
Delineation of Ac Reservoir Sand from Multi-Attribute Analysis of Well and Seismic Data – A Case Study from Awali Field Bahrain

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Ac reservoir sands are part of Wara sequence (Early Cenomanian age) overlying Mauddud limestone. The main Ac reservoir consists of white-to-tan, fine-to-medium grained, friable well-sorted sands grading laterally into silty shales. Paleo-structural study indicates that Ac sand deposition is restricted to paleo-grabens; parts probably wedging against flanking escarpments. Ac sands are prolific reservoir with porosity and permeability ranging from 25-38% and 1000 MD respectively. Presence of hydrocarbons within Ac has been established well beyond the Mauddud OWC limit. Ac formations have excellent exploration potential at the flanks. However sand distribution being discontinuous; their delineations are an arduous task.

Ac sand delineation was strived from Pseudo-gamma ray volume derived from multi-attribute analysis of well and seismic data implemented through neural network solution. The paper illustrates the adopted workflow and outcome of the study.

The essential components of the workflow are given as below:

- Well to seismic correlation
- Neural network based seismic inversion
- Estimation of seismic attributes
- Step wise multi-linear regression for selecting optimum set of seismic attributes based on least error criteria
- Training of neural network with selected set of attributes
- Estimation of Pseudo gamma ray from the trained neural network

In the study, nine wells were used for estimation of optimum set of attribute and training the neural network. Sand distribution map was prepared by extracting Pseudo gamma ray within window corresponding to Ac reservoir. Derived sand distribution showed good match with the wells not included in the analysis and outlined Ac reservoir development within study area.
