A regularity-based modeling of oil borehole logs

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Multifractional Brownian motions (mBms) are successfully used to describe borehole logs behavior. These local fractal models allow to investigate the depth-evolution of regularity of the logs, quantified by the Hölder exponent (H).

In this study, a regularity analysis is carried out on datasets recorded in Algerian oil boreholes located in different geological settings. The obtained regularity profiles show a clear correlation with lithology. Each lithological discontinuity corresponds to a jump in H value. Moreover, for a given borehole, all the regularity logs are significantly correlated and lead to similar lithological segmentations. Therefore, the Hölderian regularity is a robust property which can be used to characterize lithological heterogeneities. However, this study does not draw any relation between the recorded physical property and its estimated regularity degree for all the analyzed logs.

Keywords: well logs, regularity, Hölder exponent, multifractional Brownian motion