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Geoscientific Instrumentation Methods and Data Systems Discussions

Interactive comment on "Geological Stratigraphy and Spatial Distribution of Microfractures over Costa Rica Convergent Margin, Central America – A Wavelet-Fractal Analysis" *by* Upendra K. Singh et al.

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To

Anonymous Referee manuscript gi 2016-25

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Dear Sir First of all we wish a happy and prosperous new year 2017 to you and your family.

We would like to thank to you for suggestions and modifications to improve our

manuscript. Here we have also tried to furnish all those comments given by your side and incorporated in manuscript point to point.

With kind regard Upendra

Reply to First Referee

1. Since Gamma ray log is known for its lithology demarcation capacity and especially this logs are very much noisy in nature, but the lithology variation is indicated as high frequency change in geophysical logs. The concept of Wavelet Transform (WT) is arranging the frequency content present in the signal in descending order once it is plotted with scale (inverse of frequency). In order to validate our interpretation, a wavelet coefficient at a scale above noise level has been extracted and shown along with wavelet scalogram so the non-stationary noises (sudden bursts/sudden ups and downs irrespective of Gamma ray (API) range) which are present are eradicated (Kindly see the wavelet scalograms in Figure 3a and 3b). In reference with core samples the sudden spikes which occur in the gamma ray log is indicated as thin ash beds (Expedition 308 Scientist 2005).

2. As your comment, there a density log is subjected to Discrete Wavelet Transform (DWT), the high frequency (Detailed coefficients) alone extracted and found to produce spikes even the data magnitude is smaller in comparison with its vicinity. For understanding this abnormal behaviour they have taken porosity log for comparison and found to be in good agreement with the detailed coefficient extracted. Kindly see the reference Sahimi, Hashemi, (2001).

3. We have also approached in a similar manner using Wavelet Based Fractal Analysis (WFBA) and Core information. The abrupt changes in fractal dimension and the spike occurring depth range in DWT are found to be correlative and in good agreement with the core information. It is an additional attempt here we made to establish the techniques but it can't be a substitute to any image logs such as Borehole Televiewer or FMI.

Please also note the supplement to this comment:
http://www.geosci-instrum-method-data-syst-discuss.net/gi-2016-25/gi-2016-25-AC1-supplement.pdf

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