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Spatial and temporal variability of soil water repellency in Mediterranean rangelands in South of Spain

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Soil water repellency (SWR) has become an important field of scientific study because of its effects on soil hydrological behavior, including reduced matrix infiltration, development of fingered flow in structural or textural preferential flow paths, irregular wetting fronts, and increased runoff generation and soil erosion. This study evaluates the spatial and temporal variability SWR in two Mediterranean rangelands (with similar tree and shrub species) and its relationships to different eco-geomorphologic variables (climate, aspect, soil cover and some soil properties).
Every month from September 2008 to May 2009 (rainy season), soil moisture and SWR was measured in field conditions by means of gravimetric method and Water Drop Penetration Test, respectively. Also, disturbed and undisturbed soil samples were taken to analyze some soil properties: bulk density, texture, organic matter, pH and electrical conductivity. The entire tests were performed in North and South aspect hillslopes and beneath shrub and bare soil in every of them.
The results indicated that: i) climatic conditions seem to be more transcendent than the vegetal species for explaining the variability in SWR; ii) thus, SWR appears to be controlled by the antecedent rainfall and soil moisture; iii) more severity SWR were observed in patches characterized by sandier soils and/or greater organic matter contents; and iv) the factor 'hillslope aspect' was not found so crucial as it was previously expected.