Improving Production from Data-Sparse Fields – Application of Outcrop Analogues for Reservoir Simulation

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Older producing fields typically have gradually declining but steady production yields. These fields are in harvest mode and generally do not benefit from new technological applications such as extensive 3-D seismic datasets. Yet these fields have a wealth of production data that can be analysed and put into high-resolution reservoir models that can be used to identify bypassed pay. But how do we produce the detailed geological models that form the basis of a reservoir model and simulations of depletion strategies? Outcrop studies provide a low-cost technological advantage that provides the high-resolution data to create analogues for the reservoirs.

These high-performance geological models provide the detailed framework to constrain production data for the reservoir simulations and to analyze the sensitivity of primary recovery to a change in geological and engineering parameters. Each additional simulation run will increase the sensitivity of the model as a true history match is achieved. The next step is to alter variables based on our data from the outcrop. These include reservoir body geometry, fault placement, and layers that form baffles and barriers to flow that are beyond the resolution of seismic data and typical logging tools. The final step is to modify well placement, completion methods and model enhanced recovery techniques to develop the optimum depletion strategy for the field.