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Soils as Sediment database: closing a gap between soil science and geomorphology

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Soils are an interface between the Earth's spheres and shaped by the nature of the interaction between them. The relevance of soil properties for the nature of the interaction between atmosphere, hydrosphere and biosphere is well-studied and accepted, on point- or ecotone-scale. However, this understanding of the largely vertical connections between spheres is not matched by a similar recognition of soil properties affecting processes acting largely in a lateral way across the land surface, such as erosion, transport and deposition of soil. Key areas where such an understanding is essential are all issues related to the lateral movement of soil-bound substances that affect the nature of soils itself, as well as water or vegetation downslope from the source area. The redistribution of eroded soil falls several disciplines, most notably soil science, agronomy, hydrology and geomorphology. Accordingly, the way sediment is described differs: in soil science, aggregation and structure are essential properties, while most process-based soil erosion models treat soil as a mixture of individual mineral grains, based on concepts derived in fluvial geomorphology or civil engineering. The actual behavior of aggregated sediment is not reflected by either approach and difficult to capture due to the dynamic nature of aggregation, especially in an environment such as running water. Still, a proxy to assess the uncertainties introduced by aggregation on the behavior of soil as sediment would represent a step forward. To develop such a proxy, a database collating relevant soil and sediment properties could serve as an initial step to identify which soil types and erosion scenarios are prone to generate a high uncertainty compared to the use of soil texture in erosion models. Furthermore, it could serve to develop standardized analytical procedures for appropriate description of soil as sediment.