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The dynamics of the coastline of the Eastern Gulf of Finland: the natural processes and human activities on the natural disasters prevention.

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. **Introduction**

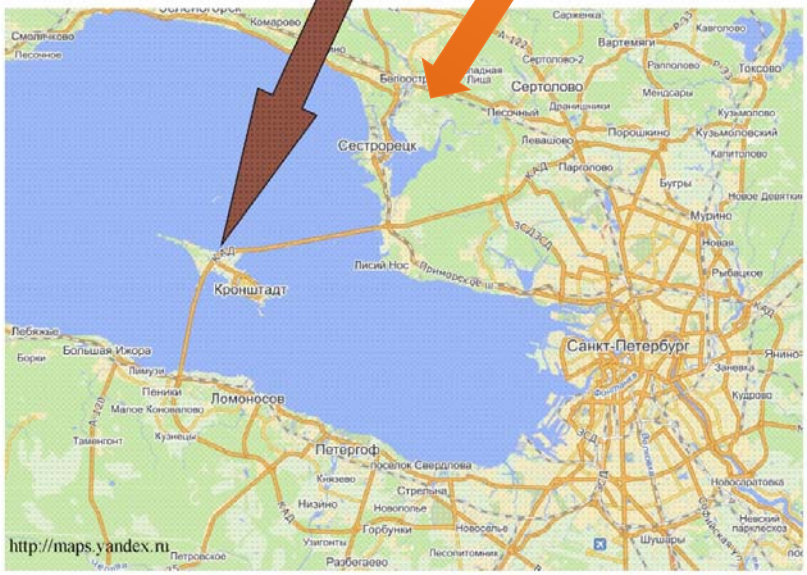
Reconstruction the dynamics of the coastline **Eastern Gulf of Finland**, in particular **the Kotlin Island and the Neva Bay** (coastal part of the Saint-Petersburg agglomeration, Russia), based on:

- the paleogeographic data,
- the data of long-term instrumental observations over the level of the Baltic Sea, covers the period in 100-200 years,
- literary and archival data,
- satellite images of recent decades showing anthropogenic changes.

