# Antarctic Ocean-Ice Shelf Interactions in High-Resolution, Global Simulations Using the Accelerated Climate Model for Energy (ACME)

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The U.S. Department of Energy's Accelerated Climate Model for Energy (ACME) includes new ocean, land-ice, and sea-ice components using the Model for Prediction Across Scales (MPAS) framework. MPAS provides an unstructured, variable-resolution capability for each of these components, allowing for global, coupled, high-resolution ACME simulations to be run efficiently on large, high-performance computers. Recently, the ability to simulate ocean circulation in ice shelf cavities has been added to ACME. This new science capability is critical for projecting Antarctica's potential future contributions to global sea level, which is one of ACME's primary science drivers. Here, we discuss results of initial simulations using this new capability. These simulations range from idealized, benchmark experiments primarily meant for model verification, to global, CORE-forced and fully-coupled simulations using a range of model configurations (down to and including eddy-resolving grid resolutions). Analysis of global simulations is currently focussed on validation, using observed submarine melt rates and other relevant oceanographic features, and the identification and minimization of coupled model biases. We also discuss preliminary results from perturbation experiments in the spirit of Spence et al. (GRL, 41, 2014), which aim to examine the impacts of anticipated future changes to Southern Ocean winds on submarine melt rates, Antarctic ice sheet dynamics, and ultimately Antarctic-sourced sea level rise.

***Keywords***: ice sheets, ice shelves, climate modeling