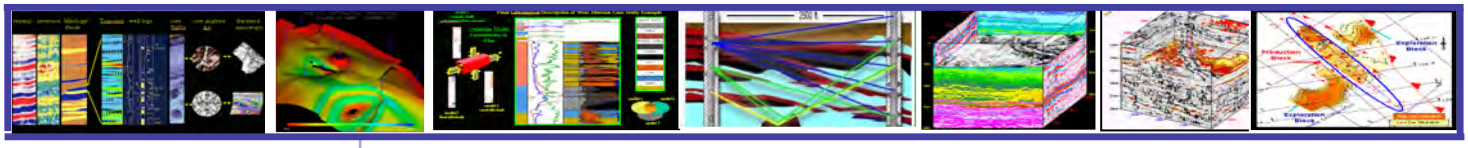
KMS Technologies

Innovating Solutions

Reservoir monitoring & ElectroMagnetic Methods



Course description

The specific content of the course is tailored to apply borehole and electromagnetic methods to reservoir monitoring and emphasize the strength of electromagnetic methods to fluid imaging. The purpose is to integrate the measurements with seismic to monitor fluid movement and observe seal integrity changes

Electromagnetic techniques are important for hydrocarbon E&P because they can distinguish between oil and water saturated rock, responding directly to water-filled porosity. Electromagnetics can be applied for exploration to reservoir monitoring.

The course is based on two courses: Electromagnetic methods and Reservoir Characterization with Borehole geophysics.

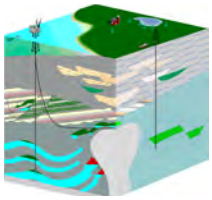
The course begins by setting the scene with reservoir monitoring overview illustrating the objectives. This is followed by a summary of rock properties linked to reservoir rock performance prepared for linking petrophysical parameters with physical measurements.

Fluid imaging requires the knowledge of the resistivities at reservoir scale and above reservoir scale. The later scaling leading to integration in the 3D seismic cube. We start will review history and basis of electromagnetic methods followed by borehole geophysics methods. The tie to the reservoir parameters is done via the log measurements, which establish the ground truth.

Numerous case histories support each one of the methods.

The course consists of 4 hours lectures daily with special reading and study assignments for the rest of the day that will be discussed the next day.

The borehole geophysics components are the elements of the borehole geophysics course and the electrical methods component follow the EM Course.



Course material and requirements

The course will provide a course website with the lectures and supporting downloads: literature, free software and previous course results (term papers etc.). Course participants will receive a password and user name. In addition the textbooks from the borehole geophysics and electrical methods for hydrocarbon course are recommended

Target audience:

Geoscientists with a basic understanding of geophysics

KMS Technologies

KJT Enterprises Inc.
6420 Richmond Ave., Suite 610
Houston, TX 77057
USA

Tel: +1.713.532.8144

Email: info@KMSTechnologies.com
www.KMSTechnologies.com

Course outline

1. Reservoir Monitoring: a technology driver
   - Monitoring methods
   - Issues & trends
   - Potential solutions
2. Rock physics overview
   - Pore space properties
   - Density of rocks
   - Natural radioactivity of rocks
   - Elastic properties
   - Anelastic properties
   - Electrical properties
   - Correlations between properties
3. Introduction, physics & methods
   - History of EM methods
   - Methods & instruments
   - Data processing
4. Introduction to borehole geophysics
   - Upscaling the measurements
5. Borehole seismic (BHS) methods
   - VSP
   - Crosswell
   - Single well
   - Microseismic monitoring
   - Seismic while drilling
6. BHS field equipment
   - Sources & sensors
   - Noise sources
7. VSP processing
   - Basic processing
   - Identification of reflectors
   - Looking ahead of the bit
8. Land EM applications
   - Defining sediments, basin-scale, sub-basalt, sub-salt
   - Shale applications
   - Resolving resistive targets (direct hydrocarbon indicators)
9. Planning a survey
10. BHS applications
    - Fracture monitoring
    - Cross well tomography
    - Single well methods
    - 3D VSP
11. Borehole electromagnetics & gravity
    - The methods
    - Cross well EM
    - Single well EM
    - Gravity principles & examples
    - BHGM & Gradiometers
12. Logging (summary only)
    - Overview
    - Mud logging (NMR)
    - MWD/LWD
    - Natural Gamma ray tools
    - Borehole imaging
    - Resistivity logs
    - Sonic logs
    - NMR
13. Geosteering
14. The Future
    Market trends