

Interactive comment on “Long-term nutrient fertilization and the carbon balance of permanent grassland: any evidence for sustainable intensification?” by Dario A.

Fornara et al.

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Thanks for the responses.

In conclusions I dont agree that the previous work that I did suggests in the long-term pasture soils lose carbon. I think there needs to be a broader discussion here 'some' pasture systems will gain C and some will lose with time and many/most will likely be at steady state. Our previous work (Schipper et al 2014) demonstrated that the majority of soils in long-term pasture on flat land in New Zealand appear at steady state except for a couple of soil orders Gley (losses attributed to drainage and enhanced C respiration, as was suggested in Belgium) and Allophanic soils (we do not have an explanation for this loss).

In contrast pasture on hill country was gaining C, possibly due to recovery after past sheet wash erosion but not known. So in the end we need to understand the variety of pasture management systems that may increase or decrease soil C but a general statement that carbon increases or decreases in pastures is not really supported, it depends strongly on past land use and current management.

We agree with the reviewer and we have modified this part in the conclusion section (see page 10, lines 14-18: “Previous studies suggests that the long-term net C balance of grassland soils will ultimately depend on how past and current management practices will influence losses and gains of C from/to soils (Schipper et al., 2014). It is likely that many grassland soils will eventually reach a C saturation point (Johnston et al., 2009; Smith 2014) where C losses and gains may still occur but could be relatively small compared to soil C stocks”.