

SEDIMENT AND ORGANIC CARBON FLUXES IN CONNECTION WITH ERODING PERMAFROST COASTS OF THE SIBERIAN ARCTIC

M.N. Grigorlev ¹, A.A. Vasillev ², V.Rachold ³

¹Permafrost Institute, Siberian Branch of Russian Academy of Science, Yakutsk, Russia

²Earth Cryosphere Institute, Siberian Branch of Russian Academy of Science, Yakutsk, Russia

³Alfred Wegener Institute for Polar and Marine Research, Potsdam, Germany

During the last decade detailed coastal studies along the Arctic Seas have been conducted within the frame of the Arctic Coastal Dynamics (ACD) Program. The results indicate that shore dynamics play an important role in the balance of sediment and organic carbon in the Arctic basin. Arctic coastal sediment flux exceeds river sediment discharge and other terrestrial sediment sources. Based on newly obtained data, this presentation evaluates average coastal erosion rates as well as sediment and organic fluxes within the Siberian Arctic coastal zone.

The Siberian Arctic sector includes four seas: the Kara, Laptev, East Siberian and Chukchi Seas. The total length of the Siberian Arctic coastline, including the islands, is about 29,500 km. Most parts of this coast are characterized by very active coastal erosion processes. A considerable proportion of the Siberian Arctic coasts (especially for the Laptev and East Siberian Seas) consists of ice-rich permafrost deposits, which are rapidly reworked by sea erosion. It has been found that the coastal sediment flux into the seas listed above plays a dominant role in their sediment budget. Based on the amount of coastal sediment released to the sea and the average organic carbon contents of the key types of coastal deposits, the total organic carbon (TOC) supplied to the Siberian Arctic Seas (SAS) has been estimated. The assessment of these lithologic-dynamic parameters is based on unified methods, which involve detailed coastal segmentation and GIS-analyses.

The calculated values of the sediment and TOC fluxes are considerably different from previously published data. Our results suggest that both coastal sediment flux (158 million tons per year) and coastal TOC flux (4.6 million tons per year) to the SAS significantly contribute to the Arctic Ocean sediment and carbon budget.

This study was supported by the INTAS (grant 01 - 2329).