



Records of subglacial meltwater on glaciated continental margins

Kelly Hogan (1), Robert Larter (1), Julian Dowdeswell (2), James Kirkham (2), Neil Arnold (2), Alistair Graham (3), Matteo Spagnolo (4), Leif Rise (5), John Shaw (6), and Jeremy Ely (7)

(1) British Antarctic Survey, Science Teams, Cambridge, United Kingdom (kelgan@bas.ac.uk), (2) Scott Polar Research Institute, University of Cambridge, Cambridge, UK, CB2 1ER, (3) Department of Geography, College of Life and Environmental Sciences, University of Exeter, Exeter EX4 4RJ, UK, (4) Department of Geography & Environment, School of Geosciences, AB24 3UF, University of Aberdeen, Scotland, UK, (5) Geological Survey of Norway (NGU), P.O. Box 6315 Sluppen, 7491 Trondheim, Norway, (6) Geological Survey of Canada (Atlantic), Natural Resources Canada, Bedford Institute of Oceanography, Box 1006, Dartmouth, NS, Canada, (7) Department of Geography The University of Sheffield SHEFFIELD S10 2TN United Kingdom

Landforms interpreted to relate to subglacial meltwater flow range from extensive networks of huge channels (up to 3 km wide and 300 m deep) to moats and crescentic scours around bedrock highs or drumlins with smaller dimensions (widths up to 500 m, depths <60 m). In addition, sedimentary deposits on glaciated continental margins result from the expulsion of meltwater at the grounding line and can form thick laminated sequences or plumites when deposited from rising meltwater plumes. Most often the meltwater-related landforms are interpreted as having been incised by meltwater during deglaciation when meltwater was more available. Yet many questions remain about exactly how some of the landforms formed (could a till slurry, or the direct action of ice erode the moats?), when these features formed during the glacial cycle, and what the source of the subglacial meltwater was. The latter is particularly relevant in the Antarctic where surface melting (and therefore routing to the bed) is negligible at present and would, therefore, have been negligible in full-glacial conditions as well.

Here, we explore the variety of meltwater-related landforms and deposits on glaciated continental margins using examples of these landforms and deposits from both the Antarctic and around Greenland. We present morphometric measurements of the landforms and discuss the similarities and differences between these features in different geographic locations. We also discuss the results of numerical hydrological modelling over large channel systems in Marguerite Trough, West Antarctica to try to address the outstanding questions about the origin of subglacial meltwater in this area, and how such large channels were incised.