

Comments to the Author:

The authors have addressed the concerns of the two reviewers and the manuscript is now nearly ready for publication. My main question that remains is how the proportion of DOC oxidized to CO₂ changes with treatment (i.e., divide CO₂ production rate by DOC content). The DOC increases with duration of autoclaving but does the CO₂ emission rate increase proportionally? This could be one more useful piece of information to help interpret the purported isotopic fractionation effects and their dependence on DOC concentration. See my comments on Fig 3 and suggestions for including this in the discussion section.

Response: We thank the editor for his careful reading of new manuscript and responses to referee's comments. We also appreciate his suggestion of a new figure presenting the proportion of DOC oxidized to CO₂. This figure has been inserted as supplementary material. The percentage of DOC oxidized to CO₂ was very low in all sterilized soils and decreased with the duration of autoclaving (and with the increase of DOC concentration). This result supports the idea that the EXOMET and its fractionation were quantified with an excess of substrate (this information has been added in the manuscript, see below). However, this result does not change the dependence of isotopic fractionation to DOC concentration.

Specific comments:

Line 31: and line 379: remove "to" so it reads "do not likely obey the same..."

Response: The sentence has been corrected.

Line 56: and line 291: change "glucose in..." to "glucose to..." and line 292, "oxidized to".

Response: The sentence has been corrected.

Lines 109-110: I don't think "mn" is an accepted abbreviation for minutes, rather use "min". Also 30 mn⁻¹ would more commonly be 0.5 Hz (one measurement per 2 seconds).

Response: The abbreviation has been corrected.

Line 130: Is FC flow cytometry? Please spell out on first use.

Response: The abbreviation is now defined.

Line 219-221 etc: Please remove the unnecessary abbreviation DER.

Response: The paragraph has been modified following your recommendations.

Line 395: change to "before they were incorporated in the first cell."

Response: The sentence has been corrected.

Figure 1: This is a helpful figure, however it needs to be edited to change the figure numbers within it, because perhaps it was prepared as a supplemental figure initially; change Fig 1a to 2a, etc.

Response: The figure has been modified with the correct figure numbers.

Figure 3: What are the units on 3c? This figure would look really different if presented per unit of DOC.

Response: Units of y-axis of figure 3c are $\mu\text{g C g}^{-1} \text{ soil day}^{-1}$. Sorry they disappeared during the edition of figures. Figure 3 presents the daily CO₂ emission rates of treated soils for the four periods of incubation. We cannot calculate the ratios respired/DOC for each period of incubation because we only measured the DOC content at the beginning of incubation. Thus, it is not possible to present Figure 3c with respiration rates expressed per unit of DOC.

Nevertheless, we calculated the % of initial DOC oxidized to CO₂ during the incubation (Total emitted CO₂/initial DOC), see below.

Figure 4: The caption says 32 days but bar graph label says 34 days.

Response: The caption has been modified.

Line 229: Has a mass balance been done on the DOC and CO₂? Probably the amount of CO₂ release was too small to make a change in the large DOC pool, but it would be useful to know what % of the DOC was cumulatively respired (similar to your estimate for the % of glucose input on lines 241-242).

Response: We calculated the % of the initial DOC oxidized to CO₂ and built a figure presented as supplementary material. Overall, this % was low for all sterilized soils (< 7.2%) and decreased with the duration of autoclaving (from 2.9 to 1.8% for IAS 0.5H and IAS 4H respectively). This information has been added lines 227-229.

Lines 268-284: Consider discussing the amount of CO₂ respired per unit of DOC in this section (see comments on Fig 3). Of course, this will be highest in LS and lower in the others, but from Figure 3a and 3c it's not clear how the other treatments will affect the efficiency of C respiration. How does this change the argument about the fractionation effect of EXOMET? Or, this could be discussed in the section on lines 304-318.

Response: After some discussions we came to the conclusion it was not relevant to include this result (% of respired DOC) when we present the body of evidence of EXOMET (Lines 268-284 of old version of manuscript). Instead of supporting the main message it would bring some confusions because 1° there are already many hypotheses considered and discussed, and 2° this result is not useful to exclude or support one of presented hypotheses.

However we find highly relevant to use this result in the discussion section dedicated to the isotopic fractionation of EXOMET (Lines 322-323). Indeed, the low percentage of DOC respired indicated that the EXOMET and its fractionation was quantified with an excess of substrate, which is the condition sine qua non for detecting a fractionation process.