



Seasonal and decadal variations of ice-shelf front positions in Dronning Maud Land, East Antarctica

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Most of recent rapid changes of the Antarctic ice sheet have been triggered from the ice shelves through enhanced basal melting and/or iceberg calving. The Dronning Maud Land (DML) coastal region is encompassed by many semi-continuous ice shelves, and its mass balance is thus particularly sensitive to changes in the coastal environment. Better knowledge on the region's ice shelves is necessary to predict future behavior of the ice sheet. Here, we present temporal changes of the ice-shelf front positions in DML over the past decade. RADARSAT-2 imagery was used to delineate the front positions at six times between August 2012 and December 2013. Displacements of the ice-shelf edges over this period are mostly in good agreement with displacements derived from satellite interferometry observations. Yet we observe in several sub-regions that displacement during the austral summer is larger than that during the winter. We also observe winter-growth of sea ice from the ice-shelf fronts and outwards to icebergs that are grounded on the continental shelf. Fast sea ice growth and break-up is seasonal and could influence ice-shelf flow close to the fronts. On a longer term, comparison between 2004 and 2009 MOA coast line datasets and our 2012-13 dataset highlights the general stability of the area in the past decade. Between 2004 and 2013, only six ice shelves experienced considerable retreat due to calving of tabular icebergs, leaving the remaining 90 % of the region's ice-shelf fronts advancing in accordance with their local flow.