

General comments

The authors present a unique and incredibly rich data set that will have numerous applications, some mentioned in the m/s, but many that have yet to be thought of. Essentially, this paper is a brief summary of the DEM with a few statistics related to its accuracy. For a data set of this kind, that is to a large extent self explanatory in terms of its value and relevance, perhaps that's OK but there is useful and important information missing that would benefit the paper and any user of the product. Details of this are listed below but may not be exhaustive and I would encourage the authors to think carefully about what an end-user would benefit from here. A little more thought and perhaps even illustration of the potential applications of a data set of this unparalleled resolution would be welcome. How about some examples of shaded relief subsets where the full resolution can be seen over different types of terrain such as ice shelf rift areas, ice stream regions near the grounding line, and some examples of more rugged terrain around the Transantarctic Mountains and/or the peninsula. These would be helpful and instructive and make the m/s less dry.

Specific comments

1. Nowhere do you actually present a plot of the DEM itself. This seems like a pretty big oversight that is easily remedied. I suggest you include a supplementary figure at say 1:3,000,000 or a PDF/jpg version of the paper map that was distributed by PGC at AGU, which I note is available from the website. This can be a relatively large file and one version or other needs to accompany the paper.
2. Much of the "missing" information about the data set is available on the PGC website and includes, for example, the strip coverage at 2 and 8 m resolution. Strip DEM file sizes and file format. The fact that the DEM is 45 Tb is rather important for users to know as this presents certain data handling and processing challenges.
3. P6, l9-16. I didn't really follow how the time stamp was generated for each strip: whether it was the date of the GCP acquisition or the image acquisition. If (as I suspect) it was the latter, then what did you do about any dh/dt trends that would offset your GCP elevations from the time stamp used? Much of the data in the interior seems to have a time stamp of ~2016-2018, almost a decade after the end of the ICESat mission.
4. Related to 3, I did not understand why you didn't use CS2 elevations from LRM data in the interior? The coverage is much better than ICESat and the accuracy comparable to SARIn mode data nearer the margins. Errors due to slope and effectively corrected in the interior. Requires explanation.
5. P3, l12. I think there is an error in the projection details provided. The std lat is most likely -71 degs and central meridian will be 0 degs not 71 degs. Otherwise it's all rotated with a non std pll.
6. P1, l23. Wrong reference to Bamber 2012. Should be Bamber, J. L., Gomez Dans, J. L., and Griggs, J. A. (2009), A new 1 km digital elevation model of the Antarctic derived from combined satellite radar and laser data. Part I: Data and methods, *The Cryosphere* 3(2), 101-111. Not the NSIDC URL.
7. P4, l31-35. The text in brackets could be better phrased. It's not picking a travel time but picking a point on the leading edge of the waveform that represents the surface. This point is a function of the retracking procedure. With a threshold retracker, the bias is a function of the choice of threshold. If the bias is really due to penetration (\Rightarrow using a threshold that picks a point below the surface) then this will be a function of snowpack properties and, in particular, density. This may not have a clear relationship with elevation but should correlate with, say, surface density as estimated from an RCM. See, for example, Wang, F., Bamber, J. L., and Cheng, X. (2015),

Accuracy and Performance of CryoSat-2 SARIn Mode Data Over Antarctica, *Geoscience and Remote Sensing Letters*, IEEE, PP(99), 1-5, doi:10.1109/LGRS.2015.2411434.

8. P5, l4. Don't think "elevational" is a real word. Replace with elevation-related.