Sestroretsk Lowland

Eastern Gulf of Finland

The Kotlin Island and the Neva Bay

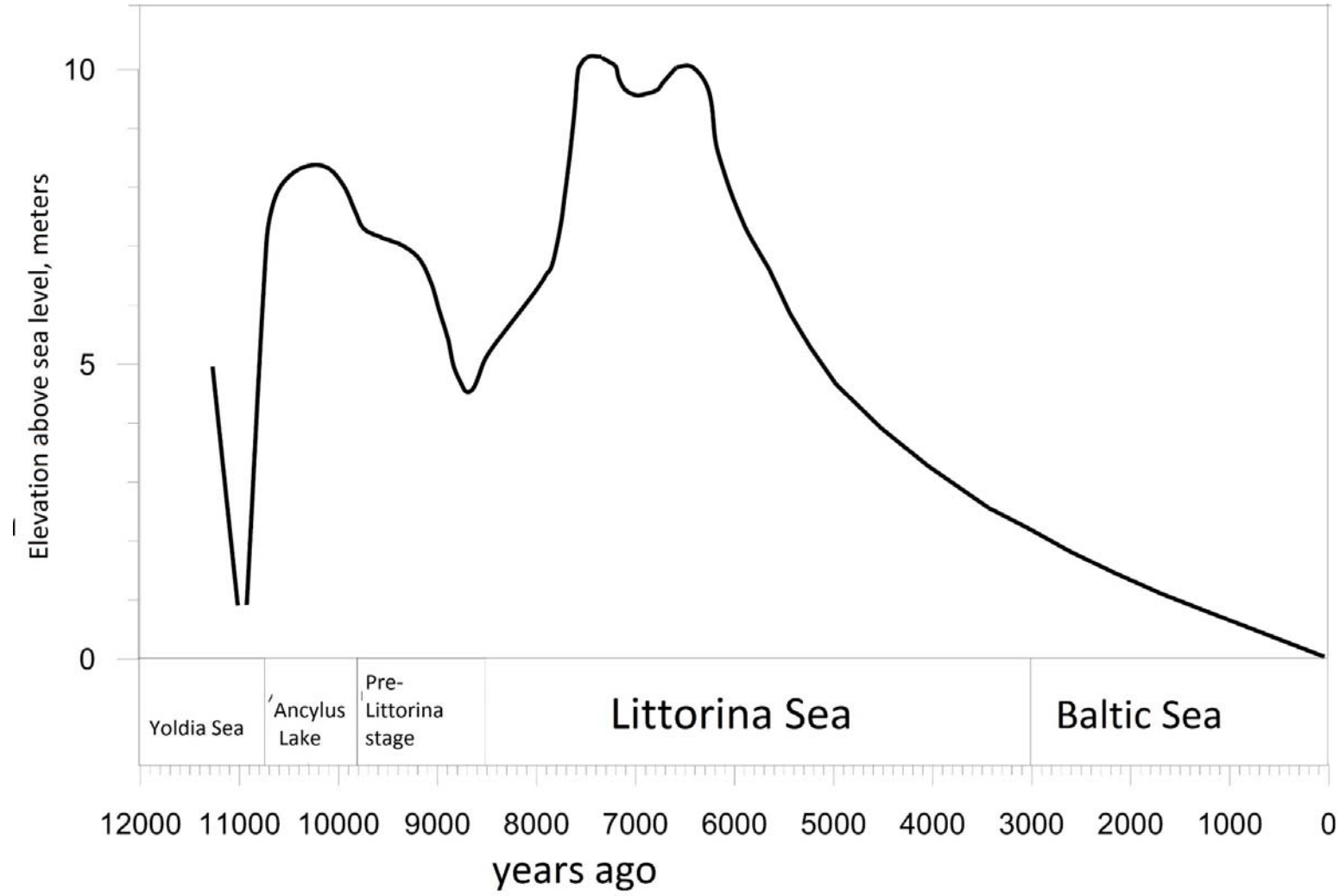


St.-Petersburg agglomeration

Shoreline change of the Eastern Gulf of Finland in the post-glacial time associated with a complex combination of vertical glacioisostatic tectonic movements and fluctuations in water level due to the melting of the glacier. Contemporary Gulf coastline generally determined at the end **Litorinal time**.

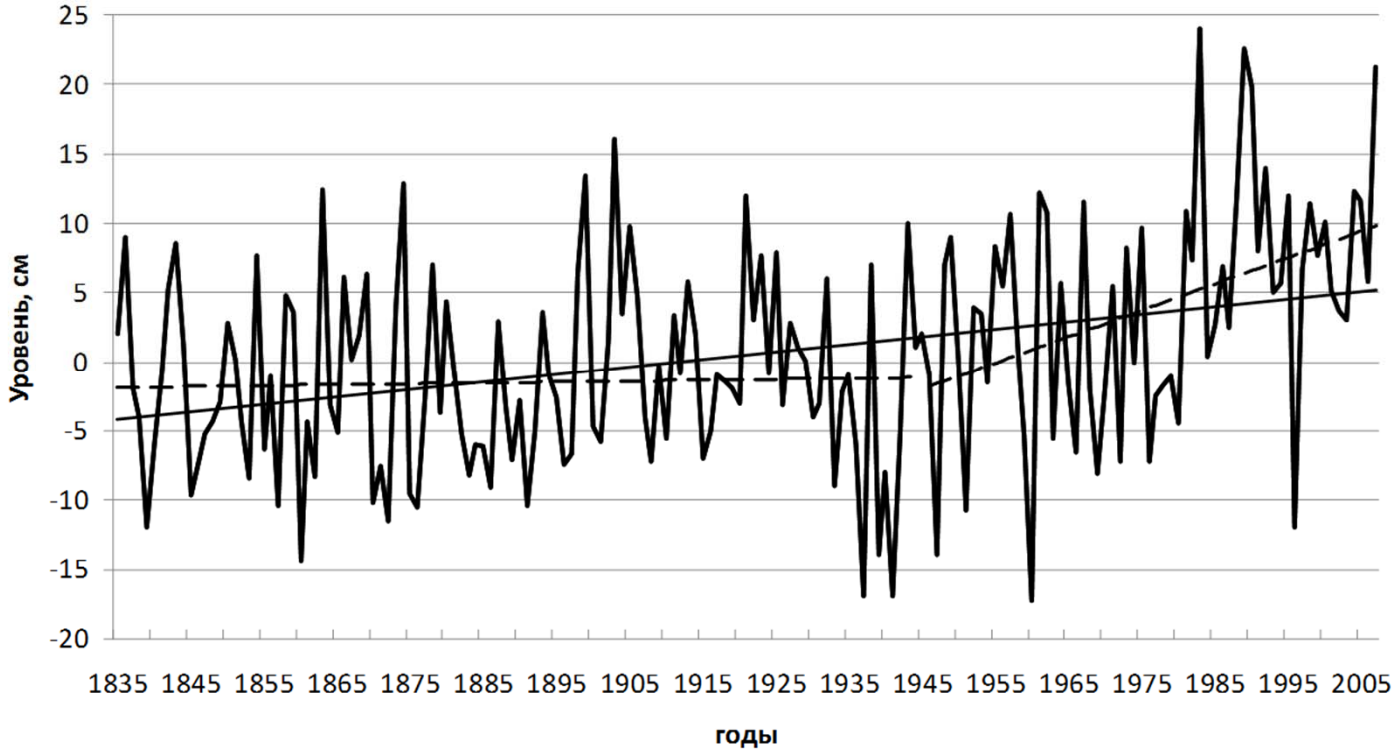
After lowering the level of Litorinal sea about three thousand years ago, to date, there were only minor fluctuations in the level of 3-5 meters.

