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New Perspectives in the Geological Interpretation and Reservoir Characterization of Vocation Field, Alabama, USA

The Upper Jurassic Smackover Formation is one of the most productive reservoirs in the eastern Gulf Coastal Plain, with a cumulative production of more than 990 MMBls of oil and 3.25 Tcf of gas from about 130 fields. Many of these fields are reaching their economic limits and therefore are projected to be abandoned in the near future. Such an example is the Vocation field in Alabama

In Vocation field, located in southeast Alabama, USA, shallow marine carbonate facies of the Smackover Formation were deposited over an exposed paleohigh composed of Paleozoic basement rocks. The high relief of the paleohigh and the intense degree of dolomitization, among other diagenetic processes, complicate the understanding of the heterogeneity of this reservoir. Also, the fact that the Smackover Formation is not exposed in the Gulf Coastal Plain hampers direct observation of the geometry and distribution of the diverse lithological facies.

Production in the field has experienced a significant drop. Currently, there is only one well producing, while another nine formerly producing wells have been plugged and abandoned due to low production rates. A common characteristic of the field is that there has been a significant reduction in the productivity of wells in relatively short periods of time.

To improve recovery in the field, wireline log data from wells and petrophysical and petrographical core analyses were integrated with 3-D seismic data to generate a geological model for the field. This model depicts the geometry, architecture, heterogeneity, and fluid flow capability of the depositional sequence.

The 3-D geologic model enhances the understanding of the reservoir and is intended to serve as a first step in the design of a reservoir wide strategy at Vocation field. Such a strategy is designed to sustain the life of the reservoir through improved oil recovery.