



Carbon sequestration and erosion of soil organic carbon.

K. Van Oost (1), T.A. Quine (2), and G Govers (3)

(1) UCLouvain, Geography, Louvain-la-Neuve, Belgium (kristof.vanoost@uclouvain.be), (2) University of Exeter, Geography, Exeter, UK. (t.a.quine@ex.ac.uk), (3) KULeuven, Earth and Environmental Sciences, Leuven, Belgium (gerard.Govers@ees.kuleuven.be)

Agricultural activities have substantially increased rates of soil erosion and deposition, and these processes have a significant impact on soil carbon cycling. Here, we present a synthesis of erosion effects on carbon dynamics using data from literature and coupled geomorphic/carbon dynamics models. Based on this synthesis, we discuss the implications of soil erosion for carbon sequestration strategies. We demonstrate that for a range of data-based parameters from the literature, soil erosion results in increased C storage. However, this effect is spatially heterogeneous and is variable on various timescales which explains to a large extent the controversial debate regarding the erosion-induced sink or source.

We show that the magnitude of the erosion term and soil carbon residence time, both strongly influenced by soil management, largely control the strength of the erosion-induced sink. In order to evaluate the effects of soil management strategies that promote carbon sequestration, a full carbon account must be made that considers the impact of erosion on carbon inputs and decomposition, including effects on net primary productivity and decomposition rates at relevant spatial and temporal scales.