



## Petrophysics and Statistical Rock Physics in Seismic Reservoir Characterisation

### Dr. Sagar Ronghe

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#### Seminar Summary: Seismic Reservoir Characterisation

Well and seismic data can be integrated to predict lithology and fluid, quantify reservoir properties, identify leads and help risk prospects. This course provides an introduction to the concepts and application of quantitative seismic interpretation. The course would benefit both geophysicists and non-geophysicists who wish to have a better understanding of the integration of well logs and seismic interpretation.

This course discusses reservoir characterisation as it applies to all stages of the upstream oil-and-gas sector: from reconnaissance, through exploration and appraisal, to focused reservoir characterization during field development. As more data becomes available the options for QI increase. Workflows should be fit-for-purpose given project objectives and data availability. Reservoir characterization methodologies spanning qualitative attributes, deterministic inversion, probabilistic predictions and the quantification of reservoir property distributions will be presented. The importance of calibration of seismic velocities to well data and rock physics as a foundation to all of these methods will also be highlighted.

#### Technical Meeting Talk Summary: Petrophysics and Rock Physics in Seismic Reservoir Characterisation:

Petrophysics and related rock physics play a vital role in quantitative interpretation and reservoir characterisation integrating wireline and seismic data. Apart from the obvious resolution differences a number of issues affect the integration: wells may be few in number and preferentially located and biased. Particular lithologies / fluids may only be intersected over certain narrow depth ranges. Recorded data by itself provides little understanding of the rock vertically and laterally away from the logged intervals. Wireline data, used in deterministic interpretation, provide a single solution without estimates of associated uncertainty.

Petrophysical evaluation followed by statistical rock physics analysis addresses these issues and forms the cornerstone for the integration of well and seismic data. Statistical rock physics comprises selecting and upscaling log intervals associated with particular lithologies, establishing depth dependent rock physics trends and stochastic modelling of the trends to generate probability density functions representative of the population behaviour of lithology and fluid combinations as a function of end member rock types, fluid content, reservoir quality and depth. This presentation will demonstrate the concepts and practical applications of statistical rock physics along with the role of petrophysics in seismic reservoir characterisation using data examples.

#### About the Presenter

**Sagar Ronghe** is the Geoscience Manager with DownUnder Geosolutions, based in Perth, Australia. His educational qualifications comprise a BSc in Geological Oceanography from the University College of North Wales, a Masters Distinction in Petroleum Geology and a PhD in Geophysics from the University of Aberdeen. He began his career in 1996 as a Lecturer in Geophysics at the University Brunei Darussalam. In 2002, he joined Fugro Jason as a Project Geoscientist based in Kuala Lumpur, relocated to Perth in 2007 and was appointed Regional Technical Manager for Fugro Jason in 2012. Sagar has been with DownUnder GeoSolutions since 2013. His specialisation is Quantitative Interpretation integrating wireline and seismic data.

**DATE:** Tuesday **12 May 2015**, Seminar 9:00 – 17:00 or Technical Meeting 12:00 – 13:30

**VENUE:** Hotel IBIS (Upstairs) - 334 Murray street, Perth

**COST:** 1 Day Seminar: FESAus/ASEG 2015 Members \$175; Non Members \$200; Students/Retirees \$75  
Tech Meeting only: FESAus/ASEG 2015 Members \$30; Non Members \$40; Students/Retirees \$10

Online registration at [www.fesaus.org](http://www.fesaus.org)

#### Seminar/Tech Meeting Topics & Times

9:00 – 12:00: Seminar Morning Session

- Introduction to quantitative interpretation
- Rock physics and stochastic modelling
- Amplitude, AVA and stack rotations

12:00 – 13:30: **FESAus Monthly Technical Meeting (Seminar & Technical Meeting participants)**

- Lunch
- FESAus Technical Talk: **"Petrophysics and Statistical Rock Physics in Seismic Reservoir Characterisation"**

13:30 – 17:00: Seminar Afternoon Session

- Relative and absolute simultaneous inversion
- Stochastic inversion
- Velocity scaling and time-depth conversion