THREE DIMENSIONAL GEOLOGICAL MODELLING OF THE LITHOFACIES OF CADDO LIMESTONE – STTEPHENS COUNTY, NORTH CENTRAL TEXAS, USING ARTIFICIAL NEURAL NETWORK

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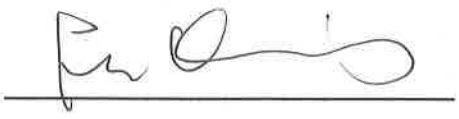
ABSTRACT

The Pennsylvanian (early Desmoinesian) Caddo Limestone in Stephens County (Texas) hosts important reservoirs as it bears considerable hydrocarbon resource. The Caddo Limestone Formation comprised shelf carbonate build-ups where the major allochems are phylloid algal and Komia. In this study, two cycles (named Cycle A and Cycle B respectively) right above the dark shale of the upper Smithwick are our major focus, which are named Cycle A and Cycle B respectively. This integrated study includes geological, geophysical and petrophysical analysis to provide a reasonable characterization of both Cycle A and Cycle B by applying all the data acquired to Petrel, for modeling the Caddo mounds. The models are based on 18 cores (totally 700 feet long), wireline logs of 173 wells and 3-Dimensional seismic data.

Structure model, lithofacies model and reservoir property model are the three key products in the modeling, among which facies modeling plays a connecting role. Five lithofacies have been differentiated: (1) *Komia* wackestone and packstone, (2) Phylloid-algal wackestone and packstone, (3) Bioclastic wackestone, (4) *Komia* grainstone and grain-dominated packstone, (5) *Komia* boundstone. Artificial Neutral Network (ANN) has been applied to the process of lithofacies modeling to predict the facies distribution of those wells without core samples. A lithofacies model of the Caddo Limestone will be eventually realized based on the distribution of the facies. This work provides an insight to carbonate reservoirs with *Komia* and phylloid algal wackestones and packstones being the major hydrocarbon-bearing rocks, also interpretations of depositional environments and regulations of mound patterns.



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