



Numerical simulation of Black Sea circulation and pollution propagation in coastal waters of the Great Sochi

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The numerical modelling of the Black Sea (BS) is performed by using INMOM (Institute of Numerical Mathematics Ocean Model). The model is based on the primitive equations in spherical σ -coordinate system with free surface boundary condition. The numerical algorithm is based on the method of multicomponent splitting and has a flexible modular structure. The splitting with respect to physical processes and spatial coordinate is used.

A computational method is proposed of the polluting substances (PS) transport in the BS region adjacent to the Great Sochi. It is based on INMOM application for the BS in two versions: M1 and M2. In the M1 INMOM has a uniform spatial resolution ~ 4 km, while M2 has non-uniform one with refinement to 50 m in the BS region near Great Sochi coast. The M2 is used only during the periods of PS transport computation for which the initial hydrothermodynamic conditions are taken from M1. Both versions reveal complexity of the BS circulation nature, however, M2 more adequately reproduces eddy circulation due to higher horizontal resolution in its eastern part.

Hence, a suggestion is made that BS eddy structure simulation requires model resolution ~ 1.5 km, and the major factor of quasistationary Batumi anti-cyclonic gyre formation is the topographical features in this part of the sea. A computation of PS distribution from the rivers Sochi, Host and Mzymta and from 18 pipes of deep-water sewage production was performed for the high-water period from 01.04.2007 to 30.04.2007. It is shown that the significant contribution to PS distribution from these punctual sources is made by whirlwind mesoscale formations generating complicated 3-dimensional PS distribution.