

APPLICATIONS OF DIGITAL CORE IMAGE ANALYSIS TO THIN-BED EVALUATION

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Abstract

Many exploration and exploitation plays involve thinly bedded sequences. These reservoirs frequently test the limits of formation evaluation. Improved reservoir evaluation can be achieved by integrating core photographs with downhole logs. Image analysis of core photographs permits the extraction of quantitative data from the core images that heretofore provided only qualitative information. Recently developed technology makes it possible to quantify sand and shale volumes on a millimeter-by-millimeter basis by using color discrimination. This makes it possible to quantify, as a function of depth, the sand-shale ratio, or, if working with UV fluorescing images, the percent of oil-bearing sand.

Digital image processing can be beneficial in all aspects of formation evaluation. Core images presented on the same scale as log data can be used to calibrate and supplement wireline log data. High resolution wireline logs can be calibrated to predict the presence or absence of sand for net-to-gross determinations on uncored intervals and wells. The conventional log suite can be calibrated to provide an accurate, foot-by-foot sand count. Bed boundary locations derived from core image analysis can be used with forward modeling to evaluate thin-bed log response. Furthermore, the core-derived geometric data can be used to constrain log inversion to obtain better R_t and S_w data.