

## TC Review Response (May 2023)

'Differential impact of isolated topographic bumps on ice sheet flow and subglacial processes'  
by McKenzie et al.

The authors have done an excellent job of addressing all the points raised by the reviewer and editor in this second round of reviews. The impact of the article is significantly strengthened – the most recent edits provide additional detail on the methods and results and stronger justification for the points made in the discussion. The overall quality of the writing is good but there are a few places where the text could be a little clearer or the reader is left to fill in some of the details – try to make your writing as explicit as possible. A few suggestions to improve the clarity of the article are listed below. I leave it to the authors to make any edits that they see fit and am delighted to say that my decision is to 'publish subject to technical corrections' (the article will not undergo any further review by the editor). Thank you for choosing to publish your research in The Cryosphere!

Pippa Whitehouse (Editor)

Line 58: you have not previously used the terminology 'isolated topographic highs', so reference to '...these isolated topographic highs' is ambiguous

Line 63: awkward logic – the text essentially says that the bumps record the influence of the bumps...

Line 69: the implications of the final clause in this sentence are unclear, are you referring to the fact that all the landforms will have experienced roughly the same deglaciation and post-glacial landscape evolution processes?

Section 1.1: refer to figure 1 somewhere in the section that describes the geographic setting of the study area

Lines 77-78: 'the lack of ice streaming seen in-between singular bump topography... allowed us to treat all bumps as "aggregate" features' – terminology is a little unclear, perhaps clarify what you mean by 'singular bump topography'

Lines 105-110: the magnitude of the GIA signal is significant, but it will be spatially uniform across each region of interest. Conversely, any tectonics or post-glacial erosion will have a spatially variable signature, but the magnitude of the signal will be much smaller than the GIA signal. I think these observations can be used to justify the neglect of all three processes in your

study but at the moment the argument is not very clear. For example, in the final sentence you refer to timescale discrepancies but then go on to talk about spatial resolution.

Line 117: be more explicit about what you mean by 'large timescales of uniform glaciation'

Line 134-135: it took me several goes to work out what you are trying to say in this sentence (I think you are saying that, statistically, bedforms on top of bumps have the lowest elongation and the greatest surface relief?) – suggest simplifying

Line 137: add a reference to figure 2 to support the statement about there being more bedforms downstream of a bump than upstream

Line 154: text missing? '...and an increase in surface relief...'

Line 161: decrease > increase?

Lines 166-167: 'increased pressure and basal drag' – wouldn't this increase the capacity for erosion?

Line 170: '...the similarities...are similar' – rephrase

Line 176: surface relief > surface area

Line 178: demonstrating > demonstrates

Line 181: could simplify, e.g. '...bumps with a volume greater than several cubic kilometres...'

Lines 182-183: '...bumps below this threshold cannot regain the same organization...' – needs a little more explanation, it is not the bumps that are organized...

Lines 183: 'This analysis found little evidence of channelized meltwater' – it is not clear which of your results supports this statement (is it actually a result from one of your other papers?)

Line 197: refer directly to your analysis, e.g. 'Overall, our results suggest...'

Line 201: 'The two largest bumps' and 'only bumps larger than several cubic kilometres' – do these essentially refer to the same thing? Can you streamline this sentence?

**Thank you for these line edits – all of them were extremely helpful and all were incorporated into the final version of the manuscript. For several of the comments, sentences were separated or simplified, with additional explanation provided as you suggested. We again appreciate the time and feedback provided by the editor as it made this work much stronger.**