

## **The Role of Ocean Warming in Central West Greenland Ice Stream Retreat: LGM through Deglaciation**

Anne Jennings<sup>1</sup>, John Andrews<sup>1</sup>, Colm ÓCofaigh<sup>2</sup>, Guillaume St.-Onge<sup>3</sup>, Julian Dowdeswell<sup>4</sup>

<sup>1</sup> INSTAAR and Dept. of Geological Sciences, University of Colorado, Boulder, Colorado 80309-0450: [Anne.Jennings@colorado.edu](mailto:Anne.Jennings@colorado.edu); [andrewsj@colorado.edu](mailto:andrewsj@colorado.edu)

<sup>2</sup> Department of Geography, Durham University, UK: [colm.ocofaigh@durham.ac.uk](mailto:colm.ocofaigh@durham.ac.uk)

<sup>3</sup> Institut des sciences de la mer de Rimouski (ISMER) & GEOTOP, Université du Québec à Rimouski, 310, allée des Ursulines, Rimouski, Québec, Canada, G5L 3A1: [guillaume\\_st-onge@uqar.qc.ca](mailto:guillaume_st-onge@uqar.qc.ca)

<sup>4</sup> Scott Polar Research Institute, University of Cambridge, Cambridge CB2 1ER, UK [jd16@cam.ac.uk](mailto:jd16@cam.ac.uk)

During the Last Glacial Maximum (LGM) Baffin Bay was enclosed on three sides by ice sheets. The Greenland Ice Sheet (GIS) extended to the continental shelf edge in the Disko and Umanak systems of West Greenland, while northern Baffin Bay hosted marine-terminating margins of the Innuitian and Laurentide ice sheets. The timing of GIS retreat, phasing of its retreat with northern Baffin Bay ice margins, and the role of ocean warming in initiating and sustaining retreat are recorded in sediment cores from trough mouth fans (TMF) beneath Atlantic Water in the WGC, and beyond the maximum GIS margin. TMFs were built by focused sediment delivery from successive advances of GIS ice streams to the shelf edge and hemipelagic sedimentation processes including iceberg rafting from GIS and Northern Baffin Bay sources, suspended sediment deposition and marine productivity. Radiocarbon dated cores are used to interpret changes in ocean and ice-sheet conditions. Lithofacies, ice-rafted detritus (IRD), and mineralogy document changes in sedimentation processes and provenance, while foraminiferal assemblages document the presence/absence of WGC. The earliest IRD event (<19.3; >15 cal ka BP) records initial retreat of the LGM GIS from the shelf edge. Ocean warming preceded ice retreat on the Umanak TMF, suggesting that WGC Atlantic Water may have destabilized the ice margin. IRD peaks with northern Baffin Bay (NBB) provenance begin c.14.1 cal ka BP, after GIS retreat from the shelf edge. The NBB peaks form an IRD belt associated with Atlantic Water fauna suggesting preferential melting of icebergs that reach warm Atlantic Water along West Greenland.