Nonlinear Processes
in Geophysics

Discussions

EGU

Interactive comment on "Multifractal characteristic-based comparison of elements in soils within the Daxing and Yicheng areas of Hefei, Anhui Province, China" *by* X. Li et al.

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GENERAL COMMENTS

Interesting article that uses the multifractal spectrum to assess possible soil contamination by industrial and agricultural activity in two regions of China. An excellent data collection work and proper use of the chosen methods. The proposed use of the distribution of alpha singularity exponents to evaluate diffusion of contaminants in the soil is valid, but the conclusions require more robust criteria of causality. The main conclusions outlined by the authors are based on correlations and comparisons that were not carefully evaluated. The authors use visual and inaccurate comparisons to validate important statements in the paper argument. The following is a detailed description of

suggestions to improve the work.

SPECIFIC COMMENTS

Line 138: I would say it suggests a non-normal distribution a priori, only. The possible fractal/multifractal pattern is something to be evaluated a posteriori.

210: Why did you choose these values of q? Is there any argument (e.g., when the Dqxq curve stabilises)?

Line 227: A comparison between the $\Delta f(\alpha)$ of the locations is considered here. The authors claim significant differences comparing only the order of the metals, sorted by $\Delta f(\alpha)$. Here a paired comparison statistic could prove the significant difference between areas.

232,234: In my point of view, Figure 3 shows no sufficient evidence to conclude about correlations between the spectra of the two regions. A correlation test between $\Delta\alpha$ (left and right) in Daxing and $\Delta\alpha$ (left and right) in Yicheng could give more support to the argument.

255-257: A logistic correlation could substantiate the statement of significant correlation between the location of industrial/agricultural facilities and metals concentrations.

258-260: A very interesting hypothesis, associating the asymmetry of the spectra with the presence of anthropic actions. Whereas the single symmetric spectrum found was the Cu in the Yicheng area, we would expect a not significant logistics correlation between the presence of agricultural facilities and concentration of Cu in Yicheng (map in Figure 6) and significant correlation in the asymmetry cases. These tests would substantiate the argument of using multifractal for evaluation of anthropogenic changes.

TECHNICAL COMMENTS

143: Just a suggestion: Make the legend a bit clear. The legend information is spread in the figure.

197: I would say more heterogeneous patterns, given the non-binary feature of heterogeneity.

214: "that describing the multifractality" - Unnecessary text.

221: The f spectrum is only another way to characterise your set. I am not sure if 'best measure' is the most suitable term.

234: Asymmetry concept could be better explained, it is presented in a way which might lead to misunderstandings. I would suggest an explanation based on the equations of the lines 191, 192 and 193.

238: Just two missed commas – "All of the heavy metals analyzed during this study, barring Hg, have higher $\Delta f(\alpha)$ values in soils from the Daxing area, with Hg having higher values in soils from the Yicheng area (Table 2)."

241: "The only significant heavy metal pollution associated with the agricultural activity in the Yicheng area WOULD BE the Hg contamination"