

Biogeosciences Discuss., referee comment RC1
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Comment on bg-2022-154

Anonymous Referee #1

Referee comment on "Mineralization of autochthonous particulate organic carbon is a fast channel of organic matter turnover in Germany's largest drinking water reservoir" by Marlene Dordoni et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2022-154-RC1>, 2022

Review of Dordoni et al. "Mineralization of autochthonous particulate organic carbon is a fast channel of organic matter turnover in Germany's largest drinking water reservoir"

Synopsis

The central focus of this manuscript is to investigate the preferential turnover of different carbon phases into DIC in the Rappbode Reservoir in Germany. For this aim, the authors analyzed ^{13}C and concentration of DOC, autochthonous and allochthonous POC, sedimentary OC and DIC in different seasons. Based on variations in ^{13}C and concentration among different carbon phases, the authors used an isotope mass balance to calculate potential C-contribution of OM to DIC pool and compared it to DIC concentration changes to determine most plausible source of OM turnover in metalimnion and hypolimnion. The authors found that autochthonous POC is main contributor to DIC increases and further calculated its turnover rate to be 0.01 to 1.3 $\mu\text{mol L}^{-1} \text{d}^{-1}$, within the range for oligotrophic water bodies.

Overall, this is well-organized and clearly written manuscript. The data, discussion and conclusion are intuitive for the most part. That said, I do have some minor to moderate comments and suggestions that I think will improve the manuscript. I outline these below, with line numbers where appropriate. Once these changes have been made, I fully support publication of the manuscript in *Biogeosciences*.

L12-13: It may be better to use "phases" instead of "sources" here. Some abbreviations seem to make me confusing, e.g., POC and ExtPOC. Could the authors just use "auto-POC" and "allo-POC" to name these two differently-sourced POC.

L14-16: I am confused about which is the "this purpose". Does it refer to the first sentence of the Abstract? Could the authors change it to "For eliminating the influence of atmospheric exchange, we" ? Also, the Abstract could be improved to be more concise and logically clearer.

L32: In the introduction part, a description of characterization of metalimnion and hypolimnion seems missing, because CO₂ exchanges from atmosphere and soil are also important sources of DIC.

L110: The description of $\delta^{13}\text{C}$ could be simplified, as it is a basic parameter to the audience in this field.

L130: Instead, the isotope mass model could be explained in more details, e.g., how the equation (2) was deduced. The variations of $\delta^{13}\text{C}_{\text{DOC}}$ and $\delta^{13}\text{C}_{\text{POC}}$ should be plotted in the main text, as they are important for the manuscript.

L175: The Results part looks very discrete with 6 paragraphs, even some paragraphs are only composed of 3-4 sentences. Please revise the part to be more simplified and concise.

L231: Please add several sub-titles to discussion part to make it more readable.