

## ***Interactive comment on “Evaluation of atmospheric nitrogen inputs into marine ecosystems of the North Sea and Baltic Sea – part A: validation and time scales of nutrient accumulation” by Daniel Neumann et al.***

**Anonymous Referee #2**

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The study aims to validate a marine ecosystem model and to quantify times scales of nutrient accumulation (c.f. the title of the study). The times scales of nutrient accumulation are expressed in terms of a residence time. The focus of the study is on the residence times of atmospheric bioavailable nitrogen in the North Sea and the Baltic Sea. Model results presented suggest that the respective residence times are two years in the North Sea and five years in the Baltic. These results are consistent with already-published estimates (c.f. pg. 1, ln. 16-18).

My main criticism is that, to calculate a residence time, a model is not needed. Multipli-

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cation of observed nutrient inventories with the inverse of the HELCOM nutrient fluxes directly, at the back of an envelope, yields residence times already. According to the authors (c.f. pg. 1, ln. 16-18) these residence times have been already known. I conclude that their model estimate does not present novel concepts, ideas - nor substantial conclusions.

The authors state that simulated deep nutrient concentrations in the Baltic are biased and that denitrification in the Wadden Sea is underestimated but that, at the same time, that " ... this did not impact surface layer concentrations" (pg. 1, ln. 13 to 15). Assuming that simulated surface nutrient concentrations were realistic makes me wonder if they are so for realistic reasons.

As concerns the second aim of the study, to validate a marine ecosystem model, I feel that a more specialized journal like "Geophysical Model Development" would be more appropriate because the audience addressed by Biogeosciences is rather broad.

I recommend to reject the manuscript and encourage resubmission to a journal that is focused on model description and validation.

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