

Interactive comment on “A multifractal approach to characterize cumulative rainfall and tillage effects on soil surface micro-topography and to predict depression storage” by E. Vidal Vázquez et al.

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Thank you very much for your helpful and valuable comments. We are pleased to present our response.

We fully agree with you that the issue of depression storage (MDS) has not been taken into account in our previous work. The importance of MDS for runoff generation is now widely acknowledged (e.g. Kamphorst et al., 2000; Darboux and Huang, 2005), but relationships between classical roughness parameters and MDS are not satisfac-

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tory. In this sense, the use of multifractal parameters for assessing MDS had not been explored before. In the manuscript MDS has been thoroughly considered; for more details on the significance of this parameter or on estimation methods, several key references have been included. It is true also that in a previous work (Vidal Vázquez et al., 2008, Vidal Vázquez et al., 2008. Assessing soil surface roughness decay during simulated rainfall by multifractal analysis, *Nonlin. Processes Geophys.*, 15, 457–468) a multifractal analysis of soil surface microrelief under increasing cumulative rain has been undertaken. However, there are important differences between previous work and the present manuscript. Please, note that now we analyze data measured with pin meter, instead of laser scanner, and they are under the effect of natural rainfall, instead of simulated rain. Moreover, we assess also the effect of several tillage systems using the multifractal approach, which was not done until now, to our knowledge. Note also that in many countries it is not possible to use devices such as the laser scanner and cheaper systems such as the pin meter are still working. Therefore, one of the virtues of the manuscript would be that it also shows the aptitude of multifractal analysis to deal with data sets obtained by classical pin meter.

The Universal Multifractal Model as described for example in Schertzer and Lovejoy (1987) has been applied successfully until now to several studies in Hydrology and Soil Science. It has been reported to have the advantage of fully describing a multifractal field with only three parameters, alpha (Lévy index), C1 (codimension of the mean process) and H (non-conservation parameter). However, it is also true that the limited work on multifractal analysis of soil microrelief has been performed using generalized dimension and multifractal spectrum. Therefore, we have employed these approach for the sake of comparison with previous work. Your comment shows that there is a gap of knowledge and we think that further research is needed using the Universal Multifractal Model.

In the final revised version of the manuscript changes have been made to lay more emphasis on its novelty.

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