

## **The study of the hydrological regime extreme effects of the Caspian Sea during the XX-XXI centuries**

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The Caspian Sea - the unique largest enclosed inland body of water on Earth. Significant periodic sea level fluctuations are a typical feature of the sea. In the XIX-XX centuries a number of comprehensive studies of the Caspian Sea was carried out. The results are published in the papers, monographs and climatic atlases.

But a number of fundamental questions about the features of the hydrological regime of the Caspian Sea is still open:

1. How does the water circulation change during the level variations?
2. What is the effect of heterogeneity of evaporation from the water surface on the formation of the flow field in the conditions of long-term level changes?
3. How does the water salinity regime change depending on the sea level position, water circulation, river flow and different climatic influences?
4. What is the effect of extreme events (multi-hazards) (ice, storms, destruction of the coasts) on coastal infrastructure?

In 2016, the project aims to study hydrological regime extreme effects of the Caspian Sea was supported by the Russian Foundation for Basic Research. Within this project all of the above problems will be solved.

Geographic information system "Caspian Sea" for the storage and data processing, including a database of primary oceanographic information for the period of instrumental observations (1897-2013), cartographic database (1921-2011) and tools for multidimensional analysis of spatio-temporal information is the basis of the study.

The scheme of interconnected hydrodynamic models (Caspian Sea MODel - Ocean Model - Wind wave model) was developed. The important factors are taken into account in the structure of the models: long-term and seasonal dynamics of the sea waves parameters, new long-term values of evaporation from the shallow waters areas of the Caspian Sea, water circulation.

Schemes of general seasonal circulation of the Caspian Sea and the Northern Caspian at different positions of the sea level in XX-XXI centuries using interconnected models will be reconstructed. Forecast of seasonal water circulation for the most probable climate change scenarios in the future will be done. Conceptual scheme of calculations of the multi-hazards (ice storms, the destruction of the coasts) in the Caspian Sea was developed. The similar method of calculation was successfully applied to the prediction of natural hazards in the Sea of Azov.

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