Inter-basin exchange in the Azov-Black-Marmara-Medirerranean Seas system: unstructured-grid modeling

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In this paper we use the unstructured grid model SCHISM to simulate the thermo-hydrodynamics in a chain of baroclinic interconnected basins. The model shows a good skill in simulating the basic thermo-hydrodynamics. The superiority of the simulations compared to the ones in earlier numerical studies is demonstrated on the example of model capabilities to resolve the strait dynamics, gravity currents originating from the straits, high-salinity bottom layer on the shallow shelf, as well as the multiple intrusions from the Bosporus Straits down to 700 m. The comparison with observations shows that the timings and magnitude of exchange flows are realistically simulated, along with the blocking events. The short-term variability of the strait transports is largely shaped by the anomalies of wind. The two-layer flow in tree straits considered here show different dependencies upon the net transport, the spatial variability of this dependence is also quite pronounced. It has been shown that the blocking of the surface flow can occur at different net transports giving a caveat when using simple relationships to prescribe (steady) outflow and inflow, as done in previous research. Specific attention has been given to the he role of synoptic atmospheric forcing for the basin wide circulation and redistribution of mass in the Black Sea.