The Cryosphere Discuss.,
https://doi.org/10.5194/tc-2018-240-RC1, 2018

The Cryosphere Discussions

Interactive comment on "The Reference Elevation Model of Antarctica" *by* Ian M. Howat et al.

Anonymous Referee #1

Received and published: 11 December 2018

The paper "The reference elevation model of Antarctica" by Howat et al. presents the first digital elevation model (DEM) of the Antarctica continent at a spatial resolution better than 10 m.

The source data are provided by multi-spectral and high-resolution commercially-operated satellites. For this, neither the data nor the algorithms used for scene processing and mosaicking are novel and no relevant scientific contribution is provided in this sense. However, the resulting, openly available, data set represents a unique tool for the scientific community and a new standard for elevation measurements on the Antarctic continent.

Before publication, there are some - not critical - aspects that deserve to be taken into account. In general, the impression is that some part of the paper is somewhat short and superficial, and for this the authors should give some more insights and

explanations. These are detailed in the following:

- In Section 2.2 (Strip DEM Processing), the procedure for DEM registration by means of Cryosat-2 and ICESat-1 data is presented. Although well known to the community, some more technical details about these two sensors should be given, such as information on the SAR interferometer and type of sensor used (e.g. frequency, operation mode) for Cryosat as well as on the typical footprint and accuracy of ICESat.

- Again in Section 2.2 it is referred to the so-called "Pole Hole", the area around the South Pole which is not covered by any of the high-resolution source data. Why is that happening? For this, I guess the authors use then the ASTER DEM to fill the gaps. Did they try to check how does the seamless 90 m-resolution TanDEM-X DEM look like over the area?

- In Section 3, the authors discuss the filtering of water bodies by means of an external product, which has a lower resolution (this should be made explicit). For this, it is referred to a "buffering of the coastline by 800 m". What is meant with that, is it just a smoothing? Please explain.

- In Section 4, the validation of the product is presented. For this, the authors should clearly state with the help of basic but unambiguous formulas the parameters that they are considering for performance assessment (e.g. LE90, LE68, their absolute value), and that are plotted in the histograms (Fig. 5 and 6). This should be done for the sake of clarity and in order to avoid misunderstanding with the reader.

- In general, the authors should check the manuscript when they shortly refer to other datasets and products, and provide sufficient details for their easy "understanding". E.g. in Section 4, it is referred to a certain "qfit" data product for the ATM: here the paper would definitely benefit from a short description of this product.

- More examples of the resulting REMA product should be provided such as image zooms or detailed performance analyses (e.g. histograms) for selected DEM area

images, in order to give the user a feeling about the possible influences or problems when dealing with such a product (cloud cover? topography-related errors?).

- Please clearly state the difference between the histograms in Fig.5 and Fig.6: are the first related to all POINTS considered for validation, whereas the second is related to each 100 km x 100 km TILE?

- Considering the relative small amount of data and regions available for validation (according to Fig.8), is there the intention to extend it to larger areas of the continent? The authors should comment on this relevant aspect.

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