Implementation of a reduced order Kalman filter to assimilate ocean color data into a coupled physical-biochemical model of the North Aegean Sea.

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Within the framework of the European project OPEC (Operational Ecology), a data assimilation system was implemented to describe chlorophyll-a concentrations of the North Aegean, as well the impact on the European anchovy (Engraulis encrasicolus) biomass distribution provided by a bioenergetics model, related to the density of three low trophic level functional groups of zooplankton (heterotrophic flagellates, microzooplankton and mesozooplankton). The three–dimensional hydrodynamic-biogeochemical model comprises two on-line coupled sub-models: the Princeton Ocean Model (POM) and the European Regional Seas Ecosystem Model (ERSEM). The assimilation scheme is based on the Singular Evolutive Extended Kalman (SEEK) filter and its variant that uses a fixed correction base (SFEK). For the initialization, SEEK filter uses a reduced order error covariance matrix provided by the dominant Empirical Orthogonal Functions (EOF) of model. The assimilation experiments were performed for year 2003 using SeaWiFS chlorophyll-a data during which the physical model uses the atmospheric forcing obtained from the regional climate model HIRHAM5. The assimilation system is validated by assessing the relevance of the system in fitting the data, the impact of the assimilation on non-observed biochemical parameters and the overall quality of the forecasts.