



Multiscaling analysis of shadows related to soil surface roughness

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Soil surface roughness (SSR) is an excellent index of soil susceptibility to wind and water erosion. Several studies have been developed to characterize SSR based on pin meter readings and applying multifractal analysis (MFA). Although it is a reliable method there are several difficulties such as the scale of the measurements needed, centimeter to millimeter, the difficulties to work on the field and extreme time consuming.

The aim of this study was to apply MFA to characterize SSR based on the interpretation of the shadows of the micro topography. The method was designed to be used mainly on the field, after soil is submitted to the tillage labors, being reliable, easy to use and low cost. Three types of tillage tools (roller, chisel and tiller) were used to work two different soils (sandy clay loam and sandy loam), to obtain different SSR scenarios. A frame was used to take the images assuring that the same area was chosen to measure SSR by the pin meter. After passing the tillage tools the images were taken before the pin meter readings, to avoid any kind of disturbance. In addition all the images were taken with a solar angle of 45° to avoid any interference by differences on the shadows.

The results obtained were compared with those obtained from a pin meter, using MFA indexes for the interpretation of the results. The numerical differences between the results, as well as the interpretation, are discussed.