

Changing the exploration rule book with emgs

If technology is going to be attractive to a new generation, then the offshore hydrocarbons survey technique pioneered by emgs, and presented here, should be an inspiration.

Nobody has 30 years' experience of using the seabed logging controlled source electromagnetic survey method introduced by Electromagnetic Geoservices (emgs) in 2002. Indeed, only a handful of people can boast five years' experience.

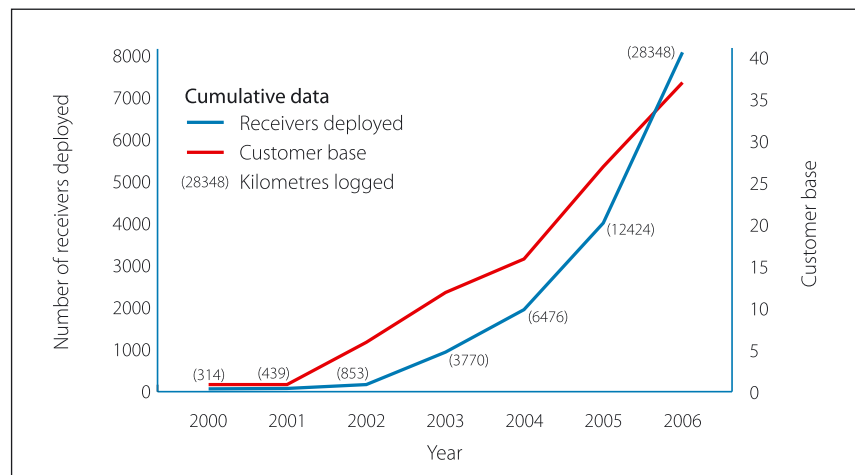
Seabed logging is a new field with huge potential, and one that is attracting the best physical and geophysical minds. The estimated success rate for deepwater offshore exploration is only 25% using conventional geophysical technologies, according to the Douglas-Westwood and Energy files World Offshore Drilling Forecast 2006–2010. In other words, 75% of offshore exploration wells are dry. Yet, in more than 90% of the cases where emgs has drilling results, its proprietary electromagnetic (EM) seabed logging surveys correctly predicted the reservoir fluids. This unprecedented statistical reversal comes at a time when many companies are being forced to explore deepwater plays and frontier regions to retain healthy reserves/replacement ratios. And, nobody wants to shoulder the responsibility of drilling a dry well when deepwater spread rates are over \$500,000 a day.

These are just some of the reasons why the world's leading oil and gas companies are using the seabed logging technique to find leads, and to validate and rank prospects before they drill. Good news spreads fast, and seabed logging has been rapidly adopted, despite being a brand new exploration concept launched in a traditionally conservative industry.

emgs performed the world's first commercial survey in November 2002. Since then, the company has undertaken over 200 commercial surveys for nearly 40 oil and gas companies. Moreover, national licensing authorities, such as the Norwegian Petroleum



Using experience gained from more than 200 commercial surveys and over 8000 receiver deployments, emgs researchers and engineers have taken EM receiver technology to new levels. The research and development team is responsible for advances such as increasing the receiver dynamic range and developing ultra-low-noise electronics that have extended water- and target-depth capabilities.



Going from strength to strength. The number of receivers deployed and the kilometres logged, as well as the emgs customer base, represent the uptake for Seabed Logging. These figures have doubled year on year since the technique was commercialized.

