



EGUsphere, author comment AC1
<https://doi.org/10.5194/egusphere-2022-827-AC1>, 2023
© Author(s) 2023. This work is distributed under
the Creative Commons Attribution 4.0 License.

Reply on CC1

Gotzon Basterretxea et al.

Author comment on "Global variability of high-nutrient low-chlorophyll regions using neural networks and wavelet coherence analysis" by Gotzon Basterretxea et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-827-AC1>, 2023

It is encouraging to see the growing number of innovative Self-Organizing Map (SOM) applications in the ocean science community since its early applications in oceanography more than a decade ago (e.g., Liu and Weisberg, 2005; Liu et al., 2006). The SOM is a powerful machine learning technique that can be widely used in oceanographic research in the future. In order for readers to better understand this, it would be good to provide a brief literature review of SOM applications in oceanography, at least in Supplement part of the paper.

>SOM methods have been used in the field of oceanography for some time. Although we have not strictly carried out a literature review, following the reviewer's recommendations, we have extended the technical aspects of the SOM both in the text and in the supplementary material.

In the main text, it is important to put your SOM application in the context of similar or relevant SOM applications that have already been published in peer-reviewed journals. For example, the SOM has been used to identify the regions of sea level variability, and the characteristic time series was further analyzed using a joint wavelet power spectral analysis (Liu et al., 2016). The current work extended in that direction by using coherent wavelet analysis to reveal the relationship between the nitrate/chlorophyll and the climate indices. It is important to properly credit previous relevant work.

>We appreciate this suggestion. We have incorporated a reference to Liu et al. 2016 in the M&M section. In any case, these studies are also referenced in the supplementary material.

Line 166, "For typical satellite datasets, the SOM can be applied to both space and time domains". It would be good to add the following sentences to properly put the current analysis in the proper context of relevant research of SOM applications: "By applying the SOM in the spatial domain, one can extract characteristic spatial patterns of the input data. If transposing the input data matrix and applying the SOM in the time domain, one can extract characteristic temporal patterns, i.e., the characteristic time series. Since each of these time series represents the temporal variability of a particular region, this method can be used to identify regions of differentiated variability on a map. The SOM, when applied to both space and time domains of the same data, provides a powerful tool for diagnosing ocean processes from such different perspectives. Thus, it was called "dual

SOM" analysis by Liu et al. (2016). In this study, we only focus on the second type."

> *Changed following the reviewers' suggestion*

Line 172, "patterns R1 to R5" should be changed to "regions R1 to R5".

> *Thank you. It has been corrected.*

Line 198, it would be good to add a sentence as follows: "Joint SOM-wavelet power spectral analysis was demonstrated by Liu et al. (2016) in the study of characteristic time series of sea level variations in different regions of Gulf of Mexico. Here in this study, we expand it further to joint SOM-wavelet coherence analysis."

> *The proposed sentence has been added.*

Wavelet power spectrum may be biased towards low frequency. The bias issue has been rectified by Liu et al. (2007). This bias rectification has been taken care of in some wavelet coherence analysis software packages, but it is not clear whether it is rectified in the version of software that was used in this analysis. It is important to clarify this in the main text (Line 210).

> *We use the matlab algorithm by Grinsted et. al (2004). However, we have introduced a comment on the low frequency bias reported by Liu et al. (2007).*

References are cited in the text (Dong et al., 2006, Dong and Sutton, 2007, Timmermann et al., 2007) but are not seen in the reference list.

> *All references have been reviewed*