

Interactive comment on “Coupling sediment flow-paths with organic carbon dynamics across a Mediterranean catchment” by C. Boix-Fayos et al.

Anonymous Referee #2

Received and published: 14 July 2014

In this work Boix-Fayos and co-workers investigate the transport and dynamics of OC in a catchment in SE Spain. The authors find that the low OC concentration in sediments, compared to soils, and then explore whether the likely explanations for the observed pattern is that most of the organic matter was mineralized after transport and deposition, or that the depositional settings they are investigating are temporary storage locations and most of the OC is mobilized further downstream with subsequent erosion events.

Major comments

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The most significant comment I have on this work is that the manuscript heavily uses C:N ratios of soils and sediments as indicators of SOM processing and decomposition. I think caution should be exercised in the use of C:N ratio for this purpose because the only way that C:N ratios can be used as reliable indicators of SOM mineralization is if the C:N ratio of the inputs across the different sites was identical. It is very likely that even similar vegetation groups have grown in different parts of a catchment can have slightly different C:N ratios. In the absence of such info on above- and below-ground vegetation inputs, one can only say changes in C:N ratios are likely due to differences in mineralization rates or selectivity of transport . . . it is hard to justify any definitive statements on C:N ratios indicating differences in mineralization rates without further data. Furthermore, when inferring input of autochthonous C from aquatic systems, I think the authors should further discuss literature that compares C:N ratios and other differences between autochthonous and allochthonous sources of OM in aquatic (or at least periodically inundated) systems.

Minor comments

Abstract, Line 6 - add 'after it is' before 'stored' Page 5009, Lines 8-11, the reasons

for how and why erosion constitutes a sink for atmospheric carbon dioxide stated here is not complete, please revise this section and make sure to also include partial replacement of eroded C as part of why erosion constitutes a sink (along with burial of eroded C). The explanation for the patterns in clay and OC concentrations in soils vs.

sediments in page 5021 doesn't seem correct. The high clay content and low OC in sediments could simply be a reflection of the selective transport of light organic particles. Consider revising this section to account for that possibility.

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