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Constructing a Static Model of a Fractured Reservoir with Disparate Data Sets: Antonio J. Bermudez Complex, Reforma District, Southern Mexico

Mature fields offer special challenges for constructing representative numerical models. These challenges are magnified when characterizing fractured and vuggy carbonate reservoirs where the static representation comprises the synthesis of three models: a structural model, a matrix property model, and a fracture property model. The available data sets are rarely conducive to an effort that requires advanced modeling technologies. Among the mostly elderly data, the key data sets utilized in integrated model construction have often been acquired during the latter phases of drilling, but rarely overlap within the same well or set of wells. For example, an image log may have been acquired for a specific well, but the same well never underwent a well test, and as a result there is no direct link between the static and dynamic properties of the fracture systems.

To meet the challenges of constructing an adequate representation from disparate data sets, workflow methodologies must be adapted to integrating, reconciling, and extrapolating the available data from multiple disciplines. The Antonio J. Bermudez Complex located in the Tabasco-Chiapas region of southern Mexico represents a case example where this adaptation has been implemented. The complex produces from multiple horizons within a 2500-meter section of fractured and vuggy carbonates that have undergone multiple phases of structural deformation. Limited characterization data from image and magnetic resonance logs are integrated with conventional logs, core observations, pressure transient analysis, and well history to construct the static and flow models for history match of the field performance and prediction scenarios.