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The Grounded Ice and Floating Ice Boundaries of Antarctica

Robert Bindschadler and the ASAID Mapping Team
NASA/GSFC, Code 614, Greenbelt, Maryland, United States (robert.a.bindschadler@nasa.gov)

The boundary of grounded ice and the location of ice transitioning to a freely floating state are mapped at 15-m resolution around the entire continent of Antarctica. These data products are produced by participants of the International Polar Year project ASAID using customized software combining Landsat-7 imagery and ICESat laser altimetry. The grounded ice boundary is 53,610 km long; 74% of it abuts to floating ice shelves or outlet glaciers, 19% is adjacent to open or sea-ice covered ocean, and 7% of the boundary are land terminations with bare rock. Elevations along each line are selected from 6 candidate digital elevation models: two created from the input ICESat laser altimetry and Landsat data, two from stereo satellite imagery, and two from compilations of primarily radar altimetry. Elevation selection and an assignment of confidence in the elevation value are based on agreement with ICESat elevation values and shape of the surface inferred from the Landsat imagery. Elevations along the freely-floating boundary (called the hydrostatic line) are converted to ice thicknesses by applying a firn-correction factor and a flotation criterion. The relationship between the seaward offset of the hydrostatic line from the grounding line only weakly matches a prediction based on beam theory. Airborne data are used to validate the technique of grounding line mapping, elevation selection and ice thickness derivation. The mapped products along with the customized software to generate them and a variety of intermediate products are available from the National Snow and Ice Data Center.