



Role of ice-ocean interaction on glacier instability: Results from numerical modelling applied to Petermann Glacier

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Calving of icebergs and bottom melting from ice shelves accounts for roughly half the ice transferred from the Greenland Ice Sheet into the surrounding ocean, and virtually all of the ice loss from the Antarctic Ice Sheet. Petermann Glacier (north Greenland) with its 16 km wide and 80 km long floating tongue, experiences massive bottom melting. We apply a numerical ice flow model using a physically-based calving criterion based on crevasse depth to investigate the contribution of processes such as bottom melting, sea ice or sikkusak disintegration, surface run off and iceberg calving to the mass balance and instability of Petermann Glacier and its ice shelf. Our modelling study provides insights into the role of ice-ocean interaction, and on how to incorporate calving in ice sheet models, improving our ability to predict future ice sheet change.