

## **Carbonate Reservoir Characterization from 3D Seismic to Outcrops: Examples from Middle East Reservoirs, UAE**

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Quantification of carbonate reservoir architecture and flow properties in 3D geologic models requires integration of multiple types and scales of data within hierarchical sequence-stratigraphic and structural frameworks. The present study highlights an integrated workflow that includes: 1) integration of outcrop and subsurface data to develop regional structural and sequence-stratigraphic frameworks that can be applied consistently from one field to the next, 2) application of high-end seismic volume interpretation and visualization technologies for quantification of reservoir architecture, 3) calibration of seismic attributes to rock properties for prediction of 3D spatial variability, 4) integration of core and petrophysical data to define reservoir rock types for porosity and permeability modeling within high-resolution frameworks, and 5) hierarchical integration of multiple scales and types of data into static and dynamic 3D reservoir models for performance prediction. Special emphasis is placed on the value of 3D seismic for quantitative reservoir characterization, and on 3D visualization as a tool for volume-based integration seismic, geologic and production data. High-quality seismic data collected by ADCO in Abu Dhabi provide unparalleled imaging and visualization of carbonate reservoir architecture (stratigraphic and structural) that can be incorporated directly into 3D models. We also demonstrate the value of outcrops and modern analogues for constraining sub-seismic, inter-well variability in facies and rock properties. Future developments in carbonate reservoir characterization will be largely keyed to advances in 3D seismic and reservoir modeling technologies. However, successful application of seismic and modeling technologies remain highly dependent on calibration to appropriate outcrop and subsurface data, validation with geologic concepts, and integration within sequence-stratigraphic and structural frameworks.

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