



Deposition of diatoms within “marginal filter zone” of the Eurasian Arctic Shelf Seas: implication for paleoenvironmental reconstructions

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Marginal filters are formed within the riverine freshwater and seawater mixing zones in river mouths and adjacent shelf areas (Lisitsin, 1995). Ninety percent of riverine suspended matter is trapped in marginal filter zone, and rapid accumulation (precipitation) of fine-grained suspension occurs due to large-scale coagulation processes under salinities of 2 to 10 (Lisitsin, 1999, 2003). Biological processes, in particular diatom accumulation, within this zone are of special importance but still remain largely unknown. From this point of view, the Eurasian Arctic shallow seas receiving approximately 90% of the total river run-off discharged to the Arctic Ocean are of a key importance for understanding processes of diatom and Si accumulation in one of the most widespread water bodies on the Earth.

Our studies are focused on diatom assemblage records from sediments of the Kara and Laptev seas (Siberian Arctic), which were examined in relation to environmental conditions. Diatom assemblages in surface sediment samples from the Ob and Yenisei estuaries and the adjacent inner Kara Sea shelf indicate that diatom concentrations reflect the biological productivity in surface waters along with specific processes of diatom valve deposition in the zone of intermixing of fresh and marine waters. Low productivity of the Kara Sea waters generally corresponds to low concentrations of marine and brackish-water diatoms in the sediments. An inverse relationship between

total concentration of diatom valves in sediments and surface water salinity has been found. Extremely high abundances of diatom valves (up to 83 mill. valves/g) of predominantly riverine planktonic species are observed in the outer Ob and Yenisei estuaries and related to a zone with rapid deposition of riverine organic matter corresponding to the summer surface water salinity < 8 . Concentration of diatom valves in surface sediments generally decreases further offshore, thus being in a good accordance with opal distribution pattern in the Kara Sea surface sediments (Nurnberg, 1996). A sharp decrease in the concentration of diatom valves is observed beyond this mixing zone (down to 3-5 mill. valves/g) with salinities $> 8-9$. Processes of biosedimentation begin to play their part as the primary production increases, which is associated with salinities between 12 and 15. The strong decrease in abundances of diatom valves in the surface sediments seaward caused both by low productivity of marine waters and by the dissolution of fragile valves of sea-ice species.

Diatom surface sediment records were employed to study temporal and spatial changes of Siberian river runoff to the Kara and Laptev seas since 11 cal. ka. Based on downcore diatom assemblage distributions and detailed chronological control this study offers the Holocene history of riverine runoff and its influence on sedimentary processes within the marginal filter of the Siberian Arctic seas under the Holocene sea-level rise.

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