

A MODELING APPROACH TO THE QUANTIFICATION OF SEDIMENT- WATER COLUMN INTERACTIONS IN AQUATIC MICROCOSMS

F. VLATSIOTOU, E. MAKRI and G. TSIRTISIS

Department of Marine Sciences, University of the Aegean
81100 Mytilene, GREECE

ABSTRACT

Laboratory aquatic microcosms were used for the quantification of sediment–water column interactions in coastal marine ecosystems. Four glass aquaria, containing seawater and natural sediment, were studied for two months. Information related to chemical and biological parameters was collected from the water column, the interstitial water and the sediment. The description and quantification of the dynamic processes was attempted using a simulation model. The model consisted of two submodels; the water column submodel describing the interactions of inorganic nutrients, phytoplankton, organic matter and bacteria, and the sediment submodel emphasizing on the ammonification and nitrification processes. The two submodels are coupled through natural processes, such as sinking of living and non-living material and diffusion of inorganic nitrogen and organic carbon. The model has shown good fit to the experimental data, since the main trends of temporal variability of the state variables were predicted. The fluxes at the interface separating sediment and water column were quantified, indicating that the proposed experimental methodology can be effectively used for the study of the role of sediments in coastal marine ecosystems.