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Comment on bg-2021-38

Anonymous Referee #2

Referee comment on "Impact of moderately energetic fine-scale dynamics on the phytoplankton community structure in the western Mediterranean Sea" by Roxane Tzortzis et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2021-38-RC2>, 2021

Journal: Biogeosciences

Manuscript: BG-2021-38

Title: Impact of moderate energetic fine-scale dynamics on the phytoplankton community structure in the western Mediterranean Sea

Article Type: Research Paper

Roxane Tzortzis et al.

General comments:

The impact of fine-scale physical processes on plankton community is indeed very important. We have fully realized the significance of this problem, but limited by the observation means (especially biological parameters), the current understanding is very limited. Based on these backgrounds, I think this work is a very good attempt. The author's cruise design is very targeted, various equipment is very effective, the text description is very clear and detailed. However, from the perspective of research papers, I did not see the logical chain driven by scientific hypotheses. Instead, they used various

devices to verify some predictable results. If the physical-biological processes and mechanisms in fine-scale are consistent with those in meso-/large- scales, why are they so important and are unique? When the scale becomes smaller, what is the most important scientific question in the process of physical-biological processes? Because this part is not highlighting enough, I have been looking forward to the new results (differences with large-scale and classical observation) and thinking about so what? What is the implication? As a research paper, I would like to see the author's point around a new result, or a logical inference. Therefore, I do not recommend that the current version be published in BG, at least major revision is needed.

I noticed that there are two different water masses, one is old AW and the other is young AW. The later data analysis is almost organized according to this logic. Although the traditional physical ocean observation (such as water mass analysis) can also distinguish these two water masses generally, I found that the biological parameters do not seem to be completely consistent (at least some mathematical analysis is needed to clarify from the seemingly chaotic distribution). If the author can dig in depth according to this logic and see if the underlying mechanism is universal (extrapolation), they may be able to find a clue.

Although the author defines fine scale (line 23), there are other related descriptions, which are easy to be confused. For example, low energetic front (lines 53, 60) and moderate energetic front (Title. Line 5, 328).

The size of phytoplankton is also confused. In fact, *Synechococcus* belongs to picophytoplankton, and I guess the "picophytoplankton" in the article means eukaryotic picophytoplankton. In addition, most cryptophytes are considered to be in nano size. Anyway, there's some confusion.

The results of this paper are mainly presented from the horizontal direction, but I think the vertical structure of physical-biological distributions is extremely valuable, and it is also the characteristics of field observation different from remote sensing and model observations.

Minor comments and suggestions

Abstract: It is necessary to present some new results based on fine scale observations.

Line 259, $n \approx ?$

Line 323-331, It is repeated in the introduction

Line 365-370: I suggest more analysis, based on your high-resolution results, to give more evidence or new explanations.

Line 373, The concentration and structure of dissolved organic matter may be controlled by physical processes (aggregation and dilution) on the one hand, and by biological effects (production rate and species composition) on the other. Whether these high-resolution matching data can be further mined.

Line 383, "provide an in-situ confirmation of the findings" may not enough. In fact, your data is so good that you don't need to prove other people's opinions at all.

Line 387, change "Kurushio" to "Kuroshio"

Figure 1, large scale circulation and map may help readers understand better

Some figures can be combined and are more suitable for comparison, as Figures 2 and 4, Figures 3 and 5, and Figures 6-10.