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# Changes in current system in the Arctic Ocean since the last glacial period: A mineralogical approach

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Changes in current system regulate the fate of sea ice in the Arctic Ocean and is involved in the processes of global climate changes via ice albedo feedback and the delivery of freshwater to the North Atlantic Ocean. Past changes in the current system and their relationship to global climate changes are, however, not clear. The Chukchi Sea is located at the region where the East Siberian Current (ESC) meets the Beaufort Gyre circulation (BG) and becomes the Transpolar Drift (TPD). Bering Strait Inflow (BSI) transports detrital matter from the Bering Sea to the Chukchi Sea. We can thus reconstruct changes in ESC, TPD, BG, BSI by analyzing sources of detrital matter in Chukchi Sea sediments.

In this study, we analyzed mineral composition in the cores retrieved from the Chukchi Sea and the Chukchi Borderland and the surface sediments from the Bering Sea, the Chukchi Sea, and the Chukchi Borderland (the Northwind Ridge to the Mendeleev Ridge) by XRD and assigned the sources of detrital matters.

Analysis for surface sediments indicated that chlorite/illite ratio is higher in Bering Sea and decreases northwards in the Chukchi Sea, reflecting the influence of the BSI. In the Chukchi Borderland, feldspar/quartz ratio is higher in Siberian margin and lower in Alaskan margin, reflecting the ice drift by the ESC and the BG. Dolomite intensity is higher in Alaskan margin, reflecting the ice drift of the BG.

Analysis for six cores from the northern Chukchi Sea and the Chukchi Borderland indicated that feldspar/quartz ratio was lower and dolomite intensity was higher in the last glacial than in the Holocene. This indicates that the BG was more intensified in the LGM than in the Holocene. Feldspar/quartz ratio gradually increased in the early Holocene and reached to the same level of the late Holocene at 6 ka. Chlorite/illite ratio gradually increased in the early and middle Holocene and reached the same level of the late Holocene at 3 ka.

Keywords: The Arctic Ocean, The Chukchi Sea, Last glacial, The Holocene, Current, Mineral