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Fully resolved whole-continent Antarctica simulations using the BISICLES AMR ice sheet model coupled with the POP2x ocean model

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We present initial results from fully-resolved (sub-kilometer resolution at grounding lines) simulations of the Antarctic ice sheet and its response to realistic forcing from subshelf incursions of warm water, obtained by coupling with the POP2X ocean model.

The BISICLES model (Cornford, et al, 2013) uses adaptive mesh refinement (AMR) to fully resolve dynamically important regions like grounding lines, while using much coarser resolution where the dynamics operate on slower and coarser time and length scales. We use a version of the vertically-integrated formulation of Schoof and Hindmarsh (2010), which has compared well with models which solve the full Stokes system (Pattyn et al, 2013). We demonstrate the importance of adequate spatial resolution in correctly resolving the dynamics of the ice sheet and its interaction with the ocean.

BISICLES has been coupled with the POP2x ocean model – one-way and fully-coupled results will be presented, including results from an idealized test case due to Goldberg et al (2012) and preliminary results of large scale coupled simulation comprising the full-continent Antarctic ice sheet coupled to the full Southern Ocean. A companion presentation, "Simulations of Antarctic ice shelves and the Southern Ocean in the POP2x ocean model coupled with the BISICLES ice-sheet model" describes the ocean-model side of this coupling.