

Anvers-Hugo Trough palaeo-ice stream, Antarctic Peninsula: geomorphological evidence for the role of subglacial water in facilitating ice stream flow

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Abstract

We will present new multibeam bathymetry data that make the Anvers-Hugo Trough west of the Antarctic Peninsula one of the most completely surveyed palaeo-ice stream pathways in Antarctica. We interpret landforms revealed by these data as indicating that subglacial water availability played an important role in facilitating ice stream flow in the trough during late Quaternary glacial periods. Specifically, we observe a set of northward-shoaling valleys that are eroded into the upstream edge of a sedimentary basin, extend northwards from a zone containing landforms typical of erosion by subglacial water flow, and coincide spatially with the onset of mega-scale glacial lineations. Water was likely supplied to the ice stream bed episodically as a result of outbursts from a subglacial lake previously hypothesized to have been located in the Palmer Deep basin on the inner continental shelf. In a palaeo-ice stream confluence area, close juxtaposition of mega-scale glacial lineations with landforms that are characteristic of slow, dry-based ice flow, suggests that water availability was also an important control on the lateral extent of these palaeo-ice streams. These interpretations are consistent with the hypothesis that subglacial lakes or areas of elevated geothermal heat flux play a critical role in the onset of many large ice streams. The interpretations also have implications for the dynamic behaviour of the Anvers-Hugo Trough palaeo-ice stream and, potentially, of several other Antarctic palaeo-ice streams.

Keywords: multibeam bathymetry, ice stream, subglacial water, landform