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Biogeosciences Discussions

Interactive comment on "Carbon input control over soil organic matter dynamics in a temperate grassland exposed to elevated CO_2 and warming" *by* Y. Carrillo et al.

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Response to Anonymous Referee no. 3

We interpret the evaluation of Anonymous Referee no. 3 as a likely misunderstanding of the aims and scope of our study. We appreciate the opportunity to clarify as we recognize that our expectations and hypotheses could have been misinterpreted. Our revised manuscript has been re-framed and simplified and now it focuses on two central questions:

1. How do elevated CO2, warming and their combination affect SOM pools and their susceptibility to decomposition?

2. Are the responses of SOM pools and their susceptibility to decomposition associated with plant biomass and dissolved organic C (DOC)?

Our first goal (Question 1) addresses one of the largest sources of uncertainty in future predictions of climate change, that of the potentially counteracting effects of elevated CO2 and warming on soil C storage (Heimann and Reichstein, 2008; Pendall et al., 2004; Norby and Luo, 2004). We applied a long-term incubation approach to evaluate the responses of soil organic matter in an ecosystem exposed to a state-of-the-art climate change experiment.

Our second goal (Question 2) is to evaluate mechanisms underlying the experimental treatment effects on SOM pools. Our overarching hypothesis is that the responses of SOM pools and their susceptibility to decomposition will be mediated by the impacts of elevated CO2 and warming on plant C inputs to soil. Increased plant inputs increase SOM pool sizes, but can also decrease them via the priming effect, or the stimulation of older SOM decomposition due associated with greater availability of labile C (Fontaine et al., 2007; Kuzyakov, 2002; Blagodatskaya and Kuzyakov, 2008). To address Question 2 we assessed whether there were relationships between several indicators of plant input (aboveground biomass, fine root biomass, dissolved organic C) and the responses of the labile and resistant pools. The cases in which such relationships existed were interpreted as evidence supporting that impacts of the experimental treatments may be mediated by plant inputs.

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