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Impacts of synchronously coupled dynamic ice sheets in the GFDL Global Ocean Cryosphere Model iOM

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The polar oceans, the high-latitude Earth systems, and the Earth climate system as a whole are strongly affected by the Antarctic and Greenland ice sheets. The recent developments of global climate models have allowed to accounting for the effects of the ice sheets either indirectly via parameterizations of freshwater fluxes, or via infrequent coupling between stand-alone ice sheet models and other climate models' components. The latter approach typically does not conserve mass across the model comonents. In order to address these issues, we have developed a global ocean-cryosphere model iOM that includes synchronously coupled Antarctic and Greenland ice sheets in addition to sea ice and icebergs. The results of global simulations forced by the EAR-Interim reanalysis show strong seasonal and subseasonal variability in the ice-sheet/ocean interactons, demonstrating the importance of a tight synchronous coupling between the ice sheet and the ocean model components. iOM will allow us to explore interactions and feedbacks between the polar oceans and cryosphere on the subseasonal to decadal timescales.