GEOPHYSICAL AND GEOLOGICAL SERVICES FOR OIL & GAS EXPLORATION

Company profile

GeoDynamics WORLDWIDE
gww.uk.com
ABOUT US

Geodynamics Worldwide s.r.l. (GWW) is a company offering geophysical services for Oil & Gas exploration.

A portfolio of services for large scale reconnaissance petroleum exploration:

- Passive Seismic Spectroscopy
- Optical Remote Sensing
- Surface Geochemical Analysis
- MagnetoTellurics and Gravity
- Geographic Information System (GIS)
- Data Integration

- Direct Hydrocarbon Indicators
  - Passive Seismic
  - Remote Sensing
  - Surface Geochem

- Structural Imaging
  - MagnetoTellurics
  - Gravity

- Direct Passive
- Structural Passive

- G&G Data Management
  - GIS
  - Data Integration

- G&G interpretation
Are there actually any Hydrocarbons?

**BENEFITS**

- Portfolio optimization through a quick evaluation of the value of an asset
- **Risk reduction during exploration:**  
  Structural data + DHI data  
  Multiple methods
- **Reduction of expenditure by focusing conventional seismic to prospective areas**
- **Full coverage of the area-of-interest, not merely on seismic lines**
- **Limited men and equipment on the ground, particularly suitable for:**  
  Vast acreages  
  Mountain areas  
  At the border with neighbouring countries  
  High-risk areas
- **Environmental-friendly**
- **Reduces cost - $/Barrel**
PASSIVE SEISMIC SPECTROSCOPY

A low-frequency seismo-acoustic spectroscopy for hydrocarbon exploration applied as a Direct Hydrocarbon Indicator (DHI)


GWW, by using Broad Band Seismometers, detects the areas where the probability of presence of hydrocarbons is higher. This technology, applied in more than 100 locations worldwide, has ultimate benefit to oil companies and petroleum authorities throughout the life of their hydrocarbon assets.

Passive Seismic Spectroscopy is not affected by problems of velocity inversions, such as in basalt and evaporitic settings or very complex geology.

It is environmental friendly, and does not require any explosions, vibrations or similar.

It requires a limited field crew, max 5-10 operators.

A grid of data points is designed to cover the target area. Spacing of the grid begins from 250m and can reach up to 2km.

The output is a contour map of the most prospective areas in terms of hydrocarbon exploration.

Figure 1. Map of hydrocarbon potential distribution.
Remote detection of biochemical and geochemical surface alterations caused by microseepage of light hydrocarbons migrating to the surface from a petroleum system

Microseepage can generate long-term biochemical and/or geochemical and/or botanical surface alterations, such as reduction from ferric to ferrous oxide (FeO), alteration of carbonate cements, as well as alteration of clay minerals, stress-related symptoms on vegetation. These invisible signals can be detected and monitored with Remote Sensing.

Satellite's imagery is able to give a quick and cost-effective preliminary assessment of new ventures, and can quickly assess large areas in a short time and cost-effectively.

Many large oil & gas companies like Eni, Petrobras, Shell, Gazprom, Sinopec, Repsol, PetroChina, or ExxonMobil, have increased their interest in Remote Sensing technologies.

Remote Sensing can support the discovery of active petroleum systems by seeking for microseepage signals without any kind of land-based operation.

Figure 2. Remote sensing workflow
SURFACE GEOCHEMISTRY

Land-based detection of biochemical and geochemical surface alterations caused by microseepage of light hydrocarbons migrating to the surface from a petroleum system

Many petroleum basin show some type of surface hydrocarbon leakage, since seals are imperfect and hydrocarbons, driven by buoyancy, move mainly vertically through thousands of meters. Locally also lateral migration occurs.

GWW collaborates with E&P Geo Field Services, a company held by Dr. Dietmar Schumacher and Luigi Clavreau, known as worldwide experts in geochem exploration.

E&P Geo Field Services unique approach involves using sensitive and precise microbiological techniques in tandem with soil gas and fluorescence methods, to identify the areas of anomalous active thermogenic hydrocarbon microseepage, and determine the composition of the hydrocarbon microseepage source (oil, gas, and condensate).

The discovery of a geochemical anomaly establishes the presence of a working petroleum system in the area of interest.

Surface geochemistry permits a fast and effective ranking of different leads or prospects.

It provides results applicable both to structural and stratigraphic traps.

Have little or no environmental impact.

Figure 3. Example of Geochemical Anomaly Map
MAGNETOTELLURIC METHOD

Electromagnetic (EM) geophysical exploration for structural imaging of the subsurface

In hydrocarbon exploration, MT is used by Oil&Gas companies mostly as a complement to the primary technique of 2D/3D seismic for a cost-effective reconnaissance of sedimentary basins and for exploration in areas where seismic surveys are difficult (Colombo et al., 2012).

GWW collaborates with PBG Geophysical Exploration Ltd for MT surveys.

While high-velocity layers are an acoustic barrier and make seismic less effective, their electrical resistivity means the magnetic signal passes through almost unimpeded. This allows MT to see deep beneath these acoustic barrier layers, complementing seismic.

MT can contribute to effective hydrocarbon exploration in two distinct ways, to image the subsurface structural setting, and in certain cases, give evidence for direct indication of the presence of hydrocarbons – DHI (Ingerov et al, 2003).

Data is acquired at each point for a period of time: from several minutes to 6 hours (MT), less for Audio MagnetoTellurics(AMT), which have higher frequencies (1 Hz to 90 kHz). The physical spacing between points depends on the target size and geometry.

Figure 4. Example of a combined Magnetotelluric and Gravity Survey
Design and production of geographically referenced data and GIS consultancy to oil companies, authorities, service companies

In the petroleum industry large amounts of data have to be managed to cope with the complexity of the process of discovering new resources and managing producing assets.

A GIS-based information system provides digital products for data integration, query and analysis by using all forms of geographically referenced information.

The best way to manage such a large amount of data is GIS. It allows the client to visualize, understand, question, interpret, data in many ways that reveal relationships, patterns, and trends in the form of maps, reports and charts.

The benefits of GIS-based map products are better decision making, cost savings, improved efficiency, improved communication, better record keeping.

GIS technology has applications throughout the oil life-cycle, from bid round organization, new ventures acquisition, exploration, production to abandonment.

GWW is specialized in providing clear and powerful maps, as well as georeferenced digital data in any format, such as .kml, .shp, .gpx, (points, lines, polygons), .jpg, .tiff (rasters).

GWW can acquire the data and information from the client’s dataset, as well as from GIS Browsers and National Cartographic Services.

Figure 5. Attribute table of a wells’ database (https://www.gov.uk) and overlap of different GIS layers for data comparison
The added value of a GWW survey does not stop at geophysical data processing, but it continues with the integration of existing information available to the client, to the critical thinking applied to every step.
OUR CLIENTS

CANADIAN QUANTUM

URALS ENERGY

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