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Recent Sedimentation in the East Siberian Sea Shelf

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The continental shelf of the East Siberian Sea (ESS) is the widest and shallowest in the World Ocean, yet it is the least explored. The wide shelf acts as an important region for terrestrial export, and processing of organic matter before the material is transported into the deeper basins of the Arctic Ocean. The ESS accumulates a strong terrestrial signal induced by summertime coastal erosion and riverine outflow (Kolyma and Indigirka). The latter is responsible for a seasonally, highly variable transport of significant amounts of suspended load onto the shelf.
In the present study we summarize our sediment sizing results obtained in the shallow (< 40 m) ESS from hundreds of sediment samples obtained by Laboratory of Arctic Studies of the Pacific Oceanological Institute in cooperation with the International Arctic Research Center of the University Alaska Fairbanks based on expeditions during 1999-2007. Last summer (2008), in the framework of the International Siberian Shelf Study (ISSS-08) and in cooperation with Stockholm University we extended the study area to the outer shelf. Final product of this collaborative work is an updated lithological map, which describes the top layer of the sediment (a typical sample was taken from the upper 0–5 cm layer of bottom sediment). Nine lithological types of sediments, each in turn subdivided into various granulometric fractions, were identified and described in connection with hydrological and sedimentation conditions. These include: psammite medium-grained (Ps2) and fine-grained (Ps3), psammite aleuritic (PsA) and psammite pelitic (PsPl), aleurite pelitic (APl), pelite aleuritic (PlA), pelite (Pl), mictit psammitic (MPs) and mictit pelitic (MPl). Influence of coastal erosion as powerful source of fine-grained terrigenous material is shown in accumulation of sediments (APl, PlA, Pl) both on the open shelf and nearshore zone. Growing contribution of aleurite and psammite fractions accompanied with reduction of pelite indicates strengthening of currents. Quartz/Feldspar (Q/FS) ratios in the Western and Eastern ESS areas are the same (Q/FS=0.26), while the Q/FS ratios typical for the Lena solid discharge are 10 times higher; Q/FS ratios range between 2 and 2.3. This evidence indicates a hitherto neglected direct influence of Lena transport of particulate material into the ESS.