



## **Numerical simulation of circulation in Kara and Pechora Seas using the system of operational diagnosis and forecast of the marine dynamics**

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The system of operational diagnosis and forecast (SODaF) is presented for hydrometeorological characteristics of Kara and Pechora Seas, which is implemented in the N.N.Zubov State Oceanography Institute (SOI). It includes the computation of atmospheric forcing using the WRF model, computation of currents, sea level, temperature, salinity and sea ice using the model INMOM, and computation of wind wave parameters using Russian Wind Wave Model (RWWM). The results of the verification are presented including simulated hydrometeocharacteristics obtained by SODaF for Kara and Pechora Seas. As well, the retrospective simulation was performed for thermohydrodynamical characteristics of these seas for the ice-free period of 2003-2012. The important features of circulation in Kara and Pechora Seas and the structure of water exchange between them in the ice-free period are shown.

The use of non-hydrostatic atmospheric model WRF allows one to reproduce katabatic winds formed over the glaciers. In general, the direction and speed of katabatic winds are fairly permanent. In accordance with the nature of katabatic winds, they are intensified from warm to cold period that is well manifested in the wind map for August.

The basis of the Kara Sea circulation is NewLand, Yamal and Ob-Yenisey currents, which are well reproduced with the INMOM. It is shown that the main contribution to the monthly mean circulation of Kara and Pechora seas is made by wind currents. In the western part of the Kara Sea between the mainland and the New Land in the fall the pronounced cyclonic circulation is formed that is typical for closed seas. The main components of the circulation are the NewLand and Yamal currents flowing respectively along the eastern coast of NewLand and the western coast of the Yamal Peninsula. It is caused by regional winds directed from the "cold" land to the "warm" sea. In summer, such a circulation is broken along the coast of the mainland, so that the Yamal flow is reduced. This happens because the significant contribution to the wind circulation is made by movement of air masses from the "cold" sea to the "warm" land. The same effect influences the intensification of the Ob-Yenisei current in autumn and its weakening in the summer.

Katabatic winds form anticyclonic (in relation to the islands) circulation around NewLand and NorthLand islands. The most prominent structure of the circulation is NewLand current. Water exchange through the Kara Gate in the ice-free period is proceeding so that the outflow from Kara to Pechora Sea occurs along the New Land, and at the opposite coast of the Kara Gate, on the contrary, the inflow in the Kara Sea appears. Outflow is formed by NewLand current. This occurs not only in the surface layer, but also over the whole depth, as indicated by the sea level distribution. At the same time, outflow from the Kara Sea in the ice-free period prevails over inflow.