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Interactive comment on "Stable carbon isotope biogeochemistry of lakes along a trophic gradient" *by* A. de Kluijver et al.

Anonymous Referee #1

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Review of "Stable carbon isotope biogeochemistry of lakes along a trophic gradient": authors A.de Kluijver, P.L. Schoon, J.A. Downing, S. Schouten and J.J. Middelburg. Submitted to Biogeosciences.

This paper summarizes efforts to characterize a series of lakes of various trophic states in terms of carbon utilization and C-stable isotope composition. The paper is reasonably well written and organized; presenting an interesting dataset. The authors have attempted to develop a detailed dataset of the compartmentalization of C (concentration and isotopically) in variety of pools in the lakes studied. However, the evaluation of these data is not clearly presented such that the discussion and conclusions drawn are not readily interpretable. I would urge the authors to re-write the discussion in a form that conveys the "story" of the carbon in their systems in clear and concise

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fashion. The following are some specific comments regarding this manuscript. 1) The site descriptions lack any information on the geologic setting. The title of the article contains “biogeochemistry” but the paper gives very little “geo” background. Are there sedimentary exposures (carbonate minerals) near the field sites that can influence the C pools? What are the d13C values of surrounding soils, vegetation, sediments, etc.? The website links only have water quality data and no specific site information. 2) What time of day were the samples collected? Did the authors take diel effects into account? (e.g., Pokrovsky and Shirokova, (2013) Water Res. 47, 922-932; Ziegler and Fogel, (2003) Biogeochemistry, 64, 25-52. 3) Do any of these lakes have anoxic zones near the bottom? Methanogenesis from disproportionation of acetate produces isotopically light CH4 and enriched CO2. This can have a significant impact on the d13C of both DIC and DOC. 4) Water samples were all collected at one depth and this may not be the best representation of the overall biogeochemistry of the lakes being investigated. The authors should consider Gammons et al. (2013) App. Geochem. 36, 57-69 for a further examination of the changes in DIC and d13C-DIC with depth in an oligotrophic lake. 5) Line 20: is it mercuric or mercurous chloride? 6) Lines 12 & 13: field rather than laboratory pH should be used since this variable can change due to degassing of CO2 in samples that are oversaturated. 7) Line 6: “simply” states. . .. . 8) Line 26: a “relatively” larger. . ..

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