

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

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This manuscript presents modeling experiments that describe the spatial-temporal evolution of alkalinity in the Mediterranean Sea using a 3-D transport biogeochemical carbonate model. The simulation experiments cover the period 1999-2004. Model results facilitate to understand, how the different biogeophysical processes contribute in describing the spatial gradients and also the seasonal variation of alkalinity.

Overall, the study is well written and presents a relevant development. The experiments are carefully described. The experiments indicate that the regression between salinity and alkalinity varies from region to region and highlight that it's potential to use one equation to reconstruct alkalinity values over the entire Mediterranean as long as marginal seas and regions influenced by fresh water inputs aren't thought-about. I

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think that the manuscript can be recommended for publication with some additional discussions/clarifications considering my comments below. Overall, this should only require a minor revision of the manuscript.

P 12875 l 20 – p 12876 l 5: The description of the carbonate model is rather complicated. Please rewrite it. It seems that for the estimation of alkalinity only BFM and salinity are required. Why the authors call it carbonate module?

P12877 l 10: how long was the spin up period?

P2878 l 6 – p12878 l 16: This information is known also from the data. The model results should provide more detailed information. It would be interesting if the authors could expand this section discussing the model results in comparison with the observations.

P12878 l20 - P12878 l25: “The thermohaline . . .less variability” How the authors identify these characteristics? It should be also beneficial to further demonstrate the role of the thermohaline circulation by calculating the water fluxes among different regions of the Mediterranean

P12879 l 15: Since alkalinity depends on evaporation and the Atlantic water inflow, a comment would be useful to show that the water budget E-P is consistent ensuring that there is not significant drift in the alkalinity.

P12881 l 18: I cannot follow the calculation of the biological contribution. Please explain.

Figure 5. Please report the selected points in the figure 5 caption.

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