

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

Anonymous Referee #1

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The manuscript explores the effect of the N fertilizer applied to a previous horticultural crop on the subsequent, unfertilized, wheat crop: the different response of weight and nitrogen content of the cereal. The differences shown by the wheat crop after the fertilization of the previous crop were already examined by several of the authors using the wavelet technique (Milne et al. 2010). The new aspect considered in this manuscript is the separation between the whole plant and the grain. The authors discussed some results like the different answer of grain weight compared to plant weight which might be due to physiological reasons, as for instance an upper threshold for grain yield, which could be similar to what Hawkesford (2014) indicates in his figures 2 and 3.

Nevertheless the authors do not try to search for the reasons of the different behavior of the whole plant and the grain, but they show that the differences observed in their data, figures 3B and 3D of the manuscript, could be appreciated too with the multifractal

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analysis using the transect sampling.

The manuscript needs a major revision: the discussions and conclusions sections do not fully agree with the abstract, the discussion section requires a clarification, as well as other sections.

Specific comments:

There are several questions:

1. Given the dry period between November 2006-April 2007, seen in figure 2, and the high grain yields of figure 3, did the wheat plants receive any irrigation? In the affirmative case was the N contribution computed?
2. The data of Table 1 require some additional explanation: if the 60% of the ET_c is 251.8 mm why the irrigation volume in the W1 treatment was 344.1 mm?
3. The explanations of Lines 10-18 of section 3.3, page 12 are not evident. The legend of the abscissa axes of figures 6, 7, and 8, should indicate the unit of the variable delta.
4. The use of the English language must be thoroughly revised.

Technical corrections:

Page 1, Line 2: According to Milne et al. (2010) M.C. Cartagena super-index 3 should be 4. Page 4, Line 14: The authors must indicate what UH mean. Page 4, Line 15: write 6,953 km² and 3,192 km². Page 4, Line 16: delete 'caliche'. Page 4, Lines 19-22: rewrite the two sentences. Page 5, Lines 12-13: the soil could belong to the xeralf suborder, and might have a petrocalcic horizon, but it does not necessarily mean that the soil can be classified as written in the manuscript. Page 5, Line 16: the proper units are molc m⁻³. Page 6, Line 1: if the plant density for wheat is written in plants m⁻² in page 7 line , why do not use similar units here: 4.44 plants m⁻²? Page 6, Line 8: what does DAT stand for? Page 8, Line 18: write 'The probability is' instead of 'We now perform a weighted sum over all segments that yield to'. Page 17, Line 1: insert

the reference Soil Survey Staff 1999 Table 1: is it necessary? Table 1: the question might be irrelevant but why the numbers are not equal to those of Table 1 of Milne et al. (2010)? Table 1: if the Table is kept in the manuscript the third, fourth, sixth, and ninth columns could be deleted. The relevant information could be reduced to the ETo, kc, and rain depth data.

Reference:

Hawkesford, M.J. 2010. Reducing the reliance on nitrogen fertilizer for wheat production. *J. Cereal Sci.* 59:276-283.

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