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Vegetation patterns, runoff, sediment delivery and organic carbon output from a small catchment in SE Spain

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Spatial patterns of vegetation are strongly affecting the pathways and connectivity of water, sediments and associated organic matter and this study aims at understanding the effect of vegetation patterns on their spatial redistribution. At first sight one would expect that there is a direct relationships between water, sediment and organic matter redistribution, but field observations showed that there is a decoupling between water and sediment on the one hand and organic matter at the other hand, because of the different nature of various components within the particulate organic matter (POM) fractions.
The results of long term measurements will be presented derived from a series of open plots in a hierarchical set up on three types of substratum, with different cover and vegetation patterns, with respect to runoff, erosion and organic carbon output. Runoff was measured continuously, whereas erosion was measured on an event base or during a cluster of events, covering the period 1996 until present. POM was measured over a shorter period and after field sampling determined in the laboratory for different fractions of the POM.
Although the general erosion rates were found to be low, there is a clear differentiation in the water and sediment yield in relation to vegetation pattern, the presence of open crusted patches close to the gutter and the density of the vegetation. The presence of small trees clearly reduced the amount of generated sediment and runoff, but differentiated type and increased the amounts of POM. The relation between runoff, sediment yield, POM and vegetation metrics were also studied. The output of organic matter was quite variable and the role of non-decayed leaves and needles, present as the floating fraction was important, despite local accumulation.
On the hillslope scale the runoff and sediment response was different if compared to the plot scale as broader scale vegetation organization was found to be more effective in capturing sediment and water than individual vegetation patches as present on a the finest scale. Coarse POM was also exported but is captured behind obstacles and this leads to an increased heterogeneity of organic matter deposition in (temporal) sediment accumulations also increasing sediment accumulation itself. The first assessment is that the output of sediment and water is different for the scale levels studied and that the output of sediment is not directly related to the amount and type of POM.