Course Programme

13-14 November 2017
Best Practice in Pore Fluid Pressure and Fracture Pressure Prediction
Prof Richard Swarbrick (Swarbrick GeoPressure Consultancy Ltd. and Department of Earth Sciences, UK)

14 November 2017
Wave-equation based AVO Inversion for High Resolution Reservoir Characterisation
Prof Dr Dries Gisolf (Delft Inversion)

15 November 2017
Rock Physics for Quantitative Interpretation: How to think like a rock physicist
Mark Sams (Ikon Science)

Accreditation

In March 2013 EAGE became the first official Continuing Professional Development (CPD) Provider of the “European Geologist” title, which is a professional accreditation established by the European Federation of Geologists (EFG). In order to obtain and maintain this title, the holder must provide a record of high quality CPD activities, which include the short courses like the ones presented in this brochure. For an overview of the provided points for EAGE Short Courses and for more information about this accreditation system and corresponding EAGE learning activities please visit www.eage.org and www.learninggeoscience.org websites.

Short Course Programme

Monday 14 November – Tuesday 15 November 2017

Best Practice in Pore Fluid Pressure and Fracture Pressure Prediction

Prof Richard Swarbrick, Consultant, Swarbrick GeoPressure Consultancy Ltd. and Honorary Professor, Department of Earth Sciences, UK

Course description

All wells drilled require a pre-drill prediction of pore fluid and fracture pressures which defines the “drilling window”. This course explains the objectives, methods and uncertainties of prediction, based on extensive global experience. The necessary understanding of the geological/geophysical context of abnormal pressures leading to standard algorithms will be provided. Data used for pressure estimation and prediction includes seismic interval velocities, various petrophysical logs and drilling behaviour. The requirements for “fit for purpose” velocities, including those obtained from tomographic inversion, are reviewed in the context of pre-drill pore pressure prediction. Once the predictions of pore pressure and fracture pressure are complete it is necessary to explain results, assumptions and uncertainty to operations/drilling groups. The course will use a series of interactive exercises to capture work flows and expose underlying assumptions in the delivery of these predictions.

Participants’ Profile

Pressure prediction is multi-disciplinary - from Geophysics to Well Operations/Drilling. This course should appeal to a very broad range of professionals, including exploration geologists, geophysicists, petrophysicists, operations geoscientists and a wide spectrum of engineering functions. Those attending should have familiarity with oilfield practices, including a general knowledge of oilfield data types and functions.

Instructor’s biography

Professor Richard Swarbrick, Consultant, Swarbrick GeoPressure Consultancy Ltd. and Honorary Professor, Department of Earth Sciences, United Kingdom. Prof. Swarbrick is a world-renowned expert in subsurface pressures and currently an independent bespoke consultant and trainer, primarily for the oil and gas industry, specialising in sub-surface pressures, whilst retaining research and teaching interests at Durham University. He is active in promoting the understanding of subsurface issues through media appearances and is well known through his publications, standard petroleum exploration books and global scale studies giving him a worldwide profile.
Wave-equation based AVO Inversion for High Resolution Reservoir Characterisation

Prof Dr Dries Gisolf, Co-founder, Delft Inversion

Course description
The purpose of this course is to teach participants the fundamentals of extracting quantitative property information from seismic data. In the end this leads to an inversion process that is linear if the data is supposed to consist of primary reflections only. If, on the other hand, the data model is based on the full elastic wave-equation, all multiple scattering and multiple mode conversion over a target interval (typically 500 m around the reservoir) are taken into account and the inversion becomes non-linear. Wave-equation based, non-linear inversion leads to a higher resolution than obtained from conventional linear inversion techniques.

In order to understand the difference between the linearised data model and the full non-linear data model it is important to have a good understanding of the acoustic and elastic wave equations. In wave-equation based inversion the properties are directly derived from the data. In the elastic case these properties are the bulk-modulus, the shear modulus and the density. The non-linear inversion presented in this course is an iterative process of which the first iteration (the Born approximation) represents the linear inversion result. In the higher iterations, progressively higher orders of scattering are matched in the data. The method is based on an integral representation of the wave equation. In conventional AVO inversion the data is linearised in the reflection coefficients. This linearisation leads to different properties to be inverted for: the acoustic and elastic impedances.

