Seabed Acquisition

Seabed Geosolutions provides cost-effective ocean bottom seismic data acquisition solutions to the global oil and gas industry using proven technologies. Our experienced teams work with you at every life stage of your reservoir asset to resolve operational and geophysical challenges in water depths from 0-3,000 meters. We deliver robust multi-component data to resolve ambiguity in your reservoir model and extract maximum value from your assets.
Transition from the Surface to the Seabed

While it is widely recognized that seabed seismic data deliver superior image quality, oil companies have traditionally considered it too expensive for large scale application. Recent innovations in seabed technologies, in conjunction with optimized survey designs that balance source and receiver efforts, expand the application of seabed seismic data acquisition to a much wider range of E&P objectives than in the past.

Optimizing Acquisition

With seabed seismic surveys, the independent nature of sources and receivers provides significant flexibility in survey geometry and design. By balancing the source and receiver effort so that at no time are the sources waiting on receivers and vice versa, surveys are acquired optimally. Seabed Geosolutions are adopting advances in multiple source technology and receiver deployment to deliver highly efficient, full azimuth seabed surveys at a cost that is competitive with wide azimuth (WAZ) streamer surveys.

Improved Receiver Deployment

Historically, remotely operated vehicle (ROV) deployed node project efficiency has been constrained by node deployment and recovery rates. Recent innovations in ROV and node technology such as automatic subsea docking and automated node handling systems are dramatically improving node deployment rates for both sparse node and very high receiver count node-on-a-wire operations. These innovations have enabled Seabed Geosolutions to offer advanced seabed seismic technology that can be used for a wider range of objectives including exploration.

Recent innovations in ROV technology, coupled with optimal source methodologies, are key to improved operational efficiencies.

Blended / Simultaneous Sources

Traditionally, seabed seismic projects have been constrained by the limited number of receiver channels available and the consequential increase in shooting time arising from the resulting duplicated shots. With the increasing size of receiver spreads, blended or simultaneous sources are the key to improved efficiencies. On a project-by-project basis, Seabed Geosolutions works with clients to develop the best blending approach to meet exploration, appraisal and development requirements in the most cost effective manner.

Managing Complex Projects Using an Integrated Approach

Seabed Geosolutions monitors and controls seabed seismic projects to implement and ensure safe, predictable and quality acquisition operations in the presence of significant SIMOPS activity. Successfully executing complex projects requires the integration of multiple service providers which is accomplished by incorporating process management and QHSE programs using substantiated methodologies and techniques. Seabed Geosolutions has a proven track record of successfully applying an integrated project management approach specifically designed for seabed seismic data acquisition projects.
Trust the Experts in OBN

Seabed Geosolutions is a pioneer in acquiring ocean bottom seismic (OBS) surveys using state-of-the-art ocean bottom node (OBN) technology. We have operational experience in a range of challenging environments, from shallow water with strong currents to the ultra deep waters of the Gulf of Mexico, and the consequent challenges resulting from dense infra-structure, parallel non-seismic operations and complex seabottom profiles.

- **2013** Seabed Geosolutions is formed in February
- **28,000+** km² of 3D OBS projects awarded
- **5,400+** km² of 4D OBS projects awarded
- **ISO 9001:2015** Quality Certification
- **220** crew months of operations
- **15** countries of operation
- **3000m** deepest operation
- **2018** shallowest ROV deployed OBN survey ever acquired
- **2018** deepest ROV deployed OBN survey record matched

<table>
<thead>
<tr>
<th>Water Depth</th>
<th># of OBS Projects</th>
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<tbody>
<tr>
<td>0 - 100m</td>
<td>33</td>
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<tr>
<td>100m - 200m</td>
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<td>200m - 300m</td>
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<tr>
<td>2000m - 3000m</td>
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<td>3000m +</td>
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</tbody>
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**Projects completed**

**Efficiency improvement**

$>250\%$
Efficiency Enhancing Technologies
In All Water Depths

Manta®, Seabed Geosolutions’ new ocean bottom node (OBN) technology, was designed to seamlessly deliver improved geophysical illumination with flexibility for dense source grid, full-azimuth and long offset surveys. Manta overcomes challenging environments with complex geologies and delivers 4-C multi-component seismic data for exploration 2D, high-density 3D or development 4D programs. Manta is a compact, autonomous node solution which offers:

- High efficiency in all survey configurations to 3,000 meters
- Flexible and innovative deployment methods
- Cost effective alternative to high-end streamer data acquisition

Manta is versatile in terms of node deployment methods, operating water depth and spatial sampling. It will accommodate dense and sparse receiver sampling for imaging objectives or ultra-sparse receiver sampling for velocity model building.

