

Comments from Referees: J. M. Miras Avalos (Editor)

The manuscript entitled “Fractal behavior of soil water storage at multiple depths” (Reference number NPG-2015-81) authored by W. Ji, M. Lin, A. Biswas, B.C. Si, H.W. Chau, and P. Cresswell presents results from a five-year study on the soil water storage from a transect in a hummocky landscape of central Canada. The authors applied multifractal and joint multifractal theories to this huge dataset in order to describe the fractal behavior of this variable at different depths along the transect.

I agree with the comments posted by reviewer1 and consider this manuscript very-well written and acceptable for publication after several modifications. Unfortunately, I have not received the comments from the second reviewer yet. Anyway, I carefully read the submitted manuscript and performed some comments and suggestions in order to improve its quality.

The reported work is interesting and fits perfectly well within the scope of the Special Issue “Multifractal analysis in soil systems” to be published in *Nonlinear Processes in Geophysics*. However, the manuscript is rather long and information can be condensed as well as reduced since it seems repetitive in some portions. Tables can be improved and, from my point of view, figure 9 is not needed and can be deleted. Finally, a few English mistakes must be corrected.

In the attached file (supplement), I provide the authors with some suggestions in order to improve their manuscript. Therefore, the authors must address these issues prior to the acceptance of their manuscript. They must correct them in order that this manuscript achieves the standard quality for being published in *Nonlinear Processes in Geophysics*.

Therefore, I recommend a moderate revision prior to its publication in this journal.

Please also note the supplement to this comment: <http://www.nonlin-processes-geophys-discuss.net/npg-2015-81/npg-2015-81-EC1-supplement.pdf>

-- Response: Thank you very much for your detailed comments. Your comments and suggestions have greatly help improve our manuscript. We have tried to condense the context by deleting some repetitive parts and combining the information by figures. The tables and figures have been revised and supplemented according to all the review comments. New figures are also added and figure sequence have been changed to improve the structure of manuscript. We have also worked carefully on the English.

We have also documented all the changes we made in the revised version and responded to each comment individually.

Author’s changes

Lines 28-30: Only for the dry period? This is somewhat unclear.

-- Response: Not only dry period, here it is just to discuss the dry period specifically as a comparison to wet period mentioned above. We changed the “in contrast” to “on the other hand”, which may shows the logic better. (L26)

Lines 44-46: You used the word “scale” too many times in this sentence.

-- Response: "Scale" has been changed to "extent" in some sentences to increase the variability according your suggestions. (L40, L47, etc)

Lines 68-69: I am not sure that "indicating the superficial properties" is needed.

-- Response: We think it is required, for it acknowledges the achievement of previous studies. (L71)

Materials and Methods:

Line 87: Please, indicate the elevation above sea level of the study site.

-- Response: The elevation data included. (L89)

Line 96: "at every 20 cm depth", you should indicate down to what depth.

-- Response: Has added "down to 140cm" (L104)

Lines 135-138: This last sentence is not clear, please, re-phrase it

-- Response: The sentence has been rewritten (L150-152)

Lines 226-229: These values are not included in Table 1. Why did you mention this table here?

-- Response: Yes, that was a mistake. We have deleted this.

Lines 230-231: "The highest average SWS..." this is not true for all depths.

-- Response: The clause of "for the surface layer" has been added. (L257)

Line 231: "large amount of spring rainfall", data on rainfall are not shown.

-- Response: Data is added. (L258)

Line 245: The minimum is 6.71 cm according to table 1 and not 6.72 cm as you said in the text

-- Response: The text has been changed to 6.71cm as it was a typo. (L273)

Line 146: Define UM when first used, please.

-- Response: The UM is expanded during first use. (L160)

Lines 321-329: This is messy and unclear, even somewhat repetitive. Please, re-phrase.

-- Response: We have modified the paragraph and tried to make it clearer. (L347-359)

Line 371: "A very similar trend was observed in other years". These data are not shown. Indicate this and also briefly specify the similarity.

-- Response: We have added a new figure (Fig. 11) to explain the pattern.

Line 396: "average SWS in a year", only in one year?

-- Response: No, it was for other years too. This is a general observation. We have deleted the word 'in a year'. (L445)

Lines 271-273: This looks like materials and methods and not results.

-- *Response: It reads like that as the result was generalized. This is necessary to main the flow of the results and discussion. So, we kept this section. However, we did modify a bit. (L484-496)*

Discussion

This section can be reduced since it seems repetitive and information can be condensed because some paragraphs look like materials and methods.

-- *Response: We have reorganized the paragraphs and reinterpreted the figures to provide further information after the analysis in the result section.*

Lines 451-457: Is this paragraph really needed? It repeats the former paragraphs.

-- *Response: We think this summary is required to increase the readability. Therefore, we kept this paragraph.*

Line 498: Is figure 9 really needed?

-- *Response: We think the figure is a summary of the main conclusion which is needed for the ease of understanding. This also shows the general trend in the data and the analysis result. Therefore, we kept the figure in the revised manuscript.*

Lines 504-506: The idea mentioned in this last sentence is not well developed throughout the text, especially it is not discussed at all in the discussion section. However, it appeared in the abstract.

-- *Response: Yes, it seemed little weak and we have deleted this sentence.*

Lines 520-522: "Therefore, the observation completed...", I am not sure about this conclusion.

-- *Response: Through this sentence, we mean to say the general pattern of the scaling indices. The relationship can be directly transferred to other field situations given the similar kind of landscape and climate condition.*

Table 1: Please, include the five-year averages, since you refer to them in the text.

-- *Response: Added.*

Table 2: Please, indicate the number of data used for each correlation. Was it the same for all dates and depths?

-- *Response: The number of data is same for all and is mentioned in the title.*

Figure 1: Why not showing the Y-scale in all left graphs?

-- *Response: We have added y-axes for all the plots.*

Figure 2 and 3: It is very difficult to distinguish the points from each depth. Besides, the UM model is missing from the graphs.

-- Response: Yes, there were too many graphs. We have reduced to only three. All the graphs have the UM model but it is not visible due to the condition of the plots.

Figures 6 and 7: Some values are overlapped in the Y-axis.

-- Response: We have modified the Fig. 6 and Fig 7. These are assigned to new numbers.

Figure 9: Is this figure really needed?

-- Response: We think the figure is a summary of the main conclusion which is needed for the ease of understanding. This also shows the general trend in the data and the analysis result. Therefore, we kept the figure in the revised manuscript.