Reservoir Characterization Best Practices For Clastic And Carbonate Reservoirs - Evolution Through Time

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ABSTRACT

The present talk aims at presenting the main chalenges in reservoir characterization of oil and gas fields, more smaller and marginal fields in particular. The key chalenges that will be targeted to cover in this talk are as follows.

Clasic and carbonates reservoirs being dominant reservoirs in producing oil and gas fields have been the active targets for reservoir characterization. Both these reservoirs pose their unique chalenges to reservoir characterization – calstic reservoir pose main chalenge in lateral continuity prediction though more predictable in terms of reservoir property development; on the other hand carbonate reservoirs are more continous laterally but the main chalenge is in predicting diagenesis and sweet spot development. Seismic attributes has limitations in predicting vertical reservoir development due to resolution but can help a lot in areal prediction particulary in small and marginal fields.

Advanced geostatistics techniques and algorithms have developed as a main tool for reservoir characterization in extrapolating known 1D data at well to the unknown space in 3D. Where facies control reservoir properties development, e.g., in clastics, predcting facies from wells logs with learing from core description has emerged quite standardized, and then predicting how these facies will be distributed in 3D space still remains a challenging area. How best natural analogs can be used to guide facies distribution for different geological environments still remains an area of innovation and dependent on the skill of the interpreters. Carbonate reservoirs pose unique challenges of diagenesis and its prediction. Here advanced log suites recorded at wells and their petrophysical characterization helps in knowing the secondary porosity and permeability component. Primary carbonate texture is often heavily altered by diagenesis and primary lithofacies no loger can predict the present porosity and permeability development. Hence reservoir rock typing integrating mercury capillary injection curves, routine core measurements and open hole logs has emerged as a new technique instead of conventional lithofacies. Thus, predicting areal distribution of diagenesis is the key challenge in carbonate reservoirs and tools like restoring paleo deposional space and predicting paleohigh areas which can get leached to develop better rock types has emerged as new techniques.

Capturing uncertainty associated with reservoir characterization is another key area of advancement to lay out the risks to be considered for field development for investment decision. However, type of uncertainties in reservoir characterization varies in the life cycle of a field and this will be briefly covered in this talk.