Geophysical Research Abstracts
Vol. 18, EGU2016-6677, 2016
EGU General Assembly 2016

Firn modelling in the Community Earth System Model (CESM)

Leo van Kampenhout (1), Jan Lenaerts (1), William Sacks (2), William Lipscomb (3), and Michiel van den Broeke (1)

(1) Institute for Marine and Atmospheric Research, Utrecht University, Netherlands, (2) National Center for Atmospheric Research, Boulder (CO), USA, (3) Los Alamos National Laboratory, Santa Fe (NM), USA

Firn meltwater retention and refreezing controls the magnitude and timing of surface runoff, which is the largest contributor of the Greenland freshwater transport into its neighbouring oceans. In Antarctica, all meltwater refreezes, but the sensitivity of ice shelf stability to atmospheric warming is strongly dependent on the amount of firn air. In this study we use the land-only version of the Community Earth System Model (CESM), forced by ERA-Interim reanalysis (1979-present) to simulate the firn air content over both ice sheets. The impact of three key parameters is examined: (1) the density of freshly fallen snow, (2) the modelled maximum depth of the firn and (3) the compaction rate by overburden pressure. An evaluation of our model results with available firn core observations shows that we can improve the representation of the ice sheet firn, which renders CESM suitable to study the long-term response of ice sheet firn to climate change.