Vadose Zone Journal

Erosion and Lateral Surface Processes

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Erosion can cause serious agricultural and environmental hazards. It can generate severe damage to the landscape, lead to significant loss of agricultural land and consequently reduction in agricultural productivity, induce surface water pollution due to the transport of sediments and suspended material to waterways and rivers, and alter the operation of hydraulic structures due to clogging of channels and sediment loading in reservoirs. The loss of soil due to erosion will also diminish its capacity to store water, which will not only negatively affect plant growth but might also increase flooding risks. Furthermore, erosion plays a significant role in the biogeochemical cycles of C, N, P, and Si as it redistributes significant amounts of these elements over the surface of the Earth.

Experimental data and quantitative estimates of the intensity of this degradation process generated by soil erosion are required to (i) assess the relative importance of it impacts on the regional basis on the soil and water resources; (ii) evaluate the efficiency and the cost of the proposed alternative solutions to solve the problems. The multi-scale and highly non-linear nature of the processes involved and the high spatial and temporal resolution of the required input data create a challenging modeling environment. Fundamental knowledge gaps remain, especially hampering moving up and down along the different scales pertinent to the processes involved. Relatively little attention has been given to the modeling of the transport over the landscape of soil material mobilized by erosion. This is very important nevertheless, as the latter will not only control the amount and quality of the sediment that will eventually reach the stream network and possibly the oceans, but it will also control the fate of the nutrients and carbon transported with this sediment. Therefore, modeling tools should not only focus on the prediction of erosion rates, but should also investigate the coupling between erosion and soil functioning and biogeochemical cycling. A related challenge is the assessment of human disturbance on erosion rates and sediment fluxes at larger scales: especially in mountain areas, natural erosion processes strongly contribute to sediment movement, making it difficult to correctly assess the effect humans have on total lateral fluxes of sediment, carbon, and nutrients. Importantly, these issues need to be considered over different time scales: erosion processes invariably change soils and landscapes, and these changes feed back to erosion processes and rates. Such feedbacks have hitherto insufficiently been considered in erosion research.

The special issue will focus on these aspects and will gather studies presenting valuable experimental data, recent relevant technologies and measuring tools, and new modeling approaches allowing a better estimate of the intensity of the degradation processes, a better assessment of their multi-scale nature and their coupling with biogeochemical processes, as well as soil functioning.

Deadline for submission of papers: 1 June 2017.