

## ***Interactive comment on “On the trophic regimes of the Mediterranean Sea: a satellite analysis” by F. D’Ortenzio and M. Ribera d’Alcalà***

**E. Devred (Referee)**

devrede@mar.dfo-mpo.gc.ca

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The authors submitted a manuscript entitled: “**On the trophic regimes of the Mediterranean Sea: a satellite analysis**”.

This work is based on a chlorophyll-concentration time series measured by ocean-colour satellite over the entire Mediterranean basin from 1997 to 2007. The analysis of the data is carried out using two approaches, namely, a Hövmoller diagram and a cluster analysis.

This work confirm some results based on a shorter time series (four years) published by other authors regarding the trophic regime of the Mediterranean Sea (MS), i.e., the eastern basin is oligotrophic with low-concentration phytoplankton blooms and a

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western part more biologically active partly due to its vicinity to the North Atlantic and to river discharge.

### General comments:

The work of A. Longhurst is over simplified in the manuscript. Initially, A. Longhurst spent a great deal of time gathering hydrodynamic (temperature, currents, etc) and biological (chlorophyll profile, photosynthetic parameters) data to define his ecological provinces where physical forcing define the biological traits of each provinces as a distinct ecosystems Often scientists reduce his work to a simple study of satellite maps and/or climatological data.

In their entire analysis, the authors ignore the bathymetry of the MS which seems to be highly correlated to the patterns found in the phytoplankton concentration maps. (The use of bathymetry in the cluster analysis might reduce the speckling effect)

The Hövmoller diagrams give valuable information regarding the development of the phytoplankton bloom and they also reveal a strong North /South and East/West gradient in chlorophyll concentration. Normalisation of the data by the maximum value reduces the information carried in the time series. The reasons given by the authors to use this normalisation are somehow concise. I would suggest to use the natural log-transformed of the data to keep the natural magnitude of chlorophyll concentration and the associated information. This comment would also hold true for the cluster analysis.

The authors performed various test to justify the optimum number of clusters to use in the statistical analysis (i.e., 7 clusters). However, the results show that the development of the bloom follows three main patterns in the Mediterranean basin. On a biological aspects, it seems therefore that three clusters should suffice to describe the trophic regimes of the MS. The authors also normalised the chlorophyll time series to the maximum values but Figure 5 does not show maximum values equal to 1. Does that mean that the normalisation was performed before the “climatological” analysis? If yes, it is interesting to note that cluster 1,2 and 3 have a maximum value close to 1 ( $\sim 0.9$ ),

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whereas the remaining clusters (especially 6 and 7) have a very low maximum value. Could that be interpreted as a difference in the timing of the maximum of chlorophyll concentration which is averaged out over the period of ten years? If yes, it could also play a non-negligible role in the characterisation of the slope of the initiation of the bloom. It would be interesting to plot the standard deviation associated with the “climatological” data because some of the interpretation on the slope of the timing of the bloom in each cluster could be misled by some “outliers” (a very high chlorophyll concentration in a give week) for a given year.

Finally, the authors’ discussion gives a light on the complex system that represents the MS. The authors discuss the input of nutrients in the MS and other processes related to the connection with the North Atlantic. The authors also acknowledge physical processes in the MS (deepening of the mixed layer depth) that drive the biological activities of phytoplankton.

In general, the manuscript is well written, sometimes a bit redundant. It gives a good description of the phytoplankton dynamic in the Mediterranean Sea based on ocean colour satellite data. I think that the manuscript meet the criteria for publication in Biogeosciences.

#### Details comments:

Page 2964, line 5: add with between “anomalous” and “respect”

Page 2971, line 6 to line 9: I find all the clusters quiet patchy.

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