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Soil erosion, sedimentation and the carbon cycle

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Historically soil erosion focused on the effects of on-site soil quality loss and consequently reduced crop yields, and off-site effects related to deposition of material and water quality issues such as increased sediment loads of rivers. In agricultural landscapes geomorphological processes reallocate considerable amounts of soil and soil organic carbon (SOC). The destiny of SOC is of importance because it constitutes the largest C pool of the fast carbon cycle, and which cannot only be understood by looking at the vertical transfer of C from soil to atmosphere. Therefore studies have been carried out to quantify this possible influence of soil erosion and soil deposition and which was summarized by Quinton et al. (2010) by "We need to consider soils as mobile systems to make accurate predictions about the consequences of global change for terrestrial biogeochemical cycles and climate feedbacks". Currently a debate exists on the actual fate of SOC in relation to the global carbon cycle, represented in a controversy between researchers claiming that erosion is a sink, and those who claim the opposite. This controversy is still continuing as it is not easy to quantify and model the dominating sink and source processes at the landscape scale.
Getting insight into the balance of the carbon budget requires a comprehensive research of all relevant processes at broad spatio-temporal scales, from catchment to regional scales and covering the present to the late Holocene. Emphasising the economic and societal benefits, the merits for scientific knowledge of the carbon cycle and the potential to sequester carbon and consequently offset increasing atmospheric CO_2 concentrations, make the fate of SOC in agricultural landscapes a high-priority research area.

Quinton, J.N., Govers, G., Van Oost, K., Bardgett, R.D., 2010. The impact of agricultural soil erosion on biogeochemical cycling. Nature Geosci, 3, 311-314.