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GLAS's new perspective on ice shelf rifts: the vertical dimension

H. Fricker (1), J. Bassis (1), B. Minster (2) and D. MacAyeal

(1) Scripps Inst of Oceanography (2) University of Chicago

The small footprint (70 m) of the Geoscience Laser Altimeter System (GLAS) means that it has unprecedented horizontal resolution for a satellite altimeter. This resolution enables GLAS to map small-scale ice shelf features such as through-cutting ice shelf rifts, i.e. the precursors to iceberg calving. GLAS gives information on the topography surrounding the rifts and also on the thickness of the mélange ice within the rifts, which has recently been speculated to play an important role in rift propagation. In this paper we present GLAS elevation data over a selection of rifts on the Ross and Amery ice shelves (the latter being a "Target of Opportunity" for GLAS). On Ross Ice Shelf we validate the GLAS mélange depth measurement with an in situ measurement. We show evidence of rift widening over the summer, which agrees with results of an independent study that we have in press. We also show that mélange ice is thicker in older rifts and that its thickness can change throughout the year in active rifts and remains quite constant in inactive rifts.