Review for "A global high-resolution data set of ice sheet topography, cavity geometry and ocean bathymetry"
By: Schaffer *et al.* (ESSD Discussion: 8 June 2016)

The authors present a comprehensive, global dataset containing bathymetry and ice surface and basal topography for the Greenland and Antarctic ice sheets. This work is based on and expands a previous effort to define a global dataset aimed primarily at ocean and climate modelers.

My overall impression of the manuscript is very positive and I think it should be published following some minor revisions outlined below. The manuscript is mostly well written, cogent, concise, and logically organized. The figures are informative and well presented. My biggest critique in the manuscript is that the authors should provide more detail on the procedure used to smoothly transition between different datasets. There are a number of ways to smoothly blend datasets and it would be nice to see a few sentences devoted to describing the chose method(s).

The dataset is accessible via the link provided in the manuscript. The data appear to be of good quality and are easy to use in QGIS. It is likely that users of RTopo-1 (the precursor to these data) and others will find these data useful.

General comments:
1. In general, what the authors are calling resolution is actually grid spacing. While it is common in GIS applications to treat the terms resolution and grid spacing as synonyms, there is an important distinction between the two and a precise discussion of datasets should recognize that distinction. Resolution is the smallest scale that is observable in a given measurement. In other words, resolution is a statement of information content, and therefore should not be applied to interpolated grids, except in special cases and with careful qualifications. Grid spacing, on the other hand, is simply part of the metadata for a gridded dataset and says nothing explicit about information content.
2. Did the authors develop the tools needed to interpolate source data to a common grid or use existing tools (ArcGIS, GDAL, etc.)? If existing tools were used, please reference where appropriate.

Section comments:
1. The dataset contains geometry for both Greenland and Antarctica but the Introduction only discusses Greenland. A second paragraph discussing Antarctica and the importance of sub-ice-shelf cavity geometry should be added.
2. Subsection partitioning in Section 2 (Datasets and processing) gets a little confusing after the 3rd subsection. I suggest getting rid of the first subsection (not the content, just the section numbering) and treating each major region (e.g. oceans, Greenland, Antarctica) as the first subsection level. In other words, what is now 2.1 would simply be the summary paragraph for section

2; what is now 2.2.1 would be 2.1, and so on. Please number all subsections if allowed by the journal format.

Minor and grammatical corrections (numbers given as page.line):

Title: Original title has a few grammatical errors and, without changing the wording, should read like: "A global, high-resolution dataset of ice-sheet topography, cavity geometry, and ocean bathymetry" (Oxford common is optional).

Everywhere: "Data set" can be written as a single word.

Everywhere: Distance descriptors of the form X-arc-minutes should contain a hyphen between "arc" and the fractional degree unit.

1.6. "with now 30-arc seconds resolution" should read "with 30-arc-second grid spacing"

2.4. cavity -> cavities

3.6. Suggest rewording the sentence to read: Surface lakes were deleted (give brief reasoning for this) and are presented as bare land. Subglacial lakes in Antarctica have been preserved.

3.11. The last sentence ("Interpolation of the source datasets...") is vague. Please provide a reference or be more explicit as to which triangulation approach was used, where artifacts come from, and what the authors mean by "careful smoothing."

4.2. "...local expertise of regional undersea mapping projects" should read "...information from regional undersea mapping projects"

4.13. "smooth blending" is too vague

7.14. Please describe in more detail (or reference) how datasets are combined in the transition zones.

9.21. "As already mentioned in..." could be reworded to be "As discussed in..."

10.5. interpolated -> interpolate

13.7. Sentence beginning with "This pattern..." should be reworded to be less awkward.

16.10. "...which both varies..." should read "...both of which vary..."

16.10. In the sentence beginning "The resolution in ice thickness," it seems like the authors are referring to vertical resolution (as opposed to horizontal resolution in much of the rest of the manuscript). Please clarify.