

Carbonate Reservoir Exploration: Reducing Uncertainty in Predicting Recovery Efficiency

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ABSTRACT

It is frequently quoted that 60% of the world's hydrocarbon reserves are hosted in carbonates. Using the DAKS IQ reservoir analogs knowledge base, which contains 1500 reservoirs worldwide, this presentation will explore the global reserve trends based on carbonate depositional environment, lithology and hydrocarbon type. Beyond a simple comparison by Estimated Ultimate Recovery (EUR) we also identify the dominant carbonate depositional environments by recovery efficiency. Based on these observations a five-fold classification scheme is proposed that combines diagenetic reservoir type, carbonate depositional environment and the pore-filling fluid. In combination, these are the three primary sub-surface controls on production performance and recovery efficiency in carbonate reservoirs. Having isolated these parameters, we provide insight into the key production value drivers among the 500 parameters recorded for each analog field and within each carbonate category class. For example, we have seen that the average recovery factor in organic build-up carbonates with an API > 22o is more than 30% higher, on average, than in diagenetic carbonates with an API > 22o. Diagenetic carbonates are regarded as all those that are a result of major post-depositional diagenetic processes, such as karstification, hydrothermal dolomitization and fracturing. Empirical observation is one aspect of this work. Additionally, through the application of multi-linear regression techniques, we have been able to firstly, conclude which parameters have the greatest impact on recovery factor. Secondly, develop a quick-look recovery factor forecasting algorithm for each carbonate class described.