



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

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The Sea of Azov is a small, shallow and freshened sea that receives a large freshwater discharge and, therefore, can be regarded as a large river estuary. Under certain external forcing conditions low-saline waters from the Sea of Azov inflow to the northeastern part of the Black Sea through the narrow Kerch Strait and form a surface-advected buoyant plume. Water flow in the Kerch Strait also regularly occurs in the opposite direction, which results in spreading of a bottom-advected plume of saline and dense waters from the Black Sea in the Sea of Azov. In this study we focus on physical mechanisms that govern water exchange through the Kerch Strait, analyse dependence of its direction and intensity on external forcing conditions. We show that water transport from the Black Sea to the Sea of Azov is induced by gravity force and occurs in absence of moderate and strong northeastern winds, which is the main driving factor of water transport in the opposite direction, i.e. from the Sea of Azov to the Black Sea. Thus, direction and intensity of water exchange through the Kerch Strait has wind-govern synoptic and seasonal variability, and do not show dependence on river discharge rate to the Sea of Azov on intra-annual time scale. We determined numerical parameterizations based on wind forcing conditions, which define, first, discharge rate from the Sea of Azov to the Black Sea and, second, spatial characteristics of the related surface-advected plume in the Black Sea.