

## **Predicting soil erosion at continental scales: bridging the gap between hillslopes and catchments**

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In many regions of the world, soil erosion poses a challenge to the long-term sustainability of our food production systems and many other eco-system services. In addition, soil erosion often has important impacts downstream, such as reservoir capacity losses, deteriorated water quality and flooding. Our understanding of soil erosion and, by extent, our capacity to prevent and tackle its related threats and impacts has significantly increased over the past decades. Nonetheless, many challenges remain. One challenge relates to the scale-dependency of soil erosion processes. As the considered spatial scale increases from hillslopes to catchments, an increasing number of processes need to be considered as well (e.g. gully erosion, mass movements, riverbank erosion, sediment transport and deposition). As a result, also the impacts of perturbations such as land use change, climatic change or extreme events on soil erosion and sediment fluxes remain poorly understood for larger geomorphic units. A second, related, key challenge is our very limited ability to model or predict these processes at regional and continental scales. For example, while we succeed fairly well in simulating sheet, rill and tillage erosion at continental scales, our insights into the spatial and temporal patterns of gully erosion, mass movements and even catchment sediment yield remain much more limited.

This presentation will give an overview of the recent advances made in the prediction of soil erosion processes and catchment sediment yield at regional to continental scales. Key challenges and research gaps in this domain will be highlighted and discussed. Special attention will be given to the role of gully erosion and our recent advancements to predict this process at regional and continental scales.