Geophysical Research Abstracts
Vol. 19, EGU2017-15120, 2017
EGU General Assembly 2017

Rapid advance, and rapid retreat at Kangiata Nunaata Sermia: potential for long term numerical model validation of Greenland outlet glacier dynamics.

Danni Pearce (1), Doug Mair (2), Brice Rea (1), James Lea (2), Ed Schofield (1), Iestyn Barr (3), and Nick Kamenos (4)

(1) University of Aberdeen, School of Geosciences, Aberdeen, U.K. (d.pearce@abdn.ac.uk), (2) University of Liverpool, School of Environmental Sciences, Liverpool, U.K., (3) Queens University Belfast, School of Geography, Archology and Palaeoecology, Elmwood Avenue, U.K., (4) University of Glasgow, School of Geographical and Earth Sciences, Glasgow, U.K.

At present, there is a poor understanding of centennial Greenlandic tidewater glacier (TWG) dynamics, with the majority of numerical modelling studies focussing on retreat during the last few decades. This is the result of an observational bias towards the last 40-50 years, during which time behaviour has been dominated by retreat. Consequently, the datasets currently used for model calibration/validation do not include a full range of glacier behaviour. To have confidence in model results that seek to simulate over centennial timescales (i.e. to 2100), it is therefore crucial to be able to (1) validate model behaviour over these timescales and (2) test models against significant advance as well as retreat phases.

Kangiata Nunaata Sermia (KNS), located c. 100 km inland from Nuuk at the head of Godthåbsfjord, SW Greenland, is the largest TWG south of Jakobshavn Isbræ. Here, we use multiple terrestrial proxies (14C, geomorphology, pollen) and modelling, to demonstrate that KNS first advanced, then retreated >22 km during the last 1000 years. Notably, ages support a rapid (>100 ma-1) Little Ice Age (LIA; AD c. 1300 to 1850) advance phase in the early part of the millennium, before undergoing stepped, rapid multi-kilometre retreats following its LIA maximum. These data provide a potentially excellent dataset to calibrate and validate numerical models over multi-decadal to centennial timescales, helping to more comprehensively understand TWG dynamics and increase confidence in their projected contributions to future sea-level rise.