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A Subgrid-Scale Parameterization for Calving-Front Advance and Retreat

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Floating ice shelves fringing most of Antarctica play a key for the flow of ice into the ocean and thereby for global sea level rise. Calving processes at the ice front are highly complex and are often neglected in numerical ice sheet models. Observed accelerated ice discharge after abrupt ice shelf retreat proofs that this is not a viable approach.

In order to be able to take ice shelf dynamics into account we have implemented a number of processes into the Potsdam Parallel Ice Sheet Model (PISM-PIK). We present a newly developed subgrid-scale parameterization for calving-front advance and retreat which allows the introduction of stress boundary conditions on the ice-ocean front and thereby a proper computation of the stress and strain field along the calving front. With these improvements we compare different calving rate approaches for different realistic ice shelf geometries (Albrecht et al., J Glac., in prep.).