Hindcast of the Black Sea Ecosystem Evolution During Three Decades

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Results of numerical simulation of long-term evolution of the Black Sea ecosystem using one way coupled 3D physical and biogeochemical models are presented. The Black Sea ecosystem manifested significant changes during the last few decades. Healthy ecosystem which was observed in early 70-ies was altered drastically by the impacts of eutrophication, overfishing and large population growth of gelatinous and opportunistic speciesin 80-ies. Reconstruction of the Black Sea dynamics during 1971 -1993 by means of assimilation archive hydrography and after 1993 by means of assimilation the space altimetry makes possible to consider the Black Sea ecosystem evolution during this time period. Biogeochemical model is an extension of the set of one-dimensional models given by Oguz with identical parameters describing interactions between its compartments. The model extends to 200m depth with 26 z-levels compressed to the sea surface. It includes 15 state variables. Phytoplankton is represented by two groups, typifying diatoms and flagellates. Zooplankton are also separated into two dimension parts: microzooplankton and mesozooplankton. The other compartments are jelly-fish *Aurelia Aurita* and the ctenophore *Mnemiopsis*; omnivorous dinoflagellate *Noctiluca*; nonphotosynthetic free living bacteriaplankton; detritus and dissolved organic nitrogen. Nitrogen cycling is resolved into three inorganic forms: nitrate, nitrite and ammonium. Nitrogen is considered as the only limiting nutrients for phytoplankton growth. The geochemical part of the model is added also with oxygen and hydrogen sulfide. The results of simulations demonstrate increase of the phytoplankton biomass in the Black Sea upper layer from early seventies to mid nineties and then it tends to decrease. The same tendency can be seen in behavior of zooplankton biomass. In the deep part of the basin zooplankton biomass grows from early seventies to past eighties and then abruptly decreases. The sharp decrease of the zooplankton biomass in past eighties is probably associated with *Mnemiopsis* invasion in the Black Sea. Surface phytoplankton distributions as a result of numerical modeling were compared with surface chlorophyll concentration measured with SeaWiFS color scanner.