



EGUsphere, referee comment RC1
<https://doi.org/10.5194/egusphere-2022-1310-RC1>, 2023
© Author(s) 2023. This work is distributed under
the Creative Commons Attribution 4.0 License.

Comment on egusphere-2022-1310

Anonymous Referee #1

Referee comment on "Brief communication: Is vertical shear in an ice shelf (still) negligible?" by Chris Miele et al., EGU sphere,
<https://doi.org/10.5194/egusphere-2022-1310-RC1>, 2023

General comments:

I think that I reviewed this manuscript for another journal, and if so, I was supportive of its publication at that time, and still am. I do note some relatively minor, but important corrections to the "narrative" being presented, and I describe them now:

The abstract uses the words "miscommunications", "misinterpretation" and "misconception". I think that these words are sort of unfair to the early scientists who developed the initial modes of thinking about, doing analysis with and modeling ice shelves. These early scientists were well aware of the fact that shear stress in the vertical was prevalent in ice shelves at amplitudes that could be large (e.g., at an ice front or when there are large thickness gradients); however, their intention was to develop strategic simplifications and approximations which would allow glaciological science to make progress. Their pioneering work leading to the "shallow shelf approximation" was fundamental to the progress of glaciology through the 1960's onward to the present day. It is thus not only unfair to their legacy to imply that they were "misleading", but it is a kind of cheap writer's trick to introduce the substance of the present paper. I strongly object to this tone and think that it detracts from the paper by setting up a false "combative" tone that completely misleads the reader.

I see that this tone that I object to is not present in the Introduction, and the authors very correctly laud the initial development of one of the most effective approximations in glaciological history (the shallow shelf approximation). This is important. And I compliment the authors for having done so. But again: I see words like (line 65) "persistent mischaracterizations". This is a false and incorrect statement: approximation is not a mischaracterization.

A challenge: After recently attending the AGU and also reading a paper by Catherine

Walker:

Walker, C. C. and Gardner, A. S. (2019). Evolution of ice shelf rifts: Implications for formation mechanics and morphological controls, *Earth and Planetary Science Letters*, 526,115764, doi:10.1016/j.epsl.2019.115764.

I became aware of the fact that many rifts on the Antarctic ice shelves are not vertical, but slightly offset from vertical, and that they have an interesting, not-fully-understood asymmetry of the rift shoulders associated with bending moments. I wonder if this phenomena (also described in one of Walker's papers on ice shelled planets) is an observable phenomena that is directly related to the subject of this paper. If the authors think that it is, then they might find that their paper is made even stronger by including references to the Walker study, and also to (not sure if this is as relevant):

Walker, C. C., J. N. Bassis, J. N. and Schmidt, B. E. (2021). Propagation of vertical fractures through planetary ice shells: The role of basal fractures at the ice-ocean interface and proximal cracks. *The Planetary Science Journal*, Vol. 2, No. 4, doi:10.3847/PSJ/ac01ee.

Specific comments:

line 2 of abstract "..., extending in only one direction,...". I'm pretty sure that Weertman's 1957 paper also gives the solution for spreading in two horizontal directions.

I was not able to find other errors or edits to make, and I commend the authors for doing a fine job of proof reading.