

Application Of Fractal Theory For Verifying Well Log Correlation

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Abstrak

Fractal analyses methods (rescale-range analyses, RIS and Power Spectrum analyses) were applied to verify wireline logs correlation through the fluvial to marine Sihapas Group (Lower-Middle Miocene) in the Central Sumantra Basin. This study was a test the applicability of a fractal analysis of well log data (gamma-ray, density, porosity and sonic logs) specially for well log correlation purposes. These analyses reveal that the fractal dimension of gamma-ray logs is the best log for well log correlation purposes with correlation coefficient 0.713, and the porosity logs shows 0.702. However, the density and sonic logs have correlation coefficient 0.533 and 0.542 respectively. The fractal dimensions for each stratigraphic unit suggests being different. In these cases, the fractal analyses will be more use as a tool for environmental determination than for correlation.

Analyses of the procedures adopted suggest, however, that the fractal geometry concepts in wireline log analyses should be treated with caution. Changes in the calculation procedures can cause larger variation in the estimate of the fractal dimension. The study was also suggested that the Rescale range analyses is more stable than the Power Spectrum method. These difficulties should be considered for the correlation purposes. The validity and suitability of fractal geometry in the well log analyses need to be considered carefully. The application of fractal geometry in the well log correlation should be considered as an experiment of fractal geometry in the geological sciences. Much work should be done before the fractal geometry can be applied safely to particular geological analysis.