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Interactive comment on “The influence of C₃ and C₄ vegetation on soil organic matter dynamics in contrasting semi-natural tropical ecosystems” by G. Saiz et al.

Anonymous Referee #5

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General comments: The manuscript deal with the important topic of assessing soil organic carbon and land cover dynamics by analyzing the C isotopic composition of soil organic matter over a vast area characterized by different climate and anthropogenic pressure. I believe it represents a substantial contribution to scientific progress, it is generally well written and its contents are within the scope of Biogeosciences. The methodology is valid and well explained. The experimental design included an important number of different ecosystems over a considerable precipitation gradient. The results are reported quite clearly and discussed taking into consideration the most relevant literature which help in considering the numerous factors that may affect a correct interpretation of C fractionation. As a general comment I suggest I) to make a deeper

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description of the most significant pattern occurring in the studied area in terms of climate change and human pressure and II), due to the high number of exceptions to the general pattern described throughout the results and discussion sections, to improve the conclusions recalling the three main objectives of the paper, highlighting the novel findings coming out from this study. In conclusion I welcome the publication of this article after considering the specific comments outlined in the following section. Specific comments: P8088_L5 – As stated in the general comments, I think it is important to describe better what are the most important drivers promoting the progressive thickening of woody vegetation: on the climate change side, is it only a matter of increasing CO2 concentration? Is that any historical record/evidence about changing in precipitation pattern and amount, temperature increase, frequency in the occurrence of drought or heat waves? What about the other human activities apart from changing in fire regimes like grazing or timber cutting? Were they present in the studied sites? Their intensity changed over the past years? I think both these climate and human related aspects may deeply influence land cover dynamics. P8091_L3 - Objectives are stated clearly but it's easy to get confused by reading the result and discussion sections especially on the light of the numerous exceptions emerging from the general patterns, as confirmed by the number of times the words “however” (13), “exception” (3) and “nonetheless” (1) were used. I suggest to organize these two chapters, as well as improving the conclusions section, in a way more consistent with the three objectives. P8091_L16 – It would be highly beneficial for the readers to have, besides figure 1, a table describing briefly all the sites (i.e. latitude, type of dominant land cover, precipitation amount, mean annual temperature, soil texture, principal investigations carried out, etc.). This would help the reader throughout the discussion as well as in the interpretation of several figures (i.e. Fig. 2, 6, 7 and 8). P8095_L10 – Why only results from the topmost soil layer are reported? I believe it would be worth to mention also the results from the 0.05-0.30 soil layer and show them in a similar way as the 0-0.05 soil layer in figure 2a. P8095_L11 – If I have understood correctly the sampling methodology, I think it is important to report the average distances at which –T and –G samples were taken in each location (this

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information could be added to table suggested in the third comment). I expect larger distances of –G sampling points in those sites where greater were the differences in $\delta^{13}\text{C}$ between –T and –G samples. P8107_L16 – Conclusions were improved from the first version of the manuscript. I would still make a clearer connection with the objectives. Technical comments P8123_Figure caption – If used, the concept of fractional vegetation cover (FC) has to be introduced in the material and method section with a brief description of how and where it was calculated, in addition to indicate the previous work explaining the methodology in detail. I thus suggest removing from the figure caption the phrase starting with “Estimates of the FC. . .” P8125_Figure caption – Description of the Sahelian ecosystems (plus the three citations) have to be moved to the text. I suggest to shorten the figure caption by removing the phrase starting with “The Sahelian ecosystems. . .”

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