

Reservoir Fluid Geodynamics and History Matching Reservoir Charge

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The workflow to understand subsurface rock formations always incorporates their depositional setting and their post-depositional setting. This same comprehensive workflow can now be performed on reservoir oils with the advent of the new technical discipline ‘reservoir fluid geodynamics (RFG)’. Petroleum systems analysis accounts for trap filling, the petroleum analogue of deposition. RFG accounts for compositional redistributions and phase change such as tar mat formation from the time of charge to present day. Key enabling advances include Downhole Fluid Analysis measurement of asphaltene gradients and their analysis with asphaltene thermodynamics. RFG is fundamentally based on thermodynamics to understand time evolution of reservoir fluids and is complemented very well by geochemistry. The speaker’s 2019 book “*Reservoir Fluid Geodynamics and Reservoir Evaluation*” (pdf link below) provides RFG evaluation of 18 reservoirs and also provides in-depth discussions of enablers and the RFG line of geochemistry and petroleum systems. To date, the SLB RFG group has evaluated 80 reservoirs around the world always aiding asset teams with production concerns and yielding new insights to reservoir complexities.

A recent development within RFG is to perform ‘history matching of reservoir charge’. Corresponding case studies involve charges of both biogenic gas and crude oils into reservoirs, two fluids which are easy to differentiate whether separate or mixed. The results are disruptive to previously held beliefs, yet the RFG evaluations are unambiguous and incontrovertible (according to the speaker!). Moreover, simple reservoir (Eclipse) simulations of reservoir charge reproduce important properties measured in the reservoir. Key attributes of connectivity, reservoir baffles, and complex fluid columns are reproduced by simple reservoir simulation. Even 2D simulations of simplified reservoir architectures test these key reservoir attributes. Consequently, there is a low barrier for asset teams to exploit these new workflows as well as the RFG discipline. The speaker will discuss possible methods for Operators and SLB to pursue joint projects.

Free Pdf of book and also short video on Reservoir Fluid Geodynamics:
<https://www.slb.com/resource-library/book/reservoir-fluid-geodynamics-and-reservoir-evaluation>

