

Estimation of Fault Seal: Pitfalls and Best Practice

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ABSTRACT

A reliable estimation of the fault seal capacity is crucial for the evaluation of many reservoirs. However increasing complexity of the selected method may increase the uncertainty accompanying the result. The scope of this poster is to discuss simulation techniques to capture the uncertainty of classic analysis methods and compare them in terms of their reliability. The Allen diagram allows displaying the juxtaposition of geological zones along the fault planes. The result highly depends on the reliability of the fault throw. One way of capturing the uncertainty of the fault throw is to work with scenarios describing the low, base and high case for the horizon-fault relationship. Moving forward the Allen diagram is applied to the facies model: for each scenario the probability of the facies juxtaposition across the fault is derived thru Gauss Indicator Simulation of the facies. The estimation of the Shale-Gauge Ratio (SGR) is based on the Gauss simulation of the VSH (volume of shale) conditioned to the facies model which, as mentioned above, is subject to uncertainty as well. The resulting overall sealing uncertainty can be captured thru estimating the probability of the SGR to be smaller than a given threshold value. The influence of the modelling parameters on the probability of fault sealing will be discussed. Additional information that allows to control the facies and VSH makes the probability calculation more reliable. In conclusion the fault seal analysis based on the Allen diagram and on SGR estimation turns out to be challenging despite the simple straight forward methods involved. Working with scenarios and estimating the probability of fault leakage is highly recommended