

Advanced ice sheet modeling: Incorporating the effects of scalar ice damage in a land ice model

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The continuum mechanics framework for ice damage modeling is reviewed. A computationally inexpensive ice damage model is incorporated in Glimmer-CISM. Ice damage is quantified by a scalar quantity which is advected by the flow and forced by a dynamic damage function. The damage function accounts for the effects of ice breaking and healing. The rheology of the damaged ice is addressed using the equivalence principle. The model is applied to an ice flow and is used to analyze calving events. Preliminary results are compared to parameterizations of calving laws and observational measurements.