

# Norske Øer Ice Barrier: the canary in the coal mine?

William A. Sneed<sup>1</sup> and Gordon S. Hamilton<sup>1,2</sup>

<sup>1</sup>Climate Change Institute, University of Maine

<sup>2</sup>School of Earth and Climate Sciences, University of Maine

## Abstract

Sea ice can potentially exert an important control on the stability of Greenland's outlet glaciers. For example, it can mechanically retard iceberg calving at the terminus. Or it can modulate the delivery of oceanic heat to the terminus, and hence submarine melting, by acting as a rigid cap between the atmosphere and near-terminus ocean waters which damps the circulation. In Northeast Greenland, the Norske Øer Ice Barrier (NØIB) abuts Nioghalvfjerdingsfjorden (79N) and Zachariae Isstrøm (ZI), two floating outlets of the Northeast Greenland Ice Stream. NØIB is an extensive region of perennially landfast sea ice whose size varies from year to year, but with complete breakup a rare event. It reportedly broke up in the 1950s and was seen to break up in August, 1997. More recently, the NØIB has broken up during eight of the last ten summers (2002-2005, 2008, and 2010-2012). The forcings driving the increased frequency of ice barrier breakup are poorly understood, and it is not clear if the breakup is a purely local phenomenon or if its increasing frequency indicates regional changes in East Greenland Current and the Greenland Sea. Preliminary analysis suggests that increased cyclonic activity in the Fram Strait and increased sea surface temperatures have a better correspondence to breakup events than other factors. It is too soon to know if subtle changes detected on 79N in the last decade are connected to breakups of the NØIB but, if they are, it suggests a complex interaction between the atmosphere, ocean and outlet glaciers.

email: [william.sneedjr@maine.edu](mailto:william.sneedjr@maine.edu)