Review of npg-2015-79

This manuscript presents multifractal analyses of nitrogen adsorption and desorption isotherms obtained on soil samples from 6 different soil profiles in São Paulo State, Brazil. There is very little that is new here, and the manuscript essentially repeats the study by Paz-Ferreiro et al. (2013), but in a different geographic area and with some less clayey soils. Although it lacks originality, I suppose there is some incremental new knowledge gained on the effects of soil texture on these types of multifractal analyses. Therefore, I recommend acceptance following minor revisions. My specific comments are itemized below (page #, line #):

1,12 & 4,27 – If SSA implies Euclidean geometry & method of moments analyses indicate multifractal geometry is it valid to present both sets of results for the same samples. Surely, the soil pore space is either Euclidean or multifractal, but not both. I am not sure that correlating SSA with generalized dimensions and Hölder exponents, as is done in Table 6, is a useful exercise.

1,18 – If the nitrogen adsorption and desorption isotherms are indeed multifractal, what are the implications for soil pore size distributions? We have well-established physical models for Euclidean (e.g., random packing of uniform spheres) and monofractal (e.g., randomized Menger sponge) soils. Physically, what would a multifractal model for soil pore space geometry look like?

2,3 – Artificial is spelled incorrectly.

2,31 – Paz-Ferreiro and Vidal Vázquez (2012) does not appear in the references.

5,1 & Fig. 1 – It would be preferable to show the differential results rather than the cumulative plots in Fig. 1, which are very smooth and give absolutely no indication of multifractality.

6,5 – How many data points are needed to perform a robust multifractal analysis? Are 41 to 52 data points acceptable, and if so, according to what criteria?

6,6 – Report R^2 values for the log-log linear regression analyses. Also, the residuals should be examined for the absence of trend.

6,7 – For a true multifractal the normalized measure versus scale is always linear on a log-log scale regardless of the subdivision level (k). Does the observation that these plots were non-linear for $k < 1$ imply that this is a pre-multifractal system operating over a limited range of scales, or is it due to the limited number of data points used in the analyses?

6,7 – Why was the range $-5 \leq q \leq +5$ chosen? Did the linearity of the plots change with q, and if so what are the implications of this? Again, for a true multifractal, linearity should not be a function of q.