



## ***Interactive comment on “Carbon sources of benthic fauna in temperate lakes across multiple trophic states” by Annika Fiskal et al.***

**Annika Fiskal et al.**

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We numbered the Referee comments for better navigation through the text

The manuscript submitted by Annika Fiskal et al. aimed to investigate various carbon sources' contribution to the benthic macrofaunal biomass across the sediments from five lakes in the temperate region.

(1) Though the introduction is short, the section is well written with current knowledge and associated gap addressed through the present work. The methodology is well described and elaborated. The results and discussion section are well written, along with all the pertinent figures and tables. The authors have substantially concluded the

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paper. The present study deals with methane-derived carbon to the benthic macrofaunal community, a poorly studied area that will give additional understating to the benthic carbon cycle. Therefore the communicated manuscript is recommended for acceptance with few minor technical revisions. Comments mentioned below may be considered while revising the MS.

Author reply: We very much appreciate this positive feedback from the referee.

(2) Discussion paper Materials and methods: It has been referred to as Fiskal et al. 2019 about the sampling locations and map in the method section. A map and short description of the depths would be catchier to easy access for the readers because few hypoxic depths are present too.

Author reply: thank you very much for your comment, we will add the map and table with the station information to the ms.

(3) How many replicates were collected for estimation of the density and biomass of macrofauna? As per the reference mentioned for detail collection in Fiskal et al. 2019, it appeared that only a single core at each station had been considered for macrofaunal estimation. What is the justification for single-core collection for macrofaunal quantification? It is always suggested to collect sufficient replicates to estimate the benthic faunal community and be statistically justified because macrofauna quantification could impact estimating the budget of other related data.

Author reply: Thank you very much for this comment. It is true that only one core was analyzed for macrofaunal abundance at each of the three stations per lake. Nevertheless, we are confident that these abundances are representative for the following reasons:

- (a) The cores have large diameters (15 cm), also in relation to the size of the organisms, and thus cover a large area of the sediment surface.
- (b) The observed trends in tubificids and chironomids follow clear lake-specific trends,

both in composition and abundance, suggesting that the depth of sampling was sufficient to address the questions investigated (also see Figure 1, Figure 2, and Table S5).

(c) We revisited one station in each eutrophic Lake Baldegg and oligotrophic Lake Lucerne at different times of the year (early to late autumn, as well as mid-spring to early summer) during 3 different years. Oligochaete abundances in 2016, 2017 and 2019 in Lake Baldegg at 66 m water depth showed only minor interannual variations ( $\sim 8450 \pm 665$  ind.  $m^{-2}$ ). The same was true for chironomid larvae in Lake Lucerne at 24 m water depth ( $\sim 1036 \pm 62$  ind.  $m^{-2}$ ).

This suggests that the abundances presented here are indeed a good representation even if only one core per station was sampled.

(4) p.5. L 4-5. The PCoA analysis line may be added to the statistical analyses section.

Author reply: Thank you for this comment, we agree and will add this.

(5) Results: Page 5, lines 17 – 19, expressing of density may be like average density  $75 \pm 86$  ind. $m^{-2}$ . It should be mentioned that SD/SE is used to expressing the density data.

Author reply: Thank you very much for this comment. These values refer to standard deviations. We will state this in the text.

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