

PETROPHYSICAL ANALYSIS OF SANDSTONES USING CT SCANNING AND CONVENTIONAL METHODS

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ABSTRACT

Computer Assisted Tomography (CT) scanning, standard thin section, Electron Microscopy (EM), micromorphology, X-ray diffraction (XRD), and grain size mechanical analyses were combined to study Paleozoic sandstone rocks. The samples investigated are oil reservoir and aquifer formations in the Gulf of Suez hydrocarbon province at the southern part of Sinai in Egypt. Samples were collected from three exposures: at the East Gebel Musabaa Salama, west-central Sinai at Wadi Soal, and Wadi Dahab located in the eastern part of the Gulf of Aquaba region.

The study correlated results obtained from the mentioned conventional analyses to CT results. The obtained correlations attempted to demonstrate that some of the expensive and time consuming conventional analyses can be substituted by this rapid and inexpensive imaging technique. Results indicate that the CT images yield two important parameters: 1) mean value of CT numbers (CTm) over a given area of the obtained images, and 2) standard deviation of CT numbers (CTs) within the selected portion of the images.

CTm numbers are directly correlated to grain density while CTs values give a quantitative value that represents the degree of heterogeneity-homogeneity of the rock. An accurate analysis of rock samples can be obtained by a fast study of these two parameters. CTs values were used to determine depositional environments of the studies rocks. This classification was latter confirmed using grain size statistical parameters.

Classification of rock samples using CT scanning also detected difficult-to-note properties, such as the presence of formation fines. Furthermore, the roles of bulk and grain densities, amount of formation fines or clay content, pore geometry, and porosity are discussed.