

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

**E. Boss (Editor)**

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This paper presents a statistical (cluster) analysis of 10yrs of SeaWIFS chlorophyll data, with the aim of classifying Mediterranean waters into different bioms. A total of 7 bioms are identified and describe in terms of their annual cycle in surface chlorophyll.

The paper is, in general, well written and clear.

This paper is descriptive and mostly reinforces known results (acknowledged by the authors). Nonetheless, this paper analyzed a longer data set and applied a different statistical technique than those applied previously. As such it provides a small incremental contribution to the body of knowledge about the Mediterranean. As a result of the analysis the Med is suggested as a model for how oceans respond to physical

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forcing.

My recommendation is that the paper be published.

Below I have comments that I feel can make this paper much more substantial in terms of its content and its impact. The authors are welcome to ignore them.

1. Chlorophyll is one variable. It only contains a limited amount of information about the ecosystem, and in addition, is not an ideal tracer of phytoplankton biomass as it suffers from physiological variability (e.g. change in chl/cell). Using additional remotely sensed data (e.g. Temperature, CDOM, bb) and in-situ/model data (e.g. mixed layer depth, zooplankton) a better description of the state of the ecosystem is most likely possible.
2. Temporal changes in chlorophyll are the result of many processes (e.g. ML dynamics, grazing, growth, physiological adaptation, species composition changes). Their interpretation without additional data is bound to be speculative at best.
3. I do not agree with the statement (abstract) that 'The analysis confirmed that the Mediterranean Sea is an ideal area to evaluate the impacts of external physical forcing on the marine ecosystem functioning'. To convince me that this statement is true I would need to be shown distribution of physical parameter and distributions of additional biological parameters, not just chlorophyll. The introduction mentions a variety of physical processes occurring in the Med and in the global oceans. Relating them directly to ecosystem response will convince me that indeed the Med has merits as a model for the larger oceans.
4. Why is the data not log-normalized? Why normalize to the maximal value (which is sensitive to outlier and thus less robust than, say, the 90<sup>th</sup> percentile)?

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5. It is claimed that the cluster analysis is more ‘robust’ than traditional analysis yet no metrics for uncertainties or robustness are provided. Robustness may be demonstrated, for example by adding realistic noise to the data, by showing how well defined the boundaries between clusters are (e.g. by the portion number of points that change groups under changes in the size, geographical extent, fidelity of the data set) etc’.
6. You avoid defining what you call a bloom (p. 9) yet you write a lot about bloom timing, non-bloom regions etc’. Unless you define what you mean by bloom it is not possible to evaluate your statements.
7. Qualitative sentences abound, e.g. ‘The geographical boundaries between the clusters are reasonably well defined. . .’. ‘The proposed classification, while more statistically robust. . .’. It will be useful if these statements were supported by numbers.
8. P.13 is full of speculation about grazers and nutrients which are not supported by data (comment 2 above). The paper will be strengthened a lot if supporting data were presented (I have no doubt the ML depths, temperature, in the least, can be obtained at similar spatial and temporal resolution, e.g. FNOC model. Bb and CDOM fields can help as well, e.g. the analysis of Loseil of bb in the Med, possibly interpreted as in Behrenfeld et al., 2005).

Dear authors, I am often wrong. If you feel I did not understand your paper and/or have missed its main points, feel free to contact me and I will be happy to change the review.

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