Comment on esd-2021-64

Anonymous Referee #2

Referee comment on "Indian Ocean marine biogeochemical variability and its feedback on simulated South Asia climate" by Dmitry V. Sein et al., Earth Syst. Dynam. Discuss., https://doi.org/10.5194/esd-2021-64-RC2, 2021

General Comments:

The paper presents an interesting study on marine biogeochemical variability on Indian Ocean and its impact on regional climate. The authors investigate the effect of a static and a variable marine biogeochemical light absorption on simulating the regional climate on Indian Ocean. Both atmosphere and ocean present climate are evaluated against observations, as well as the quality of physical and biogeochemical characteristics simulated. The paper is well written and organised.

Specific Comments:

Methods:

- Please include the horizontal and vertical resolutions of your simulations.
- The authors describe the setup of simulations performed, but a description of the observations used (WOA13, SeaWiFS and MODIS-Aqua) is missing. I suggest including a brief description of these datasets.

L166: Why did you not use a more recent version of the World Ocean Atlas?

L173: Since you use the monsoon season defined as June-September (JJAS), I suggest changing "summer season" to "monsoon season" or "extended summer" to be coherent with the seasonal periods defined in L169-172. In L180-181, the pre-monsoon and monsoon seasons are referred. Following your first definition (L169-172), this means MAM and JJAS. Please, check all the text and change accordingly with your first definition, also to be coherent with Section 4 where the summer season is defined as JJA.

L201-203: The spatial distribution of the difference between the INDB and WOA13 SST, SSS and NO3 are identical to Fig2 for INDJ? The authors do not show these results but mention here the INDB simulation.

L222-224: Did you perform the same setup but with lateral boundary conditions driven by a reanalysis dataset?

L255: Why the analysis period is different in Figure 4? Is it related with the availability of satellite data?

L376: Why was the WOA2001 included? In L384-403, there is no discussion about the added value of including two WOA datasets.

Technical corrections:

L190: "Sea surface concentration of dissolved nitrate." -> Italic style

L368: "Thermocline dynamics." -> Italic style

L500: "Fig. 16" or "Figure 16"