Geophysical Research Abstracts
Vol. 20, EGU2018-2880-1, 2018
EGU General Assembly 2018

Stopping the Flood: Could We Use Targeted Geoengineering to Mitigate Sea Level Rise?

Michael Wolovick (1) and John Moore (2,3)

(1) Atmosphere and Ocean Sciences Program, Department of Geosciences, Princeton University, USA, (2) Beijing Normal University, College of Global Change and Earth System Science, Beijing, China, (3) Arctic Centre, University of Lapland, Finland

The Marine Ice Sheet Instability is an important tipping point in the response of the world's ice sheets to a warming climate. If the instability is activated, sea levels could rise rapidly. We propose that targeted geoengineering could be used to slow or delay sea level rise due to the marine ice sheet instability. We used a suite of coupled ice-ocean flowband simulations of the largest potential sea level rise instability- Thwaites Glacier, West Antarctica with different calving laws, sliding exponents, and ways of constructing the flowband geometry. For each model experiment we explored three scenarios that vary in ocean stratification, surface ablation with associated subglacial runoff, and surface accumulation. These are: 1) constant climate, 2) warming climate, and 3) warming climate with an artificial sill placed in the open bay after 100 years. Each simulation ran for 1000 model years. The sill itself is present as a physical feature that the model glacier can ground on; in an additional set of experiments we explore the effect of allowing grounded ice to erode the sill. We suggest that an artificial sill that blocked deep warm water from reaching the grounding line would cause reduced sub-shelf melt, ice shelf thickening, and grounding on the sill. Even a very weak sill delays sea level rise for centuries before being eroded.