At the present stage eustatic factors (evaporation, precipitation, river water tributary, water exchange) have a determining influence on the trend level of the Baltic Sea
(Kaplin P.A. et. al., 1999, Gordeeva S.M. et. al., 2010).



Fluctuations in the level of the Baltic Sea in the eastern part (Gulf of Finland) during the Holocene

(Sandgren P. et al., 2004)



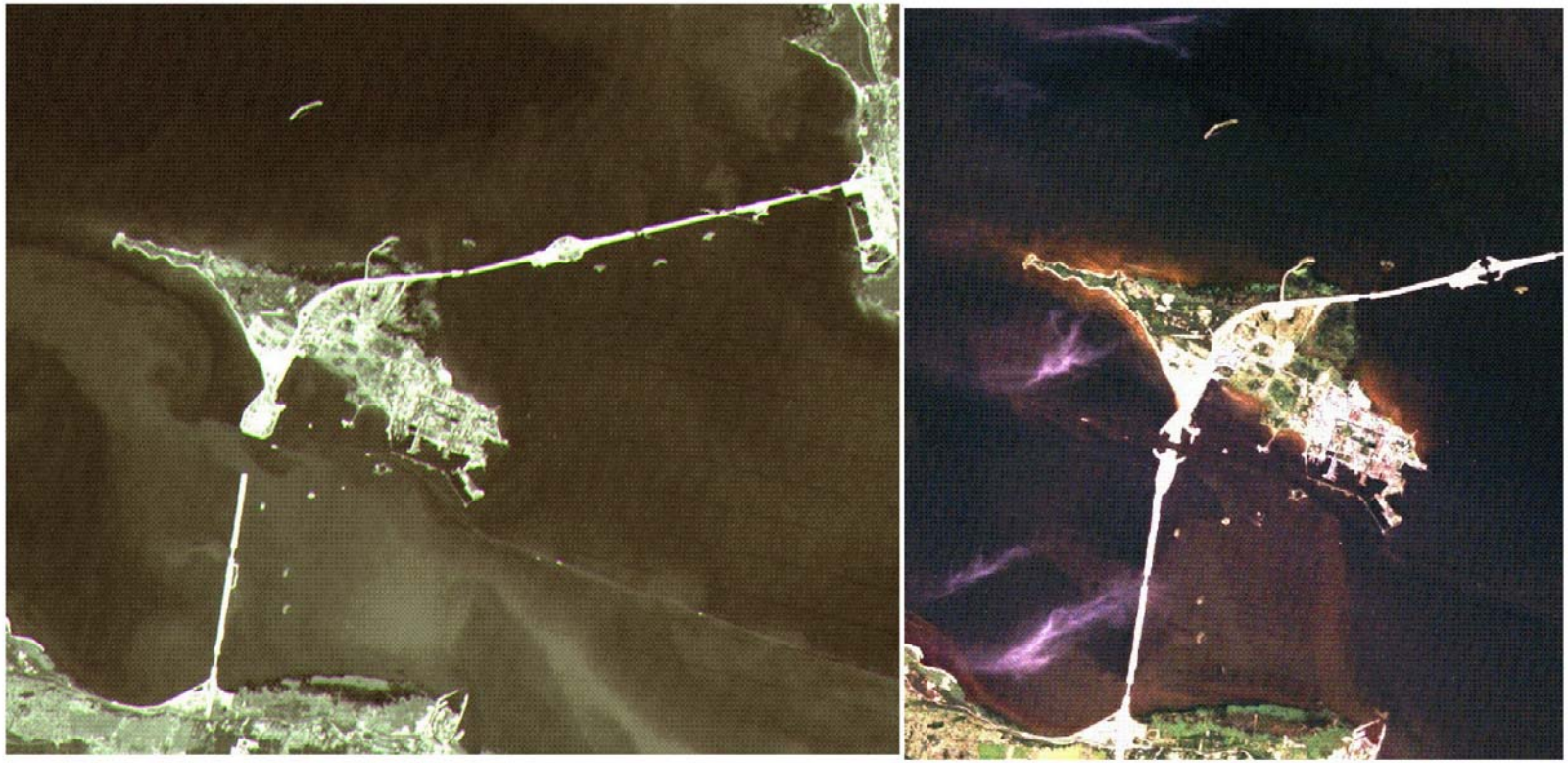
Interannual variations of sea level in Kronstadt in 1835-2007

(Gordeeva S.M. et al., 2010)

Due to 300 years of human activity associated with the development of the city of St. Petersburg, construction of embankments and quays the natural features of the coastal zone of the Neva Bay has undergone significant changes.

