GLAMAR

GLacial Meltwater and the Sedimentary ARchitecture
of High-Latitude Continental Margins

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Summary:
The advance of marine ice sheet margins is limited by a combination of iceberg calving and melting, the latter increasing in importance at lower latitudes. Meltwater recharge to subglacial drainage has a critical influence on ice and sediment dynamics, due to the central role of drainage in the processes of basal deformation and the transport of different sediment types (sorted vs unsorted) to the glacier margin. The role of drainage processes in the evolution of glaciated shelves and slopes has received surprisingly little attention, although the continental margins of eastern Canada and NW Europe contain evidence for gross latitudinal controls on their sedimentary architecture by meltwater processes (e.g. slope canyons at lower latitudes). This project seeks to evaluate the impact of spatial variability in the processes of ice sheet drainage on he development of glaciated continental margins, through a comparative evaluation of the conjugate North Atlantic continental margins (including Greenland) and their comparison with selected parts of the Antarctic margin.

Project Objectives:
The overall objective is to test the hypothesis that latitudinal variation in glacial meltwater, through its influence on the processes of subglacial sediment transport and supply to the ice margin, can influence the morphological and stratigraphical development of glaciated continental margins. Specific objectives include:

- to model the first-order mass balance of generic marine ice sheets on a continental margin, in order to constrain the latitudinal variation in meltwater supply
- to undertake a comparative analysis of the morpho-stratigraphic development of the conjugate North Atlantic margins in response to the late Quaternary (≤0.7 Ma) expansion of continental glaciation, with focus on the development of trough-mouth fans versus canyons on continental slopes and their relation to subglacial systems of sediment deformation and drainage on the adjacent shelves
- to characterise the spatial variability in the margins and relate it to subglacial processes of deformation and drainage, identifying major sites or zones of meltwater input (and glaciofluvial sediment supply) into the North Atlantic
- to compare the results from the North Atlantic margins with selected parts of the eastern vs western Antarctic margin where meltwater is of greater and lesser importance, in order to assess whether spatial (or temporal) variability in subglacial processes has been significant in its late Cenozoic evolution.

International Collaboration:
The project will seek to involve a range of scientists actively involved in research into the evolution of the glaciated continental margins bordering the North Atlantic Ocean:

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Laura Desantis, Istituto Nazionale di Oceanografia e Geofisica Sperimentale (OGS), Trieste, Italy
Richard Hindmarsh, British Antarctic Survey (BAS), Cambridge, UK
Berit Hjelstuen, Department of Earth Science, University of Bergen (UiB), Norway
Tove Nielsen, Geological Survey of Denmark and Greenland (GEUS), Copenhagen, Denmark
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Patrick Shannon, Department of Geology, University College Dublin
Martyn Stoker, British Geological Survey, Edinburgh, UK