EGU24-16804, updated on 20 Jun 2024
https://doi.org/10.5194/egusphere-egu24-16804
EGU General Assembly 2024

Rate of soil denudation from plot scale to river system in different social and physical environments

Olivier Cerdan[1], Rémi Bizeul[1,2], Olivier Evrard[2], Anthony Foucher[2], Arthur Gaillot[3], Thomas Grangeon[1], Valentin Landemaine[1], Jean Minella[4,2], Lai Ting Pak[5], and Sébastien Salvador-Blanes[6]

[1]Bureau de Recherches Géologiques et Minières, DRP DIR, Orleans, France (o.cerdan@brgm.fr)
[2]LSCE, UMR 8212 (CEA/CNRS/UVSQ) Université Paris-Saclay, France
[3]UMR ECOSYS, Université Paris-Saclay, INRAE, Palaiseau, France
[4]Department of Soils, Universidade Federal de Santa Maria, Santa Maria, Brazil
[5]UPR HortSys, Cirad, Montpellier, France
[6]EA 6293 GéoHydrosystèmes COntinentaux Université Tours, France

The negative effects of soil erosion vary widely including pollution and siltation of water bodies, reduced crop yields, organic matter loss, diminished water storage capacity. These adverse effects generate significant consequences on developing as well as modern societies, possibly leading to land abandonment and the decline of rural communities and therefore posing fundamental social challenges. While protection of the soil resources is rightfully considered an important target of environmental policy, it is crucial to accurately understand the impacts of soil erosion and allocate funds for mitigation. Achieving this requires a precise assessment of erosion rates and their geographical distribution. as well as the targeting of funds to remedy soil erosion requires a correct assessment of the amount of erosion that is occurring and of its geographical distribution. Accurate quantification of soil erosion is not only essential for environmental policy but also holds scientific significance. Recent studies stressed the importance of comprehending human-induced impacts on sediment fluxes as well as their potential effects on global biogeochemical cycles. This need is even accentuated in a context where there is a demand to assess with reasonable confidence the impact of rapid climate and land use changes on these budgets. This crucial information is often lacking.

To measure the rates and geographical extent of soil erosion, both indirect and direct methods have been used. Indirect methods generally measure soil profile truncation or sediment accumulation relative to a reference soil horizon, exposed or buried reference object (such as roots, foundations…), or to the loss or accumulation of tracers. These methods are more suitable for studying historical erosion. To assess current erosion rates, direct methods, typically plot or catchment monitoring and field-based measurements (e.g. mapping of erosion features) are preferred. Among these, field-based methods are most effective.

Based on the application of different monitoring methodologies in various social and physical environments, this study aims at bringing some insights into the causes of soil erosion rate

variations across these different environments. The methodologies employed will range from long-term high-resolution monitoring at plot or catchment and river system scales to dating sediment cores in reservoirs. The relative importance of climatic against physiographic and anthropogenic factors will also be discussed.