

## ***Interactive comment on “The Black Sea biogeochemistry: focus on temporal and spatial variability of oxygen” by E. V. Stanev et al.***

**Anonymous Referee #2**

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The manuscript describe the spatial and temporal distributions of dissolved oxygen in the Black Sea using a coupled physical-biogeochemical numerical modeling study with the help of recent argo float data and historical observations. I provide below my comments in the form of first "General" and than "Specific" comments.

General Comments:

The biogeochemical model involves a complex redox dynamics that is in fact far more complex than necessary for the purpose of the present study. On the contrary, the model possesses a very crude upper layer biological structure that is in fact linked to the oxygen dynamics more tightly than the processes taking place at the oxic-anoxic interface zone. This model was originally designed by one of the co-authors (E. Yakushev) to study the complex redox dynamics of the Black Sea from a biogeochemical

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perspective. The alternative more simplified models are also available with more simplified representation of the redox layer biogeochemical processes. The present model crudely represents the impacts of biological processes (e.g. primary production, remineralization, excretion, etc) on the oxygen structure at depths above the suboxic zone, whereas the complex redox dynamics within the suboxic and anoxic layers is redundant to study oxygen dynamics in the, by definition, oxygen deficient zone. The use of this type complex biogeochemical model structure may be necessary and justified for studying other aspects of the biogeochemistry but not for the oxygen. Indeed the authors have ended up focussing on mainly the physical processes for explaining the oxygen structure within mostly upper parts of the water column away from the oxic-anoxic interface zone. Indeed, they did not provide any justification why they have chosen such a complex biogeochemical model or, in other words, why such a complex biogeochemical model was necessary to study the oxygen dynamics. To my opinion, excluding the manganese model and parameterizing it in much simpler terms would not alter the results described in the manuscript. This is an important issue because the coupled physical-biogeochemical models can not practically accomodate such a complex biogeochemical dynamics for practical reasons in long-term decadal simulations. It would be good to know how much simplifications can be appropriately done without sacrificing much from reality. I suggest authors to include a discussion section on these issues.

The second issue is the focus of the study. There is no specific problem to be solved and/or a hypothesis to be tested. I find the manuscript too broad and many issues are touched up on briefly without providing details on the specific mechanisms responsible for them. In fact, many of the issues presented have already been known from the previous studies. The manuscript may be considered as an overview paper linking many different aspects of the Black Sea oxygen characteristics to the physical characteristics of the system. To my opinion, the most interesting part of the manuscript is the section 6.2.2 and Fig. 16 that could indeed form a novel scientific research paper by itself and would provide a nice contribution to the scientific understanding

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of the Black Sea hydrochemistry because this particular subject has not been elaborated in sufficient details up to now to my knowledge. Issues like impacts of the rim current meanders and mesoscale eddies together with the contribution of upper-layer biogeochemical processes on the local oxygen dynamics are highly novel issues for a broader oceanographic community. Unfortunately, they are presented only broadly in the manuscript. They need to be elaborated in sufficient detail and form a main focus of the text while some other sections may be shortened or taken out completely if the manuscript will be decided to appear in the journal.

The title of the manuscript is too ambitious to me. It gives a wrong impression and has nothing to do with the biogeochemistry of the Black Sea. The manuscript simply deals with how the oxygen structure is regulated/controlled by the physical processes.

Albeit all these deficiencies, I find the manuscript as a useful contribution to the existing Black Sea literature, and it is worth publishing in Biogeosciences provided that my comments are incorporated in the revised manuscript.

Specific Comments:

Because the present manuscript will undergo a substantial revision, I will not include additional specific comments on the manuscript at this stage.

Further Comments:

Scientific Significance: Does the manuscript represent a substantial contribution to scientific progress within the scope of Biogeosciences (substantial new concepts, ideas, methods, or data)? Not the present form, but may have in the revised form.

Scientific Quality: Are the scientific approach and applied methods valid? Are the results discussed in an appropriate and balanced way (consideration of related work, including appropriate references)? Not entirely and need revisions.

Presentation Quality: Are the scientific results and conclusions presented in a clear, concise, and well-structured way (number and quality of figures/tables, appropriate

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use of English language)? Yes, but too many irrelevant details are present.

Does the paper address relevant scientific questions within the scope of BG? Yes.

Does the paper present novel concepts, ideas, tools, or data? Yes.

Are substantial conclusions reached? No.

Are the scientific methods and assumptions valid and clearly outlined? No.

Are the results sufficient to support the interpretations and conclusions? No.

Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? No.

Do the authors give proper credit to related work and clearly indicate their own new/original contribution? Yes.

Does the title clearly reflect the contents of the paper? No.

Does the abstract provide a concise and complete summary? No.

Is the overall presentation well structured and clear? No.

Is the language fluent and precise? Yes.

Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? Yes.

Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? Yes.

Are the number and quality of references appropriate? Yes.

Is the amount and quality of supplementary material appropriate? Yes.

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Interactive comment on Biogeosciences Discuss., 11, 281, 2014.

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