Geophysical Research Abstracts, Vol. 7, 08021, 2005
SRef-ID: 1607-7962/gra/EGU05-A-08021

The response of the northwestern Black Sea shelf ecosystem to nitrient loading and climate changes

J. Staneva (1, 2), V. Kourafalou (3,4) and K. Tsiaras (5)

(1) ICBM, University of Oldenburg, Germany, (2) NIMH, National Insitute of meteorology and Hydrology, BAN, Sofia, Bulgaria, (3) Hellenic Center for Marine Research, Anavissos, Greece, (4) RSMAS, University of Miami, Miami, U.S.A. (jstaneva@icbm.de)

The study employs coupling between physical and biogeochemical numerical models and provides an extensive analysis on the response of the Northwestern Black Sea ecosystem to nutrient loads and climatic changes. The physical models are a one-dimensional mixed layered model and a three-dimensional, primitive equation hydrodynamic model, based on the Princeton Ocean Model. The biogeochemical model is based on the European Regional Seas Ecosystem Model (ERSEM). The model consists of five modules: (1) primary producers, (2) microbial loop, (3) mesozooplankton, (4) benthic nutrients, and (5) benthic biology. The ecosystem in ERSEM is subdivided into three functional types: producers (phytoplankton), decomposers (pelagic and benthic bacteria) and consumers (zooplankton and zoobenthos). We address here the impact of meteorological forcing, as well as the impact of vertical stratification on the functioning of the biological system. The ecosystem response to the variability in physical conditions and to the varying water and nutrient discharges from the Danube River are described in detail. The numerical simulations illustrate the basic physical and biological dynamics of the Northwestern Black Sea shelf. Climatological variability associated with changes in nutrient loads over the last 4 decades is addressed. Seasonal and inter-annual variability is discussed, based on a target simulation with high frequency forcing for the period of 2002-2003. The model results are validated against in-situ and remote (SEAWIFS) data. A hierarchy of model scenarios was developed to predict the impact of future nutrient load changes on the Northwestern Black Sea ecosystem. The model predictions indicate that the biological system is very sensitive to the changes in nutrient concentrations, as well as to C:N:P:Si ratios.