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Organic carbon redistribution due to erosion at various spatial scales

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Soil organic carbon (SOC) has a crucial role both in terms of crop production and climate change mitigation. Soil could be an effective sink of atmospheric carbon since in agricultural areas the carbon content of the soil is much lower than its capacity. The main obstacle against carbon charge of the soils is cultivation and erosion. Soil detachment, delivery and deposition are rather scale dependent processes that is why it is difficult to compare or extrapolate results among scales. Present case study aims to compare the SOC content and soil organic matter (SOM) compound of the detached soil particles on the ridge to those that are deposited at the bottom of the catena in order to clarify the role of delivery in soil erosion. Initial soil erosion was modelled using a laboratory rainfall simulator at the point scale. Deposition was surveyed and analysed by 3D sampling from drillings on the sedimentary parts at the field scale. At the detachment phase carbon enrichment (50-100%) and C/N ratio increase were found in each aggregate size class of the detached soil particles. Variations in SOM compounds suggested that a very intensive SOM exchange took place during initial erosion processes and delivery. In addition to the selective erosion selective SOC deposition were also found at the field scale. Two topographical hotspots were identified as the place of SOC surplus deposition. In these patches SOM compounds were deposited separately due to different geomorphologic positions. The lower patch next to the end of an ephemeral gully was dominated by less polymerized more aromatic SOM, while the upper one was ruled by high molecular weighted aliphatic SOM. Difference in SOM compound was manifested also in different sediment morphology. The topographically higher deposition patch were covered by aggregates while the lower one was found to be sealed by individual soil particles. Present study was supported by the National Hungarian Research Found K100180, G. Jakab was supported by the János Bolyai fellowship of the HAS.