Bathymetry in fjords of Northwestern Greenland from Operation IceBridge aerogravity.

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Understanding of the influence of water circulation on the melting and dynamics of Greenland glaciers is hampered by a lack of basic information on fjord bathymetry. Here we present results from Operation IceBridge aerogravity surveys along the axes of the fjords of northern Greenland and in a coast-parallel grid across the northwestern fjords in order to provide bathymetric models for this difficult to access region.

Fjord axis profiles reveal the depth and shape of the bed in front of the grounding line for nine glaciers around the northern coast of Greenland. Sills are revealed approximately 20 km offshore of the grounding lines of Petermann, Steensby and Ryder glaciers, with depths similar to those of their grounding lines. Sills have not been identified in the other northern fjords.

In Northwest Greenland, the recently released IBCAO v3 shows deep troughs in the continental shelf but does not resolve the connection between these troughs and the channels of the outlet glaciers that cut the coast. The changes observed in velocity and surface elevation of these glaciers does not follow a simple spatial pattern, and the influence of ocean waters is not fully understood. The new IceBridge survey provides a bathymetry model of the area between the marine IBCAO data and the grounded glaciers and shows for the first time the linking pathways at depth of individual outlet glaciers to shelf troughs.