Waves of Information

With Seabed Logging, the new company ElectroMagnetic GeoServices (EMGS) is about to reduce the guesswork of exploration. With its innovative development of existing technology, the company can go far beyond traditional seismic when it comes to deciding the likelihood of finding hydrocarbons beneath the seabed.

BY: ÅSE P. THIRUD

'Seismic logging is based on sound waves. Seabed logging is based on electro magnetic (EM) waves, and compliments seismic logging. Explained in a simple way, we can say that traditional seismic is excellent in giving the structures and identify the possible reservoirs but has problems in defining whether the reservoir contains hydrocarbons or water. The Seabed logging technique can increase the possibility of identifying if a reservoir contains hydrocarbons or not,' President of EMGS, Terje Eidesmo says.

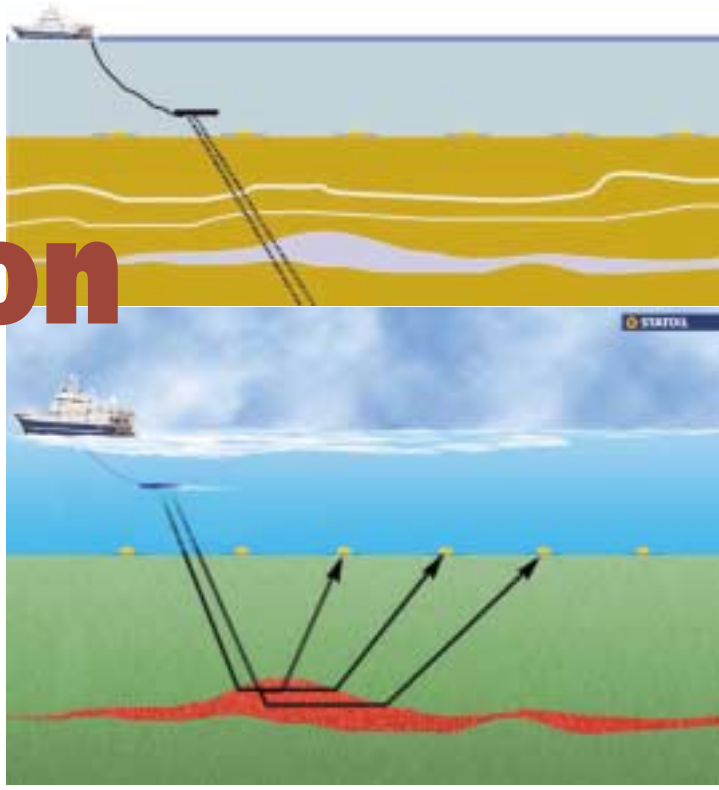
No More Dry Wells

It is well known that traditional seismic usually has problems with telling the difference between hydrocarbon and water filled reservoirs. Approximately 90 percent of seismic finds are reservoirs of water, and not of oil & gas. With Seabed Logging it is possible to distinguish between water and oil/gas reservoirs.

'That way we can save oil companies major expenses on their exploration budget, keeping in mind that the cost of drilling a dry well is approx. NOK 100 million,' Eidesmo says. Contemplating the value of EMGS' new invention considering the number of dry wells on the Norwegian Continental Shelf (NCS) over the past year gives a clue.

Chief Engineer at the Norwegian Petroleum Directorate (NPD), Per Brandshaug, says that seven dry wells were drilled on the NCS during 2001. If the new Seabed Logging technology had been used, those wells might not have been drilled, and cost of up to NOK 700 million might have been saved. In year 2000 8 dry wells were drilled on the NCS, in 1999 13 dry wells, and so the story goes…

And that is only the NCS. For EMGS the whole world is the market. In addition to the Norwegian continental shelf, Western Africa, the Gulf of Mexico and South America are especially interesting places for EMGS.

