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Biogeosciences Discussions

Interactive comment on "Soil organic matter dynamics in a North America tallgrass prairie after 9 years of experimental warming" *by* X. Cheng et al.

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This ms addresses most interesting questions, i.e. if warming modifies C inputs belowground, C allocation to different SOC pools and their turnover time. The questions are very relevant and timely but I am sorry to say that the approach used is very questionable in this experimental setting. The authors completely omit to describe, in the methods section, how plants were sampled and analyzed for delta13C and delta15N, neither are plant delta values provided in the tables. On the other hand, those values are fundamental to the study since they are used as end members in the mixing models. Not knowing how plants were sampled, with which frequency along the 9 years

period, how the data were integrated to obtain one delta value to use in the mixing model, it is hard to judge if this work is sound. However, considering the range of differences in the delta values measured for soils from different treatments (below 2‰ and with SE intervals always overlapping) – it is hard to believe that the isotopic approach was applicable at this site. In fact, under the warming treatment C3 plants may have suffered from water stress and increased their delta13C by as much as 2‰ this could have explained the very small differences in the soil delta without necessarily impling a shift in vegetation between C3 and C4. This ms cannot be considered for publication before a full description of plant sampling strategy during the nine years of the experiments is provided and plant isotopic data shown. Also given the very narrow range of delta values, authors need to use the Phillips and Roth (2001) datasheet to calculate errors and confidence intervals on source partitioning. Again, I'll be surprised to see that this approach works and that they obtain reliable estimates on their C3/C4 sources. I have read the comments of the reviewer before me and I fully agree with him/her, therefore I do not add other comments in relation to the overall manuscript.

Response: We really appreciate the specific suggestions and comments. In response, we have addressed all questions carefully. We gave descriptions of plant sampling and analysis for delta13C and delta15N of plant materials, and integrated delta13C and delta15N of plant materials data into the mixing models in the Methods section (see Lines 162-168; Lines 200-202; Lines 218-231). And also gave plant isotopic data in Results section (see Lines 260-265 and Table 2). We acknowledge that the δ 13C value is controlled by multiple factors, including hydrology, soil temperature, substrate, and vegetation, but turnover times based on natural abundance stable isotope methods tend to be more related to recent C inputs and C pools associated with the C3/C4 vegetation type conversion (Six and Jastrow, 2002). We used Phillips and Gregg (2001) datasheet to calculate errors and confidence intervals on source partitioning in the revised MS (please see Lines 232-243).

Interactive comment on Biogeosciences Discuss., 7, 8381, 2010.