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Variation of soil surface roughness under simulated rainfall

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Soil surface micro-topography or roughness (SSR) defines the physical boundary between overland flow and soil. Due to its unique position, soil roughness potentially affects surface processes such as infiltration, flow routing, erosion and sedimentation. Thus the decay of SSR under different rainfall intensities is of most interest in soil erosion. While some authors have chosen exponent function of cumulative rainfall to describe the decay of SSR, others have used the kinetic energy of rainfall.

SSR at the field level is an easy visually perceptible notion, but difficult to describe numerically. In this study we didn't use pin-meter or laser techniques to quantify SSR. Percentage of micro-topographic shadows, under fixed sunlight conditions, has been applied based on former works that proved it is an easy and reliable method to estimate SSR.

Two experimental plots, of 1m x 1m, were subjected to successive simulated rainfall events with an intensity of 67 mm/h and a height of 2 m. Both plots were a harrowed plot with an oriented roughness and 6% slope. Images were obtained each 15 minutes of rainfall with an incident angle of light of 45º approximately. The image was acquired by an OLYMPUS X-925, having a size of 2976x3968 pixels and corresponding to an area of 75 cm x 100 cm. For denoising process, the image was cropped to 590x800 pixels and for image binarization Indicator Kriging (IK) method was used.

Comparisons of both plots respect to SSR evolution, runoff accumulation and shadows morphology are showed.

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References

Garcia Moreno, R. , Díaz Alvarez, M.C., A.M. Tarquis, Paz Gonzalez, A. and Saa Requejo, A. Shadow Analysis of Soil Surface Roughness Compared to the Chain Set Method and Direct Measurement of Micro-relief. Biogeosciences, 7, 2477-2487, 2010.

García Moreno, R., Saa-Requejo, A., Durán Altisent, J.M. and Díaz Álvarez, M.C. Significance of soil erosion on soil surface roughness decay after tillage operations. Soil & Tillage Research, 117: 49-54, 2011.

Saa-Requejo, A.,Valencia, J.L., Díaz, M.C. Paz-González, A. and Tarquis, A.M. Thresholding Soil Surface Roughness Image Analysis. Pedometrics, 2011. Trest Castle, Czech Republic. August, 2011.

Tarquis, A. M., Valencia, J. L., Paz-González, A. and A. Saa-Requejo. Thresholding Soil Surface Images. Geophysical Research Abstracts, Vol. 13, EGU2011-13817-1, 2011.

Tarquis, A.M., Saa-Requejo; A., Valencia, J. L.; Moratiel, R. and A. Paz-Gonzalez. Soil Surface Roughness through Image Analysis. AGU Fall Meeting 2011. San Francisco, USA, December, 2011.