

## ***Interactive comment on “Brief communication: “Oldest Ice” patches diagnosed 37 km southwest of Dome C, East Antarctica” by Olivier Passalacqua et al.***

**B. Hubbard (Referee)**

byh@aber.ac.uk

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The manuscript presents a potentially valuable 3D modelling-based study designed to isolate, through a series of spatial masks, candidate locations for “oldest ice” (1.5 Ma) near Dome C, East Antarctica. The analysis is interesting and, I believe, robust (subject to some reservations, below) and I would support publication. I believe the manuscript structure and approach are valid, but I do see the manuscript’s current findings as somewhat undermined by the handling of temperature – and particularly basal temperature and sliding - in the analysis. I would encourage a revised manuscript to consider this in more detail, at least placing some first order approximations of error

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based on possible temperature scenarios. I accept that this may not be the forum for a full thermo-mechanical analysis but, for the analysis is fit for purpose, it needs to report some approximation of the age errors that might derive from the assumptions made.

The writing is occasionally ambiguous and includes grammatical and typographical errors.

Some more specific comments follow:

Location/Line Comment/Suggestion

Abstract Some of the wording could be improved here between lines 3 and 7.

Page 2 There are at least two typographical errors on this page (“serie” and “de-favourable”). The manuscript needs checking to remove other occurrences. I identify a few more below.

30-31 Is it not possible that changes in ice thickness have an influence here at long timescales? Can this influence and outcome be approximated?

30-42 Can the simulations and models of others publishing on this topic be summarised briefly?

77-80 This reads as contradictory, including a statement that “basal melting is probably null” (I would use zero rather than null) and “Vertical velocities. . . are equal to the basal melt rate output from previous modelling. . .”. I think the manuscript would benefit from an explanation and statement of possible error (in using this basal temperature field) here.

94 “has more influence”

124 “used”

128-130 This sentence is unclear

132-133 I do not believe this is a valid argument: either the analysis is fit for purpose or

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it is not. For the former to hold then errors need to be constrained. If, as a consequence of the 'practicable' analysis undertaken, errors are large then the manuscript would benefit from those large errors being stated as usefully as possible.

158-159 Presumably reflected radar power could inform as to the current location of this boundary. Do such data exist and/or has such an interpretation been published elsewhere?

170 "arch" and "radargrams"

Figure 2 Given the importance of these domains I find that the green on brown shading isn't working very well. In fact, this figure could be improved in several ways including: formally numbering panels a-e; increasing axis label font size in a-d; changing the depiction of the oldest ice targets considering the underlying green bed elevation band; and rewording the first line of the caption to a more standard format.

183 I wonder why this is "discarded" rather than included as a mask in the way that other spatially-distributed variables are?

186 This reference to "bottom" highlights the need for panel labelling in the figure

200 "However, it allows a restricted area to be defined where. . ."

206 I believe "overhanging its environment" is inaccurate and does not convey the intended meaning. I think this argument needs to be clarified and formalized.

Figure 3 caption "shows"

221 I would replace "On the contrary" with "In contrast"

223 Could the references here to "upper part" and "left part" be replaced with compass directions north and west?

226 I'm not familiar with the third from final word in the sentence.

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Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2018-19>, 2018.