



## **Effects of forcing on response dynamics in Antarctic ice sheet models**

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A central problem of glaciology and its impact on the Earth system is understanding the mass balance of polar ice sheets. Ice sheets exhibit dynamics over many orders of magnitude of spatial and temporal scales, which has been inferred from paleoclimate records acquired from ice cores. Time series analysis of modeled ice volume indicates that the nature of the climatic forcing can impact the cyclic behavior of mass balance. We address this issue by comparing the output of three different ice sheet models: a simple cellular automaton dynamical model of ice flow, a thermo-mechanically coupled shallow ice approximation model and a higher order model. We use various novel forcings of accumulation fields (constant, periodic and stochastic) on these models to investigate the response dynamics of ice sheets. We investigate whether the ice sheets exhibit broadband spectral dynamics, such as those found in long time climate records and other scale-free physical systems.