



Millennial scale climate change during Marine Isotope Stage (MIS) 3 and 2 - Preliminary results from the West Svalbard Slope

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The west Svalbard Slope is the gateway for Atlantic Water flow into the Arctic Ocean. Four cores from 76 to 80° N from 700 to 1900 m water depth have been studied for the lithology, magnetic susceptibility, ice rafted detritus (IRD), oxygen isotopes, and foraminifera fauna. A strong age control exists from 37 AMS-¹⁴C dates, and correlation of the lithology with, magnetic susceptibility and specific faunal changes.

The cores consist of mainly hemipelagic sediments with sedimentation rates in the range 10 to 30 cm / kyr interrupted by four distinct sedimentary events: 1: A well-sorted, fine sandy sediment layer dating ca 31 000 ¹⁴C-years BP and interpreted as a turbidite deposit was found in a core from the Isfjorden Fan. 2: Coarse, unsorted sediment layers interpreted as gravity flow deposits are found on the entire Svalbard slope with ages close to 20 000 ¹⁴C-years. 3: Silty, laminated sediments interpreted as melt water plume deposits with a thickness ranging from 15-150 cm cover the slope. The deposits dates from 12 600 and 12 450 ¹⁴C years BP. 4: A 30 to 50 cm thick layer of very fine-grained, structureless sediments occur on the deeper part of the slope dated to ca. 9 000 to 8 800 ¹⁴C-years BP. A high proportion of large diatoms *Coscinodiscus* spp. is found in the fine sand fraction.

Interestingly, the three sedimentary events seen on the entire slope occur in periods of relatively warm climate.

The composition of IRD shows that the source areas for IRD changed with time. Dur-

ing the last glacial maximum (LGM), the IRD mainly consisted of quartz mineral grains. During the deglaciation, the IRD was dominated by dark coloured grains of black and brown shales/shists. Dark coloured grains also dominated the coarse grain fractions in the gravity flow deposits. During the marine isotope stage 3, the composition of IRD shifted between “quartz dominated” and “dark colour dominated”. These shifts occurred in pace with climate changes as indicated by the distribution of planktonic foraminifera and correlating with the Greenland ice core signal of Dansgaard-Oeshger events. High abundance of dark coloured grains correlate with warm interstadials, while quartz-dominated IRD correlate with cold stadials. The “dark colour dominated” IRD is local, primarily coming from the Svalbard archipelago, while the quartz-dominated IRD apparently comes from sources outside Svalbard.

Our data thus point towards a simple relationship between climate change and the Svalbard-Barents Sea ice Sheet. During the warm periods icebergs from Svalbard melted over the slope. During the cold periods, the Svalbard ice was apparently too cold to deliver sediment loaded icebergs to the slope.