

## ***Interactive comment on “The Mediterranean subsurface phytoplankton dynamics and their impact on Mediterranean bioregions” by Julien Palmiéri et al.***

### **Anonymous Referee #2**

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This is the review of the manuscript “The Mediterranean subsurface phytoplankton dynamics and their impact on Mediterranean bioregions” by Palmiéri et al.. In the manuscript the authors analyzed the output of a coupled dynamical-biogeochemical model, adapted to the Mediterranean basin, mainly examining how the subsurface chlorophyll distribution could improve the knowledge of the ecosystem functioning of the basin. In order to validate the model, their output are compared with satellite observations and bio-ARGO profiles. I consider the topic absolutely interesting and I appreciated the validation efforts done by the authors. Nevertheless, I have to say that the low quality of the comparison of the model with both satellite and in situ observations prevents an efficient study of the dynamics of the subsurface chlorophyll distri-

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bution in view of a better comprehension of the Mediterranean ecosystem functioning. I am aware that, for the purpose of the manuscript, the authors are mainly interested to the comparison of the phenology and that a quantitative comparison may not be strictly necessary. However, in my opinion, there are several factors that need to be addressed. For example, there is a factor of 2 between satellite and model estimates of the phytoplankton chlorophyll; there is an underestimate of 60-70% of the model estimations with respect bio-ARGO observations at surface; there is an underestimation of 60% of the model chlorophyll concentration at depth with respect to the bio-ARGO profiles; the DCM depth is always deeper (between 30 and 50m) than that measured through bio-ARGO floats. Thus, the impression is that the model (or at least the used configuration) does not allow to simulate the Mediterranean conditions not only along the water column but also at surface. Observing maps in figure 1 and figure 5, it is quite evident that satellite and model are significantly different. The authors describe similarities and differences between satellite and model emphasizing a lot the few similarities and belittling the considerable differences (i.e., spatial distribution of the bloom in Ligurian Sea as well as in Rhodes Gyre, the important differences along the African coasts). These discrepancies cannot be justified only with “a known overestimation” of satellite observations especially because the used satellite dataset is dated 2004. In this respect, the scientific community have made considerable progresses over the past 14 years, and presently, this old satellite overestimation in the Mediterranean Sea has been quite well corrected. Why did the authors do not use a more recent and easily available dataset? Observing maps of figure 5, I observe many differences and some similarities; bloom-intermittently cluster is very different and the yellow cluster in the model regionalization is mostly absent in satellite bioregionalization. In figure 11 the authors analyze the annual cycle of different chlorophyll (surf, max and tot) for bio-Argo and model in some regions of the basin. I note, again, some similarities and many differences, despite the normalization of the chlorophyll values, with respect to the maximum, that should simplify the comparison. In the Gulf of Lions, bio-Argo and model show totally different results. The situation improves slightly in the Algerian and

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Tyrrhenian basins where, at least, surface chlorophyll seems to show an analogous trend between bio-Argo and model, but the others chlorophyll (max and tot) continue to be different. Results associated with the Ionian and Levantine basins are closer. In general, I think the authors should be more impartial commenting results, for which they should use the same “yardstick” for the good as well as for bad ones. In conclusion, as I wrote above, I believe the topic covered in the manuscript is absolutely stimulating and interesting. I would like to encourage the authors to try to find another way (other configurations, other models or other techniques) to reconstruct the vertical chlorophyll distribution in order to obtain a better comparison with respect to other kind of observations (satellite or in situ).

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