

Interactive comment on “The relative importance of selected factors controlling the oxygen dynamics in the water column of the Baltic Sea” by S. Miladinova and A. Stips

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General overview The work presents a new application of a couple 1-D vertical physical (GOTM) and biogeochemical (Neumann et al., 2002) models to investigate oxygen dynamics in Baltic Sea (basically in Baltic Proper but also for the connection with North Sea) during the period of 1998-2003. In order to incorporate the impact of lateral transport the vertical temperature and salinity profiles have been relaxed by results of available 3-D GETM simulations or BED observations. It was found that the parameter of limiting turbulent energy of the k- ϵ model could be used for tuning the parameterization of the oxygen exchange at the sea surface and as a results to improve the

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model performance to simulate oxygen variability in particular for surface and intermediate layers of the water column. Furthermore, the improved model has been used for a sensitivity analysis to reveal the effect of vertical turbulence exchange, atmospheric forcing and limiting nutrients or frequency of the physical profiles relaxation on the quality of oxygen simulations. On this basis it was proposed an interesting conclusion that under the framework of the present model assumptions the physical elements as a magnitude of vertical turbulent mixing, surface wind shear and variability of temperature and salinity fields are prevailing relative factors controlling the oxygen dynamics in the Baltic Sea.

Some suggestions, comments and questions Page 2117, line 23. The sentences to be connected and the part ‘during the next few years’ to be skipped. p. 2119, line19. The ten state variables of the biogeochemical model to be given. Also other simple models could be quoted. I don’t see a reason to refer ERSEM model. p.2120, lines 7-24. This part explains the novelty of work – first, the idea to use the parameter of limiting turbulent energy of the k- ϵ model as a tuning element and second, the extension of the applicability of model outside the Baltic Proper- p.2121, line 15-17. Is it reasonable to fix the Secchi depth? Maybe usage of seasonally variable values is better. P2122, line 4. Why ‘realistic’ – better to skip it. Line 20. How much is V (only constant is not sufficient). p.2124 line 23, ‘in fig2a. For all figures there is no indications about (a), (b) or (c). these could make some confusions. p.2126 lines 1-8. Could be specified the range of the depths of the surface and intermediate layers. Line 15 – citation for the original formulas of the statistical indexes. p. 2127 line 13. In reality you refer to figures 2c, 6a-8a. p. 2130 line 26. Chl a. Actually some info/statistic about the mode performance is given not here but later on p.2132. why? p. 2131, line 12. ‘An interesting finding ...’. why? Any explanation? p.2133. interesting trend about kmin p.2134 how to relax 1-D model when there is scarce or no data. What about the biological component relaxation? p.2135, line 15-18. May be this conclusion indicates that the interaction air/sea should be improved. p.2125-6. even the performed 150 scenarios the conclusion about the effect of the limiting nutrients is not very clear.

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p.2137 line4 '... the only parameters ...' usage of only is too restrictive, to be replaced.
Line 26. 'Sensitive analysis ...' sentence should start on new line because this is a new conclusion.

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