Review

of a paper by Ivan Zavialov, Alexander Osadchiev, Roman Sedakov, Bernard Barnier, Jean-Marc Molines, Vladimir Belokopytov

"Water exchange between the Sea of Azov and the Black Sea through the Kerch Strait"

The paper is devoted to the description of the mechanisms forcing the penetration of low-saline waters from the Sea of Azov to the northeastern part of the Black Sea (and their subsequent distribution in the Black Sea) and high-saline Black Sea waters to the Azov Sea through the narrow Kerch Strait. Based on the analysis of satellite data and numerical simulation results, it is convincingly shown that the main driving force of this penetration is the action of the northeast wind. Water flow through the shallow and narrow Kerch Strait is a one-way process during the majority of the time. However the penetration of the Black Sea waters into the Sea of Azov is observed after the end of a long action of a strong northeastern wind. In both cases, the barotropic pressure gradient along the strait plays the primary role in the water exchange between the seas. The variations in freshwater runoff do not significantly affect the water exchange on an intra-annual time scale. It is also clearly shown that the Azov Sea waters in the Black Sea most often spread along the coast of the Crimea peninsula as a buoyant plume. The area of this plume and the distance to which it spreads along the coast of Crimea are functions of the product of the average northeast wind speed and the duration of its action.

The paper is very interesting and contains new significant scientific results, some of which are listed above. It should be published in the OS Journal after eliminating some of the shortcomings noted below.

1. In Section 2 «Study Area», too much attention is paid to the physical-geographical description of the Sea of Azov, which is not related to the main objectives of the paper. This part is proposed to be reduced somewhat.
2. Section 5 "Discussion and Conclusions" does not consider the impact of the Black Sea dynamics on the AP propagation distance along the Crimean Peninsula. However, in case with the developed Rim current, the most distant propagation of AP along the coast can be expected, and in case with the presence of a mesoscale anticyclonic eddy near the Kerch strait - the least distant propagation of AP can be expected. This issue should be considered.
3. On page 8 it is indicated that "stable density gradient that exists along the strait doesn't exceed 6 kg/m^3". An error is made here, since the indicated value characterizes not the density gradient along the strait, but the density difference, or jump along it.
4. On page 10, the "wind forcing index" is introduced, which is the product of the average speed of the northeast wind and the duration of its action. The authors are looking for the dependences of the AP area in the Black Sea and the AP propagation distance along the coast of Crimea from this parameter. However, the index, which is the product of the wind stress and its duration, should have a more clear physical value, because the wind stress (not its speed!) determines the Ekman transport, which creates a barotropic pressure gradient along the strait. Authors should find the dependencies of the above mentioned characteristics of the AP on this parameter.
5. The caption under fig. 5 indicates that the various graphs show the gradients of different characteristics along the Kerch Strait. In fact, they are not gradients but jumps, or differences along the strait.