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Multi-proxies study on the paleoceanography and terrigenous input in the polar Nodic Sea since the Last Glacial Maximum

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The polar Nodic Sea (NS) lies between the Arctic and Antlantic Oceans and the poleward-directed Atlantic heat and water transfer system plays a key role in affecting the ocean changes and sediments input. A suite of well-proven proxy methods for sediment core ARC5-BB03 (72º26.606′N, 7º35.890′E, water depth 2598 m) are used to address issues that are critical to the understanding of paleoceanographic conditions and sediments supplies over the Last Glacial Maximum (LGM) in this region. The methods include grain size analysis, AMS14C dating, color reflectance, high-resolution XRF scanning, oxygen isotope of planktic foraminifera and organic geochemistry measuring. The principal component analysis of the XRF data is applied for identification of sedimentary sources. Variations of grain size and elements' content indicate that the sedimentary sources of the polar NS have undergone dramatic changes over the past 26 ka BP. Changes of terrigenous input in the polar NS show close relationship with the variations of the North Atlantic Current (NAC), the melting of sea ice and ice sheet, the establishment of the Thermohaline Circulation (TC) and the forming of the North Atlantic Deep Water. The coarse grain size sediments before 21.5 ka BP implies different source from those in the later period because the terrigenous input is dominant in this period and occupied by an orderly layer of expandable minerals (OLEM). Strengthened sea ice extension is deemed to the main reason for the high terrigenous input in the polar NS before 21.5 ka BP. Between 21.5∼16.5 cal. ka BP, biogenic materials increase accompanied with the decrease of terrigenous contribution indicates the impact of northward intrusion of NAC and the strenghthen of water ventilaiton in polar NS. The decrease of biogenic substance and the increase of terrigenous input during 16.5∼10 cal. ka BP is consistent with the fluctuation in the melting of ice sheet and intensity of NAC during the last deglaciation. Compare with the early stages, the sediments after 10 cal. ka BP have high biogenic contribution and the magnitude of changes is relatively high, which reflects the controling effects of NAC and TC changes on the sediment sources in the polar NS.