

Thank you for the latest technical corrections. These have been carefully addressed and incorporated to improve the manuscript. Reviewers' comments are shown in black, and our responses are provided in blue.

### Reviewer and editor comments

- In L17, I recommend changing “reports” to “studies.”

Reply: Change incorporated in the revised manuscript.

- In L41, I don't understand what you mean by “similar size.” Are you referring to the ponds you studied?

Reply: Yes, this refers to ponds included in our study. To clarify, we have revised the sentence (lines 40-43) as follows:

“For instance, ponds within the size range of our study(< 0.001 and 0.001–0.01 km<sup>2</sup>) reported by Holgerson and Raymond (2016) emitted on average 254 and 422 mg C m<sup>-2</sup> d<sup>-1</sup>, respectively, whereas exposed pond sediments reported by Keller et al. (2020) range from -73 to 11765 mg C m<sup>-2</sup> d<sup>-1</sup>.”

- I recommend spelling out the abbreviation of the unit NTU in L111.

Reply: abbreviation spelt out in the revised manuscript.

- L138: For 2022, it is (total) annual precipitation, not the “mean” annual precipitation. Additionally, I suggest putting the term “mean” in brackets in L141.

Reply: The changes recommended have been implemented in the revised manuscript.

- L337: The non-significant p value is “=” and not “<”. Additionally, I recommend adding the term “summer” somewhere in this sentence to clarify that this statement only applies to summer.

Reply: The p-value notation has been corrected, and the term “summer” has been added to the sentence to clarify that the statement refers specifically to summer (lines 333-335).

“In summer Mediterranean ponds, with longer hydroperiods were associated with increased CO<sub>2</sub> emissions ( $p < .001$ ), whereas in Temperate ponds, the trend was inverse but not statistically significant ( $p = .13$ ) (Table 1).”

- L348: To make this sentence easier to understand, I recommend spelling out that “a variable” is temperature.

Reply: We revised the sentence to improve clarity by explicitly stating that the variable is temperature (lines 345-346):

“We also explored the relationship between CO<sub>2</sub> fluxes and temperature (annual and 40-year mean). The variable temperature (annual and 40-year mean) displayed a moderately strong inverse correlation with hydroperiod length (Fig. B1). ”

- L550: In the response letter, you wrote that the data are embargoed, but you can still include the link to the repository here. Otherwise, it will be difficult for people to find your data later...

Reply: The datasets used in this study are currently under embargo but will be made available at <https://dataportal.ponderful.eu/dataset/>. In the meantime, they can be provided upon reasonable request. We have included the link to the PONDERFUL project repository in the data availability section to ensure that the data will be easily accessible once the embargo ends.

- L 97-113: Please combine two separate paragraphs into one.

Reply: The two paragraphs have been combined into a single paragraph as requested.

- L 161 “TOC-L analyzer”: total organic carbon (TOC) analyzer

Reply: Correction incorporated in the manuscript.

- L 252-253: Please move this single-sentence paragraph to the previous one.

Reply: The sentence has been moved to the previous paragraph as requested.

- L 525: “carbon” fluxes?

Reply: The term “carbon” has been added to the manuscript accordingly.

### **Relevant changes in the revised manuscript**

Only minor modifications were made to the affiliation list and corresponding author information. The required copyright statement was added to the map image in accordance with the journal’s guidelines, and no other changes were made beyond those explicitly requested by the reviewers and the editor.