



Addressing the challenges of capturing the present day transient state of the Antarctic Ice Sheet by ice flow modelling

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Ice sheets constitute the largest and most uncertain potential source of future sea-level rise.

The quality of predicted future sea-level contributions from ice sheets based on flow modelling strongly depends on how well the models are able to represent the present-day state of the ice sheets. Previous and ongoing model intercomparison efforts (e.g. SeaRISE and ISMIP6) have identified large uncertainties in sea-level projections based on model initialization and spinup.

Here we use the Parallel Ice Sheet Model (PISM v0.7.3) to perform spinup simulations for the Antarctic Ice Sheet consisting of an equilibrium spinup with steady present-day climate forcing and a paleo-climate spinup configuration for ice sheet initialization. The paleo spinup starting at 220 ka BP utilizes a glacial index approach (ice core data) combined with GCM-time slice climate anomalies (atmosphere and ocean) for the Last Interglacial and the Last Glacial Maximum to generate time dependent and spatially variable climate forcing fields during the model run.

We compare the simulated ice geometry, ice discharge and surface speeds with observations for both spinup configurations. We further assess to what extent our paleo model spinup is able to reproduce observed changes in the model climate forcing (e.g. surface mass balance) as well as in the model response (e.g. surface elevation, grounding line position) for the recent past on millennial to decadal time scales.