

4D Seismic (Time-lapse seismic)

Course Description

4D seismic or time-lapse seismic is used to assess the effects of the production of hydrocarbons. Therefore it is required that these effects are such that seismic, which responds to the elastic parameters of P-wave, S-wave velocity and density, will be affected via these parameters sufficiently in order to display an observable effect. Modeling can be applied to investigate this possibility. Repeatability of acquisition geometry and processing workflow is another requirement for a successful application of 4D seismic. 4D differences can be kinematic, i.e. traveltimes, as well as dynamic, i.e. amplitudes, as well as both.

Rock physics for modeling exercises and several processing techniques for a proper comparison of two datasets will be treated during this course.

Course Objectives

Objectives of a 4D survey :

- . mapping of bypassed oil
- . monitor costly injection programs
- . improve understanding compartmentalization and fluid flow properties of faults.
- . pressure-saturation discrimination

Participants will be able to provide the geophysical input in a multi-disciplinary team that considers conducting a 4D survey and they will be able to process the data and generate the relevant 4D attributes.

Who Should Attend

Geophysicists who deal with seismic data processing and who especially want to familiarize themselves with the theoretical and practical aspects of time-lapse seismic. With this course production geologists and reservoir engineers will be able to assess the quality of seismic input.

Course Content

4D seismic or time-lapse seismic: feasibility and requirements and processing

1. Objectives and feasibility analysis
2. Rock physics
3. Fluid substitution with the Gassmann equation
4. Measurements of travelttime differences and amplitude differences
5. Quantization of repeatability of acquisition and processing
6. Time-lapse data acquisition and time-lapse data processing
6. Methods to compare different datasets
7. Methods for cross-equalization of two datasets
8. 4D modeling

CPD Unit**Continuing Professional Development****7 HOURS CPD**