

Mono-energetic micro-computed tomography (μ CT): A reliable potential alternative to mineral investigation of formation rock

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Traditional mineralogical investigations (namely XRD and SEM) are very useful; however, they are not only time consuming and expensive but also destructive. The artifacts introduced to the samples during the preparation phase cannot be ignored neither. Application of μ CT is well known to the oil and gas industry with regard to core analysis studies, formation damage quantification and fishing expedition. However, in the former cases its application is limited to Dual energy CT scanning (DECT) since the material differentiation demands calibration of the density field (that is done traditionally using more than mono-energetic X-ray beam) which is obviously more expensive and more time consuming than mono-energetic scanning. In this study we have developed a database of mineral compositions of sedimentary formation rocks (using mineral investigation + μ CT imaging). The database was then used to develop a mathematical model to correlate the pixel intensity into density (histogram segmentation \leftrightarrow density field). We have seen promising results in quantitative measurement of mineral compositions using mono-energetic μ CT and we are currently working further to develop morphological and topological factors as extra criterion of verifiability of the model. This will further improve the model accuracy as well.