

Interactive comment on “Plankton in the open Mediterranean Sea: a review” by I. Siokou-Frangou et al.

Anonymous Referee #3

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Overall, this is a valuable review putting together all the scattered works of the last decades regarding biogeochemistry and planktonic marine foodwebs in the MS. It reveals the patchiness of the existing studies and outlines the need for more homogeneous and coordinated efforts to be undertaken in the future, including the extended use of modern tools (from satellite sensors to autonomous systems and to “-omics”). Compiling this information, particularly under “key-players” sections is of great importance.

From the few transmediterranean cruises and comparative works the general trends and patterns have been outlined while local works have studied the mechanisms and feeding relationships within planktonic marine foodwebs. Using this information, the review presented here nicely reveals a glimpse of the thousand-piece puzzle of the Med ecosystems’ functioning. An interesting and well made synthesis of existing ideas

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is made in the conclusion section.

On a more technical level, this work reads differently in the different sections, apparently reflecting different writers’ styles. However, I do not consider this as a problem in the same way that different writing styles are totally acceptable in scientific books, where different writers write each chapter. More importantly, a serious reworking of the English needs to be done throughout the text to avoid compromising comprehension. Improving the English overall will also smooth differences among sections. Publication recommended after minor revisions.

General editorial comments:

- Special care has to be taken to uniformly present short names and abbreviations, i.e.
- the use of word “sea” in i.e. Med Sea, Aegean sea
- Wmed, WM, EMed, EMS, NW Med, Basin, basin, appearing both in text and in figures/tables’ legends.
- always separate the values from units
- avoid very general statements, usually in the introduction of a paragraph, that do not add substantially to the text
- add commas after introducing words, in head of sentences: e.g. Interestingly, surprisingly, however, moreover ect.

Detailed comments:

Abstract:

- p. 11188, line 18: Overall, the basin .. (add the comma)
- p. 11189, line 4: ...enhance export towards ‘high’ ... should be ‘higher’ trophic levels
- p. 11189, line 8: “signi ficant” , replace with “significant”

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Section 1 Introduction

- p. 11189, line 15: The Mediterranean Sea (MS) is the largest quasi-enclosed sea on the Earth, its “extension” being . . . you mean “surface”?
- p. 11189, line 19: The phrase “The MS’ size, location, morphology, . . . and sub-mesoscale activity” is a copy paste from the Abstract. Consider rephrasing or deleting it in one of the two sections.
- p. 11189, line 23: Oligotrophy seems to “mainly due” to the very . . . -Replace with “be mainly due” or to “mainly be due”
- p. 11189, line 25: add Thingstad et al., 2005, in the parenthesis
- p. 11190, line 5: “whose impact on the marine environment “have” still to be clearly.. -Replace with “has” still to be...
- p. 11190, line 18: ... were hence devoted to “constrain” carbon and nutrient fluxes and to provide insight “on” the key players . . . -Replace with “study” and “into”?
- p. 11190, line 27: Clearly these studies have provided new insights “in” the MS plankton in terms of its components, “besides a more extended geographic coverage”. -Rephrase
- p. 11191, line 9: A review could be helpful, among “others”, . . . “other things”?
- p. 11191, line 10: “In addition, as detailed in the following sections, the main forcings on the basin and their scales display peculiar features. As a consequence, non-trivial responses might be triggered in plankton communities, which could be of significant interest for a wider than Mediterranean community”. -Please rephrase

Section 2 Physical and chemical framework

- p. 11191, line 23: . . . and its connection with one of the proportionally largest catchment areas. -Please explain
- p. 11192, line 3: ...with saltier and denser water exiting the basin at Gibraltar and a compensating entrance of the fresher Atlantic water. - Why the Black Sea Water inputs

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in the EMed are not mentioned? Is it quantitatively not comparable?

