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Characteristics of the Russian shelf seas in the Arctic Ocean regarding the content of heavy minerals in surface sediments: new data

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Such factors as climate, currents, morphology, riverine input, and the source rocks influence the composition of the sediments in the Arctic Ocean. Heavy minerals being quite inert in terms of transport can reflect the geology of the source rock clearly and indicate the riverine input. There is a long history of studying the heavy mineral composition of the sediments in the Arctic Ocean. The works by Vogt (1997), Kosheleva (1999), Stein (2008), and others study the distribution of the minerals both on a sea scale and oceanwide. The current study covers Russian shelf seas: Barents, Kara, Laptev, East Siberian, and Chukchi Seas. To collect the material several data sources were used: data collected by the institute VNIIOkeangeologia during numerous expeditions since 2000 for mapping the shelf, data from the old expedition reports (earlier than 2000) taken from the geological funds, and datasets from PANGAEA (www.pangaea.de). About 82 minerals and groups of minerals were included in the joint dataset. The density of the sample points varied significantly in all seas: 1394 data points in the Barents Sea, 713 in the Kara Sea, 487 in the Laptev Sea, 196 in the East Siberian Sea, and 245 in the Chukchi Sea. These data allowed comparing the areas in terms of major minerals and associations. Maps of prevailing and significant components were created in ODV (Schlitzer, 2020) to demonstrate the differences between the seas and indicate the sites of remarkable changes in the source rocks. Additionally, the standardized ratio was calculated to perform quantitative comparison: the sea average was divided by the weighted sea average and then the ratio of that number to the mineral average was found. Only the minerals present in at least four seas and amounting to at least 20 points per sea were considered. As a result, water areas with the highest content of particular minerals were detected. The ratio varied from 0 to 3,4. Combining the ratio data for various minerals allowed mapping specific groups or provinces for every sea and within the seas.

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