Effects of largest daily events on soil erosion by rainwater. An analysis of USLE database.

J.C. González-Hidalgo (1), M. De Luis (1), R.J. Batalla (2)

(1) Department of Geography, University of Zaragoza, 50009, Spain (2) Department of Environment and Soil Sciences, University of Lleida, 25198 Spain

(jcgh@posta.unizar.es)

Soil erosion by water (rain and wash) is a discrete processes, in relation to with some relevant questions are not still satisfied. How long should measurements be done to obtain a realistic mean erosion rates, and what is the effect of largest daily events on soil erosion, are questions still not fully answered. To progress on that detailed information, usually not available, is needed.

In this research we have analysed the USLE data base compiled by the Purdue University. A total of 28292 daily erosion events monitored in 308 erosion plots representing 3353 years of soil erosion measurements, were investigated. Measured time varies between plots from 2yrs to 32yrs. To compare data from different conditions, we calculated the percentage of soil eroded by the most large to the tenth largest daily events over the entire period.

The percentage of soil eroded during the n-largest events follows a power function ($y = e^{-bX}$), being "y" the percentage of soil eroded in the selected n-largest event, and x the total amount of measured daily events.

Soil erosion measured during short periods is compressed in few daily events (whatever the magnitude), so mean erosion rates estimated under such small time frames cannot be taken as a good descriptor of the real processes. Our analysis suggest that to weight the dependence of soil erosion on largest daily values, a minimum of 100 events are needed. They represent, on average, 10 years of measurements.