

Biogeosciences Discuss., referee comment RC2
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Comment on bg-2022-62

Kenneth Thorø Martinsen (Referee)

Referee comment on "Temporal patterns and drivers of CO₂ emission from dry sediments in a groyne field of a large river" by Matthias Koschorreck et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2022-62-RC2>, 2022

General comments:

The authors investigate CO₂ emissions from dry sediments at one site in a large German river. High frequency automatic flux measurements provide an excellent view into the temporal dynamics of CO₂ emissions. Additionally, measurements across transects provide information on spatial variability and the contribution of groundwater is assessed using Rn as a tracer. The CO₂ emissions are primarily driven by microbial respiration. Furthermore, there interesting descriptions of hysteresis and dark CO₂ uptake. The study appear thorough, methods appropriate, and results are well presented and discussed. Unfortunately, I was not able to access the supplementary material.

Specific comments:

- I miss some explicit hypothesis. The aims (1.4) are presented in a broad sense, and test of the groundwater hypothesis is mentioned but so much more data is presented in the manuscript which is why a think specific hypothesis should be included.
- How are the flux chamber data quality checked (L 103)? I think this should be described.
- L 216, following the ANOVA test I would have expected something like a Tukey post hoc test adjusted for multiple comparisons and not repeated pairwise t-tests.
- Regarding LME, how was model selection performed? In general, I miss some more details on the modeling procedure.
- Also regarding LME, I miss a more detailed description of LME results. Currently, only the R² values are presented but a table (supplementary perhaps) with model coefficients etc. would be welcome.
- Figure 5, I had a difficult time understanding this figure. Could this alternatively be shown using lines in a CO₂ flux (y) vs distance (x) type plot. Something is also wrong in the legend, i.e. "NA" values.
- I think the hysteresis results (L 430-432) should be presented the Results section. The hysteresis is interesting and could potentially be further elaborated in the discussion,

where there any differences between sites?

- An admittedly minor thing perhaps, but please be consistent with capitalization of axis and legend labels in all figures. Also for figure references, e.g. Figure 5 (L 304), figure S1 (L 91) and Fig. S1 b in (L 135). Please correct throughout the manuscript.
- Date formatting in tables and figures differ, e.g. month-day in figure 5 and day.month.year in table 1, at least month-day or day-month order should be consistent. Please correct throughout the manuscript.

Technical comments:

L28 Replace "largely" with "greatly" or other.

L55-57 Awkward sentence, please rephrase.

L64 Is something missing e.g. "In contrast to respiration"? Please rephrase.

L71 Replace over-saturated with super-saturated

L131 Replace "manual" with "Manual"

L186-188 and 232-234 Same paragraph occurring twice

L230 regard log-transformation, there are also negative fluxes how were they treated.

L242 +/- what – standard error? Please write.

L243 Replace "Mai" with "May"

L260 Just write LOESS smoother with span 0.1. The gray confidence region around the smoothers are confidence intervals or standard errors? And not SD?

L262 What is "HF" in title?

L266 Details regarding modelling, e.g. chamber as a random effect should be in methods.

L267 What are the R² values for the mixed models? Often they are conditional/marginal depending on whether they include random effects or not.

L291 Replace "spatial" with "Spatial"

L306 Awkward sentence, please rephrase.

L318 Description of texture method should be in Methods.

L550 "Short term temporal dynamics" Maybe replace "dynamics" with "variation"?