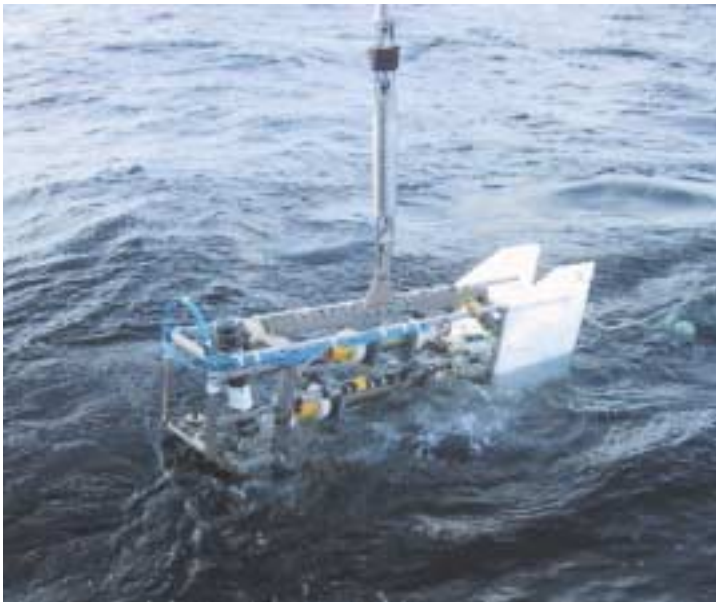


The principle of Subsea logging illustrated

'Internationally we are talking about exploration budgets totaling approximately NOK 10 billion which we can dip into. When oil companies realize how much money we can save them, we are confident we can take a sizable slice of that cake,' Eidesmo says.

Statoil Innovation

Terje Eidesmo comes from a position as Director of one of Statoil's research departments, where the new technology has been developed. He has been with Statoil for 11 years. Eidesmo has a Doctorate in physics, and he is Professor II at the NTNU



The sender being put to work

University in Trondheim. Eidesmo worked for Statoil when he did research on Subsea Logging. He developed the technology together with Svein Ellingsrud and Ståle Johansen, who are also joining the new company as owners, along with Statoil and the Norwegian Geotechnical Institute. The object of Statoil Innovation is to commercialise Statoil's technology and expertise through the establishment of new companies. EMGS is the first company to be established from Statoil Innovation.

'When we saw the potential of this development I wanted to keep on working with it. At the same time it was natural to establish an independent company to handle this technology, both to get external investors, and to be able to offer the services to all oil companies and thereby making it commercially viable,' Eidesmo explains.

Statoil has patent pending in a number of countries to make sure the technology is protected within EMGS. 'It will take years to process all patent papers,' Eidesmo says. 'The most important thing when it comes to competitive advantage is to speed up the development and marketing processes.'

At the moment EMGS is using rented equipment, and to a large extent rented manpower. 'We are in the process of negotiating further rental and development of the equipment. If we are not satisfied with those negotiations we will build our own equipment,' Eidesmo explains. He admits that if the company has to build its own equipment it might take another year until they are fully operational.

Positive Results

'Statoil has already tested the technology with very positive results,' Eidesmo says. 'Amongst other tests we used it successfully in the 17th licensing round on the NCS,' he says, careful not to disclose the position of where exactly it was used.

Prior to that testing, EMGS also tested the equipment on fields where oil reserves already were proven, and the results were exactly as anticipated. In addition to the NCS, EMGS tested Seabed Logging at Girassol outside Angola.

EMGS has received a lot of inquiries from oil companies wanting to get information about the new technology.

'We are very encouraged by all the positive attention. Of course, a lot of it is curiosity. Everybody wants to be kept informed about the possibilities new technology offers. But many of the companies we have spoken with are clearly interested in a future relationship,' Eidesmo underlines.

'One encouraging fact is that ExxonMobile is trying to make similar technology work. It shows that we are working along an interested line. However, we know we are ahead of them,' Eidesmo says with a confident smile.

The Technology

In Seabed logging electro magnetic waves are used to monitor possible hydrocarbons in a reservoir beneath the sea floor. In much the same way as radio signals are transmitted, electro magnetic waves are sent out from a vessel. The transmitter is dragged along after the boat, about 30 meters above the sea floor. If the signals meet water in the reservoir the signals are not reflected. However, if they reach hydrocarbons the radio waves send signals back to the receivers on the floor bed.

The reason for this is well known. The conductivity of geological medias such as limestone, sandstone and slate, which are the most common ones beneath the seabed floor, varies little. But if the sandstone is filled with oil the conductivity is radically reduced. The radio waves are then reflected back. If the sandstone is filled with water, however, the conductivity is high, and the waves are therefore not reflected.

This principle is already in use in well logging, where an instrument is placed inside the well. From there it sends signals that are reflected according to whether the surrounding rock contains hydrocarbons or not.

What Eidesmo and his colleagues have done is to make use of this principle on a much larger scale, sending signals from a vessel. No well is therefore needed.

At the moment the technology performs best in deep water, 500m or deeper, and with shallow reservoirs. But according to Eidesmo further development of the technology, currently being undertaken will extend its area of use considerably.

Improved Oil Recovery

Subsea logging is not only helpful in the exploration process, but also when it comes to improved oil recovery. 'We are constantly developing its area of use, e.g. within reservoir monitoring,' Eidesmo explains. But so far he will not go into details of further use of Subsea logging.

No wonder the people at EMGS is bursting with confidence. They have made a relatively small step with regard to finding new ways of using existing technology, but it is a huge step with regard to shrinking exploration budgets. When millions of dollar is at stake there is every reason to believe oil companies will listen to them! ■

President of EMGS, Terje Eidesmo