

Anonymous Referee #2

Dear Anonymous Referee #2,

Thanks a lot for your interest in the manuscript for your valuable comments. We are pleased that you consider our work an interesting contribution to hypoxia research. We apologize that our abstract as it stands rose expectations we could not fully satisfy with the presented work. In order to improve the manuscript we will address the shortcomings you identified in the revised version that we will prepare for submission in BGD. Please find some more detailed comments below.

Best regards on behalf of all authors,

Jana Friedrich and Felix Janssen

Detailed statements following the individual paragraphs of the review

Review Paragraph 1 & 2:

Hypoxia is a multifaceted phenomenon that includes a multitude of causes and consequences. Each of these aspects requires future in-depth studies in order to improve our understanding and to monitor the most crucial aspects at the most significant sites with the best suited observational strategies. We see our manuscript as a worthwhile contribution towards these aims – not as a conclusive endpoint. Indeed, our work is by nature a compilation of individual studies that were set up to tackle as many hypoxia aspects as possible. We have set up the publication by selecting examples from the project work that address what we considered to be the most important aspects in order to encourage future studies towards a thorough understanding and adequate observation of hypoxia and related phenomena. We are pleased that you appreciate the information on the application of state of the art technologies to monitor oxygen and related variables in an “impressive range of time and space scales” and that “this paper successfully displays the potential power of these approaches and technologies”.

Thank you for drawing our attention to the issue that the readers may feel misguided by the abstract. As stated above the presented work is not intended as a conclusive ‘cookbook’ on how to tackle hypoxia phenomena at any given site. We also doubt that this would be possible, given the existing diversity in causes, space and timescales of hypoxia in different ecosystems. Our goal was to demonstrate this diversity and to share our experiences from the various examples. This should – as you put it – provide the necessary information to gain “appetite for new methods to address diverse research questions” in the reader. However, we agree that the term “we synthesize” in the first sentence of the abstract may raise false expectations. We will therefore change this to “...we provide an overview over...”. For the rest of the abstract we think that it appropriately represents the character of the work (i.e., a compilation of individual studies of different hypoxia aspects).

Table 1 was inserted to provide an overview of the respective sites to guide the reader through the long manuscript. Instead of providing or relate to a classification scheme it is meant to show the main characteristics of the sites as well as the instruments and investigations carried out. To make this more

obvious we will refer to the table also in section 2 where we characterize the sites. Furthermore we will make column 4 (“frequency and duration”) – which probably serves best as a site-classification – to column 2.

In conclusion we think that our work indeed provides some guidance that will “help researchers select instruments and deployment strategies for hypoxia studies” but intrinsic to the structure of the manuscript the information is given in the different examples and hence distributed in the text. We will strengthen this aspect in the conclusions in order for the reader to infer information on suggested deployment strategies for sites with different hypoxia characteristics more easily.

Review Paragraph 3

Thank you for pointing out several aspects you were pleased with. We agree that some examples of long-term hypoxia analysis are rather complex – especially as we took care to keep them brief. With respect to the study on long term oxygenation history in the Bosphorus outlet area we will follow your advice and explain the patterns more thoroughly. We agree that the study of Lake Zurich time series (Fig. 18) is rather demanding for the reader but in this case we think that the manuscript provides the necessary information (it also refers to more detailed studies that could additionally be consulted). Fig. 15 already has 40 lines of analysis and explanation (p. 37, l. 10 - p. 38, l. 21). As the reviewer admits, the text devoted to each project description must necessarily be brief. Given the amount of space already devoted to Fig. 15, an expansion of this section would automatically mean that other sections of the paper would have to be cut correspondingly to compensate. We would therefore prefer to leave the analysis and explanation of the Lake Zurich data as they are. A fuller explanation of this part of the project is given by North et al. (2013b), which we have cited.

With regard to the integration of the benthic faunal studies the chosen structure (i.e., separating monitoring approaches of oxygen and related parameters from hypoxia consequences in different chapters) still makes sense to us. By combining faunal studies and biogeochemistry studies in one chapter and oxygen monitoring approaches in another chapter we make sure that both the broad variety of hypoxia consequences and the monitoring approaches are adequately addressed in a coherent manner. However, to better integrate the fauna investigations (Western Black Sea shelf, Crimean Shelf, Bosphorus outflow) into the hypoxia monitoring at the respective sites, we will add crosslinks to chapters 3.2 and 3.4 focusing on hypoxia monitoring at those sites.

Review Paragraph 4

As mentioned above we will address your advice to “strengthen the integration of the presentation, including possible suggestions of appropriate monitoring approaches to address particular research questions in aquatic systems characterized by hypoxia dynamics at different time and space scales” mainly by revising the conclusions. To avoid the conclusions growing too long, we will at the same time reduce summary / repetition of the main results obtained at the different sites.

The 'Europe-bias' in our references is a consequence from the fact that we focused in HYPOX on European study sites and therefore often cite earlier work at our study sites. We are aware of non-European work on hypoxia and also included some already. In the introduction but also in other parts of the manuscript, we cite at least 26 studies from Africa, Asia, and the American continent and from authors of those origins. We will revisit the existing literature in order to include some more non-European work.