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An empirical soil erosion map for Europe

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We compiled a large dataset of several hundreds of entries on soil erosion plot studies in Europe. In this study, we used these data for two main purposes. First, we investigated to what extent the tendencies found in the data agree with existing soil erosion theory. We found significant effects that were generally in agreement with literature with respect to the effect of crop type, slope gradient, slope length and soil type on sheet and rill erosion rates on arable land. On plots with permanent vegetation cover, such trends are absent, which is explained by the overriding effect of vegetation.

Next, we used these data to produce a realistic spatially explicit estimate of the variation of sheet and rill erosion rates over the European continent. In order to achieve this we developed methodologies to scale up the observational data using existing geospatial data on topography, land use and soils. We did not use climate data as no significant relationships between observed erosion rates and climate could be detected, which may be due to long-term interaction effects between climate and soil resistance to erosion.

Our calculations show that average erosion rates in Europe on arable land are of the

order of 1-2 ton $ha^{-1}yr^{-1}$. These rates are significantly less than the average rates measured on erosion plots as the latter are preferably located in areas where erosion is above average. Direct extrapolation of these rates leads to gross overestimations of the erosion problem in Europe. The highest erosion rates are found in the loess areas of West and Central Europe and in the hilly areas around the Mediterranean, notably in South Spain, the Appenines and the footslopes of the Pyrenees, both in Spain and in France.

The map may serve as a basis for future model testing and evaluation: conversely, more advanced geospatial modeling techniques may help to improve on the current version, which still suffers from the moderate quality of the spatial data that are available for the whole of Europe.