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# Assessing the impact of utilizing event based water erosion versus static average water erosion (RUSLE) in carbon turnover modeling

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The discrepancy between the time scales at which soil redistribution processes and SOC turnover occur is an unresolved issue in erosion related carbon turnover modeling. The use of a static average erosion rate (e.g. revised universal soil loss equation; RUSLE) ignores event dynamic processes of (i) SOC enrichment during erosion, transport and deposition, (ii) event specific C release to the atmosphere during erosion processes, and (iii) event specific depth of SOC burial,. We hypothesize that event driven SOC enrichment and SOC burial is of fundamental importance for inter-annual carbon turnover. The study was carried out in an arable watershed (3.7 ha) with no-till management located in the loess dominated Tertiary hills 40 km north of Munich, Germany. To assess the importance of event dynamic SOC redistribution processes, we implemented two different water erosion modelling approaches in the coupled erosion and turnover model SPEROS-C. The first, RUSLE-based approach as already implemented in SPEROS-C, represents long-term mean erosion, while the second is based on the high-resolution, event-based and especially sediment size class selective Multi-Class Sediment Transport model (MCST). In both cases bulk sediment delivery and in case of MCST sediment size specific sediment delivery are tested and partly calibrated against an eight year monitoring data set. First results indicate that especially SOC enrichment during erosion, transport and deposition should be included in estimates of soil redistribution processes upon watershed C balances. The modelling with MCST also indicates that interpreting SOC patterns in eroding landscapes might be also biased if the selective nature of SOC erosion and deposition is ignored.