Review of "Pelagic primary production in the coastal Mediterranean Sea: variability, trends and contribution to basin scale budgets" by Salgado-Hernanz et al.

Detailed comments

Title: I suggest removing pelagic as I currently feel the title is an oxymoron. I don't consider areas>5m deep to be pelagic?

Line 76: 'Coastal areas were generally ignored in such studies'. Following my statement above, both Bricaud et al. and Bosc et al. masked areas of high turbidity where data is uncertain. Please comment on what improvements have been made to the CMEMS data to make it relevant in this study (if improvements have indeed been made).

Line 152: How does this assumption impact your results? Are waters in the Mediterranean well mixed to 200m deep?

Line 224: As already mentioned, considering that some of these authors exclude the productive areas that you are including is this a fair comparison? The analysis would be a lot stronger if the same dataset was used to compare coastal production vs total production in the Mediterranean

Equation 1: Considering you assign a uniform chlorophyll concentration it is not really dependant on depth?

Line 236-238: The authors mention that the Eastern Mediterranean has twice the amount of coastal primar productivity than the western basin due to its size. However, primary productivity per unit volume is also twice the amount of western shelf and is also higher than that observed in the Adriatic? Why is this? This is not what I would expect, especially given the little river inputs along the coast of the Eastern Mediterranean,

Line 241-242: What about the Nile delta and Gulf of Gabes – these stand out to me as high areas of primary production based on Figure 1.

Table 1: What are the uncertainties? Standard deviation? Please state this in the caption

Table1: Why did you use a different product to estimate chlorophyll in the whole Mediterranean Sea or open ocean water rather than the same one as coastal waters? Why couldn't you also estimate primary productivity using the whole dataset? Then it is a coherent analysis and you are comparing like for like. It would then enable comparison of the coastal ocean vs the entire Med Sea in the temporal trend analysis too.

Figure2/3. What is the difference between Fig 2c and fig 3b?

Figure 5/Line 303: The authors say there is no significant trend in primary productivity in the Adriatic based on Figure 4. Why then does the Adriatic actually show the largest trend in Figure 5 with almost the entire 'coastal' Adriatic showing a positive trend? Likewise I can't really see any trends in the Western basin despite the authors saying there was a slight significant negative trend in the Western basin based on Figure4.

Figure 7: Are the alongshore (Z areas) also based on the temporal patterns as indicated by the main caption to the figure?

Line 358: The authors suggest enhanced production occurs in regions of freshwater influence. I would argue R7 is not. What other factors lead to high R7? Possibly domestic and industrial wastewater inputs?

Line 369-372: Interestingly Macias et al. (2018) use model simulations to show that primary production in the coastal region of the Western basin (including Gulf of Lions) is mostly influenced by circulation patterns, not river inputs . I suggest the authors include this reference somewhere in this manuscript.

Line 400: But the eastern Mediterranean also had higher values m3 that the western basin so it is not purely due to the bigger surface are of the eastern basin?

Lines 400-410: What about the influence of wastewater inputs (Powley et al., 2016) and submarine groundwater discharge (Rodellas et al., 2015)? It is mentioned again later in the discussion but I think it should be introduced earlier.

Line 431: What method did Barale et al., use? Is this also from satellites?

Line 443-445: Are you referring to the Biomodal Osciallation System (BIOS; i.e., Civitarese et al. 2010) here? If yes, I suggest you refer to it explicitly.

Lines 475-485: What about domestic and industrial wastewater inputs into the sea? Powley et al. (2016) show they may be significant and certainly are likely to contribute to primary production in some areas of the Mediterranean coastline.

Table 4: Please state how the errors are calculated.

Figure 8: The figure caption and figure do not seem to match to me. There appears to be nothing about seasonality in the figure

Figure 9: What unit is annual PP in? Does it make a difference if you use m-2 vs m-3 vs total?

Line 546-547– "Our analysis also reveals a weak negative PP trend which cannot be classed as climate driven" – but on lines 456 you say *"we observed an influence of climate scale variability on coastal productivity as suggested by the inverse correlations between ΣPP and SST and, more loosely, with NAO and MO?"* I don't agree/understand this conclusion based upon what is mentioned in the discussion

Conclusion: It would be nice if the authors could speculate how a dataset like this could be useful to the Mediterranean/scientific community. For example, could it be used to highlight coastal areas where additional monitoring should take place (Note the authors don't have to use this particular example)

Minor edits

Line 84: rather than basin scale budgets I suggest the authors be specific and either say basin scale PP or basin scale carbon fixation.

Line 104: 'whenever they exceeded about 3-times the mean'. Using "about" in this sentence makes it seem not very precise. Do you really mean to include this here?

Line 131: when you say day length do you mean hours of daylight?

Line 170 : For clarity I suggest adding coastline before Western, Eastern and Adriatic.

Line 240 Gulf of Sirte – I suggest if places are mentioned , they are included in the map in figure 1.

Line 241: add north before western African

Table 2: Suggest using 'Mediterranean' rather than 'Global' .

Line 316: Please rephrase as I don't understand what you are trying to say,

Lines 318-323: Are these results shown anywhere: Perhaps they can be included in supplementary material?

Line 550: MAW – This acronym is not defined in the text so please use full term.

Line 610 Bricaud reference – please provide full reference/link that works

Figures: I suggest to avoid using the rainbow colour scheme as it can emphasize unrealistic patterns.

References

Civitarese, G., Gačić, M., Lipizer, M., & Eusebi Borzelli, G. L. (2010). On the impact of the Bimodal Oscillating System (BiOS) on the biogeochemistry and biology of the Adriatic and Ionian Seas (Eastern Mediterranean). *Biogeosciences*, *7*(12), 3987–3997. https://doi.org/10.5194/bg-7-3987-2010

Macias, D., Garcia-Gorriz, E., & Stips, A. (2018). Major fertilization sources and mechanisms for Mediterranean Sea coastal ecosystems. *Limnology and Oceanography*, *63*(2), 897–914. https://doi.org/10.1002/lno.10677

Powley, H. R., Dürr, H. H., Lima, A. T., Krom, M. D., & Van Cappellen, P. (2016). Direct Discharges of Domestic Wastewater are a Major Source of Phosphorus and Nitrogen to the Mediterranean Sea. *Environmental Science & Technology*, *50*(16), 8722–8730. https://doi.org/10.1021/acs.est.6b01742

Rodellas, V., Garcia-Orellana, J., Masque, P., Feldman, M., & Weinstein, Y. (2015). Submarine groundwater discharge as a major source of nutrients to the Mediterranean Sea. *Proceedings of the National Academy of Sciences of the United States of America*, *112*(13), 3926–3930. https://doi.org/10.1073/pnas.1419049112