- p. 11192, line 4-5: As the unbalance between evaporation and precipitation plus “runoff” (the E-P-R term) “in-creases” towards east... -Replace with “run-off”, “in-creases”, add towards “the” east
- p. 11192, line 5: ..the eastern basin is anti-estuarine respect to the western basin. -Add “in” respect to the western basin.
- p. 11192, line 13: ...which are mainly anticyclonic in the southern regions and cyclonic in the northern ones (Pinardi and Masetti, 2000). -Add (Fig.2) after this phrase
- p. 11192, line 15: The MAW adds a haline component to the thermal contribution to stratification in large areas of the SW MS decreasing the winter mixed layer depth. -Add comma: SW MS. Decreasing
- p. 11192, line 19: . . . in both the Alboran Sea and “in” the Algerian basin... -Delete “in”
- p. 11192, line 23: which separates two “subregions”... -Replace with “sub-regions”
- p. 11193, line 11: . . . Shikmona (south of Cyprus) and Cyprus Eddy (south-west of Cyprus).. -Are one and the same
- p. 11193, line 11-12: ...Local deep convection events occur periodically in the deep troughs (>1000m) of the North Aegean Sea and in the deep basin of the South Aegean sea. -Add references
- p. 11193, line 23: Main features are. . . – Add “the” main features. . .
- p. 11194, line 8-10: Rephrase! Also add comma (Therefore, . . .)
- p. 11194, line 23: . . . with a “dramatically” decrease – Replace with “dramatic”
- p. 11195, line 11: This adds to riverine inputs. Complete the sentence
- p. 11195, line 15: To complete the picture on respirable carbon not produced inside the basin we have also to account for the net DOC input through Gibraltar. . . Again DOC inputs from the BSW inputs are not considered, yet they have been considered to be important (Sempéré et al., 2002)

Section 3 Phytoplankton

- p. 11197, line 8: These gradients clearly reflect the physiography of the basin and the

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related circulation patterns. – Very general. Not informative.

p. 11198, line 6: Similarly high peak values. . . . Add comma; Similarly, . . .

p. 11198, line 13: between the two MS sub-basins . . . Add full stop: . . .sub-basins.

p. 11198, line 23:p. showed a “two-threefold” variability... –Replace with: showed a “two to threefold” variability

p. 11199, line 21: The DCM progressively deepens from west to east (Fig. 7) from 30m in the westernmost area (..), to 70m in the South Adriatic Sea (..), down to 120m (..). – Where is this 120m?

p. 11199, line 22: ..probably related with lower productivity.. Replace with: related to

p. 11200, line 15: . . .primary production rates were 240–716mgCm⁻² (in 14 h). Define parenthesis content

p. 11202, line 15: In the following, . . . Add: In the following section, . . .

p. 11202, line 19: . . .the different groups depicted below are “included” in completely distinct trophic pathways. . . . *Replace with are “involved” . . .*

p.11202, line27 : *As an average on the whole basin, . . . primary production.* –
– *Add reference*

p.11203, line3 : . . . and size fraction considered. *Replace with : size fractions. . . .*

p.11203, line5 : . . . in the Strait of Sicily during “the” summer. *Delete “the”*

p.11204, line7 – 8 : . . . have also found to be abundant. . . . Add : *have also “been” found. . .*

p.11205, line4 : . . . in addition to a limited number of small solitary diatom species. Add :
“and coccolithophores”.

p.11205, line12 : . . . probably because it is “kept in check” by. . . . *Replace with : “controlled”*

p.11206, line3 : *In a June 1999 transmediterranean study, . . . Rephrase*

p.11207, line29 : *Apparently, diatoms in highly “dynamics” areas are only associated with the high*
– *Rephrase sentence and replace “dynamics” with “dynamic”*

p.11208, line7 : . . . the main contributors also to high “chl” patches. – *Replace with chl – a*

p.11208, line10 : . . . have been defined the “oasis” of the Mediterranean desert. – *Add :*
“as” the oasis”

p.11208, line15 : . . . as in the exceptional case of a monospecific “blooms” of. . . . –

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Replace with “bloom”

p.11209, line22 : . . . pulses of diatom growth in deep waters might contribute explaining. . . . Add :
“in” explaining

Section 4 Heterotrophic microbes and viruses

p. 11212, line 23: Existing data (Table 2) also suggests that. . . . Replace with “suggest”

p. 11215, line 26: Surprisingly little information exists . . . Add comma: Surprisingly, . . .

p. 11216, line 8: In the MS an accumulation of DOC in the surface waters has been hypothesized as resulting from nutrient limitation of bacterial activity, specifically BGE. Please rephrase!

p. 11218, line 4: ..where ciliate abundance “were” always lower. . . . Replace with “was”

p. 11218, line 9: It could be that the relationship between ciliate abundance and chl-a concentration is stronger in the WMS than in the EMS indicating a better coupling with phytoplankton stock in the WMS. – Have you any clue about this?

p. 11218, line 28: Dolan et al. (1999) have found that large mixotrophic ciliates were more abundant, both in absolute and relative terms, in the EMS than in the WMS. – Any clues why?

