Geophysical Research Abstracts, Vol. 9, 04950, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-04950

Erosion, transport and deposition of sediment on the formerly glaciated north and east Svalbard continental margin.

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On many high-latitude continental margins sediment transport is dominated by glacier-related processes including ice-rafting, glacigenic debris flows and subglacial transport. In turn, glacier growth and decay is largely driven by climatic forcing. Glacial modification of the western, passive continental margin of Norway and Svalbard has been successfully investigated using high resolution geophysical systems and geological core data (e.g. Ottesen et al., 2005). However, to the north and east of Svalbard, mapping has previously been hampered by perennial sea ice cover. In August 2006 a geophysical cruise to this area successfully collected an extensive dataset of swath bathymetric and sub-bottom profiler data as well as 23 gravity cores. We present a preliminary interpretation of this dataset and consider the sedimentary processes acting on the margin and their relationship to climatic forcing.

As full glacial conditions were reached between 25 and 15ka, grounded ice expanded on to the outer shelf. Our cores sample consolidated diamicton across the shelf, which is interpreted as a subglacial till deposit. Ice flow and sediment transport at the base of the ice sheet produced elongate subglacial bedforms (lineations, drumlin-like forms) and swath bathymetric records show that fast ice flow transported ice and sediment northwards via ice streams in cross-shelf troughs at Hinlopen and Kvitøya. At Hinlopen, a small sedimentary fan was deposited at the shelf break overlying the Hinlopen Slide scar. At the Kvitøya Trough to the east no such fan was identified and glacial sediments are largely glaciomarine (ice-rafted) in origin, partially reworked by contour currents. Climatic warming promoted instability of the Svalbard-Barents Sea Ice Sheet, which began to decay sometime after 15ka. Sediment core data and

acoustic records from the outer shelf identify thin deglacial sequences of massive or laminated muds overlying glacial diamicton, indicating that initial ice sheet decay was likely rapid. However, sediment lobes and suites of retreat moraines on the inner shelf ($\leq$15m high, $>$5km long) mark ice margin positions during retreat and suggest that ice decay here was more gradual.

On the northern and eastern Svalbard continental margin sediment transport is controlled by glacier-related processes and in particular ice stream flow through cross-shelf troughs. The relative importance of the Hinlopen and Kvitøya troughs is indicated by their smaller size and volume of sediment transported through them, when compared with the larger Franz Victoria and Bear Island troughs to the east and south. Indeed, sedimentary bedforms south of Kong Karls Land show that ice flow (and sediment transport) was to the east, where it most likely drained into the Franz Victoria Trough helping to feed the large trough-mouth fan at the shelf break.