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Hydrological and sediment connectivity in three grazed Mediterranean hillslopes.

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Masselink et al. (2016) addressed the concept of connectivity addresses the spatial and temporal variability in runoff, sediment transport and associated substances such as pollutants and how these move through the catchment. Sediment connectivity explains which sediment sources contribute and where (semi-) permanent sinks and pathways of sediment are (Bracken & Croke, 2007). The Mediterranean eco-geomorphological landscape is highly dependent on the climatic conditions. Its elements form the spatial patterns of landscapes, which control the structural connectivity. The existence of rainfall gradients in the Mediterranean region has been well-documented (Lavee et al., 1998) along which those elements are modified by the spatio-temporal variability of rainfalls. The characteristics of those elements are modified from the rainiest to the driest regions following a positive feedback process leading to soil erosion and degradation. As the climate becomes less rainy, the patchy vegetation pattern becomes frequent and bare soil areas can be easily connected whether the magnitude and intensity of rainfall exceed a certain threshold (Cammeraat, 2004). The interaction between topography and processes occurring within catchments is key to understanding dynamics of hydrological connectivity (Wainwright et al, 2011).
Our study evaluated the hydrological and sediment connectivity between sections (top, middle and bottom-channel) from three grazed hillslopes located under contrasted Mediterranean climatic conditions. Rain-gauge stations and opened-plots were installed in order to register overland flow and sediment concentration from Feb-2008 to Jan-2010. The results indicated that: i) major volumes of overland flow and sediment transport occurred more frequently in humid and semiarid sites; ii) the more frequent hydrological connectivity was observed between the middle and bottom-channel sections, though the major values of overland flow and sediment concentration were registered in the upper sections; iii) it was found very frequent those rainfall events in which all sections contributed with overland flow and sediment to the channel; iv) the factors controlling hydrological and sediment connectivity varied from one site to another depending on the rainfall regime and vegetation cover, though the soil surface conditions were found a key factor in all of them. In summary, the grazing activity contribute to distance the hydrological and sediment connectivity processes from three hillslopes located under contrasted Mediterranean climatic conditions from the response expected for the three of them.

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