

Interactive comment on “The effects of biomanipulation on the biogeochemistry, carbon isotopic composition and pelagic food web relations of a shallow turf lake” by B. M. Bontes et al.

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Reviewer #1

We thank reviewer 1 for the constructive evaluation of our manuscript. The comments were very useful to improve the content and presentation of the manuscript. Below we provide a detailed description of the adjustments we have made (page- and line numbers refer to the 1st submitted on-line version);

General Comment: Reviewer 1 expresses enthusiasm regarding the chemical enhanced diffusion results and its impacts on carbon cycling and isotopes. We agree that this aspect is one of the main findings. As notified by the reviewer, unfortunately we can not identify which primary producer caused the CED in the - FW treatment,

although some density data (surface cover) were obtained. This has now been stated more clearly in the revised paper. We hypothesize a combined effect of increase in macrophytes and macro algae and later in the season, respiration of biomass to the depletion of the DIC source. Following the advice of reviewer # 1 we have added an appendix (A) with data of C, pH and plankton dynamics from the years prior to the biomanipulation experiment. We agree that the anomalous behavior is merely an effect of high productivity than a general phenomenon in biomanipulation and now clearly communicate this to the reader.

Detailed comments: Introduction: - The introduction was rearranged so that it focuses more on the use of isotopes, the observation of CED and the novel aspects of the study and less on the biomanipulation as such. However, we maintained some introduction on biomanipulation to guarantee a link to the field and to inform geochemists not familiar with biomanipulation. - The morphometry of turf ponds is explained and the introduction runs from source to sink. - We end the introduction with the aim of the study regarding the effects on DIC, algae and higher trophic levels.

Methods: - The optical density was removed from material and methods, as Secchi depth was used to describe transparency; the niche of bream and roach is shortly mentioned as well as the formula for the calculation of the fractionation. - The epsilon was calculated with respect to the CO₂ source and only in this calculation we applied an offset of 9 permille (Pel et al. 2004). All figures are based on raw delta 13C values because comparisons are only made among FA delta 13C values. This has now been cleared up in the text, figure and table legends. For diatoms however the biomarker C20:5 fatty acid was used compared to the C18:n fatty acid for all other plankton groups.

Results: - Macrophyte abundance was determined as lake cover per group (floating, submerge). Species diversity was also determined but absence of information on growth rate and isotopes did not allow us to go into detail about the role of the macrophytes and macro algae on carbon cycling. - The small paragraph with the ex-

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planation on the DIC dynamics was moved to the discussion and now just results are presented here. - Isotope results of zooplankton were generalized so that we conclude that most, if not all species were generalists and were probably supported by a mixed diet. - We added a new table which shows the temporal variation in epsilon instead of the mean values, but no correlations between CO₂, HCO₃⁻, CO₃²⁻ and epsilon in phytoplankton were observed.

Discussion: - The small paragraph at the beginning of the discussion has been removed. - The Hanson reference has been deleted and a clarification has been made with respect to the setup of the different studies (Cole, Carpenter and Schindler) - The negative values of delta 13CDIC are now explained more clearly. - We now state that we can not rule out which of the primary producers (macro algae or macrophytes) contributed more to the CO₂ depletion in - FW. - Mean epsilon value is not the optimal way to present a temporal series; therefore a new table (3) with temporal data combined with partial CO₂ pressures in the water is now given. Nonetheless the low resolution did not allow us to extensively discuss the food web relations and we draw some general conclusions. For explaining the hypothesized differential fractionation of cyanobacteria we now discuss the relationship $\epsilon = 21 - f_a * 21.3$ more thoroughly and we provide literature references. - The paragraph on p.1014 was removed and we consider the anomalous behavior of delta 13CDIC to be a result of high productivity instead of biomanipulation.

Technical comments: We addressed all technical comments and corrected the sentences as suggested by the reviewer. Here we refer to the main technical suggestions made by the reviewer; - p.1004 l.3 whole zooplankton species were combusted (pyrolysed), however for analysis of the data we focused on the C18:n fatty acid. - p.1008 l.1 this sentence was erased. - p.1011 l.17 most of the discussion was rewritten or rearranged. - Table 2 text rotifers and cladocerans are now separated in two lines as suggested by the reviewer.

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