Geophysical Research Abstracts
Vol. 19, EGU2017-1573, 2017
EGU General Assembly 2017

Coupled ice sheet-ocean modelling to investigate ocean driven melting of marine ice sheets in Antarctica

Lenneke Jong (1,2), Rupert Gladstone (1,3,4), Ben Galton-Fenzi (1,5)

(1) Antarctic Climate and Ecosystems Cooperative Research Centre, Hobart, Australia (lenneke.jong@utas.edu.au), (2) Institute of Marine and Antarctic Studies, University of Tasmania, Hobart, Australia, (3) Versuchsanstalt für Wasserbau, Hydrologie und Glaziologie (VAW), ETH Zurich, Switzerland, (4) Arctic Centre, University of Lapland, Rovaniemi, Finland, (5) Australian Antarctic Division, Kingston, Australia

Ocean induced melting below the ice shelves of marine ice sheets is a major source of uncertainty for predictions of ice mass loss and Antarctica's resultant contribution to future sea level rise. The floating ice shelves provide a buttressing force against the flow of ice across the grounding line into the ocean. Thinning of these ice shelves due to an increase in melting reduces this force and can lead to an increase in the discharge of grounded ice. Fully coupled modelling of ice sheet-ocean interactions is key to improving understanding the influence of the Southern ocean on the evolution of the Antarctic ice sheet, and to predicting its future behaviour under changing climate conditions.

Coupling of ocean and ice sheet models is needed to provide more realistic melt rates at the base of ice shelves and hence make better predictions of the behaviour of the grounding line and the shape of the ice-shelf cavity as the ice sheet evolves. The Framework for Ice Sheet - Ocean Coupling (FISOC) has been developed to provide a flexible platform for performing coupled ice sheet - ocean modelling experiments. We present preliminary results using FISOC to couple the Regional Ocean Modelling System (ROMS) with Elmer/Ice in idealised experiments Marine Ice Sheet-Ocean Model Intercomparison Project (MISOMIP). These experiments use an idealised geometry motivated by that of Pine Island glacier and the adjacent Amundsen Sea in West Antarctica, a region which has shown shown signs of thinning ice and grounding line retreat.