, the methods presented here, even if simplified, are attempting to represent continuum mechanics. (I’m not sure I really understand why continuum mechanics is being brought up, as it is rarely used in papers I have read within the glaciological literature.)

scattered through the manuscript: There seems to be a convention of expressing physical quantities in units of Pa and bar simultaneously. This might be considered an excessive use of space. It is also not clear whether physical quantities being expressed in bar units is consistent with the journal style. In some places, quantities are expressed in bar alone (e.g., on page 4309 for A)

Page 4318: “contribute to Termination of the glaciation cycles during the Quaternary Ice Age in which we now live.” Should “T” be lower case? Also, is the sense of this sentence saying that the 20,000, 41,000 and 100,000 year cyclically of glaciation that has persisted over the past million years or so being ended, or is it saying simply that interglacials begin with this process?

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