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Ocean Science Discussions

Interactive comment on "Assimilation of ocean colour data into a Biochemical Flux Model of the Eastern Mediterranean Sea" *by* G. Triantafyllou et al.

G. Triantafyllou et al.

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General comments

G-1 As suggested by the referee, at the end of the subsection "Hindcast experiment" we have add the following text:

"The physical model setup is able (despite its rather coarse resolution) to represent several key features of the EMED general circulation. As shown in Fig.˜2. the model produces an intense and elongated Rhodes gyre with a strong two-lobe Mersha Matruh anticyclone to the south. At the eastern end of the basin a stretched Shikmona anticyclone is reproduced by the model while to the southwest of Peloponissos the signature of the Pelops gyre is evident."

which describes better the features shown in Figure 2 in order to show the similar capabilities of our model compared to ALERMO that successfully reproduce the circulation characteristics of the E. Mediterranean. Unfortunately a detailed inter-comparison between the two models is not feasible since our model has run with open boundary conditions, as described now in the manuscript in subsection “Climatological run” while ALERMO has run with the Mediterranean OGCM (Pinardi, Allen et al. 2003).

Pinardi, N., I. Allen, et al. (2003). "The Mediterranean ocean Forecasting System: first phase of implementation (1998-2001)." Annales Geophysicae 21: 3-20.

G-2 In order to better explain the poor performance of the filter during the spring bloom period the following text has been added in the manuscript in section 5:

“This particular period is characterised by increased variability in both nutrients and biological variables with significant gradients being developed even in very short time periods (days). Additionally the dynamics of the assimilated variable is controlled by the supply of phosphorus and nitrogen as well as by the grazing pressure exerted on the phytoplankton. Thus the calculation of the dominant EOFs from a phosphate limited system with small top down control on primary production, as the simulated area most of the year is, might be insufficient to successfully approximate the covariance matrix of the filter.”

G-3 We appreciate the opinion of the referee resulting probably of the low quality of Figure 8. However, following the suggestion of the referee we have significantly improve the quality of the figures and now ii is evident that the performance of the filter during the period 12-19/11/1999 is rather satisfactory even over the Aegean Sea bringing the model results close to the observations.

Specific comments

S-1 We appreciate the referee’s suggestion. In future works we will utilise DBDB1.

S-2 We agree with the referee and our future works will make use of the MEDATLAS

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database.

S-3 The following text has been added in subsection “Climatological run” to describe the open boundary conditions for both biogeochemical and hydrodynamic models:

“The ecosystem pelagic state variables along the open boundary are described by solving water column 1-D ecosystem models at each surface grid point on the open boundary. For the physical model open boundary conditions were set as follows: Zero gradient condition for the free surface elevation. Flather boundary condition for the barotropic velocity normal to the open boundary. Sommerfeld radiation for the internal (baroclinic) velocities. Temperature and salinity are advected upstream. When there is inflow through the open boundary, temperature and salinity profiles are prescribed from the MODB-MED4 seasonal climatology.”

S-4 Figure 10 has been reconstructed and now includes both Free and Assimilation runs as suggested by the reviewer.

Editorial comments

E-1 The word “biogeochemical” has replaced “biochemical” in whole text and title as it is suggested.

E-2 Lines 20-21 in the introductory section have been changed according to the referee’s suggestion.

E-3 The referee is correct. Now a reference for the Mediterranean Sea operational forecasting system is included.

E-4 Repeat corrected to repeated.

E-5 Text in parentheses is removed.

E-6 The reference has been corrected as suggested by the referee.

E-7 (Off-line) has been added to better explain the asynchronous coupling.

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E-8 The figures have been redone in a clear publishable format.

E-9 We appreciate the referee's correction. It was our mistake and now the units in captions of figures 10-13 are correct.

Interactive comment on Ocean Sci. Discuss., 3, 1569, 2006.