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Indetermination of the relation cause - effect between the climatic parameters and the loss of sediment by erosion

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Due to its simplicity and to the relatively small number of parameters that define it, the Universal Equation of Loss of Soil (USLE) has been widely used by the erosion researchers. The parametric character of this equation, in addition to the easy way as it can be applied in the GIS studies, have led to the fact that the erosion risk cartography in Spain is based on this model. One of the key factors in the erosion modelling is the knowledge of the rain erosivity or R factor of different rainfall events determined with the biggest temporary possible resolution. Nevertheless, in Spain the majority of the available information from the National Meteorological Institute refer to the daily rainfall.

In this paper the results obtained from 9 experimental USLE plots (4 m wide x 20 m long) without plant cover (bare soil) along the period of 12 years (1994-2005) are studied. The plots are located in 7 different regions of the center of the Iberian peninsula. As they presented bare soil, the differences in sediment yield between events will depend essentially on the rainfall erosivity, as the factor LS does not change. As for the factor K, although it can minimally evolve with time, can be considered as a constant for all the plots. The different localities were provided with a meteorological automatic station that allowed us to calculate the factor R for every event. The following climatic variables were considered: Rainfall depth between samplings, Top Intensity, Maximum Intensity and Average rainfall depth in 15 and 30 minutes, as well as Kinetic Energy and Rainfall Erosivity calculated following Wischmeier & Smith and Zanchi & Torri studies. These called climatic variables were studied looking for their influence in sediment yield and runoff generation (erosion signs).

In view of the heterogeneity of the results obtained when we tried to relate the sedi-

ment yield to the climatic parameters, we grouped the samplings in two main groups. The first one covers all those samplings in which sediment yield were till 1 t ha^{-1}, that is considered to be low or moderate. The second one is formed by all those samplings in which the losses have been over 1 t ha^{-1}.

This grouping can be considered to be arbitrary but it happens that this limit of 1 t ha^{-1} has been mentioned in the literature as a threshold that must not be exceeded in semiarid or arid territories with soils of scarce thickness. Also in our study we have found that when we analyze the relation established between variables, the group of events with moderate losses presented significant correlations between the erosion signs and all the climatic variables ($P < 0.001$). The average loss of soil for sampling courts 8 ± 17 (n=331) g m^{-2}.

These correlations do not exist in the group of sediment yield $>$ 1 t ha-1. This observation is in conflict with the conclusions of some studies stating the relationship between rain intensity and erosion is direct, although diminishing simultaneously the variability between plots.

Since also the meteorological circumstances substantially influence the soil erodibility, we separated the main events in two periods, the wet season (October-April) and the dry season (May-September), *a priori* with storms and more erosive events. The average sediment yield per sampling in each period was 508 ± 836 (n=32) and 570 ± 566 (n=31) g m^{-2} respectively.

Nevertheless, we have not found any significant correlation between the climatic variables and sediment yield in any of the two seasons of the year. Although, the runoff established significant correlations with the rainfall depth and the rainfall intensity in the wet season , and also with the Kinetic Energy and the R factor calculated according to Zanchi & Torri in summer. The runoff seems to be more sensitive to the climatic variables than the sediment yield, whose patterns seems to be more foreseeable in the moderate rainfall events than in the intense ones.