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Biogeosciences Discussions

Interactive comment on "The effect of soil redistribution on soil organic carbon: an experimental study" *by* H. Van Hemelryck et al.

Anonymous Referee #1

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General comments

In view of increasing soil erosion rates due to land-use change and intensified land-use management practices, the research on the effects of soil redistribution due to fluvial erosion processes on the organic C cycling in agricultural soils is of broad interest. The authors present rare experimental data on the effects of different soil redistribution/deposition processes affecting the SOC mineralisation potential of a loamy soil substrate. However, some shortcomings occurred with regard to some methodical questions raised on the accuracy of organic carbon determination in soil suspensions and the unit in which the CO2 efflux is calculated and presented.

Specific comments

Introduction - P. 5034, l. 21 "[. . .] pools of labile C [. . .]" how is "labile" defined here?

Materials and methods - P. 5039, l. 1-2 "All soil samples (from parent soil, deposited sediment and collected runoff) were ovendried at 45 °C for three days." Using this kind of sample preparation and organic carbon determination, I assume a considerable loss of organic carbon from the dissolved (< 0.45 μm DOC) and particulate (0.45 μm < POM < 500 μm) fraction due to mineralisation during the moderate drying procedure. As DOC and POC likely forming part of the soil suspension, especially in the export via the runoff carrying smaller particles, the C export might have been underestimated. Consequently, the SOC budget presented in Figure 6 appears questionable with regard to the C export via the runoff.

Results - Figure 3 Why is the sediment C concentration in the DSR outflow that high, reaching up to 10%, while starting SOC contents were around 1.5%? Please comment on that.

- Figure 4. Why does the CO2 efflux increase with time, reaching peaking values towards the end of the experiment? This is quite untypical for incubation experiments, where new substrate enters the system and where the soil material was sieved (0.02 cm) beforehand and thus aggregates disruption occurred exposing new C substrate from the aggregate inner-sphere. And if the amount of the CO2 efflux is simply a matter of the temperature increase, then the general question might be allowed, in how far soil redistribution is an important process for soil carbon balancing compared to the projected temperature increase?

- The CO2 efflux is presented in a "per area and time" unit, exhibiting higher CO2 fluxes especially for the DSR treatment. But how do the results look like when relating the CO2 efflux rate to the amount of soil dry mass rather than to the core/ m2 area? With regard to sediment deposition, the treatments differ considerably, with the DSR approach receiving most of the sediment (Table 1) and producing the highest CO2 fluxes. Please, comment on that.

Interactive comment on Biogeosciences Discuss., 6, 5031, 2009.