The Neva Bay (Russia) – anthropogenic lagoon

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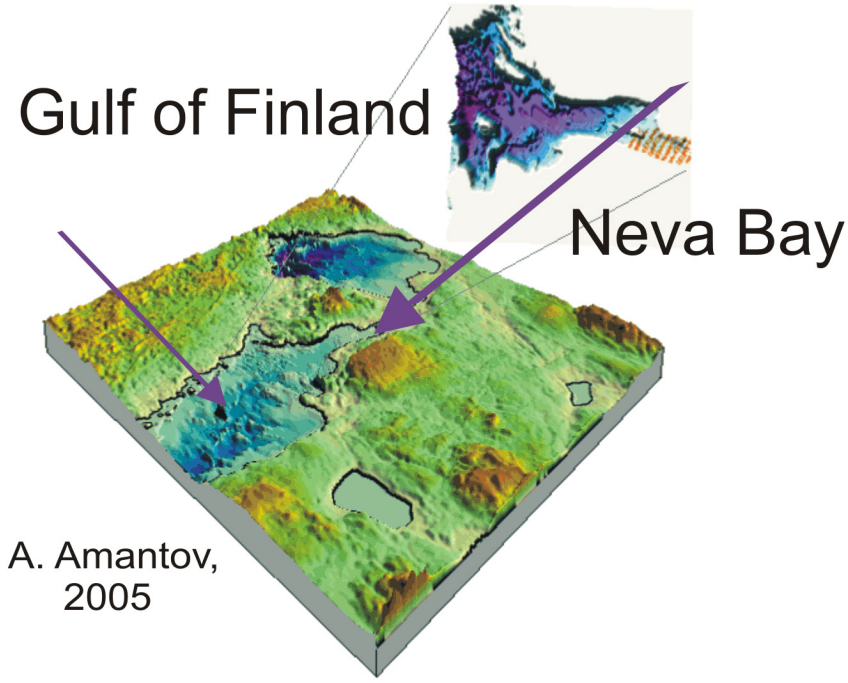
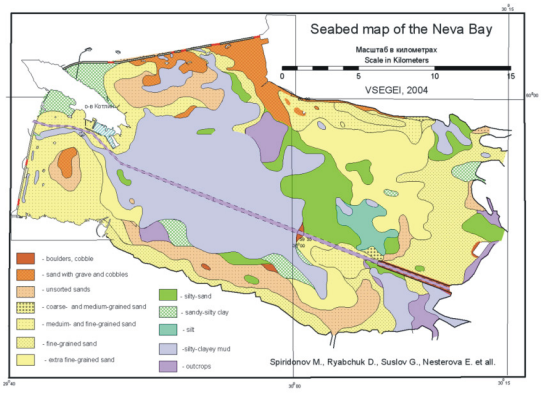


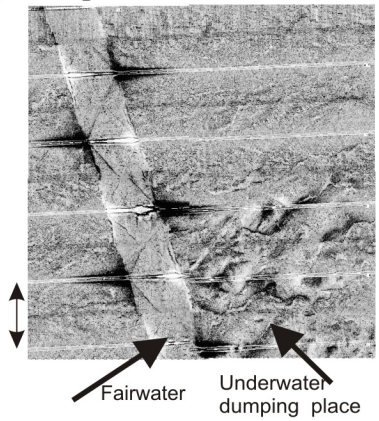
Location. The Neva Bay is the eastern and the most shallow part of the Gulf of Finland (Fig.1). It is 21 km long, 15 km maximal wide, its water surface area is 329 km^2, average depth 3.5 m and water mass volume about 1.2 km^3. The maximal depths are observed at the centre-western part of the Bay (5-6 m) and within former underwater sand-mining careers (10-12 m). The Neva Bay can be considered as specific anthropogenic lagoon since 1980 when it was practically separated from the eastern Gulf of Finland by the St.Petersburg Flood Protective Dam. At present total width of 6 channels (gates) including Main Marine Channel connecting the Neva Bay with the open sea is about 1 km.

Hydrology. The hydrological regime of the Bay is very changeable because of frequent changes of hydrometeorological parameters, shallow-water condition and influence of strong Neva River current. Water level fluctuations, wind waves and currents are the most important hydrodynamic factors here. Surface water current (up to 10 cm/sec) at the Neva Bay goes to the western direction. Brackish near bottom water current goes along the southern coast of the bay to the east. Neva Bay water has a very low salinity (0.3 – 1.0‰) and just as a result of strong near bottom currents of eastern direction it can grow up to 3‰. Fast extreme rising of the water level (floods - higher than 1.6 meters above the average level) caused by complex combination of several hydrometeorological factors is a specific phenomena in the Neva Bay. During the period since foundation of St.Petersburg in 1703 up to the present more than 300 floods were observed. The maximal catastrophic floods took place at 1777 (3.21 m), 1824 (4.21 m) and 1924 (3.80 m).



Bottom sediments. Most part of the Neva Bay bottom is covered by sands and silty-sands (Fig.2, 3). The stable silty-clay accumulative processes in the eastern Gulf of Finland take place in the bottom depressions deeper than 30 meters. But in the Neva Bay the silty-clay mud accumulative areas are fixed at the sea depths from 4 to 6 meters. Both analytical data and investigation of archive materials permit to conclude that during last two centuries sedimentation processes in the Neva Bay have changed and special condition for silty-clay mud accumulation have extremely developed. Anthropogenic activity is among the main factors provoking these processes.

Since St.Petersburg foundation in 1703 the Neva Bay is under the constantly growing technogenic load. As a result of these processes bottom relief of the bay was considerably transformed and special technogenic sediment facies were formed. Locally mainly in the anchor riding areas, near St.Petersburg port and in the Neva River mouth some areas of contamination of the bottom sediments are fixed. At present complex investigations of the Neva Bay are of high priority because of the new construction of St.Petersburg passenger harbour accompanied with essential transformation of the bay bottom (new territories creation, fairways excavation and so on).



References: M.A.Spiridonov, D.V.Ryabchuk, V.A.Shachverdov et all. The Neva Bay. Environmental Geology. S.Petersburg, 2004. In Russian.
Geoecological Atlas of the eastern part of the Gulf of Finland. Ed.M.Spiridonov and V.Pitulko. S.-Petersburg, 2002