Symmetrical sparse or ultra-sparse receiver sampling is typically achieved by node deployment with ROV handling from the vessel. This method is also highly beneficial when deploying OBN in obstructed or environmentally sensitive areas where streamer, cable and wire/rope systems have limited accessibility.

Non-symmetrical sampling, where the receiver spacing is typically more dense in the in-line direction, is achieved with wire/rope handling of Manta on the vessel.

Seabed Geosolutions also utilizes proprietary CASE Abyss® nodes and ROV handling on our Hugin Explorer vessel. With over 6 months battery life CASE Abyss also has the added functionality of remote interrogation of the OBN from the surface to ensure operational integrity of the node on the seafloor.

Seabed Geosolutions can accommodate mixed source, mixed receiver, and/or hybrid land-transition zone surveys.
Seabed Geosolutions leverages the most efficiency enhancing technology positioned on the seabed, along with innovative deployment and optimal marine source methods, to acquire multi-component exploration, appraisal or development 3D and 4D seismic programs to 3,000 meter water depths.

Seabed Geosolutions delivers high quality multi-component data utilizing the most versatile and efficient seabed imaging technologies including ocean bottom nodes (OBN) and ocean bottom cables (OBC).
Seabed Geosolutions safely and efficiently delivers the highest quality ocean bottom seismic (OBS) data using the most advanced geophysical and subsea technology. Acquired using our best-in-class project-based approach, Seabed Geosolutions’ OBS data produce an uplift over conventional streamer surveys, delivering multi-component seismic data recording which supports:

- Improved frequency content and signal-to-noise through deghosting (P/Vz summation) and ultra-low noise acquisition
- Decoupled sources and receivers provide the flexibility to acquire densely sampled, full azimuthal and high-angle (long-offset) datasets
- Multiple measurements - Additional converted wave measurements provide for a second measurement of the sub-surface and has specific benefits in imaging through gas

OBS data highlight faulting which is important for overburden analysis and future well planning. OBS also offers a wider bandwidth to aid AVO joint PP-PS inversions.

Results from Sparse Ocean Bottom Node on the Alwyn Field – from Acquisition to Joint PP-PS Imaging, Brunelliere et al., EAGE Conference (2016) highlight clear improvements on both faults and lithology in the OBN data versus streamer data.
Seabed Geosolutions is committed to conducting our business in a manner that is compatible with the communities in which we live and work, and that protects the health, safety and security of our employees, contractors, customers, and the public. These commitments are documented in our corporate Quality, Health, Safety, Security and Environmental policies.

These policies are put into practice through a disciplined management framework called our Operating Management System (OMS). The OMS is the cornerstone of our commitment to managing potential hazards and risks inherent to our operations, and to achieving operational excellence. It provides us with one systematic and controlled holistic approach for how we manage our operations globally with respect to safety, risk management, operational integrity and project execution.

Seabed Geosolutions uses Guardian, our on-line document control and event reporting system, to store our documents as well as track and manage Quality and HSSE events. The system is divided into two modules; one module provides a secure document control system, and the other provides us with an event reporting system. This system allows for simplified and enhanced internal documentation processes, as well as event reporting, management, investigation and analysis.

At Seabed Geosolutions, Quality is embedded in our culture. We recognize that maintaining quality standards throughout the project lifecycle is critical to our success and that we must continuously improve our products, services and processes using clearly defined methodologies. Our Quality Policy statement further defines the quality processes and controls implemented to ensure consistency in our approach to project management in our global operations. We are pleased to publicize that our Quality Management System complies with and is certified under the ISO standard for quality management (ISO 9001:2015).
About Us

Our History

With headquarters in Leidschendam in The Netherlands, and offices in Houston, Dubai, Massy and Kuala Lumpur, Seabed Geosolutions was established in 2013 as a joint venture between Fugro (60%) and CGG (40%) – uniting the Fugro’s ocean bottom node expertise with CGG’s ocean bottom cable, node and transition zone operational experience.

Our People

In our fast moving industry, investing in people is vital to maintaining our position as the global leader in providing seabed seismic solutions. Our teams represent decades of experience and knowledge in the field and in our offices worldwide. We are committed to continuously educating and developing our most important resource – our people – by providing growth opportunities and industry leading training facilities.

Research & Development

As a leading provider of innovative seabed solutions, we are committed to the development and application of the most advanced, safe and efficient seabed technologies available in the market. Our Research and Development (R&D) team comprises some of the industry’s most talented and experienced geoscientists, engineers and programmers who are engaged with meeting our client’s needs and delivering quality seismic data.

Proven Track Record

Seabed Geosolutions has acquired more than 38,000 km² of 3D ocean bottom seismic data since 2005 as shown below:
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