Biogeosciences Discuss., 7, C3473–C3477, 2010
www.biogeosciences-discuss.net/7/C3473/2010/

Biogeosciences Discussions

Interactive comment on "On the impact of the Bimodal Oscillating System (BiOS) on the biogeochemistry and biology of the Adriatic and Ionian Seas (Eastern Mediterranean)" *by* G. Civitarese et al.

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Received and published: 25 October 2010

We greatly appreciate Referee #1 comments, since he rises a very crucial and intricated point for what concerns the primary production in the Southern Adriatic.

Following his suggestions, we report here the SeaWiFS 8-day average Chlorophyll a concentration time series for two zones: one (Fig. 1) centered in the Southern Adriatic (41.5°N-42.0°N, 17.5°E-18.0°E), the other (Fig. 2) located in the Central Adriatic (42.8°N-43.0°N, 16.2°E-16.3°E), as produced by NASA at:

http://reason.gsfc.nasa.gov/OPS/Giovanni/ocean.swf8D.2.shtml#description

The role of the winter convective mixing in the biomass development is particularly evident from the series of Chl peaks occurring in the first three months of subsequent years 2005, 2006, and 2007 (indicated with red rectangles). These events were not present in the Central Adriatic, where the winter convection did not occur. Interestingly, 2005, 2006 and 2007 were also the years with maximum salinity (and nutrients minimum), as shown in Fig. 2 of the ms. Higher salinity of the upper layer results in the lower buoyancy content. Therefore, this suggests that the upper layer buoyancy content, driven by the BiOS, is the preconditioning factor for setting the amount of primary production in the Southern Adriatic by determining the extent of the winter vertical mixing.

However, the picture is complicated by the fact that the air-sea heat fluxes play an important role in the convection, too. For example, the year 1999 is also characterized by a strong late winter – early spring biomass maximum. It was due to repeated mixing/restratification events associated with distinct and significant heat loss episodes at the end of January (Santoleri et al., JGR 2003), although the salinity in the basin was not particularly high (Fig. 2 of the ms.) and the buoyancy content was rather high.

To conclude, in the Southern Adriatic the spring primary production, being driven by the convective mixing, seems to be sensitive to the salinity i.e. the buoyancy content in the water column, even though the heat transfer often plays a determinant role. Thus we cannot categorically state that primary production "is phased with salinity", and on the other hand any relationships with the nutrient amount in the basin can be ruled out. This makes the Southern Adriatic productivity particularly sensitive to the change of the meteorological and (on a larger time scale) the climatic conditions in the area on one hand, and on the buoyancy content as determined by BiOS on the other.

We fully agree with the referee that this conceptual picture should be explicitly presented in the ms. and in a revised version we'll insert a paragraph discussing this

unexpected feature.

Concerning the Central Adriatic, at least for the last decade, from satellite Chl a data, there are no clear evidence of any relationship among the biomass and the variability of the properties (salinity, nutrients) of the water coming from the south. Therefore, our revision of the "Adriatic ingression" theory as far as its infuence on the primary productivity is still valid, i.e. a possible relationship salinity – primary production can hardly be documented.

Interactive comment on Biogeosciences Discuss., 7, 6971, 2010.

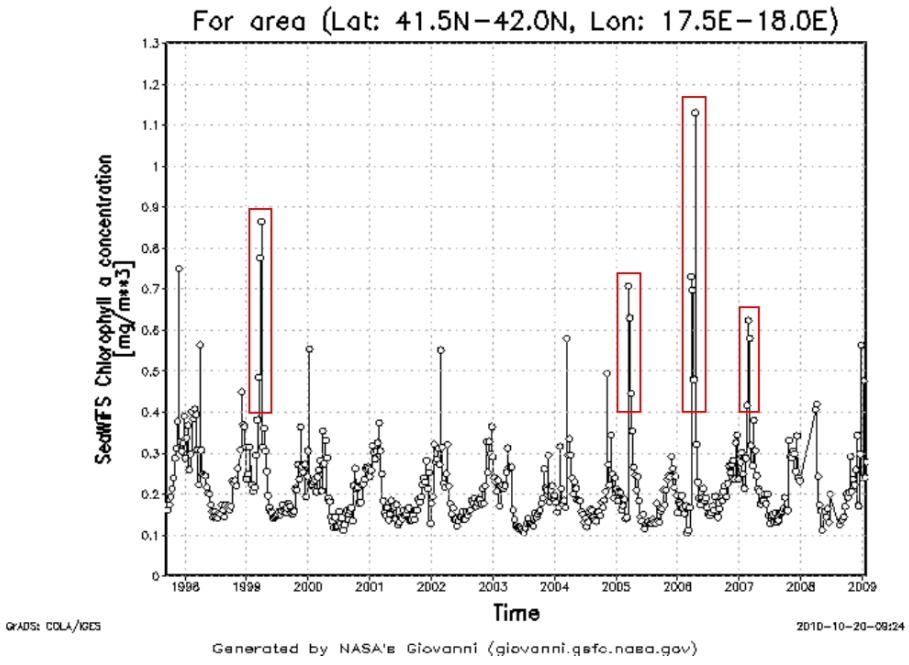

Fig. 1. SeaWiFS 8-day average Chlorophyll a concentration for the Southern Adriatic (41.5°N-42.0°N, 17.5°E-18.0°E)

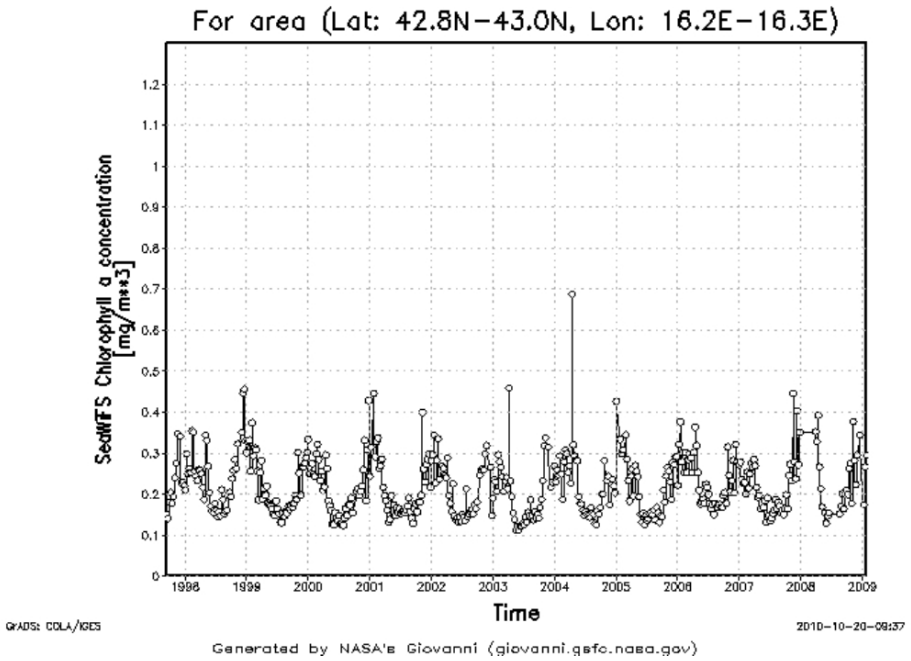

Fig. 2. SeaWiFS 8-day average Chlorophyll a concentration for the Central Adriatic (42.8°N-43.0°N, 16.2°E-16.3°E)(