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Ocean Science Discussions

Interactive comment on "Physical forcing and physical/biochemical variability of the Mediterranean Sea: a review of unresolved issues and directions for future research" *by* P. Malanotte-Rizzoli et al.

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Answers to comments of reviewer 3- Reviewer's comments are in quotes

We first wish to thank the reviewer for the many nice comments he has for the paper and for the constructive suggestions provided.

1)"The main weakness lies in the references on the key interactions between physics and biogeochemistry in the Mediterranean Sea. No mention of MERMEX group paper was done (MerMex Group, 2011. . .. .) and the paper would benefit from it as one of

the goal of this synthesis, as underlined in the conclusion, is to gather all the “Mediterranean scientists together for multidisciplinary and multinational programs in order to better address the key questions for future research” “

Indeed this is a correct remark considering the effort made by the authors. Some of their contributions are discussed in the revised sub-sections 2.3 and 2.4.

Specific comments

2)“Section 2.3 Forcing and variability in the stock of nutrients(P1216-1219).I would suggest another specific issue regarding the changes in nutrient stocks : exchange flux between shelf (under high anthropogenic pressure, e.g. waste and industrial waters enhanced in nutrients) and open sea waters. These fluxes are strongly related to the shelf-open sea circulation, and represent an issue addressed by MERMEX/MISTRAL project.”

Remarks in answer to this comment have been included in the revised sub-section 2.3

3)“ Section 2.4.Modeling and assessing ecosystems. Point 4 of specific issue. I am not sure that O2 vertical structure, showing no real minimum, is only related to a small export.I would suggest that a strong O2 penetration led by anticyclonic meanders would explain it (as well as low nutrients in basin interior).”

This may be an interesting hypothesis but, as far as we are aware, the baroclinic structure of the anticyclones confines their influence in the first hundred meters (Robinson et al., 2001; Isern-Fontanet et al., 2004). The anti-estuarine thermohaline cell dominates the Mediterranean intermediate layer, LIW continuously ventilating this layer.In our opinion, the oxygen ventilation of the ocean interior by anticyclonic convergence happens only in limited areas with a relatively small impact on the overall DO vertical structure. A sentence has however been added in section 2.4 to include this remark.

4)“Section 3.7. Carbonate system (p.1247). 1) Another specific issue is related to surface pH. How CO2 penetration affects surface pH with time ? And how pH changes

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in turn, affect bioavailability of micronutrient, metal speciation and the related food webs? 2) Ait-Ameur and Goyet (2006) have proposed an estimate of the anthropogenic carbon that outflow the Mediterranean Sea at Gibraltar strait. Although I agree that physical-biochemical variability requires some kind of monitoring,this paper should be mentioned . Suggested specific issue : monitoring surface pH changes with current pH sensors in key Mediterranean ecosystems."

We thank the reviewer for pointing out to us that the ocean acidification observing system was not mentioned in the original manuscript. We have now added this to the text and the reference to the work by Ait-Ameur and Goyet (2006). Also, as the reviewer suggests, we have added a "bullet" issue on pH changes and the reviewer's suggestion for current pH sensors. We discuss this in the revised text. We also now mention some papers related to the outflow of carbon through the strait of Gibraltar and discuss this.

5)"Sections 3 and 4. SOCIB observational system is mentioned in P.1253.In no part of the manuscript I have seen the MOOSE observational system cited. It is an important program that aims at addressing most of the key issues that arise in your manuscript. It has been developed a few years ago and is now operational in the liguro-provenzal basin (mio-pytheas.univ-amu.fr/moose/"

The MOOSE observational system is now amply mentioned in subsection 4.1 after SOCIB.

Interactive comment on Ocean Sci. Discuss., 10, 1205, 2013.