



Dynamic soil properties in response to anthropogenic disturbance

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Anthropogenic disturbance of natural vegetation can profoundly alter the physical, chemical and biological processes within soils. Rapid removal of topsoil during intense farming can result in an imbalance between soil production through chemical weathering and physical erosion, with direct implications on local biogeochemical cycling. However, the feedbacks between soil erosion, chemical weathering and biogeochemical cycling in response to anthropogenic forcing are not yet fully understood.

Here, we study dynamic soil properties for a rapidly changing anthropogenic landscape, and focus on the coupling between physical erosion, soil production and soil chemical weathering. The archaeological site of Santa Maria de Melque (Toledo, Central Spain) was selected for its remarkably long occupation history dating back to the 7th century AD. As part of the agricultural complex, four retention reservoirs were built in the Early Middle Ages. The sedimentary archive was used to track the evolution in sedimentation rates and geochemical properties of the sediment.

Catchment-wide soil erosion rates vary slightly between the various occupation phases (7th century-now), but are of the same magnitude as the cosmogenic nuclide-derived erosion rates. However, there exists large spatial variation in physical erosion rates that are coupled with chemical weathering intensities. The sedimentary records suggest that there are important changes in the spatial pattern of sediment source areas through time as a result of changing land use patterns