Supplementary material (part 1) of "Seasonal and inter-annual variability of plankton chlorophyll and primary production in the Mediterranean Sea: a modelling approach"

by P. Lazzari[1], C. Solidoro[1], V. Ibello[1,*], S. Salon[1], A. Teruzzi[1], K. Béranger[2], S. Colella[3], and A. Crise[1]

[1] Istituto Nazionale di Oceanografia e di Geofisica Sperimentale – OGS, Trieste, Italy
[2] École Nationale Supérieure de Techniques Avancées, ENSTA ParisTech, Palaiseau, France
[3] Centro Nazionale delle Ricerche, CNR ISAC UOS, Roma, Italy
[*] now at Institute of Marine Sciences, Middle East Technical University, Erdemli, Turkey

Correspondence to: P. Lazzari (plazzari@ogs.trieste.it)

Mixed Layer Depth (MLD)

As shown in Fig.S1, climatological simulated MLD maps are in very good agreement with the data presented in D'Ortenzio et al. (2005) [see their Fig. 1]. The MLD is reduced in summer to values lower than 10 m depth, reaching 30 m depth in the south-eastern Mediterranean. In winter, the MLD progressively increases, with values between 80 and 110 m depth in December, presenting the highest values in February in areas of dense water formation. Despite the first layers of the model are 6 m depth only, the deepening and restratification processes are correctly simulated in the model, giving confidence to the present study using these fields to transport the biogeochemical properties.

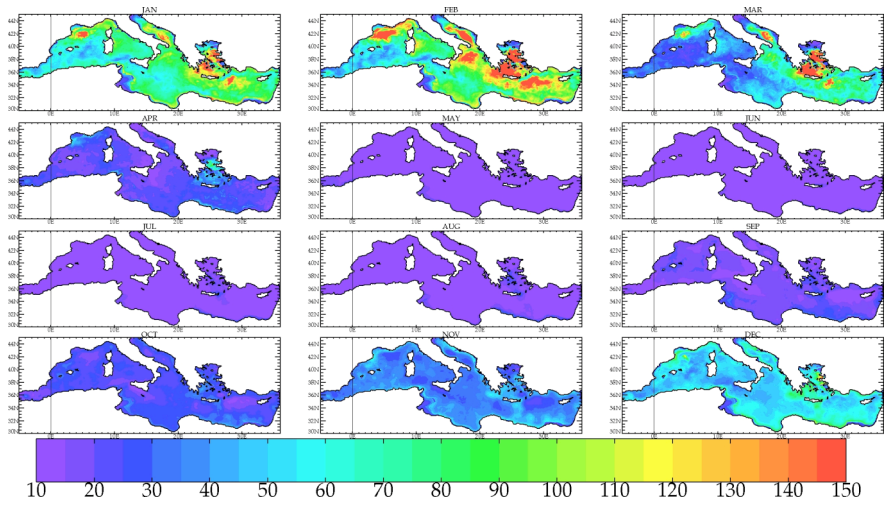

Fig. S1. Mixed layer depth climatology over the period 1999-2004 obtained using the turbocline criteria (Blanke and Delecluse, 1993).

Alboran Sea Production

The Alboran Sea production is correlated with the circulation patterns present in the area (see Figs.S2a, b, c, d). Vertical velocities enrich the surface Atlantic Waters with nutrients, that are subsequently advected horizontally through the gyres present in the area. The principal sites of vertical flux are located in the Gibraltar Strait and along the northern coast of the Alboran Sea.

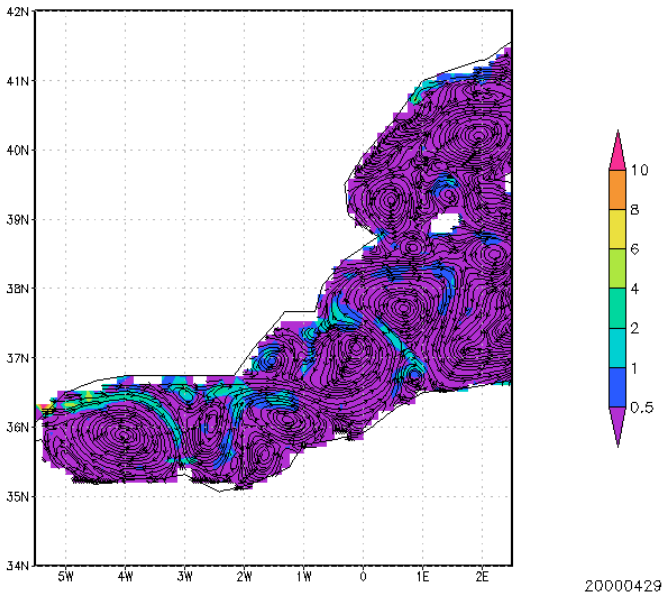

Fig. S2a. Horizontal current velocity field (stream lines) and vertical velocity field (shaded, m d^{-1}) on the upper model level (end of April).

