Geophysical Research Abstracts
Vol. 13, EGU2011-13836, 2011
EGU General Assembly 2011

Crusting and interrill C erosion: event characteristic and sediment C enrichment on silts and loams

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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 both fast and slow crusting. Results from silts support the data reported in the literature which indicate an enrichment. C erosion on sandy soils, however, show a decline of sediment SOM with increasing event duration, accompanied by a reduced SOM concentration in crusts and coarsening of crust texture. This result emphasizes the relationship between rainfall properties and interrill C erosion. Interrill processes mobilize up to 0.5 GT C annually on agricultural land across the world. The crust SOM experiences increased bioavailability and thus potential mineralization. Our results highlight the sensitivity of this SOM mobilization to rainfall characteristics and thus climate change. Thereby they illustrate the need for further research into the role of interrill processes within the global C cycle.