

## ***Interactive comment on “Scale and space dependencies of soil Nitrogen variability” by Ana M. Tarquis et al.***

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Anonymous Referee #2 Overall, it is an interesting work that addresses scale-dependence of structure in series. Thank you for your comment.

Three components of the work require better explanations: 1. The transect crosses areas with different treatments. This is reflected in responses to N shown in Fig. 3. The multifractal formalism does not allow for trends. How then the deterministic component of variation is reflected in multifractal parameters?

Figure 4 is showing the relation of nitrogen applied in melon crop and the values of the four variables study and of course that there is a relation. But to study the tendency in the transect for each variable we have to study Figure 3. For that we have done a statistical test to see if the slope of the data versus distance has a significant value or

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not.

At the end of section 2.4: Finally, a statistical test was applied for each variable to determine if there was any significant trend with distance that would not allow the application of a straight multifractal analysis on the original data. The measure used was the coefficient of the slope of the regression line along the distance. This coefficient is derived using the least squares method and then compared to zero using the Student t-test. If the t value is less than a critical t value at the 95% level for the degrees of freedom, then the slope is considered to be zero.

At the end of section 3.1: Before applying the multifractal analysis, a statistical test was applied to each variable to determine whether it presented a significant trend with distance. The results are shown in Table 3, where the estimated t was always lower than the critical t-value, implying that no spatial trend was significant.

We have included a new table: (see Table 3)

2. Distances of 5 and 10 m are mentioned as the distances at which structure is best revealed. Why the numbers are round? What is the method of finding these numbers? Do these numbers depend on the spatial increment of measurements? The data were obtained each 0.5 m. The relation between number of data points and equivalent distance is added in Figure 7.

3. Authors are talking about structure throughout the manuscript. But what is structure? How is it defined? It is important for future attempts to relate structure and function. At the introduction we have added: Geostatistical methods and, more recently, multifractal/wavelet techniques have been used to characterize the scaling and heterogeneity of soil properties, among other approaches coming from complexity science (de Bartolo et al., 2011). These methods study the structure of the property measured in the sense that compares the probability distribution at each scale and among scales.

The manuscript requires editing for English. It has been revised and a certificate of the

translator is included.

There are many small pesky errors. Here are examples from first two pages. Page 2 9 Change “can be seen as the result of” to “exhibit”. Done. Change “Logsdon” to “Logsdon”. Done. Change “on a” to “in” 20 Change “the scaling property” to “scaling propertirs”. Done. How a surface site can be located near an aquifer? The irrigated agriculture is an activity very important in this area and principally is irrigated agriculture, which is located near to groundwater sources. Mancha Occidental aquifer and Campo de Montiel Aquifer are the main sources of water in more than the half-irrigated lands (Domínguez and de Juan, 2008).

Domínguez, A., J.A. de Juan. 2008. Agricultural water management in Castilla-La Mancha (Spain). p. 69-128. In: Agricultural water management Research Trends, Magnus L. Sorensen (Ed.). Nova Science Publishers, New York.

What are you trying to say with this characterization? We are describing the importance of water and nitrogen in this area with special characteristics in the soil and type of crops.

“Nitrogen” not capital. Done.

Please also note the supplement to this comment:

<http://www.nonlin-processes-geophys-discuss.net/npg-2016-32/npg-2016-32-AC2-supplement.zip>

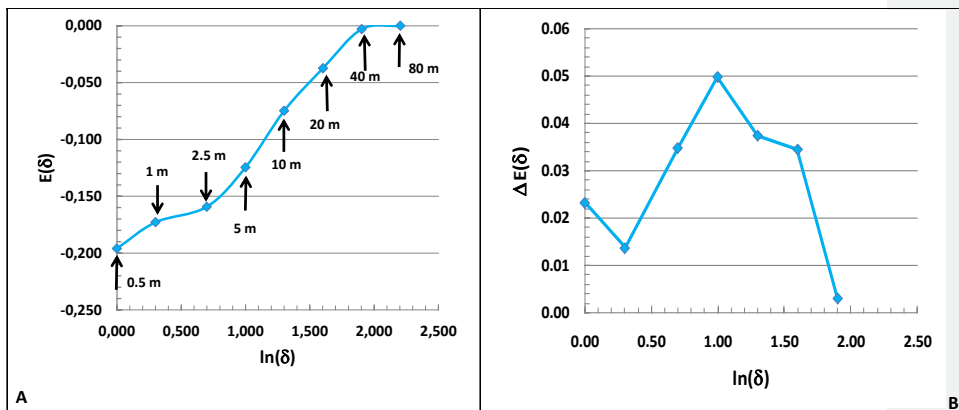
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**Table 3.** Statistical trend significance between the variables studied and distance in the transect (see Fig. 3): grain N content (*GN*), grain weight (*GW*), wheat N content (*PN*) and wheat weight (*PW*).

	<i>GN</i>	<i>GW</i>	<i>PN</i>	<i>PW</i>
slope	0.21118	-4.34944	0.15982	1.70951
s.e.	0.11690	6.46473	0.11633	12.37794
R <sup>2</sup>	0.02919	0.00286	0.01180	0.00012
t estimated	1.07253	0.67279	1.37376	0.13811
t value	1.97509	1.97509	1.97509	1.97509
significance	ns	ns	ns	ns

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**Fig 7.** Entropy study: A) relative entropy,  $E(\delta)$ , of Nitrogen applied (Napp), B) increment of relative entropy,  $\Delta E(\delta)$ , of Napp. The equivalent distance to the number of data points ( $\delta$ ) are marked in  $E(\delta)$ .

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