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Soil erosion model parameterisation as a fundamental step in predicting erosion rates for different land use types

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Soil erosion susceptibility, when affected by land management, can be assessed successfully with some relatively easily measured variables, such as soil microtopography and some soil properties, in terms of texture, hydraulic properties and land cover. During rain, soil microtopography changes, mainly because of drops impact and flow shear stress, some areas becoming more susceptible to runoff generation and also more subjected to soil losses than others. If during storms these areas connect each other and to the rill system, and from the rill to the channel, watershed-scale erosion is likely to be much higher than where these areas are separated, acting as sinks for overland flow and transported sediment. In this research the most vulnerable locations for erosion and runoff within several different land use types have been assessed by experimental field data-collection and numerical modelling in two little catchments, the Orme basin and the Rivo basin, both located in Central Italy. The field-work has concerned rainfall simulation experiments to measure and quantify runoff and sediment delivery under different land use and management plots, located in some vineyards, olive groves, sunflower and corn fields. The intensities were performed on the basis of the return time of 2, 5 and 10 years. During the experiments, multi - temporal photogrammetric surveys were carried out to obtain high resolution (2 by 2 mm) plot DEMs. Soil roughness, expressed by standard deviation of elevations or by fractal dimension, local relief energy, and others parameters such as soil and sediment transfer, expressed by hypsometric curves, local elevation and volume differences were calculated on the DEMs. Collected data have been thought to provide a sufficient basis for an accurate parameterisation of two physically-based models, WEPP and MEFIDIS, that have been calibrated for the different scenarios, according to a calibration strategy for runoff and erosion predictions. During the calibration we assessed the sensitivity of the input co-

efficients, and provided a suitable range for these input coefficients. Pre-calibration outputs show that runoff is underestimed in both models, mainly for low intensity rainfalls, while erosion shows more stable values with a very small error for WEPP model than for MEFIDIS. After the calibration MEFIDIS better estimates runoff than WEPP, even if both models poorly simulate erosion values. This uncertainty of model predictions can be due to the spatial heterogeneity of processes controlling soil erosion and should be investigated in detail.