ETLP Summer Training Courses in 4D QI 2nd & 3rd June 2020

In conjunction with the our bi-annual sponsors meeting on 4 and 5th June, ETLP is pleased to announce the running of two one-day courses on 4D seismic analysis. These will be held at Heriot-Watt University's campus in Edinburgh.

Tuesday 2nd June

4D quantitative interpretation: the measurement and use of time-shifts by ***Colin MacBeth***

Wednesday 3rd June

4D seismic and 4D Geomechanics by ***Jorg Herwanger***

Course fees and registration

Both courses are offered at a discounted rate of £550 per day per person to ETLP sponsors. You may register for one of both courses as desired. Non-sponsors may attend, and are subject to a higher fee rate of £875 per day. A discounted rate of £50 per day may be offered to registered university students.

Proceeds from these courses will be donated to ETLP student travel funds, to enable our students to gain benefit from attending conferences and workshops.

Registration and payment for the courses can be made by contacting Colin MacBeth directly at Heriot-Watt University: c.macbeth@hw.ac.uk / tel: +44 131 451 3171

Course 1 – Tuesday 2nd June 2020

4D Quantitative Interpretation: the measurement and use of time-shifts by Colin MacBeth

Instructor biography

Colin MacBeth is a Professor at the Institute of Geoenergy Engineering, Heriot-Watt University. He studied Physics at Oxford University (1980) and a PhD in Geophysics at Edinburgh University (1983). He worked ten years in the British Geological Survey before moving to Heriot-Watt University in 1999 to establish the Edinburgh Time-Lapse Project. His specific interests are in 4D Quantitative Interpretation, seismic monitoring and surveillance, and seismic history matching. He has published over 250 journal papers and conference publications in the general field of seismic reservoir characterization.

Short description

The use of **4D seismic time-shifts** in dynamic reservoir characterisation has grown in maturity as an attribute of value in both geomechanical analyses and detection of fluid movement. This course describes from first principles how to measure, use and interpret such time-shifts from 4D seismic data. We reinforce the main points of this topic with plentiful case studies, use of class examples plus software demonstrations.

Course outline

- First Principles of time-shifts related to Geomechanics and fluid saturation
- Linking time-shift magnitude to reservoir production
- Methods of measurement: specific methods explained, application to range of datasets
- Errors and uncertainty in time-shift measurement
- Pressure versus saturation using time-shifts
- Pressure change estimation using time-shifts
- Future possibilities:
    - Offset dependent time-shifts
    - 4D tomography
    - Velocities and imaging
- All the above are illustrated with field examples

Course 2 – Wednesday 3rd June 2020

4D seismic and 4D Geomechanics by Jorg Herwanger

Instructor biography

After studies at TU Clausthal and ETH Zurich, Jorg completed his PhD in Geophysics at Imperial College London, followed by ten years with WesternGeco/Schlumberger as a Principal Geophysicist. In 2011 he wrote a book on Seismic Geomechanics to accompany his EAGE Education Tour (EET-V). He now is a Director at MP Geomechanics and is a Visiting Professor with the Edinburgh Time-Lapse Project (ETLP) at Heriot Watt University

Short description

3D and 4D geomechanical models are becoming frequently used to assess the state of stress inside the Earth. This course describes the process of building 3D mechanical property models, calculation of the state of stress inside the Earth, and calibration of the 3D/4D geomechancial models with 3D and 4D seismic data observations. The process is illustrated by field case studies. Special emphasis is placed on rock-physics models that allow linking the stress-state in the Earth to seismic velocity observations.

Course outline

- Mechanical properties
  - Definitions and laboratory measurements
  - Derivation of mechanical properties from geophysical data
- Stress state
  - Stress tensors and stress attributes
- 3D case study offshore West Africa
  - Model building
  - 3D geomechanical model calibration to wellbore observations
  - Application of 3D geomechancial model to wellbore stability, fault re-activation and fracture containment
- 4D case study: South Arne, Danish North Sea
  - 4D geomechanical model calibration to 4D seismic time-shifts
  - Application of 4D model to (i) reservoir drainage, (ii) reservoir compaction, (iii) hydraulic stimulation, and (iv) fracture re-orientation