Section 5 Mesozooplankton

p. 11220, line 3: An overview of the distribution of mesozooplankton standing stock in epipelagic Mediterranean waters highlights a general paucity in most regions, which reflects the oligotrophic character of the basin (Fig. 16, Table 5) – This is not apparent to non-specialists

p. 11221, line 21: In the annual cycle, . . . in comparison to coastal waters. - Add reference

p. 11223, line 3: . . .as reported for Paracalanus (..), that has similar swimming behavior. – Delete comma

p. 11223, line 20: Although their populations largely overlap, . . . , similarly to what

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observed in coastal waters. Rephrase, not clear

p. 11224, line 7: West-to-east differences in the community . . . and paths in the systems. – Very general statement, not adding anything to the text

p. 11225, line 8: Among crustaceans, cladocerans, which are a very abundant component of zooplankton in coastal waters, expand their occurrence beyond the continental slope only in narrow neritic areas at their maximum abundance observed in summer. – Not clear, rephrase

p. 11225, line 11: In open waters of the Straits of Sicily and the EMS during autumn, cladocerans accounted for only 0.3p. 11226, line 15: Among the highest contributions should be that recorded in the Ligurian Sea in December. . . - Please rephrase

p. 11229, line 3: . . . and “the” contrast might be attributed to factors other than nutrition such as zooplankton mortality due to predation. – Replace with: . . . and this contrast might be attributed to factors other than nutrition, such as zooplankton mortality due to predation.

p. 11229, line 6: In situ measurements evidenced that mesozooplankton grazing impact on phytoplankton could be significant. – Add reference

p. 11230, line 6: The observed uncoupling between mesozooplankton and microheterotroph standing stocks in the North Aegean Sea could be due to the same factor. - Isn't this contradicting to the previous section? (p.11229, l22 – p.11230, l.6)

Section 6 Planktonic food webs in the Mediterranean epipelagos

p. 11232, line 24: The heterotrophic biomass would then “have been” quickly channeled. . . - Replace with : The heterotrophic biomass would then “be” quickly channeled. . .

p. 11232, line 25: The relaxation of P limitation produced a “luxurious” accumulation of P in both bacteria and picophytoplankton (presumably less in the latter) with a P enriched diet for grazers. . . Replace with : The relaxation of P limitation produced a “luxurious” accumulation of P in both bacteria and picophytoplankton (presumably less in the latter) forming a P enriched diet for grazers. . .

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p. 11233, line 9: The leading role of heterotrophs, in the MS, as it emerges from a plankton standing stock prevalently heterotrophic and dominated by microbes, is the dominant situation in the basin. – Rephrase

p. 11234, line 23:.. but its overall weight on the production of the basin is poorly “constrained”. –Replace with “studied”.

p. 11235, line 17: All this suggests that in the MS is characterized by a “multivorous food web” (. . .), including a continuum of trophic pathways spanning from the herbivorous food web to the microbial loop and dynamically expanding or contracting along with seasons, areas and transient processes. Very general, better rephrase

Section 7 Perspectives

p. 11236, line 27: The diversity and distribution patterns of autotrophic and heterotrophic prokaryotes, viruses, and eukaryotes which are the major component of the MS epipelagos are still largely “underestimated”. – Replace with: “understudied”.

p. 11237, line 13: The relatively close proximity with land intensifies the effect of climatic changes and anthropic-driven impacts such as increased nutrient fluxes and/or overfishing might affect the biological structure of the basin at a more rapid scale as compared to the large oceans, and strongly support the role of Mediterranean as a sensitive sentinel for future changes. – Rephrase, not clear

p. 11237, line 29: Among these, a great opportunity is represented by a clever merge of modern oceanographic tools such as Autonomous Systems and the sophisticated methods of the “omics”, whose results may feed tentative integrated conceptual models of the system dynamics to approach a broad range of marine environmental issues such as fisheries, climate change impact, harmful blooms, emerging diseases and pollution. – Please rephrase, not clear

p.11272, Table 4: exchange column 1 (Period) with column 2 (Location)