



Spatial and temporal evaluation of erosion with RUSLE: a case study in an olive orchard microcatchment in Spain

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Soil loss is commonly predicted using the Revised Universal Soil Loss Equation (RUSLE). The high spatial and temporal variability of erosion in Mediterranean environments and scale effects -since RUSLE is an empirically based soil loss model derived from experiment on plots- provoke that studies evaluating the model on other spatial units such as the microcatchment are necessary. Most studies to check the suitability of the management operations in olive orchards have been done on plot scales. However, the microcatchment is a geomorphological unit where hydrological processes are more numerous, do not occur isolatedly and whose area is well-adapted to the farmland small size and medium size. In this study, different topographic and soil surveys were carried out on a microcatchment of 6.7 ha in a mountainous area under non-tillage farming with bare soil to examine spatial and temporal results produced by RUSLE. The height difference of microrelief through GPS measurements was set on a control area in the microcatchment to compare observed erosion and deposition points with RUSLE spatial predictions. In addition, measures of sediment loads were taken out to calculate the annual sediment delivery ratio and the storage that evaluate the capability of the RUSLE. Finally, data series of daily rainfall were acquired to calculate the long term erosion and to check the suitability of land-use and the management under different thresholds of tolerance. Erosion points were located on zones with the highest RUSLE values while the distribution of deposition points showed no correlations with RUSLE predictions. In addition, an annual sediment delivery ratio in the catchment about 26 % was calculated (period 2005-06). Although substantial spatial differences were observed, mean long term erosion estimates in the catchment showed 35 % of studied time period (14 years), annual soil loss may overpass 2 t.ha-1.year-1 and 7 % of it, erosion may be higher than 5 t.ha-1.year-1. On the study scale, RUSLE allowed to locate the most erosive areas and to combine the suitability of the soil land-use and the management with the frequency of the annual erosivity.