

## ***Interactive comment on “Sentinel-3 Delay-Doppler Altimetry over Antarctica” by Malcolm McMillan et al.***

**Anonymous Referee #1**

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This paper presents some of the first results from Sentinel 3’s doppler focused radar altimeter over Antarctica. It describes the instrument and processing strategies, and it gives evidence that the data have decimeter precision over flat targets, and up to a few meters precision over sloping surfaces.

The paper is well written and needed very little editing. Its introduction to Sentinel-3 data should be valuable to the research community, and it makes the case well that the data are useful. The paper is somewhat weak in the analysis (rather than illustration) of the data.

I would have liked to see the elevation error magnitudes explained by mechanisms, rather than just quantified by region: it appears that even in the DML and Wilkes Land areas, the errors are multimodal, with a narrow distribution in flat areas and a wide

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distribution in areas with high relief. Were I using the data, I would want to assign error estimates to the data based on, for example, the local surface slope or the footprint-scale relief. Calculating errors based on histograms for areas hundreds of km on a side does not do much to help me do this. Likewise, it would be useful if the authors could explore a quantitative connection between the roughness differences at Dome C and Vostok and the biases, and perhaps include the other sites in this analysis. Without understanding the roughness at the DML and Wilkes sites, I don’t know if the roughness difference between Vostok and Dome C is significant.

My other concerns about the figures. Fonts are consistently too small, and lines are consistently too fine. The authors should print out their paper and try to read the figures!

Figure 2: Panels d and e show the same thing as b and c. I recommend just showing just one of these profiles. The green bars do not seem to show anything different from one part of the pass to another. I would recommend showing a histogram of the data contained in the bars (i.e. a histogram of the 400-m standard deviations).

Figures 3 and 4: It is hard to tell if the DEM spans the axes, or if there is extra white space around the DEM surface. The elevation axis is illegible, as are the labels on the inset panels.

Figure 3: The span of the colour scale for the coloured points is too large, and should be reduced to the span of the residuals.

Figure 5: I could not find a description of the differences between panels A-C, and between panels E-G, either in the text or the caption. Are there multiple profiles in d and h? The lines and points in D and H are too small, and the axis label font sizes are unreadable.