

Combining SAR images with an iceberg drift model for improving mass loss estimations caused by iceberg calving – a case study

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Recent estimations of mass loss caused by iceberg calving are limited to huge icebergs (>18.5km edge length) or are spatially limited. Since the 1970s, the course of huge icebergs is permanently tracked using satellite images by the National Ice Center (NIC). A large break off event is undetected very likely and huge icebergs are easily to track on their way through the ocean. In many cases, calving of smaller icebergs takes place unobserved, which hampers the estimation of calving rates and mass loss caused by iceberg calving. The surface structures of the floating ice masses around Antarctica give information about the size and shape of potential calved icebergs, so that the origin of icebergs drifting in the ocean can be restricted to a few calving fronts. SAR images at different resolutions and an edge detection were used to map the surface structures of the floating ice masses around Antarctica and regarding to this, a calving front classification was done. Using the results of the classification, icebergs within SAR images could be assigned to their potential calving front. An iceberg drift model is then used to certify the origin. The iceberg drift model is implemented in a Finite Element Sea ice Ocean Model (FESOM), and the course and the velocity of icebergs are calculated. With this information it is possible to track iceberg ensembles back to their calving front to estimate local calving rates.