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Organic Matter erosion from sandy soils: solving the mass balance

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Global soils contain an estimated 1500GT of carbon, over twice that present in the atmosphere (IPCC, 2001). However the role of soils in the global carbon cycle is highly debated. Soil erosion redistributes OM over the landscape. This can occur at a range of scales from mass movement to interrill erosion. It has been well documented that interrill erosion occurring on clay rich stable soils causes sediment to become enriched in OM by up to a factor of 6.2 (Mora et al. 2007). However, maintenance of mass dictates that such enrichment can only be temporary unless erosion ceases due to armoring. The lack of studies showing a decline in organic matter erosion is attributed to the well-aggregated, slow crusting soils used in most studies. Thus this investigation aimed to investigate OM erosion from sandy soils that form crust rapidly. Soil from both organic and conventionally farmed land from Shropshire UK were exposed to simulated rainfalls differing in intensity and kinetic energy. Texture and organic matter content of soil crusts and eroded sediment were analyzed. Organic matter was enriched by more than 10% in one test only, but significantly reduced during two soil and rainfall combinations. Analysis of crust and sediment texture showed that the interaction between crust development and rainfall erosivity was responsible for the varying organic matter enrichment. The results also confirmed that for practical erosion applications the maintenance of the mass of organic material has to be considered. Accordingly, a key requirement for the correct assessment of organic matter erosion is the proper assessment of the interaction between surface and rainfall over time in each erosion system.