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The impact of soil erosion on soil biogeochemical cycling

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Soils play a key role in controlling the cycling of nutrients and carbon through the lithosphere and biosphere, yet estimates of the influence of soil on biogeochemical cycles do not conventionally take into account erosion, lateral movement and soil mixing. In this paper, we synthesize data on the global fluxes of soil carbon, nitrogen and phosphorus moving over agricultural landscapes as a result of erosion processes. The mobilization and deposition of soil can have significant impacts on carbon and nutrient cycling causing lateral fluxes of N and P similar in magnitude to those induced by fertilizer application and crop removal. The translocation and burial of carbon reduces decomposition and leads to a potential carbon sink. Cycling of carbon, nitrogen and phosphorus are strongly interrelated: lateral fluxes of carbon induce lateral fluxes of nutrients. This has consequences for primary productivity, which in turn influences the replacement of lost carbon. As a result, soils must be viewed as dynamic systems in time and space if we are to understand their role in major biogeochemical cycles.