



Water and sediment dynamics in a small Mediterranean cultivated catchment under cracking soils

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Shrink–swell soils, such as those in a Mediterranean climate regime, can cause changes in terms of hydrological and erosive responses due to the changing soil water storage conditions. Only a limited number of long-term studies have focused on the impacts on both hydrological and erosive responses and their interactions in an agricultural environment. In this context, this study aims to document the dynamics of cracks, runoff and soil erosion within a small Mediterranean cultivated catchment and to quantify the influence of crack processes on the water and sediment supplied to a reservoir located at the catchment outlet. Detailed monitoring of the presence of topsoil cracks was conducted within the Kamech catchment (ORE OMERE, Tunisia), and runoff and suspended sediment loads were continuously measured over a long period of time (2005–2012) at the outlets of a field (1.32 ha) and a catchment (263 ha). Analysis of the data showed that topsoil cracks were open approximately half of the year and that the rainfall regime and water table level conditions locally control the seasonal cracking dynamics. Topsoil cracks appeared to seriously affect the generation of runoff and sediment concentrations and, consequently, sediment yields, with similar dynamics observed at the field and catchment outlets. A similar time lag in the seasonality between water and sediment delivery was observed at these two scales: although the runoff rates were globally low during the presence of topsoil cracks, most sediment transport occurred during this period associated with very high sediment concentrations. This study underlines the importance of a good prediction of runoff during the presence of cracks for reservoir siltation considerations. In this context, the prediction of cracking effects on runoff and soil erosion is a key factor for the development of effective soil and water management strategies and downstream reservoir preservation.