

## ***Interactive comment on “Effects of eutrophication on sedimentary organic carbon cycling in five temperate lakes” by Annika Fiskal et al.***

**Anonymous Referee #1**

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### **General comments:**

This ms deals with the impact of eutrophication on sediment TOC burial and mineralization in 5 temperate lakes. I find the topic interesting and the study and analyses are thoroughly performed and described.

However, I found that the introduction lacks some background information. First, the potential reasons for the increase of TOC burial in case of eutrophication appear too late and too briefly in the ms (p18 L10-15) and should be detailed in the introduction. The authors mostly assume that TOC accumulation/burial increased because of an increase of OC deposited on the sediment (e.g. p10 L25, P8 L1-2, p21 L8). Other potential reasons could be mentioned. For example, in some cases OC could be better preserved because of anoxic conditions due to low sediment mixing and low bioturbation.

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tion (so not necessarily related to an increase in NPP)? Secondly, besides the influence of mitigation strategies on OC burial (p3 L20), the novelty of the study regarding the relationships between eutrophication, TOC burial in general and respiration could be more detailed in the introduction. The authors mention respiration in the hypotheses p3 L28 but cite very few references on this aspect before that.

I think the authors should better justify the use of only one decay constant k for their calculations of OC burial and accumulation rates. The decomposition rate of TOC can strongly vary and the authors show in this ms that the respiration rates and ratios (RR DIC/ RR CH4) differ between sites.

### **Detailed comments:**

P3 L30: I find strange to already give the results here

P4 L21: repetitive with L7-8

P4 L32: “The porewater was then sampled under strictly anoxic conditions” how? Because the syringe was rinsed?

P7 L21: Punctuation missing

P8 L1-2: it can also mean that the decay constant is in reality slower (higher)?

P9 please provide more details on the flux (unit, the flux is from what to what...) L14 what is the unit of RR DIC and RR CH4? Please provide more details on how RR DIC and RR CH4 are calculated (i.e. write explicitly the relation between the flux, RR DIC and RR CH4).

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