

We thank the anonymous reviewer for making helpful suggestions on how to improve our manuscript.

NOTE: The original comments by the referee have been numbered 1-20, and red text has been used for the response by the authors.

1. *I do not understand why the acronyms for dissolved oxygen and dissolved inorganic carbon widely referred as O₂ and DIC among others in the ocean biogeochemistry literature are here referred as c(O₂) and c(DIC) .. why the "c"? I think is unnecessary and could be misinterpreted.*

As referenced by Schwartz and Warneck (1995) – page 22, 'c' or 'C' is the symbol used to represent a concentration of something. DIC and O₂ by themselves represent only the chemical species, hence the reason why we added the 'c' before the brackets. This symbol has also been used by Castro-Morales and Kaiser (2012) published in *Ocean Science*. A few words explaining that 'c' represents a concentration will be added to the manuscript for improved clarity.

2. *The only thing I miss in the introduction is short paragraph about the particular CO₂ chemistry characteristics in the Western Mediterranean Sea. Some information about this can be found in the literature, for example Rivarolo et al. (Mar Chem, 2010), Touratier & Goyet (DSRI, 2011), Álvarez et al. (OcsSc, 2014), Yao et al. (Mar. Environ. Res., 2016) among others. The MedSea is warm, salty, very high in alkalinity and high in pH compared to rest of the open ocean, concretely the adjacent Atlantic. This fact should be highlighted in my opinion.*

A paragraph will be added to the manuscript's introduction to describe CO₂ chemistry characteristics, and particularly, the expected range of pH in the Western Mediterranean region, including the mentioned references.

3. *I would suggest a reorganization of this section. I think it can be improved and some more information should be given.*

The following headings were suggested by the referee:

2. *Methodology*
 - 2.1 *REP14-MED sea trial*
 - 2.2 *Glider sensors*
 - 2.3 *Ship based measurements*

We will reorganise and expand the methodology section as suggested, and we will give each sub-section the headings as suggested by the referee, to make it easier for readers.

4. *Despite the general overview of this trial is given in Onken et al (this issue). It might be good to just write a short paragraph about the general aim of deploying 11 gliders and concretely one with a pH (and other biogeochemical) sensors.*

A short paragraph will be added to this section as suggested, describing the general aim of the REP14 campaign, and the context of the 11 glider deployment in which the glider trial was embedded.

5. *I am not an expert on the different types of ISFET sensors, so it is not clear to me if the glider had a pCO₂ sensor separated from a pH sensor, or is it a dual sensor?.*

There were two dual pH/p(CO₂) sensors on the glider. One sensor was integrated into the glider's electronics allowing the glider to control sampling, and one sensor was stand-alone. This will be more clearly explained in the updated manuscript.

6. *Please clearly separate the paragraphs according to the sensors described, first conductivity and temperature, then oxygen, then pCO₂ and finally pH. Give details about the quality control for each of them. For example no reference is given for the O₂-glider calibration, I am sure this data is analysed in other manuscript, and if not please provide this information because the data is presented and discussed along with the final pH-glider data.*

More information on quality control and sensor calibrations will be described (either in the relevant section, or as supplementary information), with text organised into paragraphs for each sensor in the order suggested by the referee.

7. *In this section [2.3 ship based measurements], I would also include for example a description of the oxygen winkler measurements if any done to calibrate the glider O₂ sensor.*

Oxygen Winkler measurements were not used for the calibration of the glider's c(O₂) sensor. Instead, the glider's oxygen optode was calibrated against measurements from a Seabird SBE 43 sensor deployed on the ship's CTD package. The method of calibrating the glider's c(O₂) measurements will now be described.

