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Exploring calibration strategies of SEDD model in two olive orchard watersheds

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To optimize soil conservation strategies in catchments, an accurate diagnosis of areas contributing to soil erosion using models such as SEDD (Ferro and Minacapilly, 1995) is required. In this study, different calibration strategies of the SEDD model were explored in two commercial olive microcatchments in Spain, Setenil (6.7 ha) and Conchuela (8 ha) monitored for 6 years. The main objectives were to calibrate the model to the study watersheds with different environmental characteristics, soil management ways, and runoff conditions, and to evaluate the temporal variability of the sediment delivery ratio (SDR) at the event and annual scales. The calibration used five different erosivity scenarios with different weights of precipitation components and concentrated flow. To optimize the calibration, biweekly and annual C-RUSLE values and the weight of the travel times of the different watershed morphological units were evaluated.
The SEDD model was calibrated successfully in the Conchuela watershed, whereas poor adjustments were found for the Setenil watershed. In Conchuela, the best calibration scenarios were associated with concentrated flow, while the erosivity of Setenil was only rain-dependent. Biweekly C-RUSLE values provided suitable, consistent results in Conchuela where soil moisture over the year. In contrast, there were no appreciable improvements between annual and biweekly C-RUSLE values in Setenil, probably due to the narrower variation interval.
The analysis of the SDR function justified the grouping of the different β values according to their sign (positive or negative) as a calibration strategy in Setenil. The medians of these groups of events allowed them to be adjusted (E = 0.7; RMSE = 6.4). In the Conchuela watershed, this variation in the model calibration produced only minor improvements to an adjustment which was already good.
The sediment delivery ratios (SDR) in both watersheds indicate very dynamic sediment transport. The mean annual SDR for Setenil was 64.1% (with a standard deviation of 57.5%), while in Conchuela it was 110.1% (with a standard deviation of 83.7%). Extreme SDR values (>100%) were associated with very humid years and with precipitations 30% above the mean values. At the event scale, similar SDR behaviour was observed. SDR values >100% were associated with a dominant role of the gully in exporting sediments out of the watershed in Conchuela, whereas this was done by rills and an ephemeral gully in the Setenil watershed.

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