Insights from Coupled Modeling on Ice, Sea Level and Solid Earth Changes in Antarctica

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Modeling paleo ice sheet and sea level changes has classically been approached by either modeling the dynamic response of ice sheets to past climate changes or inferring ice cover changes through applying sea level modeling and comparing to geological sea level records. More recently, we have begun to develop coupled models that simultaneously predict dynamic ice sheet evolution, global sea level changes and solid Earth deformation, as well as considering the feedbacks that arise between these systems. I will present recent work applying coupled modeling to give insight into ice sheet evolution and associated sea level changes since the Last Deglaciation and during past warm periods such as the Pliocene. Results will focus on Antarctica, where there are extensive sectors of marine-based ice, and where complex and laterally varying rheological structure of the solid Earth beneath the ice sheet influences predictions of ice sheet evolution, sea level changes and modern glacial isostatic adjustment. I will also discuss implications of this work for long term Antarctic ice loss in response to future climate warming.

Keywords: ice sheet evolution, sea level, glacial isostatic adjustment, coupled ice - earth - sea level modeling