

Interactive comment on “Fractal behavior of soil water storage at multiple depths” by Wenjun Ji et al.

Anonymous Referee #1

Received and published: 7 March 2016

General Comments

This manuscript repeatedly evaluates soil water storage (SWS) across an transect consisting of 128 individual measurement points by multifractal and joint multifractal analysis. In each point SWS was determined at seven depth increments, and this several times per year during a five years period. Therefore the relationship between several multifractal parameters obtained from SWS transects as a function of depth and time were investigated. This study follows previous studies carried out with in the same site, with the same experimental design and using similar methods of analysis. The rationale and the objectives exposed in the Introduction are worthwhile and in general the work appears well justified and appealing for the international reader of this journal. The main findings, such as the usefulness of either multifractal or monofractal parameters to assess patters of heterogeneity and evenness of SWS transects with increasing

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soil depth and for different seasons of the year. In general, the paper is well written and organized, and represents an original contribution, even if it follows previous similar work. The results are based in robust data analysis. This study also is compatible with the aims Nonlinear Processes in Geophysics and may fit well into the scope of the current special section titled “Multifractal analysis in soil systems”. In my opinion, it should be acceptable for publication following minor to moderate revisions.

In my opinion the manuscript could be ameliorated by plotting selected multifractal parameters (for example, the amplitude of the singularity spectrum, $\bar{\tau}_{\text{max}}-\bar{\tau}_{\text{min}}$, or the information dimension $D1$) as a function of depth and time, or both, depth and time. Next I'm indicating two places where plots are recommended, but this is not exhaustive.

Specific Comments 1. Page 4, Lines 95-100. I recommend to briefly describe the methods used to measure soil water content and to evaluate soil water storage (SWS), even if they have been already detailed described before. 2.- Page 9, Lines 226-243. I suggest to draw a graphic with these statistical information; then check if including this graph increases readability. 3.- Page 12 and 13, Lines 342-352. Again, I suggest to draw a graphic plotting ($\bar{\tau}_{\text{max}}-\bar{\tau}_{\text{min}}$) as a function of depth for several mesarument periods. 4.- Page 23, Table 2. I suggest to include figures showing some multifractal spectra either in the main manuscript or as supplementary content. 5.- Page 25, Figures 2 and 3. I recommend to show only two or four selected plots of mass exponent functions to increase visibility. (because of thee small size of the Figures, differences are hardly to vew). 6.- Page 26, Figures 4 and 5. I suggest to take into account the shape of the singularity spectra and not only the amplitude in ths and the Results and in the Discussion sections; also these shapes should provide valuable information, I guess. 7.- Page 28, Figure 8. I suggest to move Figure 8 (scheme of the vegetation growth patterns) either to the Material and Method section, or to the section 3.1 (Spatial pattern of soil water storage at different depths). Indeed this Figure is related to the Discussion section, but it is also pertinent to previous section.

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