SPECIAL GEOPHYSICAL TECHNIQUES

EXP011

COURSE DESCRIPTION

Given strongly rising drilling costs, it is clear that additional data next to seismic are needed to reduce exploration risk. Seismic data has been the main subsurface evaluation tool. However, this information gives only an approximate insight in the likely fluids. Combination with other techniques can significantly reduce uncertainty of the subsurface model.

Additional information can be found in potential field data (gravity and magnetics) and in electromagnetic data (interestingly the oldest exploration tool). Especially in Controlled Source (deep) marine Electro-Magnetic Techniques can we measure the reservoir resistivity directly, which is a direct indicator whether it contains hydrocarbons. On land in remote areas, Magneto-Telluric is an efficient exploration tool. However, none of these Techniques will solve all problems, but in combining them, we gain more than just the sum of the individual benefits

This program shall address the role Gravity, Magnetic and Electromagnetic Techniques play in an exploration program, and most importantly when and how to use these Techniques. The program will cover the theoretical drivers of these Techniques, including acquisition.

COURSE GOAL

To enhance the participants' knowledge, skills, and attitudes necessary to understand how to benefit from Gravity, Magnetic and Electromagnetic Techniques in an exploration program, and most importantly when and how to use these techniques.

COURSE OBJECTIVES

By the end of this course, participant will be able to:

- Understand seismic data.
- Gain an enhanced way of analyzing basins.
- Learn The application of gravity and magnetic methods.
- Understand the acquisition of exploration data and their anomalies.
- Gain Insights of the geology through advanced processing.
- Overcome magnetic interpretation problems.
- Combining the various physical quantities in interpretation.

WHO SHOULD ATTEND

- Geo-scientists who prepare the geophysical data for interpretation
- Quantitative Interpreters incorporating the potential and electromagnetic data and those involved in deciding which data should be acquired for exploration and for quantitative interpretation.

COURSE DURATION

5 Working Days

COURSE OUTLINES

1. **Useful Seismic Data: An Overview**

   - Understanding the principles and limitations of seismic data.

   - Exploring different types and applications of seismic data.

2. **Quantitative Interpretation and Its Limits**

   - Applying quantitative interpretation techniques to analyze subsurface data.

   - Identifying limitations and uncertainties in quantitative interpretation.

3. **Gravity**

   - Introduction to gravity methods for subsurface evaluation.

   - Understanding the theory and interpretation of gravity measurements.

   - Applications of gravity data in identifying structures and density variations.

4. **Magnetics**

   - Overview of magnetic methods in geophysical exploration.

   - Understanding the principles and interpretation of magnetic measurements.

   - Applications of magnetic data in detecting geological features and mapping anomalies.

5. **Electromagnetics**

   - Fundamentals of electromagnetic techniques for exploration.

   - Historical significance and applications of electromagnetic data.

   - Role of electromagnetic methods in determining resistivity and identifying hydrocarbon reservoirs.

6. **Controlled Source Marine Electro-Magnetic methods (CSEM)**

   - Study of deep marine electromagnetic techniques.

   - Principles and benefits of using CSEM for direct reservoir resistivity measurement.

   - Applications of CSEM in marine exploration and reservoir characterization.

7. **Magneto-Tellurics (MT)**

   - Introduction to Magneto-Tellurics as an efficient exploration tool.

   - Principles and data acquisition techniques of MT.

   - Applications of MT in characterizing structures and identifying mineral deposits.

8. Combining Physical Quantities in Interpretation

- Integration of gravity, magnetic, and electromagnetic data in interpretation.
- Advantages of combining different geophysical techniques.
- Methodologies for analyzing various physical quantities to enhance subsurface modeling.

9. Industry and Participants Case Studies

- Analysis of real-life case studies from the industry.
- Successful applications of geophysical techniques in exploration programs.
- Discussion of challenges faced and lessons learned from the case studies.