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Black Sea Biochemistry: Variability of Suboxic Zone as seen in continuous observations and 3D Numerical Simulations

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The seasonal evolution of physical and biogeochemical variables in the upper layer of the Black Sea and down to its suboxic zone was analysed. Data used originated from numerical simulations with coupled three-dimensional hydrophysical-biochemical model with 24 biochemical state variables. The model was forced with 6-hourly meteorological analysis data. The second data source consisted of vertical profiles from two Argo floats with oxygen sensors deployed in May, 2010. These data have been used to validate model simulations. The model simulated realistically the spacial-temporal variations of the general circulation and biogeochemical process. In particular, the seasonal variability of suboxic zone, imparted by the horizontal and vertical variations of the physical and chemical properties of the water column, was clearly illustrated. In spite of the simplicity of the model, the simulation of the seasonal variability of the suboxic zone gave a good agreement with the in situ observations. Its upper boundary (isoline of oxygen with 10μM) shoaled in the central area and penetrated into deeper water in the coast area of the Black Sea. The depth of the redox layer varied with time and space in concert with the variability of the physical system.