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# Modelling soil redistribution in a hydrologically defined crop field with WATEM/SEDEM

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Soil degradation and depletion of soil nutrients is a main effect of soil erosion. In arable land tillage practices produces erosion of fertile topsoil from upslope positions, the subsequent transport of soil and nutrients and their accumulation at depositional sites. The loss of topsoil by tillage and water erosion may affect to important soil properties such as nutrient levels, water holding capacity and soil stability thus reducing the productivity of agricultural systems. Erosion models that simulate soil redistribution rates allow obtaining the spatial distribution of soil loss and deposition, which is useful to identify the areas that might require the application of soil conservation practices. In this study the soil erosion and sediment delivery WATEM/SEDEM 2005 model was applied in a cultivated field of winter cereals (3846 m2) located in NE Spain (42º 01' 42" N, 0º 31' 30" E). The study area was selected as representative of the typical mountain rainfed Mediterranean agro-ecosystems. This area appears as a closed hydrological unit that conforms a defined drainage area, which was delimitated on the basis of a detailed digital elevation model (1 x 1 m of cell size) as well as detailed field observations before and after erosive rainfall events. The WATEM/SEDEM model is a useful tool, which has been widely used to assess soil redistribution by water and tillage processes at different spatial scales. Soil redistribution patterns were simulated and results of the WATEM/SEDEM model were used to map the spatially distributed rates of net soil loss and deposition. In order to perform the calibration procedure, quantified values of soil redistribution in the cultivated field were derived from Caesium-137 measurements. This fallout radionuclide provides information for the whole erosion and deposition processes at medium and long-term. The simulation results from each conversion module were compared with the soil redistribution pattern derived from Cs-137 measurements to identify the sediment delivery related with water and tillage erosion and with topographic attributes derived from the digital elevation model. Comparison with estimates derived from Cs-137 is of interest for future model testing and validation of WATEM/SEDEM in Mediterranean agro-ecosystems and especially in intense anthropized landscapes.