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Nonlinear Processes in Geophysics
Discussions

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

Anonymous Referee #3

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The manuscript deals with the effect of residual soil N content, resulting from a previous experiment with melon, on several parameters in a wheat crop, including grain and plant N content and biomass. The main objective was to identify the structure of the variations in these parameters along a transect at different scales, for which the authors apply multifractal and entropy analyses. The topic of this work is interesting for a wide range of potential readers, and the analyses conducted, although previously used for other parameters, are novel when considering the crop parameters covered. However, my recommendation on the manuscript is that it needs a major revision for a series of reasons:

-The introduction section is not well constructed, and contains some paragraphs (more precisely, P. 3, L. 12-20) that are a mere description of the experimental setup. This description should be part of the Material and Methods section and not the Introduction.

Moreover, since several other papers with data from this experiment have been published already, their main findings should be included in this section (e.g., Castellanos et al., 2010; Milne et al., 2010).

-The Material and Methods section includes a detailed description of a previous experiment with melon plants that was conducted prior to the establishment of the wheat crop. Although knowing the history of the plots is necessary for the interpretation of the data, many of the details that the authors include are not relevant for the present work, since only parameters of wheat are discussed. For example, melon plant density (P.4, L. 14-15) or the number or rows and plants per row (P.4, L.17), or the details of melon plants (P. 4, L 12-13) are just irrelevant information. The information on the melon experiment should be revised and only the aspects that are important to understand the wheat data should be kept (fertilization, irrigation, and similar). Also, Figure 1 indicates the plot distribution for the different treatments in the melon experiment, when only the upper line of plots, which are the ones crossed by the transect, are needed in this paper. The figure should be revised to remove unnecessary information.

-The results and discussion section is very limited (roughly, one page in length). In my opinion, the authors should do a better job describing and specially discussing the results and the implications of their findings. For example, Milne et al. (2010) used the same data reported here but subjected to a different type of analysis. I might suggest comparing both analyses and discuss differences and similarities. Also, the authors could discuss other aspects shown by the data, as why wheat grain weight does not increase substantially with N applications above approximately 150 kg/ha, while N content increases both in the plant and in the grain and plant biomass increases with increasing N. -The English of the text should be the subject of a deep revision. There are many mistakes and colloquial expressions that should be removed.

Some specific comments:

The text and expressions should be revised. For example, P.3, L.4 "This can give us an

insight into the dominant processes". This sentence seems unfinished (processes governing something?). As another example, in P.3, L. 5-11: the word "scale" is repeated too many times "to study scale effects localized in scale".

In P. 3, L 20. What the authors did was to analyze the differences in some plant parameters that may be caused by residual N. However, residual soil N is not evaluated in this work, and the procedures used do not allow to do that. Therefore, this sentence should be deleted.

-Do you, by any chance, have any numbers about N exports from the plots in the melon experiments? This could be very valuable information in order to understand the starting point of the wheat experiment.

-Revise the Soil Taxonomy classification of this soil (P.4, L.4).

-Check the separators used for decimals and thousands (e.g., P.4, L.6 and 7: "7,9", "2,2"). -P.4,L.12. "The species..." replace with "The variety...". In the same line, "Cucumismelo" should be replaced by "Cucumis melo".

-Table 1 and figure 4. The N-application treatments in the melon experiment are only three, but in figure 4 there are 9 application rates. I guess that this is due to the addition of different irrigation amounts to the plots, which contain some amount of N. These amounts are not indicated in table 1 clearly, probably due to some mistake when preparing the table. I understand from Milne et al. (2010) that it should be the third column from the right in this table.

In figure 4, and considering the high variability that the treatments present, it might be necessary to calculate the confidence interval for the slope of the regression lines. It seems to me that in the Grain weight vs. N applied the 0 will be included in this interval, and thus no linear relation could be

Overall, the manuscript needs a deep revision prior to be accepted for publication in Non-linear Processes in Geophysics.

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