Session 5.1: The Last Deglaciation: Talk
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Sediment features across the grounding zone and beneath Ekström Ice Shelf, East Antarctica, imaged using on-ice vibroseis

Smith, E.[1], Drews, R.[2], Ehlers, T.[2], Franke, D.[3], Gaedicke, C.[3], Hofstede, C.[1], Kuhn, G.[1], Lambrecht, A.[4], Mayer, C.[4], Tiedemann, R.[1, 5], Eisen, O.[1, 5]

[1]Alfred-Wegener-Institut Helmholtz-Zentrum fu¨r Polar- und Meeresforschung, Bremerhaven, Germany, [2]Department of Geosciences, University of Tu¨bingen, Tu¨bingen, Germany, [3]BGR, Federal Institute for Geosciences and Natural Resources, Geozentrum Hannover, Hannover, Germany, [4]Geodesy and Glaciology, Bavarian Academy of Sciences and Humanities, Munich, Germany, [5]Department of Geosciences, University of Bremen, Bremen, Germany

Content

An extensive grid of seismic reflection data collected on Ekström Ice Shelf, East Antarctica, between 2010 – 2017 are used to constrain palaeo-ice flow and retreat in the region. Sets of elongated bedforms are seen in a topographic trough, indicating a probable former ice-stream under the western part of the ice shelf. A smoother bed and truncated marine sediments under the eastern part of the ice shelf suggest there was slower ice flow in this area. Sediment wedges at the current ice-shelf front show the grounded ice extent likely reached this region; further investigation of these features will allow the style of deglaciation to be better determined.

It is common to map geomorphological sediment features in front of ice shelves and beneath modern-day ice streams using geophysical methods, but there are much less data documenting landforms beneath ice shelves. The data presented here were collected as part of pre-site survey for an envisaged sub-ice shelf geological drilling campaign. These data cover a large portion of the Ekström ice shelf and also extend into the grounded ice areas. Data were collected using an on-ice vibroseis source combined with a snowstreamer. This method of collection is fast and effective allowing for a high volume of data collection. For example, in the 2016/17 season ~280 km of multi- fold seismic reflection data were collected over a 25-day period. In contrast to AUVs with capabilities to measure bathymetry in full spatial coverage, seismic reflection data also allows the vertical structure of sea floor strata and properties to be investigated. The acoustic properties of the sub- surface allow information about the material characteristics, and potentially age and origin of the sediment features to be determined. Moreover, the thickness of the glacial debris, deposited on pre- existing marine sediments, is a first-order indication of where to retrieve short sediment cores. Future integration of these geophysical results with numerical models of ice and sediment dynamics will provide a better understanding of past and present interactions between ice and the solid Earth in East Antarctica; leading to an improved understanding of future contributions of this region to sea-level rise.