Biogeosciences

Discussions

BGD

Interactive comment on "Modelling nutrient retention in the coastal zone of an eutrophic sea – a model study" *by* Elin Almroth-Rosell et al.

Anonymous Referee #1

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The manuscript Almroth-Rosell et al investigates nutrient retention in the eutrophic Stockholm Archipelago. A 1990-2012 simulation is first validated against observations and then used to calculate the retention of N and P in the three sub-basins of the archipelago. A sensitivity analysis with realistic N and P reduction is then carried out to assess the effect of nutrient management on nutrient retention. The study is regional but of general interest, the manuscript is well written and the method and overall analysis appropriate. I therefore recommend publication of the manuscript in Biogeosciences after minor to moderate revisions. My main comments are discussed below, followed by a list of specific comments.

My main issue is the lack of discussion of the results with respect to the wider literature. This is probably due to the choice of format that merge the Results with Discussion. A comparison of retention capacity with previous studies is provided (e.g. Figure 14) but

the authors should provide a deeper discussion of their results and their implications. This would benefit their study and the audience of Biogeosciences.

Nutrient load decrease during the study which lead to uncertainties in the interpretation of the results. Could the author calculate retention for specific periods (in addition to the 1990-2012 period), i.e. in the earlier and later period of the study, in order to remove the uncertainty about the system not being at steady state? or provide a retention time series for 1990-2012, as in Figure 15? This would also provide information about the change in the system over this period.

Specific comments:

P5L4: missing words, "which is why"?

P8L21: (2009; 2011)

P9L3-5: Not clear, does that mean that for each observation you calculate the most limiting nutrient (N or P) and infer the non limiting nutrient with respect to Redfield?

P9 L21: why is there a plus/minus symbol in front of the square root?

P12L3-5: Is this first sentence needed?

P12L6: suggestion: "good agreement" or "agrees well" rather than "good results"

P12L21: Please rephrase for clarity (and remove "described")

P13L3-5: Why choosing this station?

P13L8-10: Unless there is primary production in summer.

P13L22: "surface nutrients".

P13L25-29: Why not move this higher up, before you describe the first station. Also, change "parameters" to "state variables" (or else), also L31.

P15L4-5: This is already mentioned above.

P15L5-20: Discuss more the implications of the different estimates.

P15L31: suggestion: "during the simulated period" or "over the 1990-2012 period".

P15L31-P16L2. Could you be more specific about the importance of the import of nutrients? Also this statement sounds strange, you say that the effect of nutrient transport has not been studied and will be studied in the future. Then what is this mentioned at all?

P17L2-4: please rephrase for clarity.

P18L7: "by" instead of "with"

P18L29: Replace with "This implies that under the 2010 conditions, all the total P load..."

P20L5: Suggestion: change to "overall, model results agree with observations"

P20L15: Suggestion: start sentence with However.

P20L20: Space before N.

P20L27-28: Doesn't the retention capacity increases for N on short time scales?

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