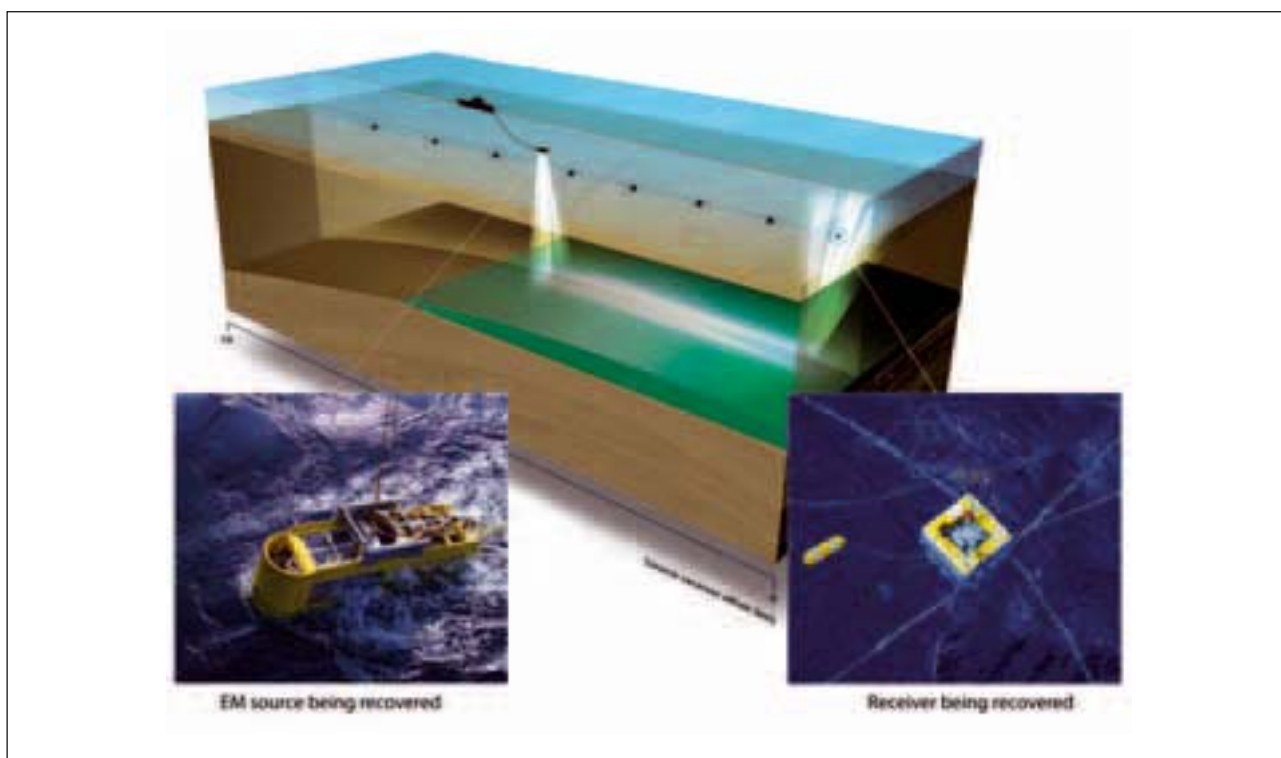
Directorate, are including seabed logging in operators' work commitments, which is a further demonstration of the technique's broad acceptance.

In short, drill-or-drop decisions are being made and work commitments are being demonstrated with the confidence that seabed logging data can provide. emgs and the business it pioneered are booming on the back of the technique's success. This should make the company's operations very attractive to

recent graduates as well as those with some geophysical experience.

Make electromagnetic waves

The remote detection of hydrocarbon reservoirs is a prize that has been sought since the 1920s. Experimenters tried deploying electrical logging devices at the surface, but soon turned their attentions to borehole measurement of formation resistivity, which launched the well-logging industry. Practical seismic



Getting down to work. At offsets of more than about three times the burial depth, energy emitted by an EM source near the seabed arrives at receivers on the seabed via resistive formations such as hydrocarbon reservoirs. The emgs proprietary 1250-A source delivers a powerful output to enable the detection of deep hydrocarbons.

methods were developed at about the same time and have dominated reservoir-scale investigations ever since. They are well suited to identifying potential reservoir structures, but the inherent limitations of acoustic methods mean that they remain of limited value for identifying fluid content.

