



Modern processes controlling the sea bed sediment formation in Barents Sea

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The Barents Sea is one of the key regions for understanding of the postglacial history of the climate and circulation of the World Ocean. There are the limits of warm North Atlantic waters penetration to the Arctic and a zone of interaction between Atlantic and Arctic waters.

The Barents Sea's limits are the deep Norwegian Sea in the West, the Spitsbergen Island and the Franz Josef Land and the deep Nansen trough in the North, the Novaya Zemlya archipelago in the East and the North shore of Europe in the South.

An analysis of Eurasian-Arctic continental margin shows correspondence between the rift systems of the shelf with those of the ocean. This relation can be observed in the central Arctic region. All the rift systems underlying the sediment basin are expressed in the sea bed relief as spacious and extensive graben valleys burnished by lobes.

Two transverse trenches cross both shelf and continental slope, namely the Medvezhinsky trench between Norway and Spitsbergen in the West and the Franz Victoria trench between Spitsbergen and the Franz Josef Land in the North. The Barents and the Kara Seas are connected by the Kara Gate Strait and wide transverse trough of Saint Anna in the North-West.

The recent assessment of the eolian solid sediment supply to the Barents Sea is about 0.904 tons. The Barents Sea as a whole should be considered as "starving" in terms of its feeding with solid sediment matter. Observations show the considerable part of the sea bottom to be free of Holocene sediment cover. The more ancient Quaternary units or bedrock can be seen at the bottom surface. This phenomenon is the most typical for arches of relatively shallow elevations. Thick accumulations of new sediments are connected with fjords.

The amount of sea ice delivered from the Barents Sea to the Arctic Ocean is 35 km³ a year. This value should be added by iceberg delivery from the North island of Novaya Zemlya, the Franz Josef Land, the Spitsbergen Island and North Norway but most of terrigenous matter settles in natural sediment traps of fjords.

The Barents Sea bottom has rather dissected relief. A number of isometric or, rarer, elongated underwater elevations (Perseus, Central, the Admiralty Bar, the Goose shoal) and separation trenches and troughs (South and North Barents Sea troughs, Perseus, Aldanov, Medvezhinsky, Franz Victoria, West and South Novozemelsky trenches) can be distinguished.

The major processes that control a structure of the friable sedimentary cover of Arctic shelves appear on the seismic acoustic records as chaotic effect of cryolithogenesis (permafrost, themokarst, thawed patches, paleoriverbeds, etc.) and hydrocarbons migration (gas hydrates, gas saturated sediments, gas seeping, porkmarks, etc). Such phenomena are the main components of geo-risks for oil and gas fields development in Arctic Seas and are, together with the gas hydrates deposits, the top priority objects of seismic acoustic measurements.

The shelf of the Barents Sea is one of the most extensively studied with high resolution acoustic methods because of large-scale engineering and geological problems solved in process of its industrial development. Mainly, it is related to exploring and development of oil and gas fields, oil terminals and submarine pipelines construction, and building up the whole infrastructure for their exploitation.