

***Interactive comment on “Carbon input control  
over soil organic matter dynamics in a temperate  
grassland exposed to elevated CO<sub>2</sub> and warming”  
by Y. Carrillo et al.***

**Anonymous Referee #1**

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In this work, Pendall and co-authors investigated the interactive effects of short-term exposure (1 to 2 years) to elevated CO<sub>2</sub> and temperature on soil C mineralization rates by long term laboratory incubations, and used the mineralization rate curve to derive the size and decay rates of different SOC pools. As conducted the work, in my opinion, suffers from several drawbacks: 1. The long term incubations were conducted at standard temperature (15 or 25°C) and moisture conditions (60% WHC) independent of field treatments. This approach only allows to estimate the size of the different SOC pool, but any speculation on the decay rates of these pools is misleading and should be omitted from the ms. Field decay rates of the different SOC pools are in fact likely to be much different from the one measured in the lab and also the relative difference

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among them is likely to be different, due to potential differences in temperate sensitivity, sensitivity to priming etc. The authors at pag.1587 line 22-25, comment on this. Yet to me the comment is not enough to make the results acceptable. In fact, given the study conditions, it is not surprising that no changes in pool decay rates among treatments were measured (fig. 5). 2. The authors report high carbonates content (1 to 5% - i.e. higher than the organic C content) in the soil below 15 cm, but do not mention the content on the top soil. Yet they treated for carbonate their soil samples previous to elemental analysis, suggesting that carbonate were present. If that is the case, carbonates can well have contributed, by weathering processes, to the soil CO<sub>2</sub> efflux measured during soil incubation and thus biased the obtained results. This is a major potential flow of this study that need to be carefully considered and clarified, before the data can be trusted. 3. Changes in soil C stocks take time to occur and this work presents results from only 1 to 2 year exposure to the treatments. Also time since the start of the treatment has been shown to affect the response of SOC stores to elevated CO<sub>2</sub> at FACE sites. For this reason the current ms has relatively limited value and this should be stressed more in the conclusions.

On this basis, I think that this ms should be shortened, results reported only in terms of pool sizes and experimental limits explicitly discussed. It may also be better suited for a lower ranked journal.

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