Geophysical Research Abstracts,
Vol. 11, EGU2009-918-1, 2009
EGU General Assembly 2009

Time compression of soil erosion by the effect of largest daily event. A regional analysis of USLE database.

J. C. Gonzalez-Hidalgo (1), R Batalla (2), A Cerda (3), and M de Luis (1)

(1) University Zaragoza, Geography, Zaragoza, Spain (jcgh@unizar.es), (2) Department of Environment and Soil Sciences, University of Lleida, Spain, (3) Department of Geography, University of Valencia, Spain

When Thornes and Brunsden wrote in 1977 “How often one hears the researcher (and no less the undergraduate) complain that after weeks of observation “nothing happened” only to learn that, the day after his departure, a flood caused unprecedent erosion and channel changes!” (Thornes and Brunsden, 1977, p. 57), they focussed on two different problems in geomorphological research: the effects of extreme events and the temporal compression of geomorphological processes.

The time compression is one of the main characteristic of erosion processes. It means that an important amount of the total soil eroded is produced in very short temporal intervals, i.e. few events mostly related to extreme events. From magnitude-frequency analysis we know that few events, not necessarily extreme by magnitude, produce high amount of geomorphological work. Last but not least, extreme isolated events are a classical issue in geomorphology by their specific effects, and they are receiving permanent attention, increased at present because of scenarios of global change.

Notwithstanding, the time compression of geomorphological processes could be focused not only on the analysis of extreme events and the traditional magnitude-frequency approach, but on new complementary approach based on the effects of largest events. The classical approach define extreme event as a rare event (identified by its magnitude and quantified by some deviation from central value), while we define largest events by the rank, whatever their magnitude.

In a previous research on time compression of soil erosion, using USLE soil erosion database (Gonzalez-Hidalgo et al., EGU 2007), we described a relationship between the total amount of daily erosive events recorded by plot and the percentage contribution to total soil erosion of n-largest aggregated daily events. Now we offer a further refined analysis comparing different agricultural regions in USA. To do that we have analyzed data from 594 erosion plots from USLE database with different record periods, and located in different climatic regions.

Results indicate that there are no significant differences in the mean contribution of aggregated 5-largest daily erosion events between different agricultural divisions (i.e. different regional climate), and the differences detected can be attributed to specific site and plots conditions. Expected contribution of 5-largest daily event for 100 total daily events recorded is estimated around 40% of total soil erosion. We discuss the possible causes of such results and the applicability of them to the design of field research on soil erosion plots.