



Parameter sensitivity of dynamic ice loss from Antarctica: SeaRISE experiments with the Parallel Ice Sheet Model

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The ice-parameter sensitivity for a number of perturbations of the boundary of the Antarctic ice sheet within the SeaRISE project is investigated for the Parallel Ice Sheet Model (PISM). The model incorporates a shallow approximation of the stress balance including the potential to model ice streams and the backstress of ice shelves on grounded ice. The dynamic enhancement of the flux across the grounding line caused by additional sub-shelf melting, reduced basal friction, enhanced net accumulation or surface warming, is sensitive to ice parameters for ice flow and sliding. The resulting model spread is large in the experiments with reduced basal friction, where after a strong initial response the ice discharge settles towards a new equilibrium. In the experiments with enhanced sub-shelf melting, the grounded-ice response is delayed by over a century, because the forcing itself acts on the ice shelves first and is then dynamically transmitted into the ice sheet. The experiments with altered surface climate comprise warming surface temperatures as well as enhanced net accumulation, which can be computed in separate experiments and additively combined.

We compare the full ice-parameter uncertainty range of PISM to the model spread in the SeaRISE-Antarctica experiments conducted within the model intercomparison project.