The Cryosphere Discussions

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Comment on tc-2021-54

Jonathan D Mackay (Referee)

Referee comment on "Brief communication: Growth and decay of an ice stupa in alpine conditions – a simple model driven by energy-flux observations over a glacier surface" by Johannes Oerlemans et al., The Cryosphere Discuss., https://doi.org/10.5194/tc-2021-54-RC1, 2021

This manuscript details the application of a simple energy balance model to a surface ice 'cone' geometry to simulate the dynamic melt and growth of a hypothetical ice stupa situated in the Oberengadin region, Switzerland. My feeling is that this manuscript does provide novel theoretical methods (subject to clarification from the authors of what the novelty actually is – see comments below) which are relevant to scientific investigations within the journal scope, and therefore should be published subject to recommended revisions. Specific comments are provided in the attached pdf. Below, I've provided a brief summary of my thoughts.

Overall, the manuscript is brief and to the point – well suited for a brief communication. However, I did feel that the work itself is not well-justified in the introduction. The author's note that the work is complementary to the much more elaborate study of Balasubramanian at al. (2021), but they don't elaborate on how this communication compliments it/provides novelty (i.e. why should this communication be published?). I wasn't able to access this study as I believe it is currently under review, so it's difficult to establish where the novelty lies. I therefore recommend that the author's briefly and succinctly outline the novelty of the work and why it complements the more detailed work of Balasubramanian at al. (2021).

There are two occasions in the manuscript where the authors refer to their "belief" in the approach and "reasonable[ness]" of assumptions they employ without giving any specific justification. On another occasion, they postulate that the roughness parameter is, "expected to be larger than one, and could perhaps have a value of 2 or more". This later forms the basis for selecting a value of 2 for the experiments presented. I appreciate that this text is a brief communication, but some justification for these assumptions is, I think, important (there is still lots of space to cite previous work as justification).

Finally, clearer definition of equation terms and units are required.

I believe these issues, along with the more detailed attached comments should be relatively easy for the authors to address and, therefore, subject to these minor revisions, I recommend that this brief communication is published.

Please also note the supplement to this comment:
https://tc.copernicus.org/preprints/tc-2021-54/tc-2021-54-RC1-supplement.pdf