**Ice sheet model mesh-resolution dependence of damage advection and calving**

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**abstract:** The damage of ice shelves is a metric for describing the rigidity of glacier ice. It is impacted by internal ice flow and external, environmental forcings, for example, ice extensional stretching and shearing, sub-shelf ocean melting and surface hydrofractruring processes. Heavily damaged ice will result in a more vulnerable ice shelf, and induce more frequent calving events, which regulate the dynamics of the ice shelf and grounded ice sheet. Therefore, it is critical to properly describe damage and calving processes in ice sheet models. Using DOE's MALI ice sheet model, we implemented the Bassis and Ma (2015) damage model and linked it to modeled iceberg calving. Two different damage-calving relations are implemented: 1) the whole ice cell volume is calved if the damage at the cell is above a threshold, and 2) ice volume is calved according to a calving rate described as a function of damage value. We apply the damage-calving relationship to both the idealized MISMIP+ domain for runs of several hundreds of years. We find that the coupling of damage and calving is sensitive to the mesh resolution we apply in the simulations, implying that a careful consideration of mesh resolution should be taken near the calving front and inside the ice shelf. The discrepancy due to mesh dependency increases when we couple damage to ice rheology, which generates softer ice near grounding line or shear margin areas, predicts more grounding line retreat and raises difficulties in the convergence of the non-linear ice velocity solver.These findings further emphasize the importance of a careful approach to the modeling and coupling of damage evolution and iceberg calving.