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Interactive comment on "The temporal variability of oxygen inventory in the NE Black Sea slope water" *by* Alexander G. Ostrovskii et al.

Anonymous Referee #4

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General Comments ****************** In this manuscript the authors present and analyze a extremely valuable dataset gathered from a moored profiler equipped with Doppler and oxygen sensors on the edge of the Black Sea North Eastern shelf. Based on this datasets, they address the issue of the short time-scales of variations for vertical horizons characterizing the density and oxygenation structure. Several recent publication have shown the timeliness of this study, in the context of Black Sea deoxygenation, as such detailed experimental data set provides the means to evidence diapycnal ventilation processes and to quantify the variability of bottom oxygen conditions on the narrow eastern shelf. As discussed extensively by other reviewers, the manuscript would gain a lot by revising the structure and language, and therefore requires substantial revision. However, we encourage the authors in tackling this effort since the materials and results absolutely deserves publication. Here follow some additional suggestions, and comments.

âĂć A major object of the manuscript (and a strong asset of the sampling approach) regards the characterization of the temporal scales of vertical oscillations. In particular, it is very interesting to perceive phenomena acting at time scales shorter than those typical of current sampling in the open sea sampling frequency (eg. Argo). I would suggest, as I think this is accessible , to analyze those time scales more robustly with spectral analysis tools, applied, for instance on the time series of SOL, onset depth of hypoxia, velocity components a certain depth, etc.. This could feed the discussion by putting processes in relation with (ranges of) time scales more clearly.

âĂć The discussion on oxygen inventory is somewhat confusing, since it may give, at a fast read, the impression that the observed variations in oxygen inventory are to be related to oxygen sinks/sources terms. It later appears that the variations in this oxygen inventory (integrated over depth) is mostly due to widening/thickening of isopycnals intervals, meaning that oxygen waters enter and leaves this particular water column laterally as waves displaces the isopycnal surfaces vertically. I believe this should be clarified earlier. Maybe (suggestion) the wording "local oxygen inventory" may serve this clarification.

âĂć Reporting on velocities : 1) I think there is a confusion in the directions given as referential for the velocities. 1a) cross and along-shore directions are switched in legend of Fig 3. 1b) the two direction given are not perpendicular ? 2) Could the authors consider the option to report velocities with intensity (magnitude) on one panel, and direction on a second panel (using a cyclic color scale).

Specific comments ******************* âĂć P1L9 : How the fact that the benthic habitat is small compared to the tota Black Sea area does aggravate the stress of the ecosystem ? Could you clarify this statement ? âĂć P2L1-2 replace "resistance" with "resilience". This sentence should be detailed and referenced. âĂć P2L3-26 Please rephrase this paragraph, the reading is somewhat unclear. (eg. 'downwelling in the coastal part and upwelling in the central part', or refer to curvarture of isopycnal surfaces) âĂć P3L25 the term "minimum" is unclear here. âĂć P3L28 "Wind-induced upwellings, although .." (add "-" and ",") âĂć P4L13 ".. deployed at a depth of approximately .." (add "a depth of") âĂć P4L22 "smoothly worked" -> "worked smoothly" âĂć P5L26 week -> weak âĂć P7L24-26 -> a part of this sentence should go to methods âĂć Fig 6,7 I suggest to define the vertical referential used here in the methods (for instance referring to "normalized depth" or some similar wordings) , and to use this definition in the figures and captions. In addition, I'd indicate an horizontal mark at the mean depth of maximum density gradient, that is used as a reference. On the same topic: was a shift of vertical coordinates also operated for fig 11? if yes, please indicate so, if no, could you explain why ? âĂć Fig 10: To support the discussion on this figure, it would be useful to get a similar picture for the cases Is14 > 3.5.

References *********** P1L25 Reference Stanev et al 1995 does not appear in the bibliography. P1L28 Capet et al 2004 does not appear in the bibliography. P1L28 Capet et al 2014 does not appear in the bibliography. P6L24 Middelburg & Levin 2009 does not appear in the bibliography. P7L19 Zatsepin et al 2011 does not appear in the bibliography. General : add "and" when referencing two-authors references.

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