

Author's response

We appreciate once again the opportunity to continue with the review process of our work. Below is a detailed description of the changes made to the article at this stage.

In Figure 6, panels b and c, it may be helpful to include the word “age” on the X axis.

Figure 6 was modified according to the suggestion.

L523-525: It would be helpful to provide a more explicit interpretation regarding the management of the pasture. Is it typical for a pasture to be mowed without any biomass removal in an agricultural rotation? If not, then it should ideally be pointed out that this type of management is atypical, and that additional work should be done under more typical management practices (e.g., biomass is removed for hay).

Text was added in L.525 referring to this point:

“This management was implemented in this experiment to facilitate operational aspects by avoiding the inclusion of direct grazing by animals. Since typical management of these agricultural systems producing beef and dairy would include either the presence of grazing animals in pasture fields, or the removal of biomass produced by hay harvest, future work should consider these effects on the dynamics of SOC, in an approach of compartmental model adjustment assisted by isotopic information.”

L536-537: It is not clear what the is the comparison in this statement: “...the mean transit time reached lower values...” What are the values lower than?

Text was modified from L.543 to answer to this point:

However, the mean transit time in CC system reached lower values than in R system, though these differences were not statistically significant (CC system: 6.2 years; R system: 11.5 years)(Fig. 6d). This is explained by the different dynamics of the slow pool, which, because of higher output rates in CC system, tends to become younger as the new C entering this compartment is less diluted in a large stock of old C.

L550: Please clarify this: “...of which more than half (13.5%) ...” 13.5% is less than half.

Text was slightly modified from L.556 to answer to this point:

Focusing on the age structure of C in the R system, we found that 21.4% of its C (12.10 Mg ha⁻¹) was incorporated during the period of the experiment (59 years), of which more than half (7.58 Mg ha⁻¹) consists of fast-cycling C (~ POM), a pool that in its entirety is younger than the age of the experiment. The remainder of the total renewed C corresponds to slow-cycling C (~ MAOM), and only 8.8% of the C from this pool entered the system after the year 1963; therefore, most of this pool was already present in the soil before the experiment's installation.