



Estimation of the mean annual erosivity in the region Eastern Andalusia (Spain) through the maximum annual precipitation values of 24 hours and daily duration.

Patricia Ayuso-Ruiz, Jose Luis Ayuso, Encarnación Taguas, Amanda García-Marín, and Rafael Ayuso-Muñoz
University of Cordoba, Rural Engineering Department, Córdoba, Spain. E-mail: ir1aymuj@uco.es

Soil loss is commonly predicted using an empirical model such as the Universal Soil Loss Equation (USLE), because of its simple structure and easy application. Among the empirical coefficients used to calculate potential erosion, rainfall erosivity represents a natural environmental constraint on soil erosion that limits and conditions land use and management. Long term records of the erosivity values are not common since they require rainfall data at intervals of at least 30 minutes and the weather records are usually given on a daily or monthly basis.

In this work, the relationships between the mean annual erosivity $(EI_{30})_y$ and the maximum annual precipitation values of 24 hours (P_{24}) and daily duration (P_d) from the four provinces in the region Eastern Andalusia (Spain) are explored.

Using hourly data of precipitation corresponding to the period 1981-2007 from Jaén, Málaga, Granada and Almería, the values of annual erosivities (EI_{60}) were calculated for different minimum times between events (MTE; 1, 2, 3, 4, 5 and 6 h). Only the events with a larger accumulated rainfall depth than 10 mm were considered. A data series of time step equal to 10 min corresponding to the period 1999-2002 allowed to adjust the relationships EI_{60} - EI_{30} . Then, the parameters a and b as well as the determination coefficient were calculated for the potential equations $(EI_{30})_y = a.P_{24}^b$ and $(EI_{30})_y = a.P_d^b$ in the four considered gauges, where $(EI_{30})_y$ is the mean annual erosivity and P_{24} and P_d are the averages of the annual maximum rainfall in 24 h and annual maximum daily precipitation, respectively.

The results show how the longer MTEs are considered, the largest determination coefficients are obtained. In addition, the best adjusting –with a determination coefficient equal to 0.9992– was obtained for MTE of 6 hours and the duration of 24 h. This simple approach for calculating the mean annual erosivity could be applied in other areas in order to study and to calculate the erosion risk through daily/24 h data records.