



EGUsphere, referee comment RC3
<https://doi.org/10.5194/egusphere-2022-140-RC3>, 2022
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Comment on egusphere-2022-140

Anonymous Referee #3

Referee comment on "The mixed layer depth below the pycnocline (BMLD) as an ecological indicator of subsurface chlorophyll-a" by Arianna Zampollo et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-140-RC3>, 2022

General comments

The manuscript (MS) presents results on relationships between chlorophyll and density profiles in shelf sea conditions. The work is based on in situ data and focuses on the need to investigate if and how the main features of deep chlorophyll maximum conditions can be related (or even inferred) to observations of density profiles.

The topic is relevant for the scientific community due to the growing need to understand biogeochemical processes and impacts on them by climate modifications or human interventions in coastal and shelf areas. A great effort has been spent by the Authors to address the topic with a set of novel and relatively high-complexity tools. However, even if on one side these novel methods are an added value of the MS, on the other hand their description is probably excessively detailed and not easily readable resulting in a quite long MS that probably lacks of clarity also in the results, discussion and conclusions.

I suggest to deeply revise the MS in order to better highlight its scientific value.

Specific comments and Technical corrections

The authors should consider to address the following aspects to improve the MS quality.

- Improve the methods section readability, reducing the description of the methods and avoiding non-necessary details and repetitions in the methods.
- Generally improve the quality of the figures; moreover tables and figures could be used to resume results in a more comprehensive way. As a consequence, the results section could be focused on the most relevant results and significantly shortened.
- Discussion section is quite long and one of the focus of the MS (wind farm impacts) risks to be lost by the reader. The Authors should consider to focus the Discussion on few relevant themes.

In the following some minor points are listed. Maybe additional minor issues could be revised, however I think that these aspects can be better addressed in a next review step after a deep revision of the manuscript.

In the abstract, it should be clearly stated that the work is based on experimental measurements. Moreover, the sentence about the eight density layers and the three different portions of pycnocline could be modified in order to better describe the methods applied. If I correctly understood: i) pycnocline has been identified on a set of density profiles; ii) three portions of the density have been identified with respect to the pycnocline (above, centre, below); iii) density profiles have been classified in eight types; iv) in the density profiles, possible proxies the position of deep chlorophyll maximum have been investigated. If corrected, these steps should more clearly result in the abstract.

L. 19 in the abstract: instead of " ≤ 120 m", consider "depth ≤ 120 m".

L. 42: Maybe "processes" instead of "effects".

Some parts that could be removed or significantly reduced in the introduction, since they seem repetitions or they are not very informative with respect of the MS objectives:

L. 46-47: "The vertical [...] in the marine environment".

L. 66-68: "The exclusive [...] needs to be investigate further".

L. 82-90.

L. 95: Are you meaning "the distance" instead of "the depth"?

L. 101: "the performance of these two proposed density layers" can be misleading, since it is not evident what a density layer performance mean. Maybe it could be rephrased with "we compared results with other relationships between density layers and Chl-a proposed in literature".

L. 107-114: The first paragraph of the Methods section seems more suitable to the introduction. Consider if it can be feasible in the new version of the manuscript.

L. 112: I suggest to consider to replace "identify" with "to identify".

L. 113 "is evaluated by comparing the vertical distribution of subsurface Chl-a": to clarify the comparison cited in the sentence, I suggest to consider the following rephrasing "is evaluated thanks to comparison of BMLD with the vertical distribution of subsurface Chl-a.

L. 121: The indication of the years (from 2000 to 2014) can be moved at L. 118, where the time length of measurements is cited firstly.

Some details about instruments could be probably removed:

L. 122-123: "Temperature and conductivity [...] editing procedure".

L. 130-133: From "In situ" to the paragraph end.

L. 141: "predict" is a word that is usually relate to forecast, in this sentence maybe "interpolate" is more appropriate.

L. 144 From "The pre-processing" to the paragraph end: my impression is that this sentence can be shortened removing non-necessary details, or delated.

L. 152: Maybe DCM is a more usual way to identify the subsurface (or deep) Chl-a maximum. However, I understand that the authors are aiming at defining an abbreviation for the depth of the Chl-a mximum (that is not strictly DCM, indeed); I suggest to consider CMd (Chl-a maximum depth) to avoid confusion with DCM.

L. 154: Here Eq. 1 is cited, but It appears three page later. Usually equations are cited more closely to their appearance in a MS. Consider to move the equation and the first time it is cited closer.

L. 164-165: Consider to rephrase as follows: "Only 2% of the profiles were excluded from the dataset due to unclear subdivision or very different shapes.

Fig. 2: It would be more consistent to indicate with a letter (a, b , etc.) each sub-plot of the figure (the left plot is not labelled with a letter). In the right plots, the "Depth" arrow should point toward the bottom.

L. 182: I think that "rectangles" is more suitable than "squares".

L. 186: "Among" (capital A) instead of "among".

L. 200: Maybe "maximum squared buoyancy frequency" instead of "maximum buoyancy frequency squared"?

L. 210-216 illustrate characteristics of AMLD and BMLD and methods to identify them, however AMLD definition and identification methods are discussed also at lines 189-195. Consider to condensate in a unique paragraph.

L. 224-227 seem a repetition of the strategy adopted in the MS.

L. 228-292: Please, consider to move detail of this method to an Appendix.

L. 346-360: these lines contain some repetitions of details provided in Methods section. They can be significantly shortened or removed.

L. 392: A bracket is missing after Fig. 4c.

L. 440: "amount of phytoplankton" is perhaps misleading, since chlorophyll is evaluated here (and not phytoplankton biomass).

L. 514-516: "demonstrates" seems quite strong in this context. Please, consider "suggest" or "indicate".

L. 649-651 and L. 655-660 provide valuable discussion points.