

Report #1

I appreciate the authors' efforts in addressing my previous comments and revising the manuscript accordingly. The clarity of the paper has improved. Only a few minor points remain, which are detailed below.

We sincerely thank the reviewer for the positive evaluation of our revised manuscript and for the helpful additional comments. The manuscript was adapted accordingly as detailed in the following responses.

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- Lines 65-68: The final version of this part in the manuscript is slightly different from the one indicated in the authors' reply to my comments, but this is fine, as the main suggestion has been implemented.

We appreciate the reviewer's understanding regarding this modification and are glad that the main suggestion has been satisfactorily implemented.

- Lines 170-172: The authors stated that here they prefer using "bioregion" instead of "cluster" because this sentence refers to their latitudinal distribution. I understand this motivation; however, for the reader this is the first explicit reference to the obtained bioregions, which are shown in Fig. 2a, but have not yet been introduced (the previous sentence refers to the clusters in Fig. 1). To improve readability, I suggest explicitly referring to Fig. 2a at the beginning of the sentence, e.g., "These patterns, corresponding to the bioregions in Fig. 2a, range from no clear seasonality (bioregion 1), ... typical of blooms in temperate and high-latitude systems."

We agree that explicitly referring to Fig. 2a at this point improves readability. The term bioregion, (i.e. spatial extent of the clusters) is defined in the introduction (line 52) and through the method (line 117-118). Nonetheless, the reviewer's suggestion was considered as it is a useful reminder to the reader.

- Line 212, Figure 3: I appreciate the new version of the figure. Upon closer inspection, there may be an error in the computation of the interquartile range. According to the text, this range should encompass the statistics for 26 threshold values $\times$ 10 years of estimates (black dots) within each of the two decadal periods. However, the figure shows substantial discrepancies; for example, the error bars in Bioregion 2 extend well beyond the distribution of all black dots. If a different definition of the interquartile range was used, I suggest specifying it more clearly.

We thank the reviewer for highlighting this error, the figure has been corrected accordingly and now shows the interquartile range of the 26 thresholds values over the 10 years.

- Lines 238-239: There is a possible typo in the sentence: "Minor changes, associated with an area inferior to 0.1% of the global ocean, are not represented". I believe that the authors may have meant 0.01%.

This is indeed a typo, which has been corrected, we thank the reviewers for highlighting it.

- Lines 220-222, Figure 4: I suggest rephrasing panel (b) to maintain grammatical parallelism with panel (a), e.g.: “(b) Latitudinal distribution of bioregions for the 2015-2024 decadal period (filled), compared with the 1998-2007 decadal period (red line).”

The reviewer's suggestion was considered and the caption was adapted.

Thanks to the authors for the revised manuscript and addressing well the comments I have brought up. The manuscript has been very much improved.

Only one additional comment:

- I have the impression that the CHL L4 gap free product was generated using an adapted DINEOF method other than the OI (optimal interpolation) mentioned in this manuscript. Please check and confirm.

We thank the reviewer for the positive assessment of our revised manuscript. Regarding the CHL L4 gap-free product, we carefully checked the product documentation. In Saulquin et al., 2019, it is written:

The second step consists in a space–time interpolation of the chl-a merged fields of each sensor. Our interpolation technique is an advanced version of the standard optimal interpolation technique (OI) that includes anisotropic covariance models ...

Therefore we kept the reference as it is (line 79).

Saulquin, B., Gohin, F., & Fanton d'Andon, O. (2019). Interpolated fields of satellite-derived multi-algorithm chlorophyll-a estimates at global and European scales in the frame of the European Copernicus-Marine Environment Monitoring Service. *Journal of Operational Oceanography*, 12(1), 47–57. <https://doi.org/10.1080/1755876X.2018.1552358>