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Advanced ice sheet modeling: Simulating dynamic ice shelves in a global ocean model

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To date, only a few global ocean models have the capable of simulating the flow under ice shelves; none of these models has the capability of representing ice shelves that change in time. In order to properly assess sea level rise into the next century, coupled climate models will need to include dynamic land-ice/ocean interfaces. We present an immersed boundary method (IBM) representing the land-ice/ocean interface that has been added to the Parallel Ocean Program (POP), the ocean model in the Community Earth System Model (CESM). With the IBM we are able to couple the ocean model to a fully dynamic ice sheet model (CISM, the Community Ice Sheet Model) within the CESM. (The coupling method is presented in the companion poster "Advanced ice sheet modeling: Coupling oceans and ice sheets in the Community Earth System Model".) The IBM allows for geometrically correct representation of the boundary conditions at the ocean/ice interface without the need for a modeling grid that conforms to the boundary or changes in time. We present simulation results of flows under idealized, dynamic ice shelf geometries.