



Numerical investigation of the thermal regime of the Black Sea upper layer in conditions of alternation of atmospheric circulation processes

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Studying of exchange processes of heat, mass and momentum between the ocean and atmosphere are very important first of all because of their considerable role in formation of weather and climate. The Black Sea region in this respect deserves the significant attention. Overview of scientific literature shows that there is not common opinion about present and future climate changes in this region. From this point of view the studying of processes connected with formation of thermal regime in the upper layer of the Black Sea (generally, in the upper layer of the World ocean) is very important first of all because of its active role in the sea – atmosphere interaction. Just this layer is connecting link between the atmosphere and lower layers of the sea (ocean) and its thermodynamic state significantly defines thermal regime of the lower layers of the atmosphere.

This paper addresses to the studying of processes of heat transport and vertical changeability of the thermal regime in the mixing layer of the Black Sea, also changeability of heat content in conditions of strongly variability of averaged atmospheric circulation processes in the inner-annual time scale and thermohaline impact, which is changed from monthly to monthly only. With this purpose a 3-D baroclinic prognostic Z-level model of the Black Sea dynamics (Kordzadze and Demetashvili) by 5 km resolution with taken into consideration absorption of short –wave radiation by the sea upper mixed layer is used.

The analysis of numerical experiment on modelling of inner-annual variability of hydrological regime of the Black Sea showed that distribution of temperature field in the upper layer is correlated with features of the Black Sea non-stationary circulation, which in turn significantly depends on a changeability of atmospheric wind forcing. In addition, dependence of a thermal mode of the upper layer of the Black Sea on changeability of atmospheric circulation has different character in cold and warm seasons. For example, in January in cases of weak atmospheric circulation character of horizontal distribution of temperature field practically does not change by depth in the upper layer with thickness about 16 m. During warm season (on an example, April) such homogenous layer is not observed at any modes of atmospheric circulation.

The model results confirmed that the interaction between the sea and the atmosphere which is developed by affected of the nonstationary alternation of the atmospheric circulation plays a decisive role in the formation on the thermal regime in the mixing layer of the Black Sea .