Response to comments from RC2

On behalf of all authors, we would like to thank the reviewer for their reading of the manuscript and their remarks. Your comments provided valuable insights to refine and clarify the manuscript. We have taken into consideration all suggestions.

In the following, we try to address all issues raised as best as possible.

Below, the reviewers' comments are given in *italic blue* and responses in normal black font.

Belgacem and coll. present a compilation of dissolved oxygen profiles obtained in the western Mediterranean. This dataset covers the period 2004 - 2023, although most of the data were collected between 2004 and 2013. The introduction is brief, as are the methods and results sections, while the article presents the data qualification in great detail. It's true that a data paper should explain the data and quality controls, but in the end this version of the submitted article mainly covers this aspect. What is missing, however, is a contextualization of the topic (oxygenation of Mediterranean waters) based on recent articles, a more detailed description of the data set, and a comparison of the data with other data sets (Argo, other campaigns in the Mediterranean).

• We agree that placing our dataset in a broader scientific context is important. Accordingly, we have significantly expanded the introduction to include a more detailed discussion of oxygen dynamics in the Mediterranean Sea, highlighting recent findings on deep convection and oxygen variability. We incorporated the suggested references (Fourrier et al., 2022; Ulses et al., 2021).

Many details are given for quality control. But there are almost no details about how the data was collected. It is only written that (line 39) 1382 CTD oxygen profiles, but there is no information about how they were obtained. This is a real problem because to use a dataset, it is important to know the type of sensors used, their accuracy, how they are calibrated and the calibration frequency, especially for marine waters where the values must be very precise.

• We have added mor details about calibration. This information is now included in the Methods section to provide users with a clear understanding of data provenance and reliability.

It would also be useful to explain why there have been far fewer measures since 2014, and to indicate whether this will continue.

• Th reduction in data collection after 2014, notably due to the loss of the main research vessel *URANIA* in 2015, which affected the continuity of measurements. We comment on the prospects for future data collection efforts.

It is not explained also what are reference cruises (figure caption 2) and how they were defined.

• We have clarified the definition of reference cruises in the revised version and main text, explaining their role as high-quality baseline datasets used for sensor calibration and quality control.

The introduction to Dissolved Oxygen (DO) and the Mediterranean Sea is minimalist, with a few generalisations about this element and some very conventional references, and then very few details about DO dynamics in this sea, which is considered a hot spot for climate change. To justify the interest of the database presented, a more precise state of the art is

required. Some work has already been published, in particular on the DO minimum, which is strongly determined by the intermittent convection process. There is an important issue related to the decrease in the intensity of deep convection in the northwestern Mediterranean predicted by the end of the century in recent projections, which may have important consequences on the DO concentration. This needs to be highlighted in the article, as it reinforces the interest in making DO datasets available in the Mediterranean Sea. The Mediterranean Sea is not my usual area of study. However, I would like to suggest some recent articles :

Fourrier & al (2022) Impact of Intermittent Convection in the Northwestern Mediterranean Sea on Oxygen Content, Nutrients, and the Carbonate System JOURNAL OF GEOPHYSICAL RESEARCH-OCEANS DOI10.1029/2022JC018615

Ulses e& al (2021) Oxygen budget of the north-western Mediterranean deep-convection region BIOGEOSCIENCES DOI10.5194/bg-18-937-2021

• We have expanded and updated the state-of-the-art discussion in the introduction, integrating recent literature on dissolved oxygen dynamics, including the importance of intermittent convection, projected changes under climate scenarios, and implications for Mediterranean oxygen budgets. This reinforces the motivation for making quality-assured oxygen datasets publicly available.

The description of the quality assurance method needs to be improved, the principle of the method is relevant to be described in the article with an example, but the other cases should be placed as a supplementary section or provided as information at the link where the data can be accessed.

• We have improved the description of the control methods, including a detailed explanation of the approach applied to the new database. While the core principles and representative examples are now in the main text, for more detailed cruise-specific quality control cases ,plots are accessible upon request for now.

Even though it is a data paper, the data need to be better presented, how they compare with other data sets or Argo profiles.

• We are comparing with other data sets: the reference cruises are different. But we will take that into consideration: a dedicated section about comparison of the new product with other cruises is implements at selected sub regions. Besides the accuracy of the Argo float data is generally lower than that of CTD profile, especially with the recent issues encountered with BGC-Argo. The dataset will be used together with other data sources and shall be compared with other globally-averaged O2 climatology, which is not the scope of this paper. But we will do in future work.

The conclusion also needs to be considered, for example, it is underlined (lines 498) that the accuracy of the measurements, but in fact the article does not introduce what data are available for this region.

• The purpose of the paper is to make available the Italian cruise data. We added more information about the already existing data.

The text in the article also needs to be improved. For example, it is strange to start an abstract by mentioning the doi of another dataset (lines 16-18 lines). This sentence can appear in the body of the article, but not in the abstract.

• We revised the abstract to remove the DOI and moved this information to the data availability section, improving readability and flow.

In summary, I have very mixed feelings about this paper submitted by Belgacem and coll. On the one hand, it presents an interesting dataset, but at this stage it needs a thorough rewrite.

• We believe that the revised manuscript now addresses your concerns and better meets the expectations for a comprehensive and well-contextualized data paper. We thank you again for your valuable comments and hope the improved manuscript will be of interest to the scientific community.