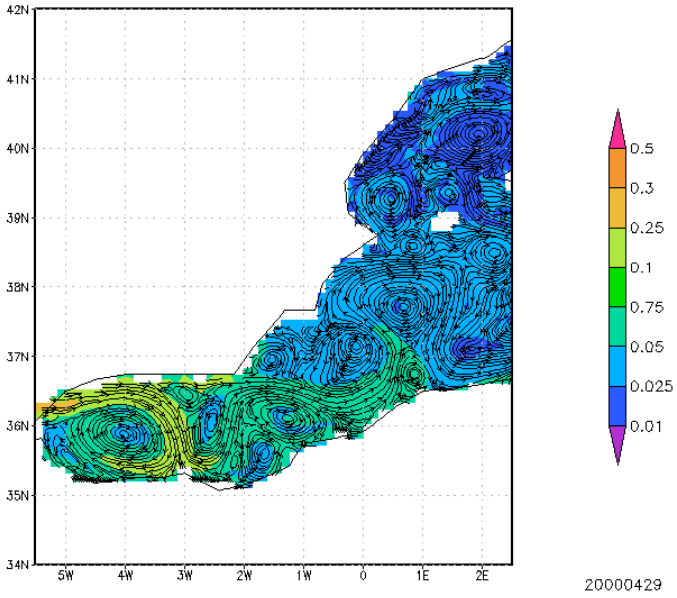

Fig. S2b. Horizontal current velocity field (stream lines) and phosphate concentration (shaded, mmol P m^{-3}) on the upper model level (end of April).

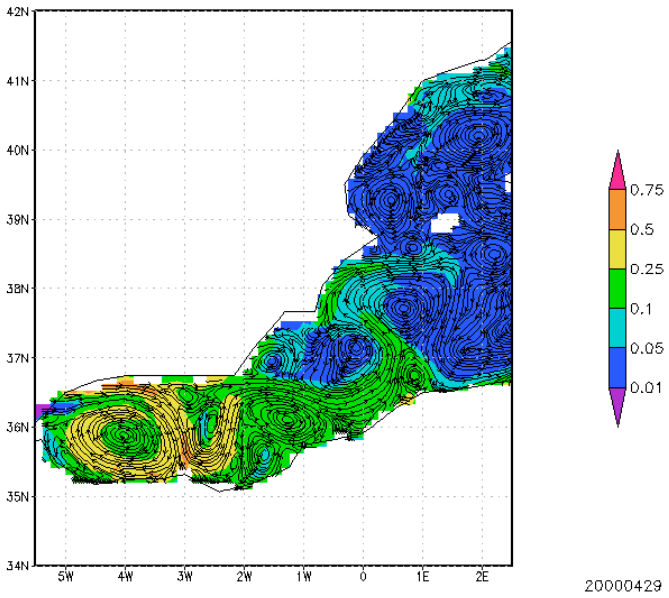

Fig. S2c. Horizontal current velocity field (stream lines) and chlorophyll concentration (shaded, mg chla m^{-3}) on the upper model level (end of April).

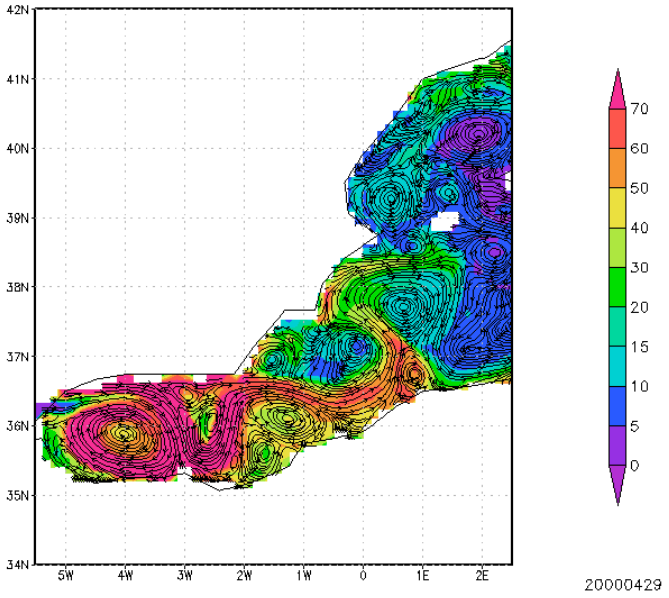

Fig. S2d. Horizontal current velocity field (stream lines) and NPP concentration (shaded, mg C m^{-3} d^{-1}) on the upper model level (end of April).

References

Blanke, B., Delecluse, P.: Variability of the tropical Atlantic ocean simulated by a general circulation model with two different mixed layer physics, J. Phys. Oceanogr., 23, 1363--1388, 1993.

D'Ortenzio, F., D. Iudicone, C. Boyer Montegut, P. Testor, D. Antoine, S. Marullo, R. Santoleri, and G. Madec, Seasonal variability of the Mixed layer depth in the Mediterranean Sea as derived from in-situ profiles, Geophys. Res. Let. 32, LI2605,doi:10.1029/20005GL022463, 2005.