Geophysical strata rating (GSR) as an aid in carbonate reservoir characterisation: an example from the South Pars gas field, Persian Gulf Basin

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Abstract

In this study, the geophysical strata rating (GSR) is calculated from petrophysical data using the equations developed for clastic rocks. The region being investigated is the South Pars gas field in the Persian Gulf Basin, where the Pernian-Trassic Danian and Kangan reservoirs host the largest accumulations of gas in the world. A 3D GSR model is estimated from 3D petrophysical seismic data by using a probabilistic neural network model. In this study, two methodologies are used to estimate GSR values at the different scales of wireline logs and 3D seismic data.

Strong correlations between neural network predictions and actual GSR data at a blind well prove the validity of the intelligent model for estimating GSR. The GSR results are also in good agreement with porosity and elastic modules of these carbonate rocks. Discrimination between the reservoir and non-reservoir shaly units can easily be obtained by comparing GSR and wire logs. Key oil GSR issues with high gamma ray log responses indicate shaly intervals. These can cause workovers, taking collapse and other related drilling problems. Intervals with low GSR values and low gamma ray log responses indicate the presence of good reservoir units.

Keywords: geophysical strata rating, multi-regression analysis, probabilistic neural network, South Pars gas field, well logs, wellbore stability.

References

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