



Parameterization of grounding-line cliff failure in an Antarctic ice sheet model

David Pollard (1) and Robert DeConto (2)

(1) Earth and Environmental Systems Institute, Pennsylvania State University, University Park, Pennsylvania, United States (pollard@essc.psu.edu), (2) Department of Geoscience, University of Massachusetts, Amherst, Massachusetts, United States (deconto@geo.umass.edu)

Two mechanisms have recently been added to a 3-D ice-sheet model that can produce drastic retreat into East Antarctic sub-glacial basins during past warm periods, as implied by (albeit uncertain) geologic evidence. The two mechanisms, (1) structural failure of large tidewater cliffs, and (2) enhanced ice-shelf calving due to meltwater draining into crevasses, present challenges in their parameterization within coarse-grid models. Here we describe details and choices in the parameterization of structural failure at deep grounding lines, its incorporation into the large-scale dynamical equations, and the sensitivity of model results to these choices. In addition, a parameterization of melt-enhanced calving is described, along with a simple representation of the clogging effects of ice melange in narrow seaways, and their effects on Antarctic simulations.