



Sedimentary record of postglacial variability in near-bottom currents, sediment supply and ice rafting on the continental shelf off SW Spitsbergen

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The continental shelf off the west coast of southern Spitsbergen is influenced by the northward-flowing water masses (warmer and more saline Atlantic Water carried by the West Spitsbergen Current and colder, fresher Arctic Water carried by the East Spitsbergen Current), as well as ice rafting. The present study was conducted to identify the influence of these factors on the sedimentary environment and to decipher temporal variations in the intensity of bottom currents, ice rafting off and glacial activity on southwestern Spitsbergen during the past 14,000 years. The study is based on a multiproxy analyses of one gravity core from the outer continental shelf (148 m water depth) in decadal to centennial resolution. Age control was obtained on a basis of ten AMS ¹⁴C dates along with ²¹⁰Pb and ¹³⁷Cs datings. To infer the style of sedimentation and the sediment supply the core was measured for magnetic susceptibility, X-rayed, analysed for grain-size distribution of bulk sediment and for coarse sand fraction components. The assessment of ice rafting intensity was based on coarse sand fraction counting (IRD), whereas to assume the type of ice rafting, whether by icebergs or sea ice, the analysis of quartz grains roundness was performed. Moreover, relative velocity of bottom currents was estimated by grain-size analysis of sortable silt fraction. We distinguish seven intervals: c. 14,000 – 12,600 cal yr BP – Bølling/Allerød (unit 1); 12,600 – 11,500 cal yr BP – Younger Dryas (unit 2) and 11,500 cal yr BP to present – Holocene (units 3 – 7). The smallest mean sortable silt values, reflecting relatively low bottom current velocity, occurred from the Bølling/Allerød to the early Younger Dryas and after ~0.5 cal ka BP. Increased velocities were inferred for the early Holocene as well as period between 8.8 – 7.8 cal yr BP. The IRD was present throughout the entire record indicating continuous supply of a material delivered from ice rafting, with variable dominance of transport by icebergs or sea ice. The sediment accumulation rates were the highest during the earliest Holocene and in the last few centuries, whereas the lowest were recorded for the most of the Holocene. The general shifts in style of sedimentation were closely related to decay or growth of the glaciers on southern Spitsbergen.

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