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# Does Aggregation Affect the Redistribution and Quality of Eroded SOC?

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A substantial amount of literature has discussed the impacts of soil erosion on global carbon cycling. However, numerous gaps in our knowledge remain unaddressed, for instance, the biogeochemical fate of displaced SOC during transport being one of them. The transport distance and the quality of eroded SOC are the two major factors that determine its fate. Previous laboratory-based research had demonstrated that the effects of aggregation can potentially shorten the transport distance of eroded SOC. The mineralization potential of SOC also differs in sediment fractions of different likely transport distances. It is therefore essential to examine the transport distance and quality of eroded SOC under field conditions with natural rainfall as the agent of erosion.

Soil samples from a silty clay soil from Switzerland and a sandy soil from Denmark, were collected in the field this summer after natural rainfall events. The soil from Switzerland was sampled from a field of maize in St. Ursanne (47°20' N 7°09' E) on August 6th, 2014 after a natural rainfall event. A depositional fan consisting of aggregated sediment was formed outside the lower edge of the field. The sandy soil from Denmark was sampled from a farm in Foulum (56°30' N, 9°35' W) on September 4, 2014, after a series of natural rainfall events. Soil samples were collected at different topographic positions along the two slopes. All the soil samples from the two farms were fractionated by a settling tube. Bulk soil from Switzerland and Denmark was also dispersed by ultrasound. The SOC contents of all bulk soils and associated fractions were determined using a carbon analyzer Leco 612 at 1000°C. The quality of SOC in different settling fractions collected from various topographic positions were also determined by stable isotopes of C and N (13C and 15N).

Our results show that 1) the aggregate specific SOC distribution evidently differs from the mineral particle specific SOC distribution, indicating that re-distribution of eroded SOC is determined by actual aggregate size distribution rather than mineral particle size distribution. 2) The aggregate specific distributions of SOC content from different positions along hillslopes demonstrate that preferential deposition of SOC-enrich sediment along hillslopes is much more pronounced than the mineral particle specific SOC would suggest. 3) The quality of SOC differs significantly in various settling fractions. The fast settling fractions consist of more of labile SOC, and thus is very likely to be mineralized during transport across landscapes, thereby likely contributing as a source of atmospheric $CO_2$. Overall, effects of aggregation can potentially change the transport distance of eroded SOC and thus skew its redistribution towards the terrestrial deposition.