The Cryosphere Discuss.,
https://doi.org/10.5194/tc-2020-210-RC2, 2020


The Cryosphere Discussions
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# *Interactive comment on* "Characterization of Titan Dome, East Antarctica, and potential as an ice core target" *by* Lucas H. Beem et al.

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Received and published: 9 October 2020

Review of: Characterization of Titan Dome, East Antarctica, and potential as an ice core target (MS No.: tc-2020-210)

This manuscript provides a detailed and in-depth analysis of Titan Dome, East Antarctica. The manuscript characterises the study area using radio-echo sounding data and modelling to characterise the englacial layering and basal properties of Titan Dome, using these to assess its viability as an 'old-ice' target. The manuscript makes a substantive and important contribution to the discipline and study region.

The manuscript is reasonably well-written, the datasets and methods are comprehensively reported, and the data and modelling are presented reasonably effectively



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Discussion paper

(though please see my comments below and in the annotated manuscript).

General comments: There are a few general issues that I believe are worth highlighting about the manuscript in its current form. Were these to be addressed, the manuscript would be much improved:

1. A number of the figures require improvement to present the data effectively and to give the reader a fuller appreciation of 'Titan Dome'. 2. An improved description of the datasets (e.g. ice thickness, bed topography) are required in section 4.1. 3. An improved characterisation of the locational context of the study is required. There are numerous references in the text to "ice catchments" but these are never named (e.g. Academy Glacier, Patuxent Ice Stream etc.). 4. Engagement with relevant recent literature should be improved. Papers by Winter et al. 2018 https://doi.org/10.1029/2018GL077504, Paxman et al. 2019 https://doi.org/10.1029/2018GC008126 and Studinger et al 2020 https://doi.org/10.5194/tc-14-3287-2020 may help to provide more context (e.g. for naming ice catchments etc.), and for placing Titan Dome in a wider geographical, glaciological and geophysical context - the authors may wish to consider using some of these papers for a more developed study area section, and may wish to integrate the Studinger et al. 2020 paper into their discussion on surfaceaccumulation?

5. There are quite a few grammatical errors throughout the text that will need rectified.

6. The authors should consider adding to the introduction a short section describing the use and modelling of englacial layering for developing age stratigraphies for the ice sheet. There are a number of recent papers (e.g. https://essd.copernicus.org/articles/11/1069/2019/ or https://doi.org/10.1029/2019GL086663) that would be relevant, in addition to the papers of Marie Cavitte that several of the authors of this manuscript were also involved with.

Specific comments on figures Figure 1 – A zoom in of Titan Dome is required. -

define PS on the axis labels - it is unclear why Filchner Ronne Ice Shelf is annotated, but Ross Ice Shelf is not. Labelling of major outlet glaciers and/or glaciological catchments would be useful. - typo: “temperture” - authors should consider improving the colour scale for the basal temperature - the plotting of the polargap survey lines are (a) difficult to make out; and (b) incomplete – see figure 1 of https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2018GC008126 - there is no need to have ‘candidate’ written on the figure. A and B will be sufficient.

Figure 3 - the new data presented in this figure are generally rather lost in the background. What about plotting the new along track data without the underlying DEMs, and then having a set of line data vs. DEM difference figures (e.g. from Bedmap2, Bamber DEM etc.) - Contours would be useful where DEM grids are shown. - later in the manuscript there is numerous references to a new subglacial mountain. Please annotate this in 3b.

Figure 5 - The way that the reflectivity data have been plotted in this figure makes it indecipherable, at least to me. Authors should look to improve the display of data in this figure. - Subglacial Troughs: these need described in section 4.1 of the paper, and they also need to be represented better in this figure. The blue polygon looks nothing like two troughs to me.

Figure 6 - this figure is afflicted with the same problems of figure 5. It is very difficult to make out the detail given the colour scheme and the way in which the data have been plotted.

For further specific comments on the manuscript, please see annotated PDF attachment.

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Please also note the supplement to this comment:
https://tc.copernicus.org/preprints/tc-2020-210/tc-2020-210-RC2-supplement.pdf

Interactive comment on The Cryosphere Discuss., https://doi.org/10.5194/tc-2020-210, 2020.