Evaluation of different strategies for calibration of the simple distributed model SEDD for sediment transport in an olive microcatchment

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Olive groves located in mountainous areas with steep slopes in the south of Spain, have been identified as a major source of sediments in the region, contributing to diffuse pollution of surface water and causing major damage to roads and reservoirs. This study has as objective the evaluation of different calibration approaches of a water erosion distributed model in a 6.7 ha watershed of olive groves, with soil management based on tillage and herbicide in Setenil (Cadiz).

The model chosen was SEDD (Ferro and Porto, 2000), which was calibrated using data from rainfall, runoff and soil erosion measured in the same basin in a series of five years, following the original methodology proposed by its creators. It was compared with the modelling approach presented by Taguas et al. (2011), which considers the possibility of binomial distribution of its main parameter coefficient β. In both cases the calibration of the model assumes a constant C value which is not the case in olive orchards (Gómez et al., 2003). In a second stage, the calibration of the model was repeated using a variable C depending on the ground cover and soil moisture evolution along the season.

The results indicate that the coefficient β determines the travel time within each sub-basin is a distribution that is far from the normal distribution suggested by Ferro and Porto (2000). This is a similar result to that obtained by Taguas et al. (2011) in another basin of olive groves. In this case the explanation for this deviation from a normal distribution of key parameters of the model β cannot be the evolution of the coverage. It also reflects little predictive power because of the inability of it to capture two major events that caused the greatest erosion of soil loss measured in the 97 events.

These results suggest that progress must be made in the calibration of the model, based on different estimates of β characteristic of the basin that is not dependent on an approximation of its distribution to a normal distribution, and including the impact of soil management along the season.

References
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