“The Behavior of Petermann Glacier, NW Greenland, as Revealed by Seismic Stratigraphy and Seafloor Morphology”

by Kelly Hogan
Marine Geophysicist, British Antarctic Survey

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Abstract: Petermann Glacier is one of the largest fast-flowing outlet glaciers in North Greenland, transferring about 12 km^3 of ice to the ocean each year and draining about 4% of the ice sheet by area. The grounded glacier margin now sits about 100 km inland of the coastline in Petermann Fjord where it is buttressed at its front by a 20 km-wide and 42 km-long floating ice tongue – the longest in the Northern Hemisphere. However, during the Last Glacial Maximum ~20 000 years ago Petermann Glacier, as part of the expanded Greenland Ice Sheet, extended beyond the fjord-mouth and coalesced with the Innutian Ice Sheet which covered Arctic Canada. Owing to often severe sea-ice conditions Petermann Fjord has only been rarely accessed by ship and had not, until recently, been surveyed by modern methods. In 2015 the *Petermann 2015 Expedition* acquired a wealth of multidisciplinary datasets in Petermann Fjord and the adjacent Nares Strait from the Swedish Icebreaker *Oden*. Here I will briefly discuss the range of marine geoscientific data acquired, and then present the results (to date) of the research from marine geophysical datasets including high-resolution seismic stratigraphy and seafloor bathymetry. The main focus will be the on the post-glacial sedimentary package, what determines the patterns and sedimentary architecture of the units in this environment, and what this seismic stratigraphic information can tell us about the retreat behavior of a major outlet glacier. I will discuss total sediment volumes observed and fluxes of glacial sediment to the marine environment in the context of a major stillstand during retreat at about 7200 years BP. Improving our understanding of how marine-terminating outlet glaciers retreat, what drives and controls retreat, and on what timescales the retreat occurs on, is crucial for improving predictions of how ice sheets and glaciers will contribute to global sea-level rise in the future, especially in the context of a warming ocean.