Recent decades building the Complex of protective constructions against floods (giant dam), creating artificial inwashed areas radically change coastline of the Neva Bay.

Periodic fluctuations in sea level (storm surge, seiches), reaching 5-6 meters amplitude (Spiridonov M.A. et. al., 2004) also have an impact on the coast of bay. Therefore, the problem of natural disasters like floods is traditional for St. Petersburg.



Satellite images of recent years showing building protective structures against floods, creating artificial inwashed areas, changing coastline of the Kotlin Island.

Stage of development areas near lake Sestroretsky Razliv during Baltic Littorina transgression maximum (7500 calendar years ago), when sea level reached + 8-10 meters above contemporary sea level

(Yakovlev S.A. 1925, Subetto et al., 2014)

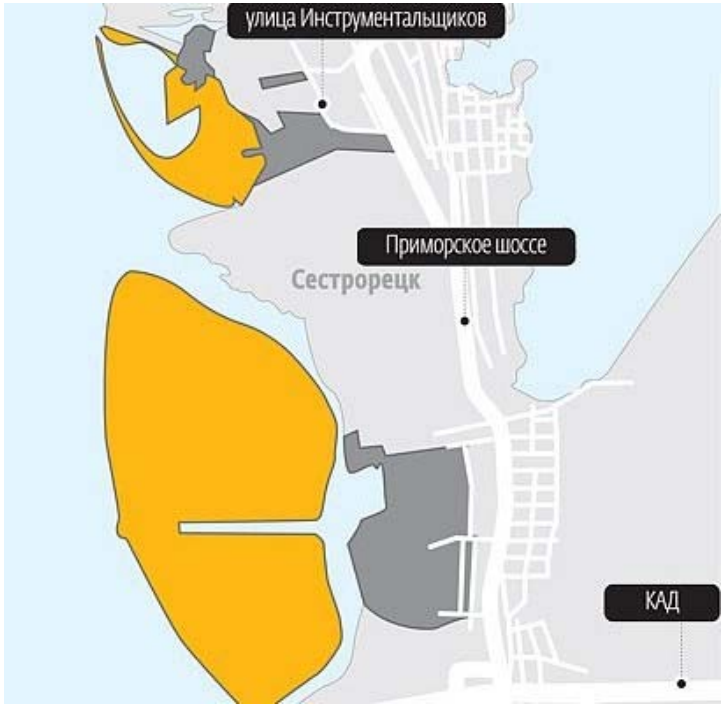
Stage of development areas near lake Sestroretsky Razliv about 7,000 calendar years ago, with an insignificant decrease / stabilize sea level. Spits and bay-bars formed, separating Sestroretsky bay from the sea and forming a lagoon.

(Yakovlev S.A. 1925, Subetto et al., 2014)

Lake stage of development areas near lake Sestroretsky Razliv with the gradual lowering Baltic water lavel after 6500 calendar years ago.

Lake stage of development areas near lake Sestroretsky Razliv with the gradual lowering Baltic water lavel after 6500 calendar years ago. Drainage and lowering of the lake, gradual bogging Cestroretsky lowlands as further the reduction of sea level and it reaches the contemporary levels.

As such, the area of the disappeared Sestroretsk Lake had existed till the beginning of the XVIII century when it was flooded again with a dammed water of the rivers Sestra and Chernaya, thereby modern Sestroretsk Razliv Lake was formed.



http://zmdosie.ru/proekty/podrobnosti/377-sestroretskij-namyv

http://vsekommentarii.com/news/2012/04/20/6086427.htm

Modern commercial project creation of artificial inwashed areas (new housing area) near Sestroretsky Razliv

. Conclusions

In the dynamics of changes in the coastline of the Eastern Gulf of Finland on the basis of the relation of natural processes and human activities (in many ways caused by the need to protect against floods) can be distinguished several periods.

1. Formation of natural coastal zone in post-glacial time, the appearance of the main features of the present coastline.
2. Technogenic period (over 300 years), caused by the foundation and the development of St. Petersburg.
3. Intense changes of the coastal zone in recent decades caused by the construction of protective structures against floods (1979-2011) and the creation of artificial dry land in the water area.

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Thank for your attention!

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