

THE GIS-BASED QUANTIFICATION OF THE SEDIMENT AND ORGANIC CARBON FLUX TO THE LAPTEV AND EAST SIBERIAN SEAS THROUGH COASTAL EROSION

M.N. Grigoriev*, M. Lack** and V. Rachold**

** Permafrost Institute, Siberian Branch of the Russian Academy of Sciences, Yakutsk, Russia, ** Alfred Wegener Institute for Polar and Marine Research, Research Unit Potsdam, Germany*

Coastal erosion forms a major source of the sediment, organic carbon and nutrient flux into the Arctic basin. Numerous publications about coastal characteristics of that area are available in the literature. However, the portion of sediment and organic carbon that is supplied to the shelf from each type of erosive coastal sections is known insufficiently. For a detailed evaluation of the main parameters and effects of coastal erosion in the Laptev and East Siberian Seas the review and analysis of our own, new data and published information concerning coastal dynamics, shore composition, lithology, morphology, hydrodynamics and permafrost features was carried out.

Based on the available data a preliminary database of coastal dynamics and an assessment of the coastal sediment and organic carbon flux to these Arctic Seas were created. The development of a coastal dynamics database is founded on a detailed segmentation of the studied coast according to the parameters indicated above. This segmentation is based upon the detailed classification of erosional and accumulative shores of the Laptev and East Siberian Seas. The results are incorporated in a digital map, which is the main component of the coastal database. The local (regional) database is organized in ArcInfo/ArcView GIS-format. These studies allow us to summarize cumulative data on coastal dynamics as well as to estimate the coastal sediment input for those seas where the influence of permafrost peculiarities is most important. A segmentation of the Laptev Sea coastline was performed as a first step towards a GIS-based quantification of the Arctic sediment and organic carbon fluxes resulting from coastal erosion.

At this stage a preliminary GIS-based database of the Laptev Sea coastal dynamics is available. All main coastal parameters including sediment and organic carbon flux are introduced to the database and characterized by average values within each of the 73 selected coastal segments. Our previous estimation of the annual coastal sediment and organic carbon input was 58.4 and $1.8 \cdot 10^6 \text{ t yr}^{-1}$ respectively. The new GIS-based quantification suggests similar values: 62.2 and $1.63 \cdot 10^6 \text{ t yr}^{-1}$.

The East-Siberian Sea coast is not investigated in such details yet. Nevertheless, we can roughly quantify coastal sediment and organic carbon input as 66.5 and $2.2 \cdot 10^6 \text{ t yr}^{-1}$.