

Interactive comment on “Large-scale integrated subglacial drainage around the former Keewatin Ice Divide, Canada reveals interaction between distributed and channelised systems” by Emma L. M. Lewington et al.

Anonymous Referee #1

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New imagery and DEMS made available through the Polar Geospatial Data Center have made it possible to map glacial landforms in a semi-automated approach and at a higher resolution than ever before. Without field-checking, these maps remain interpretations of landform origin and assumptions of the materials that comprise them. This paper does, however, cite some of the primary Canadian work on the ground so some of the interpretations have ground-truthing.

The focus of the work was on the concentration of a variety of landforms of interpreted subglacial fluvial origin in corridors and then an explanation for this. Areas previously

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mapped as ice streams were noted to have fewer meltwater landforms. The suggestion that this was a matter of preservation potential of landforms in these locations was not addressed. The timing of the formation of the landforms can assumed by basic geologic principles. However, in this case, the authors suggested that the landforms represented approximately 1,000 years during deglaciation and were not overly concerned with a finer temporal resolution made possible by cross-cutting relationships or ice-marginal or ice-collapse features.

Without more geologic evidence, I was left with questions on: the contemporaneous nature and subglacial origin of features such as tunnels and similar-dimension positive-relief features; the subglacial origin and sedimentology of the hummocks; and the origin of splay landform which is similar to ice-marginal fans. I found the justification for their interpretations lacking.

However, this is part of the very nature of a paper based on the cataloging of landforms from remotely sensed data: questions will remain. Hypothesis for formation will need to be tested with observations of the materials at the very least. Measurements made on modern glaciers or demonstrated in experimental work would also help provide credibility to their interpretations that landforms vary with the pressurization of the subglacial water system. This is not a novel hypothesis, nor one that explains all observed features of the glacier bed but it is the primary interpretation of the paper.

The explanation for ice streams lacking meltwater features because of their low surface slopes is not the only plausible hypothesis; fast moving ice over deforming beds will destroy the evidence of channel formation. However, the authors emphasize that a well drained bed results in more stable ice. This is simply reversing the emphasis typically presented in ice-stream papers but using similar reasoning for the bimodal behavior of ice flow.

Non-standard and casual punctuation is pervasive throughout the paper: and/or, presence/absence, substrate/geology, splay/glaciofluvial, meltwater track/meltwater chan-

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nel, erosion/deposition, streaming/surging. Please choose a conjunction or a single word. Hyphens are used in noun strings but not needed with adverbs. I would avoid unnecessary complicated acronyms: MW subscript route(s); MW subscript track(s), MW subscript corridors; VPA–variable pressure axis (a new one for me); GrIS for Greenland Ice Sheet (couldn't see where you defined that one). What is the point of using any of them in an online manuscript with no limits on characters or words? They are also not used consistently, e.g. line 516.

Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2020-10>, 2020.

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