An important aspect of reservoir oriented full wave form inversion (FWI-res) is that the surface recorded data are localised (focused) to the target area. This can be achieved by redatuming, or by local demigration of migrated data.

finally, wave-equation based inversions at the reservoir scale is demonstrated by realistic synthetic reservoir models and real data case studies. The real data case studies include the extraction of angle dependent wavelets from the seismic-to-well match and the inversion of 3D data volumes for two different properties.

Participants’ Profile
This course is designed for geophysicists active in reservoir studies and/or quantitative interpretation. Also, processing geophysicists who would like to become involved in quantitative interpretation should attend this course.

Instructor’s biography
Prof Dr Dries Gisolf graduated from the Delft University of Technology in 1971 and obtained his PhD at the University of Utrecht in 1975. In 1976 he joined Shell International Research in Rijswijk, The Netherlands, as a seismic data processing geophysicist. Between 1980-2000 he held various positions for Shell in Oman, The Netherlands, Australia, Malaysia and Nigeria. Throughout his career with Shell he was involved in acquisition, processing and interpretation of seismic data, with an emphasis on quantitative prediction of reservoir properties. In September 2000, he was appointed Professor of Acoustics at the Faculty of Applied Sciences at Delft University of Technology. After retiring from TU Delft in 2010, he co-founded Delft Inversion in 2012, a service company providing high-resolution reservoir-oriented inversion services to the oil and gas industry.

Rock Physics for Quantitative Interpretation: How to think like a rock physicist

Mark Sams, Quantitative Interpretation Manager, Ikon Science

Course Description
Rock physics is a key element of quantitative interpretation. Rock physics is used through all stages of the seismic reservoir characterization workflow, from quality control on petrophysical evaluation to interpretation of elastic properties from seismic inversion. This course will provide the attendee with the knowledge to participate actively and intelligently in Quantitative Interpretation studies. The course will cover the basics of rock physics by examining the link between reservoir properties and seismic amplitudes via the elastic properties of the rocks. A detailed exploration of the critical seismic petrophysics workflow – petrophysics, rock physics and well tie - will be made including: understanding the rocks, preparing logs for integration with seismic, rock physics modelling, fluid substitution and more. Finally, use of rock physics for the interpretation of seismic amplitudes through seismic inversion will be
discussed. The course will focus on practical application rather than theory. Using a broad range of real data examples, the methods, benefits and limitations of applying rock physics will be explored. The main aim of the course is to teach attendees how to think like a rock physicist.

The main aim of the course is to help attendees think like a rock physicist. The key takeaways will be:

- Understanding the link between reservoir properties and seismic amplitudes
- How to prepare logs for integration with seismic data
- How to select and apply rock physics models
- How to quality control data and processes
- Rock physics rules of thumb

Participants’ Profile
This is a course that would benefit all professionals in the Oil and Gas sector involved in the use of seismic data for understanding the subsurface. This includes seismic processors, petrophysicists, seismic interpreters, quantitative interpreters, geophysicists and geologists. The course will be aimed at a beginner to intermediate rock physics level. No prior rock physics knowledge is required.

Instructor’s biography
Mark Sams is currently QI Manager of Ikon Science Asia Pacific. He has more than 30 years’ experience in academia and industry. He spent 12 years at Imperial College, London, where he received an MSc and PhD in geophysics and carried out post-doctoral research in rock physics. He moved to Malaysia in 1994 and joined Petronas Research working on AVO analysis and inversion. He then worked for Jason for 14 years and joined Ikon Science in early 2012. He specialises in rock physics and seismic reservoir characterisation and has taught, published and presented widely on both topics. Mark is a member of EAGE and SEG.

Overview registration fees
All fees are in Euros (€). One Euro of your total registration fee is donated to the EAGE Green Fund.
Please note: The deadlines are following the Local Time in the Netherlands (Central European Time (UTC/GMT +1 hour).

One-day Course

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Two-day Course

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All fees are in Euros (€)
1. Members’ rates are applicable for EAGE members if the membership dues for 2017 have been paid and confirmed.
2. Non-member fee includes membership for the remainder of the year when event organized before 1 October (except lectures). EAGE membership runs from January through December.