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Modelling of Small River Runoff Transport in Coastal Sea

Victor Zhurbas, Peter Zavialov, Alex Sviridov, Dmitriy Lyzhkov, and Elena Andrulionis
Shirshov Institute of Oceanology, Moscow, Russia, zhurbas@ocean.ru

A numerical simulation has been undertaken to study transport of small river runoff by alongshore baroclinic sea currents. The study is based on implementation of the Princeton Ocean Model (POM) in the condition of a circular stratified basin whose surface is exposed to a transient tangential wind stress to form longshore baroclinic current. Baroclinic current of downwelling type (directed to the right respectively to a sea-oriented observer in the Northern Hemisphere) was shown to provide carrying-out of the river discharge from estuary's vicinity more effectively than baroclinic current of upwelling type (directed to the left respectively to a sea-oriented observer). Reduced ability of longshore baroclinic current of upwelling type to carry-out and mix river runoff is caused by two reasons. The first reason is a density front which is formed between the current's core and the seaside, (Note that such density front is absent in the case of downwelling-type baroclinic current). The density front prevents the river plume from being involved to the baroclinic current and, therefore, from its mixing with ambient waters. The second reason is opposite directions of the baroclinic current of upwelling type and a self-propulsion flow of the river plume (the latter is directed longshore to the right respectively to a sea-oriented observer). The modeling results are illustrated by some observational data from the Black Sea.