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Surface mass balance of the Greenland ice sheet in the new CCSM: results for 1948-present and comparison with observations and higher-resolution models

Miren Vizcaíno (1) and William H. Lipscomb (2)

(1) Department of Geography, University of California at Berkeley, California, USA (mirenvt@berkeley.edu), (2) Climate, Ocean and Sea Ice Modeling Group, Los Alamos National Laboratory, Los Alamos, New Mexico, USA (lipscomb@lanl.gov)

The latest version of the Community Climate System Model, CCSM4, has been coupled to the Glimmer ice sheet model in order to simulate interactive ice sheets. The surface mass balance is computed in the land surface component of CCSM, using an energy-balance scheme with multiple elevation classes in each grid cell. We present initial results of the 20th-century surface mass balance of the Greenland ice sheet with the new scheme. The land model is run in two configurations: (1) forced with atmospheric climatology from reanalysis, 1948-present, and (2) coupled on a half-hourly time scale to the CCSM atmosphere model. Results are compared to observations and to output from a high-resolution regional model. The sensitivity of the simulated surface mass balance to several key parameters (e.g., ice albedo and temperature lapse rate) is examined. This work is being done in preparation for IPCC AR5 climate change simulations using CCSM4 with a dynamic Greenland ice sheet.