

***Interactive comment on “Getting around Antarctica: new high-resolution mappings of the grounded and freely-floating boundaries of the Antarctic ice sheet created for the International Polar Year” by R. Bindshadler et al.***

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Received and published: 14 March 2011

Hello,

This article presents a new mapping of Antarctic grounding lines using photogrammetry techniques and optical visible imagery. This represents an impressive sum of efforts by a very vast group of researchers. Unfortunately, I am concerned that this paper and the release of the results will create a massive confusion about the location of Antarctic grounding lines because the method is inapplicable on ice streams and glaciers. On

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these features, the break up in slope is smeared by the fast flow of ice and the grounding line is mapped with inaccuracies ranging from -50 km to +50 km. This is not a systematic bias, it is simply put impossible to trace the exact position of the grounding line with optical visible imagery, surface topography or inclinometry data in areas of fast flow. It almost never works right.

An exact mean of mapping grounding line positions is to use differential satellite radar interferometry. This technique is a direct measure of the deformation of the ice surface in response to tide, with a vertical precision of millimeters, and a spatial resolution of a few tens of meters. With this approach you can precisely determine where ice detaches from the bed. There is no question about the accuracy of this method since it is a direct measure.

When we compare these data with the MODIS-derived grounding line of Antarctica or the Landsat-derived grounding line (Swithinbank and others), we find errors ranging from -50 km to +50 km, although more commonly the error is of several 10 km. There is only one place where the error is rather low: the Getz Ice Shelf. This is no wrong doing of the authors, it is simply that this approach does not work in these fast flow regions. I know places where the grounding line is confused with a local ice rise too. This new delineation of the grounding line will suffer from exactly the same limitation as its predecessors.

We are releasing our InSAR grounding lines to NSIDC in the coming month and a paper will accompany a description of the results and the above comparison with prior grounding lines. I am greatly concerned that the present paper does not include any word of caution about the accuracy of the results. I am equally concerned that if anything this paper will introduce more confusion in the community about the location of grounding lines. This will have an enormous negative impact on ice sheet modeling, calculation of ice fluxes, calculation of ice-shelf melt rates, calculations of tides, modulation of ice-shelf ocean interactions, etc.

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The InSAR grounding lines were only completed recently because we were missing a large sector of Antarctica south of 79S. This is now done thanks to the great support of CSA and MDA's Radarsat-2 campaign planned for IPY in fall 2009; the data were finally distributed to us in mid 2010. The rest of the data had been assembled through a painstaking processing of InSAR data, glacier by glacier, for the past 15 years. I am sorry we did not release it sooner.

Regards,

Eric

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Interactive comment on The Cryosphere Discuss., 5, 183, 2011.