

Interactive comment on “Space-time variability of alkalinity in the Mediterranean Sea” by G. Cossarini et al.

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We thank reviewer #1 for her/his comments.

Surely we will carefully consider them in the revision of the manuscript.

Here, very briefly, we just clarify that –even if we do have simulations, which describe the carbonate system and DIC dynamics - in this manuscript our choice was to focus on alkalinity and the empirical alkalinity-salinity relationships. As it is well known, alkalinity is a master variable for the resolution of the carbonate system, but (differently from DIC) it is not influenced by the atmospheric CO₂ invasion (Wolf-Gladrow et al., 2007). Therefore we believe that models should have some skill in reproducing this parameter, before being used to investigate the carbonate system dynamics.

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Furthermore, and in spite of its importance, experimental measures of alkalinity not always are available, so that empirical relationships are often used to derive alkalinity values from salinities. Therefore, to us it seemed important to use a realistic model to test whether or not such empirical relationships could be extrapolated over all the Mediterranean sea sub-regions, and possibly point out the fact that for different regions specific relationships have to be used for different reasons.

For this reason, we focused this paper on the analysis of how good our model is in reproducing the alkalinity in the Mediterranean, on the quantification of the biological and physical sources of its variability, on the analysis of the spatial and temporal variability of alkalinity and on the analysis of alkalinity and salinity relationship in the Mediterranean Sea.

On this point we also add that our model has been used (together with others models within the FP7 MedSeA project) to estimate the impact of acidification within the Mediterranean Sea. The results indicate that the Mediterranean Sea responses to CO₂ invasion and acidification not too differently from other open ocean area, because the differences of alkalinity between Mediterranean Sea and oceans are somehow compensated by the higher values of DIC in the Mediterranean Sea. However, we would prefer not to squeeze too much material in a single manuscript, and these results are the object of a different publication now in preparation.

However, we are prone to accept the reviewer suggestion to enlarge a bit our scope, if the editors and the other reviewers see this advisable, and “going a little bit further” in quantify the different factors that contribute to defining spatial gradients and temporal variability.

Finally we thank the reviewer for the indication about very recent literature that we had not incorporated yet in our manuscript, and that we will be happy to fully consider.

Thanks

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