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Stability of the Greenland and Antarctic ice sheets when dynamically coupled through the Atlantic meridional overturning circulation.

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Climate change challenges all Earth subsystems. The Greenland and Antarctic ice sheets together with the Atlantic Meridional Overturning Circulation are subsystems of particular concern, as they are subject to tipping points, i.e., thresholds above which their current state changes to another that is qualitatively and quantitatively different. Their stability has been studied in depth through offline (stand-alone) modeling and “one-way” coupling with each other. However, we know that in the past, the Northern and Southern hemispheres have interacted through the bipolar seesaw. Thus, these subsystems have the potential to interact with each other, but this relationship is challenging to simulate. Here we investigate the behavior of a simplified approach coupling the state-of-the-art ice-sheet model Yelmo with an ocean box model and, importantly, vice versa. We will show the results of exposing the system to various climate change scenarios in order to see how different ice timescale responses alter the coupled stability.