



FESAus Monthly Technical Meeting

“Characterizing Reservoir Compartmentalization: Single well fault seal analysis and uncertainty”

Russell Davies (Structural Geology Advisor, Schlumberger)

Abstract :

Assessing the cross-fault flow behavior of faults is critical to characterizing reservoir compartmentalization and seal. Standard workflows are well-established in estimating the flow properties across faults to determine whether they act as a seal for trapping in exploration or in compartmentalizing reservoirs more important in production. These workflows include calculating clay contents from the unfaulted stratigraphic section using algorithms such as shale gouge ratio or clay smear factor, distributing these across the fault surface, and calibrating clay values to capillary threshold pressures or permeability. The analyses, however, have uncertainties that arise from the range in calculated and measured values. Lateral and vertical variation in stratigraphic models also add a degree of uncertainty in the juxtaposition of reservoirs and the distribution of fault rock properties across faults. Three-dimensional stratigraphic models for estimating clay contents are often limited by a small number of wells and core data that may be a long distance from the fault. One method to quickly evaluate stratigraphic uncertainty and the impact on the fault rock property distributions is in the construction of triangle diagrams. The stratigraphy and Vclay values from a single well are extended horizontally and then the same section sheared across this horizontal section. The shear is equivalent to the fault throw and at specific values shows critical juxtapositions and fault rock properties. Additional stratigraphic variability on the cross-fault fault properties can be evaluated with additional wells or pseudo wells of a modeled stratigraphy based on the original well. The well sections provide end-point stratigraphic control. Lateral stratigraphic variability can be modeled between the wells and any modeled stratigraphy selected provides a range in fault property values. Together these stratigraphic sections define the uncertainty in the fault properties including a range in permeability and capillary threshold pressure for seal analysis. This method is more efficient in the evaluation of fault rock properties where building 3-dimensional models is less feasible.

About the Presenter:

Russell Davies is a structural geology Advisor in Schlumberger. He has 28 years' experience in the oil and gas industry working at Shell in Exploration and Production and in the ARCO structural geology technology group. In 2000 he joined Rock Deformation Research (RDR) as a consultant working on structural geology and trap and seal analysis with a focus on the flow characterization of faults and fractures for clients worldwide. He joined Schlumberger in 2014 with the acquisition of RDR by Schlumberger. He continues to work from his location north of Dallas, Texas.



DATE: Tuesday 10th April 2018, 12:00 – 1:30 PM **VENUE:** Hotel IBIS- 334 Murray Street, Perth

COST: Members \$30.00; Non Members \$40.00; Students/Retirees \$10.00

Online registration at www.fesaus.org by Friday 6th April 3PM

Note: limited seats for unregistered attendees may be available: \$50.00 cash door charge

