



Runoff and erosion processes across scales in a small mediterranean marly catchment

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As one of the major types of land degradation on the earth surface, soil erosion caused by water has induced large-scale environmental deterioration and widespread declines in land productivity, which threatens the sustainability of human-earth systems. Water erosion presents a complex hierarchy of processes and is studied over a wide range of spatial scales. To study the scale effect on soil erosion processes and sediments redistribution, different methods are required. Erosion processes are numerous and the processes and their intensity vary with climate and the topography - soil - vegetation complex. Interactions between soil surface properties, water runoff and erosion occur at many time and space scales. This study investigates the relation between contributing surface area and dominant hydrological and erosion processes by a combination of runoff and erosion measurement rates at nested scales in Mediterranean region. A detailed monitoring investigation was conducted in the Kamech catchment (ORE OMERE, Tunisia) that includes continuous runoff and suspended sediment load measurement between 2005 and 2012 at the outlet of a plot (P1: 1,32 ha), a gully that drains an area similar to P1 (P2+G: 1,37 ha) and a catchment (C: 15,2 ha) located downstream P1 and P2+G. The results showed that annual runoff slightly increases with the contributing area: 95 mm/year for P1, 105 mm/ year for the P2+G and 120mm/year for the catchment. Erosion rates observed at C (14,5 t/ha/ year) were lower than those observed at P1 (17 t/ha/year) and P2+G (23,5 t/ha/ year). The increase of runoff and decrease of erosion with an increase of watershed area confirms that catchment soil loss cannot be estimated by the sum of individual plots soil losses and that gully has to be considered both as a sediment contributing source and a connectivity component. Discussion about the sediment sources and the factors influencing runoff and erosion across scales on the study site are then discussed.

Key words: Runoff, Water erosion, Plot, Gully, Catchment, Scale effect, Sediment contributing source, Mediterranean region.