

Interactive comment on “N/P ratio of nutrient uptake in the Baltic Sea” by Z. Wan et al.

Anonymous Referee #2

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General comments.

In my opinion, the main purpose of this manuscript is to fit a 3-D ecosystem-hydrodynamical model to available data (mainly on Chlorophyll a, DIN, DIP) in the Baltic Sea. To this end, the authors assume that the model solution is most sensitive to the N/P ratio of nutrient uptake and perform some model runs with different values of N/P ratio. They show that the model solution for the Baltic Proper agrees well with data in the case of using the N/P ratio equal to 10. But the authors do not take into account that the same or similar results could be obtained through variation of other ecosystem model parameters. In particular, as the authors indicated in the Introduction, “Osterroht and Thomas (2000) noticed that the N/P ratio of nutrient alteration fore and after the growing season was much different from Redfield ratios, they explained that the elemental ratios of nutrient uptake were consistent with Redfield ratios, but the nutrient mineralized from freshly produced organic material had non-Redfield ratios”. So,

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it would be fine to check the latter assumption by performing numerical experiments with different mineralization constants for N and P. Unfortunately, it would require reformulation of the ecosystem model ERGOM (Neumann et al.) used in this study which contains only one kind of detritus.

In other words, the authors did not prove that the N/P ratio of nutrient uptake has a non-Redfield value in the Baltic Sea, but they showed only that using a non-Redfield value for N/P ratio of nutrient uptake makes it possible to get better agreement between data (for only 3 stations in the Baltic Proper!) and one from existing 3D models. Therefore, I would recommend that the authors do not be so categorical and insist on non-Redfield value of the N/P ratio of nutrient uptake in the Baltic Sea as a whole. It is still a hypothesis!

Specific comments.

1. P.4, L 10-11.

“...because the Baltic Sea is relatively closed and the imported nutrients are less than the nutrient uptake.”

Such statement should be proved by giving estimates for nutrient uptake and nutrient transport.

2. P.4, L 9-10, Table 2.

How much reliable are the small values of nutrient concentrations (especially DIP) determined? Their imprecise definition can greatly change the final result

3. P.6, L 27, Table 1.

What is the reason for such strong changes in model parameters in comparison with Neumann et al. (2002)? It would be fine to see in the paper a comparison between two model solutions which are relevant to these two model parameter sets.

4. P.6, L.27-28

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“The model runs from 1 January 2001 to 31 December 2007”.

This duration of model runs is too short to get equilibrium solution in the system water column - benthic layer. It is not clear how it can influence on final result. Could the authors give some comments?

5. Part 2.2. Ecosystem model

A description of the benthic layer model should be given.

6. P.9, L. 4-5.

“The model results of Case NP10 are the best approaching to observations in all tested cases.”

This should be confirmed through statistical comparison between modeled results and observed data

Technical corrections

1. Table 2.

There is an error in the last row and the last column of the Table: N/P=27.7:1 rather than 21.7:1

2. P.8, L.13.

“10_N” should be “10_E”

The same is on line 22!

Interactive comment on Ocean Sci. Discuss., 8, 1233, 2011.