Ocean Science
Discussions

Interactive comment on "Marine Ecosystem forecasts: skill performance of the CMEMS Mediterranean Sea model system" *by* Stefano Salon et al.

Anonymous Referee #2

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General Comments

This study deals with the assessment of an operational BGC system on the Mediterranean Sea. It is organized as follows: (1) the study of the pre-operational qualification run (2-year long) both in terms of consistency and skill performance; (2) the near-real time validation of the operational run (from April 2018 to November 2018) in terms of skill performance. This manuscript is well structured and gives an overview of the overall quality of the BGC simulation using classical CLASS 1 metrics but also innovative CLASS4 metrics (using quality-controlled BGC-Argo data). The authors use a BGC-Argo database consisting of 28 floats with chlorophyll, 13 with nitrate and 15 with

oxygen. The weaknesses of this study are: (1) It doesn't give an overview of other published simulations on the Mediterranean Sea. The reader is not able to appreciate the quality of this simulation in relation to other BGC models in the literature; (2) It doesn't manage to rationalize the discrepancies diagnosed by the comparison with observations and to disentangle the origin of the observed biases (problems due to the physical model, the biogeochemical parameterizations or to the sensor quality control?). They are a lot of metrics that are not enough used to suggest some solutions and to improve the future systems. Some figures need also to be improved.

Specific comments

P3 L26-27: "surface chlorophyll . . . of CMEMS" Which CMEMS product? Is it the same as the one used for assessment on Fig 3 and Fig 4?

P4 L10: Which database do you use for river inputs? Reference?

P4 L15-16: "Additional 2D fields include the surface data for solar irradiance and wind stress": Where are these data from?

P5 L11: Is the spin-up forced by a climatological year?

P6 L16-20: is it the same dataset as the one used in the data assimilation scheme? Can you precise the temporal frequency. Daily?

P6 L24-30: do you use the BGC-Argo dataset available on Coriolis website?

P11 L19: prefer 'averaged' instead of 'integrated'

P11 L20 and Fig9: why do the correlation values vary so abruptly and reach zero sometimes in winter?

P11 L22-23 and Fig9: This sentence is not convincing. Why these differences between modelled and observed depth of MWB? What is the difference between the mixed layer depth (MLD) and the depth of MWB? Why did you choose this index? Did you compare the mixed layer depths along the float trajectory?

Fig9: in summer 2017, there is no diagnosed DCM for model. Why?

Fig 10: skill index 4th row: the legend is missing for NITRCL1/NITRCL2. Why is the blue index missing for model in the beginning of 2017?

Fig10-11: Authors don't show depths below 300m. For oxygen, the colorbar is saturated below 200 umol/L. It doesn't allow to study the nitrate gradient and the OMZs.

P12 L21: I would say 'solubility' instead of 'saturation'

P12 L22: What are the consumption terms?

Fig 12: needs to be improved (quality). Do you compare to the daily NRT L3 chlorophyll product? The figure seems to be at a coarser temporal resolution. Moreover, the yaxis labels don't appear correctly (they are truncated). I don't understand why the red curve is constant during the summer.

P13 L15: 0.041 instead of 0.41 mg/m3?

P13 L18-20 and Fig 13: Authors don't comment much the Fig13. For example, the nitrate dots are very scattered (between 0 and 100m depth), do you think that it is due to nitrate sensor anomalous values or is it a problem in the physical or biological models? Oxygen panels display a bias (model overestimates float data): do you think it is a bias in the model or in the data?

Table 6: I am wondering why the chlorophyll RMSD for the pre-operational is twice as large as the one for the T0 forecast. Do you have an explanation for the nitrate RMSD decrease from T0 to T3?

Technical comments:

P4 L16-17: "are used respectively . . .module". I think you should switch both: "as input for the BFM optical module and to solve the gas air-sea exchanges"

P4 L21: temperature AND salinity

P6 L14: the same AS

P7 L2: SchmeCHtig

P7 L16: relies instead of relays

P9 L6-7: surface bloomS in nwm appear (remove the s)

P9 L9-10: NODC-OGS instead of OGS-NODC for more consistency with the beginning of the manuscript

P10 L7: "a large seasonal cycles": remove the "s" in cycles

P11 L10 "river plume" : remove the "s"

P18 L1: represent a (remove the 'n')

Fig 14: in caption, 'increase' instead of 'increment'?