

FESAUS Talk 27th August 2019

The Impact of Upscaling on Porosity, Permeability & Water Saturation Modelling in Heterogeneous Reservoirs

Presented by Stephen Adams (The Petrophysicist Limited) and Colin McPhee (Mercat Energy Limited)

Reservoir modelling in homogeneous (rarely encountered – but often assumed) reservoirs appears straightforward, with properties being readily upscaled from log to static and dynamic model scales while maintaining the same relationships between said properties. In heterogeneous reservoirs (those where reservoir properties vary at scales similar to or less than log resolution), the assumption that relationships derived at one vertical resolution are applicable at another is no longer valid.

This talk will discuss what happens to reservoir property relationships in heterogeneous reservoirs (those most commonly encountered) when upscaling from core plugs to logs and then from logs to static and dynamic model scales. Creation of meaningful permeability models in these reservoirs can be problematic at even the log scale. It is now usually recognised that porosity to permeability transforms change with upscaling, but it is less widely recognised that there is an impact on saturation-height models too. Examples will be shown to illustrate what happens and why.

The talk will include recommendations how to check for the impact of these issues in your logs and models. Strategies to reduce the impact will also be outlined.

Biographies – Steve Adams

Steve has been a Petrophysicist since 1987. Following training and an initial 7 years with Shell, he has worked as an independent consultant with clients in Australasia, Asia, the Middle East and elsewhere. Steve has also worked extensively for Reserves Auditing companies including Gaffney-Cline, RPS and RISC.

Steve has 19 papers published and is well known in the industry as a Specialist in Saturation-Height Modelling. His 2016 book “Saturation-Height Modelling for Reservoir Description” has been well received by the Industry. He has been providing petrophysically focussed training courses since 2001.

Biographies – Colin McPhee

Colin has over 40 years' experience in petrophysics, core analysis, geomechanics, formation damage and sand management. Before becoming a Director of Mercat Energy, Colin was Global Head of Rock Properties with LR Senergy. He previously worked for Helix-RDS, Edinburgh Petroleum Services, Heriot Watt University and Wimpey Laboratories. Colin has worked on over 500 major integrated petrophysics and geomechanics projects in Asia, Middle East, Europe, Africa and elsewhere.

Colin is peer-recognised as an industry expert on rock properties and core analysis testing and interpretation for input to static and dynamic reservoir models. He is the author or co-author of over 20 technical papers and co-author of the 2015 “Core Analysis: Best Practice” textbook, published by Elsevier.