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Biogeosciences Discussions

Interactive comment on "Link or sink: a modelling interpretation of the open Baltic biogeochemistry" *by* M. Vichi et al.

Anonymous Referee #1

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Vichi et al. provide a description of a 1-D biogeochemical model and its application to the Bornholm basin of the Baltic Sea. This is a well written and detailed paper, abundantly illustrated. I particularly appreciated the lengths to which the authors went to validate their simulations.

I'm concerned about the computation of the gas exchange of O2 across the air-sea interface that is a critical process in modelling O2 and thus in deriving rates of metabolic processes (pelagic NCP). Some further description on how this was accomplished would be useful to some readers. Also, if a simple parameterization of the gas transfer velocity as a function of wind speed was used to compute O2 air-sea fluxes, note that a parameterization has recently been proposed for the Baltic (Kuss et al. 2004). The use of this formulation compared to other recent formulations (Wanninkhof and McGillis 1999; Nightingale et al. 2000; McGillis et al. 2002) or classical ones (Liss and Merlivat 1986; Wanninkhof 1992) could be, in my opinion, a very interesting sensitivity test of the model.

I was surprised that the authors do not compare their model simulations with the process rates reported by Schneider et al. (2002; 2004) in the eastern Gotland Sea. These authors used a mass balance approach of carbon and nitrogen to derive rates of POC production and export and N2 fixation. The rates of POC production and export could be directly compared between the two sites in the Baltic. Also, in page 235, Vichi et al. state : “Data indicate a more intense summer production which would require the availability of additional sources of N. However, these sources cannot be traced from concentration measurements, especially whether they are from diffusion across the thermocline, local regeneration in the euphotic zone or bacterial N-fixation”. Schneider et al. (2004) have estimated that N2 fixation in the eastern Gotland Sea corresponds to about twice the DIN consumption. This deserves at least to be mentioned in the discussion.

Minor comments:

1) update the reference of the Gazeau et al. paper

2) use of colour in figures would improve their readability.

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