**Hydrology and
Earth System
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Discussions

Interactive comment on "Extreme value statistics of scalable data exemplified by neutron porosities in deep boreholes" *by* A. Guadagnini et al.

Anonymous Referee #3

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The manuscripts reports on a statistical analysis of neutron porosity data using the framework developed by the authors. This framework models the porosity increments as the product of a truncated fractal Brownian motion with lag-dependent variance and a random variable, which here is modeled either by an alpha-stable or lognormal random variable. The variogram of the fractal Brownian motion is modeled as a truncated power variogram. Sections 3-5 are concerned with the estimation of the parameters of the increment models and the determination of sample structure functions. Sections 6 and 7 provide an analysis of the frequency distribution of peak over threshold of the porosity increments and their structure functions. The paper provides an interesting statistical analysis that sheds light on spatial porosity patterns, which may give insight into the spatial distribution of hydraulic conductivity.

Comments:

In order to improve the readability of the manuscript it may be useful to provide a glossary with the abbreviations used throughout the manuscript.

p. 11639, lines 25-27: How fundamental is "fundamental importance"? The remark on "fundamental importance" to fluid flow and transport seems to be a bit overstated.

p. 11648, lines 20-22: Could the authors be more specific on who is subordinated here to who? Or in other words, which process is the subordinated and which is the subordinator?

p. 11644, line 21: The scale parameter sigma is a function of the stability parameter. Thus, the estimates for sigma should coincide with sigma(alpha). Have the authors tested this property?

p. 11645, lines 21-23 and p. 11654, lines 5-10: This is indeed an interesting observation. Do the authors have an explanation for this observation? Also, what specific surface area do the authors refer to here specifically?

p. 11646. line 16 and p. 11654, lines 23-24: What do porosity increments have to do with the Burger's equation for fluid turbulence?

p. 11653, lines 11-13: The authors stress the generality of their results and the statistical representation of increments of natural processes. It would be interesting if the authors could discuss why the proposed increment process is a good representation of a variety of spatial and temporal processes.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 11637, 2014.