8. *During the CO₂ compiling exercise CARINA the Mehrbach et al. (1973) constants refitted by Dickson and Millero (1987) (see Key et al., 2010) were suggested to calculate pH from DIC and TA, as also concluded by Álvarez et al. (2014), specifically for the MedSea, however in GlodapV2 the ones used by Lueker et al. (2000) were used. Please comment about this.*

We used the lueker *et al.*, (2000) constants for the calculation of pH as these are the internationally recommended 'best-practice' ones (Dickson *et al.*, 2007). However, the Mehrbach *et al.*, (1973) refitted by Dickson and Millero (1987) constants will now be used, and a short sentence explaining our reasoning for using these constants, with reference to the CARINA exercise/Alvarez *et al.*, (2014) will be added to the manuscript. The effect of this change on pH values is relatively small as the pH values derived using the Mehrbach *et al.*, (1973) refitted by Dickson and Millero (1987) constants were on average 0.002 lower than pH derived using the lueker *et al.*, (2000) constants.

9. *Please clearly state that both pH from the ship and from the glider are expressed on the total scale and at in situ temperature.*

We previously stated that pH is on the total scale (e.g. P4L25), but the referee is correct in that we should clearly indicate that it is pH at *in situ* temperature. A few words stating this will be added to the manuscript.

10. *3. Results and Discussion (the title "Results and corrections" is not very appropriate for a journal section).*

We will use this title in the updated manuscript.

11. *I do not see a clear separation between the different sections included here, the pH corrections and validation are given in 3.1, 3.2 and 3.3. I suggest a reorganization of the whole section to make it more readable.*

We will reorganise the sections as suggested by the referee and we will give each section more informative headings.

12. *TA and DIC measurements are expensive and time consuming, I think they deserve to be presented within a section from coast to open ocean (and also the pHT in situ) derived from them. Figure 4 a b and c are just showing vertical ranges of variability, but some coast-ocean variability should be also seen in the data. CTD hydrographic temperature and salinity data should also be included.*

Yes, we agree that it would be useful to show transect sections of these parameters to better display spatial variability. We will include transects of $c(\text{DIC})$, A_T , and derived pH_s from the ship samples, and also hydrographic sections of temperature, salinity, $c(\text{O}_2)$, and Fluorescence from the CTD in the updated version of the manuscript.

13. *I do not understand the first paragraph in section 3.1... what do you mean with the standard deviation values, are you calculating bin averages and STD by depth intervals?.*

Yes, this is exactly what we have done. We will clarify this better in the updated version of the manuscript.

14. *Fig 4c is useless, are you showing pH total scale at in situ temperature?.. please adjust the pH range if you keep it.*

Yes, we are showing this, and we chose this pH range on the x-axis for consistency when comparing with Fig. 4d. However, we agree that it would be more useful to decrease the pH range in order to see the variability in pH profiles as a function of depth more clearly. The pH range (x-axis) will be reduced and we will mention that pH is on a total scale at *in situ* temperature in the figure's caption.

15. *First comment on the Temperature and salinity glider data referring to the vertical distribution in Fig 4 e and f. Secondly some words and maybe a figure (now missing) about the comparison between ship and glider O2 data.*

We will show and discuss the comparison between ship and glider measurements of temperature, salinity, and $c(\text{O}_2)$ in the updated manuscript. We will create a new figure containing Fig. 4e-f, accompanied by a comparison plot of ship and glider $c(\text{O}_2)$ values, displayed in similar fashion.

16. *Finally all your findings about the pH glider data. I would start commenting Fig 4d.*

A discussion of our findings concerning the pH glider data (e.g. corrections, light effect) will be discussed together as proposed by the referee. We will start this discussion by commenting on the pH profiles

displayed in Fig. 4d.

17. *Here you should comment fig 8 & 9.*

The referee is referring to a new proposed subsection (not copied here) based on ocean to coast glider data. We will discuss Fig. 8 & 9 in this proposed subsection.

18. *In general this section also needs some bibliography review. Please check the references given above that should be also included when discussing pH values and variability associated with distinct water masses in the MedSea.*

The references from comment 8 above, as well as elsewhere, will be cited in this section when discussing variability in values of pH and the other parameters.

19. *Please the final phrase I think it should include "potential use of the corrected glider pH" as the pH sensors are still under development and in situ checking.*

This sentence will be modified in the new version of the manuscript.

20. *I hope to have been helpful.*

Thank you for taking the time to read through the manuscript. The comments have been very useful in improving the manuscript.