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The Cryosphere Discussions

Interactive comment on "A new 1 km digital elevation model of the Antarctic derived from combined satellite radar and laser data – Part 1: Data and methods" *by* J. L. Bamber et al.

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These are brief comments as I am about to travel and will not be back in time for the January 20th deadline. I did not know the paper was up for comment until today. Is there an email alert for The Cryosphere, so we can see when papers are submitted rather than to randomly stumble across them?

My overall impression is that this is a good piece of work that is sure to be frequently cited by the many users of this DEM. However, I strongly feel that the DEM generation and the validation should all appear in the same paper, i.e. this should be just one paper and not two parts.

A general comment about the use of GLAS vs ICESat. NASA's preferred terminology is "ICESat" as opposed to "GLAS" and so the Science Team tend to refer the data as "ICESat data". For the GRL Special Issue on ICESat (2005), almost all papers used that terminology – could you do the same in this paper?

There is no discussion about the differences between the two altimeter systems footprint sizes, unless I missed it. It should be in Section 2, but I cannot see it. I think a separate sub-section on ERS and ICESat would be useful, before you describe the processing.

In Table 1, start date for Laser 2a is 4 Oct 2003, end is 19 Nov 2003. End of L3e is 28 March 2006. Why don't you use the other campaigns? They are all processed to R428 now.

Figure 7 caption: What do our ICESat GZ points add to this figure? Can you use the MOA grounding line, which is continuous around the FRIS perimeter? The DiMarzio ref is 2007 not 2008.

Figure 12: I noticed that Figure 12 seems to replicate Figure 4c, apart from the fact that 4c is showing the no. of obs between 0 and 10 and 9 is showing it between 0 and 15. I recommend just deleting Figure 12.

The following comments pertain to the DEM over the floating parts of the ice sheet (ice shelves and glacier tongues):

i) There is no mention in Section 2 of what was done to remove the tide signal in these regions. The tide model used in both the ERS and ICESat processing chains is not accurate in Antarctica and should not be used (I note that this is mentioned later on Page 820 but it should appear earlier. Basically there needs to be a caveat to say the DEM has lower accuracy over the ice shelves because of this – this should probably appear in the abstract as well);

ii) It would be useful to also provide a second DEM which provides elevations above

TCD
2, S482–S484, 2009

the geoid (using the new EGM-2008 that includes GRACE) so that users can generate their own ice thickness maps for ice shelves. Although bearing in mind the caveat in (i), perhaps this is not essential;

iii) Please can you refer to the 1-km DEM that exists for the Amery Ice Shelf, which was derived from the ERS-1 168-day data using kriging. [For info, we are currently updating this DEM using Laurie Padman's Amery tide model and EGM-2008]. Fricker, H.A., G. Hyland, R. Coleman, and N. W. Young. 2000. Digital elevation models for the Lambert Glacier-Amery Ice Shelf system, East Antarctica, from ERS-1 satellite radar altimetry, J. Glaciol., 46(155), 553-560. Thank you! :-)

Interactive comment on The Cryosphere Discuss., 2, 811, 2008.