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Soil redistribution and erosion by tillage: Remodelling agricultural landscapes

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Soil redistribution by conventional tillage practices has been recognised as a process of intense landscape transformation. Field limits represent physical barriers that interrupt soil flux by tillage. These lines of zero flux produce a net soil accumulation on the upslope side or a net soil loss on the lower slope side. When a cross-slope boundary between fields is located at mid-slope positions, opposite balances of net soil loss or soil gain take place in the two sides of the boundary with the consequent formation of a linear step along the boundary. Location of field boundaries determines the spatial patterns of soil redistribution as well as the final morphology of the slope profiles. This paper presents the results of several study cases in Central Spain and field experiments conducted to evaluate the intensity of such soil redistribution and its effects on remodelling landscapes. They are analyzed, field observations, experimental results of soil bank formation along field boundaries and 3D-simulation predictions of slope morphology evolution, in order to compare the absolute rates of soil transport and the resulted slope morphology in each case. Findings of this study reveal that soil redistribution by tillage could represent the main process of soil redistribution transforming the slope morphology in rolling landscapes. As the same time, results point to the importance of incorporating the process of soil redistribution by tillage into comprehensive models of soil erosion and hydrological process and the need to explore subsequent interactions and synergies.

Key Words: soil redistribution, tillage erosion, slopes morphology, landscape modelling, soil variability