

Biogeosciences Discuss., referee comment RC2
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Comment on bg-2022-105

Anonymous Referee #2

Referee comment on "Influence of GEOTRACES data distribution and misfit function choice on objective parameter retrieval in a marine zinc cycle model" by Claudia Eisenring et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2022-105-RC2>, 2022

Review of "Influence of GEOTRACES data distribution and misfit function choice on objective parameter retrieval in a marine zinc cycle model" by Eisenring et al.

The manuscript investigates global spatial distribution of Zn:P uptake ratios by phytoplankton using the GEOTRACES dataset, MIT numerical model and optimization techniques. The methodology is adapted and well described, and analyses focuses on the influence of limited spatial data coverage, model circulation uncertainty, and choices of optimization functions. The manuscript provides some information of interest for the marine biology community. However the manuscript is very dense and technical, and in its actual shape not very accessible for the majority of scientists. I recommend to rework on the manuscript to make it more accessible, to highlight more the conclusions of interest for the zinc cycle and to base the discussions less on the technical aspects. in particular, focus more on the impact of the partial coverage of the database, the seasonal cycle and the circulation, and put more indented the different optimization techniques and synthesize may be in an appendix how their choice can strongly influence the main conclusions of the paper Zn cycle.

Also, the study on the influence of the circulation needs to be better described and analyzed. While for the other analyzes there is information on the range of variation of the parameters or the techniques, no details are given on the sensitivity experiment with the higher resolution model. the paper concludes on the strong influence of the ocean circulation, but perhaps the circulations generated by the models are very different, and only caused by significant shortcomings in the low-resolution model, so that range of variation is not realistic.

Minor points :

- Parameterization of Zn^{2+}/Zn with Ligands (L) is not described
- the czn parameter seems to be almost systematically optimized by the lowest allowed value. wouldn't it be possible to widen the to allow lower values?