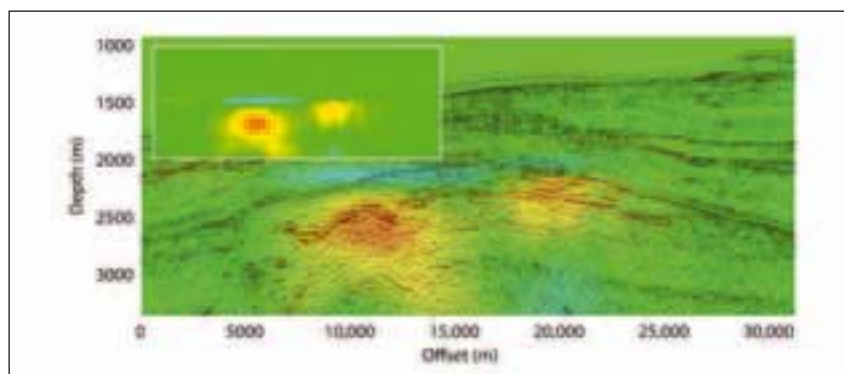
In the late 1990s, Svein Ellingsrud and Terje Eidesmo, the founders of emgs, learned of a powerful new electromagnetic source. They speculated about whether such a source, towed above the seabed, could be used to detect hydrocarbons without drilling a well. Ellingsrud and Eidesmo initiated a Statoil research project to assess the feasibility of the technique, which they named seabed logging. In doing so, they realized the goal of the early geophysical pioneers, and of every exploration manager since. They showed that remote measurement techniques could locate offshore hydrocarbon reservoirs.

emgs was formed in 2002 and has transformed seabed logging from a

promising research project into a commercial success. The company is the market leader in the field and is rapidly expanding its workforce while constantly improving its technology and its understanding of the physics involved. Anyone aspiring to work in geophysical research and development or in operations, cannot do better than join emgs.

Intricacies of seabed logging

Seabed logging is not simply a case of acquiring data with off-the-shelf equipment, nor is its advanced processing borrowed from seismic surveying. In fact, emgs had to develop, and is still evolving, the technology and processing algorithms. Dozens of patents have been filed in the process. And the research and development department at the compa-



Power in combination. Advanced processing using 3D Maxwell equations enables seabed logging data to be depth migrated (inset). The geology and geophysics team can then combine resistivity features with other data to offer powerful visualizations of the subsurface.

ny's heart continues to make advances, with every member of the technical staff encouraged to contribute.

Arctic waters and Indonesian seas

Joining the operations department can take an individual around the world because the emgs fleet of survey vessels operates in all the world's offshore hydrocarbon provinces. Offshore personnel work a five-week rotation that gives them the leave they need to pursue training opportunities, family life, and recreational activities.

The company's three main offices in Trondheim, Norway; Houston,

USA; and Kuala Lumpur, Malaysia, support its work in the world's frontier regions and mature basins. The main processing centre and the research and development centre are in the picturesque and vibrant university city of Trondheim, which provides an environment suitable for many recreational pursuits. emgs also has strategically placed representatives who look after clients across the world.

Joining emgs

emgs' growth could be an opportunity for someone to establish himself or her-



Sail on silver: emgs sailing team celebrates after reaching the final of the 2006 Adresseavisen cup.

self as an expert within a young and vibrant company. The company has doubled its workforce every year of its history so far and is set to do so again in 2007. Not only is there the rare opportunity to become an expert in a new field, but, with such rapid growth, the company offers accelerated career prospects for those people with energy and enthusiasm.

Motivated and energetic physicists, geophysicists, or geoscientists looking to join a dynamic and rapidly growing company should visit www.emgs.com or email youroportunity@emgs.com. The company is expanding in all areas, and there are other opportunities in disciplines ranging from mechanical field engineering to international sales management, and in departments ranging from geology and geophysics to administration.



See the world. emgs operations have taken company staff from the Barents Sea to Southeast Asia. From offices in Asia, Europe, and America, personnel travel to client's offices all over the world.