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Nonlinear Processes in Geophysics
Discussions
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Interactive comment on "Spatial analysis of oil reservoirs using DFA of geophysical data" *by* R. A. Ribeiro et al.

Anonymous Referee #2

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The authors apply the Detrended Fluctuation Analysis (DFA) method in order to conduct an spatial analysis of oil reservoirs. They used Mantel test, that accounts for correlation between matrices, to compare the differences between DFA-exponents of geophysical quantities data available from well logs and the distances among these well logs. I consider the work achieves what it intends to, but lacks more persuasive arguments to defend the usefulness of the DFA approach to reveal spatial patterns on earth's surface. I think the following suggestions could help in this task.

The authors could include a figure showing the spatial distribution of the DFA-exponent over the field, that could be superimposed on the clustering analysis pattern shown in figure 3, in order to allow readers to evaluate the clustering algorithm.

The authors could provide more details about certain statements that are crucial to the

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conclusions of the work. For example, section 1, line 18: “The DFA parameter summarizes the global behaviour of the full data set, it is a synthetic index of its complexity.”. In other cases, I suggest to better explain the implementation of the techniques, for example:

- section 1: “The question of this article is: can we use DFA-exponent to discover spatial patterns?” (explain better what are these spatial patterns, which are the key point of the article)

- subsection 2.2: “In this work we have computed alpha with help of the algorithm available in Matlab” (what is the algorithm? Who developed it?);

- subsection 2.2: “For 98% of cases the correlation coefficient of the adjusted line in the log-log plot fulfil the relation $R^2 \leq 0.95$, for R the Pearson correlation” (introduce the Pearson correlation to the reader);

- subsection 2.3.3, line 26: “We create balls of radius b attached to each well log” (what are these “balls”?);

- subsection 3.1: “We initially compute the function Corr(τ) for $0 \leq \tau \leq 80$ for all geophysical variables” (why did you choose 80 for the upper limit of τ?)

- subsection 3.3, line 15: “To test how good is the spatial formation of the clustering analyse we employ a Monte Carlo test.” (Please provide more details about on how the Monte Carlo technique is implemented);

Minor issues:

- Define the Num parameter presented in subsection 2.3.1;

- Include units for all quantities in figure 1;

- Include a scale bar in figure 3;

- Correct some grammar, spelling, and punctuation mistakes.

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I suggest that the paper may be fit for publication in NPG after a revision taking into account the comments mentioned above.

Interactive comment on Nonlin. Processes Geophys. Discuss., 1, 877, 2014.

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