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Coupling of ocean circulation and sea ice D.A. KURTZE, Saint Joseph's University, D. S. COMEAU, K. GIMRE, J.M. RESTREPO, University of Arizona — We propose a simple model of the coupling between oceanic circulation and sea ice dynamics on long time scales. The model begins with a one-dimensional Budyko-Sellers energy balance model of ice-albedo feedback, with a linearized temperature dependence of outgoing longwave radiation. This sits atop a box model of ocean circulation, with conventional thermohaline forcing except that surface heat exchange occurs via the Budyko-Sellers model. The ocean and the ice sheet are coupled via advection and plastic flow of ice, and by the thermodynamics of the ice/seawater interface. We use this model to assess how (and by what mechanisms) ocean circulation and ice sheet dynamics affect one another, primarily to investigate the role played by changes in solar input and greenhouse gas forcing, e.g. in the Snowball Earth scenario.

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