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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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This manuscript provides new aerial geophysical observations allowing to constraints a basal ice age modelling on the flanks of Titan Dome. This Dome was previously identified as a contender for possible deep ice core site that could capture the middle Pleistocene transition (900-1200 kyrs).

Titan Dome (88.50° S, 165.00° E) is located about 200 km from South Pole and It was delineated by the SPRI-NFS-TUD airborne radio-echo sounding program between 1967 and 1979. The Dome and its southern flanks are beyond the geographic limit of many satellite-based observations (e.g. ICESat 86°S; SSM/I 87°S; CryoSat-2, 88°S) and only few old air-borne radar surveys provide data of surface elevation, ice thickness

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and bed topography.

The requirements for a site to collect stratigraphically intact oldest ice core are: low snow accumulation, low geothermal heat flow, proximity to an ice dome/divide, limited basal roughness, ice thicknesses of about 2500-2700 m (Fisher et al. 2017).

Acquisition of an accurate ice age modelling on the base of detail geophysical observation is prerequisite for any paleoclimatic ice core site selection. Authors used new and previous radio-echosounding and laser altimeter data to provide new surface elevation, ice thickness and bedrock topography.

The important effort to acquire new geophysical information in remote area and their analysis must be supported and the main results are of interest, but someone already published in Beem et al., 2017. However, this manuscript suffers of some flaws, in particular:

both the age model use snow accumulation value, but the authors do not provide sufficient information on spatial variability in the analysed area and their source data (e.g. Fig.2 snow accumulation map on the base of Arthern or Wessen with background the snow accumulation derived by 4.7 kyr isochrone), the source of snow accumulation value are not everywhere clarified and made the manuscript difficult to follow; the snow accumulation of 4.4 cm/yr i.e. are not explained, and not clarify if represent the present snow accumulation or the mean value snow accumulation rate histories taking in account the reduction during glacial period and how is calculated;

the source/process of isochronal layer ages are not explained and does not take in account the recent result of SPICEcore (e.g. Winski et al., 2019) everywhere;

the analysis of Candidate B site is reduced at 5 lines on discussion, remove the B site or analyzed in more detail;

the comparison with the previous DEM does not take in account the source of the data (SPRI-NFS-TUD airborne radio-echo sounding) southern of 88°S. The uncertain and

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accuracy in elevation and position of the data southern of 88°S are very different from altimetry satellite data;

the RES tracks of BedMap2 must be shown in figure 2 and analyzed a used for provide new maps;

the suggest change in ice velocity from Beem et al. 2017 have impact on dome/ice divide position, the authors should analyze this point in relation with potential ice core site, column stratigraphy integrity and upstream correction, more than report the previous results;

the proposed geographical coordinates of the Titan Dome position are in an unusual format (88.1716° N, -99.5234° E) and longitude is wrong (line 148 and 281). The longitude value must be correct everywhere.

In detail: Line 22 and 234: the threshold of ice thickness in Fisher et al. 2013 is much higher than 2000 m for snow accumulation of 4.4 cm/yr i.e., and ice velocity lower;

line 23: add the minimum desired temporal resolution of ice of 10 kyr m−1, it is very important the resolution at MPT to resolve 41 kyr cycle;

Line 36: Titan Dome position is along around 160°E meridian;

Fig. 1 the summit position proposed is not visible, the PPT line of legend is too light;

Line 85: the theoretical value of attenuation of -35°C is not reported in Beem et al. 2017, provide more information;

Fig. 3: add elevation contour line with value and proposed dome summit, add new panel with snow accumulation map with accumulation derived by 4.7 kyr isochrone, a new panel with ice thickness difference;

Paragraph 4.1 and fig. 4 see general comments;

Fig.5 Add proposed summit position and the value of hydraulic potential contour;

Paragraph 4.3 see general comments on snow accumulation;

Fig. 6: add summit position and elevation contour value; For Dansgaard-Johnson model is not correct the label of panel as Basal ice age because the modelled age is at z=0.2H and 0.5H;

Line 178-179 Please explain how the spatial variability of snow is consistent with Nye Model, it is a circular reasoning;

Paragraph 4.4, fig.7 does not show clearly the difference in submergence velocity, improve the color scale;

Fig. 7 The first panel fractional depth is not described;

Line 225-226 see general comments on previous radarsounding data;

Line 231-232 why the area between the two-candidate area were exclude? Explain the source of ice velocity >2m/yr, surface elevation morphology and ice thickness are not different in the area;

Line 232 please explain the 2000 m of ice thickness threshold;

Line 234 Titan Dome could be migrated in the past, the evidence of change in ice velocity has been proposed for the flank about 100 km far, not at dome site;

Line 236 the pattern is not clear evident in fig. 7a;

Line 255 candidate B site is forward to Dome A from South Pole, along the 80° meridian East;

Line 264 The subglacial catchment basin analysed by Jordan et al. 2018, include completely the candidate A and B area, rephrase.

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