



Regional scale modelling of hillslope sediment delivery with WATEM/SEDEM: an example in the Ésera—Isábena watershed, Central Spanish Pyrenees

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Soil erosion and sediment delivery are major environmental problems posing substantial financial burden upon society. Policy makers therefore look for a strategy to minimize their impact. The spatial nature of soil erosion and sediment delivery, as well as the variety of possible soil conservation and sediment control measures, require an integrated approach to catchment management. A spatially distributed soil erosion and sediment delivery model (WATEM/SEDEM) was applied to the Ésera—Isábena watershed in the Central Spanish Pyrenees (1066 km² and 438 km², respectively). Several raster data layers with an identical resolution of 20x20 m were necessary to run the model: digital terrain model (DTM), a new drainage network derived from DTM with 1 km² area threshold, land use map derived from CORINE (2000) Land Cover data, rainfall erosivity map (R-factor in RUSLE), soil erodibility map (K-factor in RUSLE) and the crop management map (C-factor in RUSLE). The validation of the model has been performed by means of the depositional history of the Barasona reservoir (437,500 t y⁻¹), conserving the same ratio between the two transport capacity coefficient values (i.e. $k_{tc_{max}}/k_{tc_{min}} = 3.33$), and changed the value of both parameters jointly. These data were used to calculate the average annual sediment yield contributed by each sub-catchment. Model results indicate that approximately 70 % of the sediment yield is generated in the Ésera river basin. Large spatial variability in hillslope sediment delivery was found, with the major sediment sources situated in the low part (fields under agriculture) and in the badlands on Eocene marls situated in the middle part (Pyrenean internal ranges).