Sediment provenance of the East Siberian Arctic shelf: evidence from clay minerals and chemical elements

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Grain size, clay minerals and major and trace elements of surface sediment samples collected from the East Siberian Arctic shelf are analyzed. Based on factor analysis and cluster analysis the study area is classified into four provinces, the main sediment sources of each province is discussed. The results show: province I covers the coastal estuary of the Kolyma River and the Indigirka River. The sediments are mainly composed of silt and sandy silt, and characterized by highest content of SiO₂, TiO₂, Zr, Sr and low content of other elements. Illite is dominant which accounting for 70% of the whole clay minerals. This area is strongly influenced by terrestrial sources from the Kolyma River and the Indigirka River. Province II is located in the middle of the East Siberian Sea, where the sediments are generally silt and mud. The content of Al₂O₃, K₂O, MnO and Ni are relatively high. Clay minerals composition is similar to Province I, but MnO/TiO₂ ratio is higher. The sediments in this area are mainly fine-grained imported by rivers, which are also influenced by sea ice process. As the distance increasing offshore, the content of marine authigenic components begin to increase. Province III is located in the northern East Siberian Sea, sediments there are mainly mud. Elements such as Al₂O₃, K₂O, V, Li reach the maximum value in this area. The content of illite is the lowest, semctite and kaolinite reach the maximum (>10%). Fine sediments in this area are probably influenced by Atlantic waters and the Beaufort Gyre. Province IV is located in Chukchi Sea where the sediments consist of silt and sandy silt. Elements are characterized by higher contents of CaO, P₂O₅, and the content of Chlorite reach peak (>20%). Sediments in this area are significantly influenced by the Pacific inflow water.

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