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1 Influence of inlets on tabular iceberg evolution

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Antarctic tabular icebergs contribute significantly to the fresh water input to the Southern Ocean, as they release considerable amounts of melt water during their drift and especially during their final decay. The shape of large Antarctic tabular icebergs is often predetermined by major inlets, which grow at the ice shelf front during decades and can be several tens of kilometres long. Regarding iceberg A38A, formerly part of iceberg A38, which calved off the Ronne Ice Shelf in October 1998, its geometry is dominated by two inlets, which are filled by a melange of sea ice, snow and debris from the iceberg margins.

We investigated the role of prominent geometry anomalies on tabular iceberg evolution and evaluated the influence of major inlets and inlet filling on iceberg stability by numerical modelling. The finite difference model COMBATIS (Computer-based Antarctic tabular iceberg simulator) is based on the fundamental equation of ice shelf flow and is forced by environmental parameters of the ice-ocean-atmosphere system. The evolution of A38A has been documented by medium resolution (250 m) optical images from MODIS. The iceberg geometry determined by such images provided the basis for specifying geometrical input data for the model.

The simulation of the evolution of iceberg A38A indicates, that the iceberg thickness decreases by about 100 m mainly due to basal melting during the five year drift period. The temperature profile of the floating ice body is strongly affected by erosion of the relatively warm base and simultaneous warming in the uppermost part. The inlets have only minor effects on iceberg evolution during its drift. However, when iceberg

A38A broke into three fragments in March 2004 during a grounding period near South Georgia Island, their shapes were determined by the positions of the former inlets.