

How seabed logging is reducing risk today and creating opportunities tomorrow

Five years ago, seabed logging was considered a fringe technology. Today, it can be used in a wide range of geological settings to confirm the presence of hydrocarbons before a well is drilled. Oil company exploration managers and partners now view a positive seabed-logging response as a key factor in assessing project risk, as **Dave Ridyrd**, Vice President, emgs, explains...

Technology leaders such as Shell and ExxonMobil have expressed high levels of confidence in the method but this belies the fact that seabed logging is still relatively new. Despite its recent introduction, the applications for this technology are already evolving. When first introduced seabed logging was used to confirm the presence of hydrocarbons in leads that had been identified by seismic data. However, seabed logging may ultimately create more value by creating new exploration leads.

The seabed logging technique

The seabed logging principle is simple. The presence of hydrocarbons in a reservoir changes the electrical resistivity of the rock. Perturbations in an electric field around a reservoir can be measured and the data used to infer the presence (or absence) of hydrocarbons. In practice sensors are deployed on the seabed to measure electric and magnetic fields that are created by a deep-towed electric dipole source. Processed data provide the user with 2D resistivity profiles or 3D resistivity volumes.

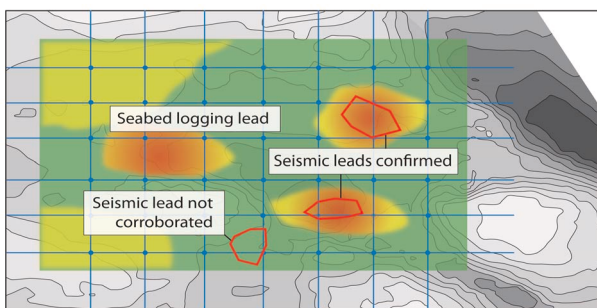


IMAGE 1: RANKING PROSPECTS

Seabed logging data, displayed as a colored map of subsurface resistivity, can confirm or rule out the presence of hydrocarbons in areas identified by seismic methods (bordered by red lines, right). It can also highlight areas worth investigating that do not show up as prospects on seismic data ('hot spot', left)

Reducing drilling risk

To date, more than 30 oil companies have contracted emgs to apply its patented seabed logging technology in over 180 drilling projects. Most are using seabed logging to validate their exploration decisions after prospective structures have been identified using seismic data. Complimentary 2D seabed logging lines acquired over the structure can indicate the presence of hydrocarbons and establish the extent of any accumulation.

In situations where pre-survey modeling indicates that the technique will be effective, drilling risk can be almost eliminated through the use of seabed logging. When 3D seismic methods became available they created value undreamt of by the pioneers of 2D seismic. Now 3D seabed logging is emerging with similar potential to create value through improved reservoir delineation and improved well placement. Furthermore, since seabed logging has the potential to provide a quantitative measure of fluid saturation, 3D seabed logging could ultimately provide more reliable reserves estimation.

Creating exploration opportunity

One of the biggest challenges facing many oil companies today is the lack of prospective new exploration areas. Much of the available acreage is considered unattractive because of the time and investment required to determine the presence of commercial hydrocarbons in areas with a limited track record of production. Seabed logging may help to answer this problem.

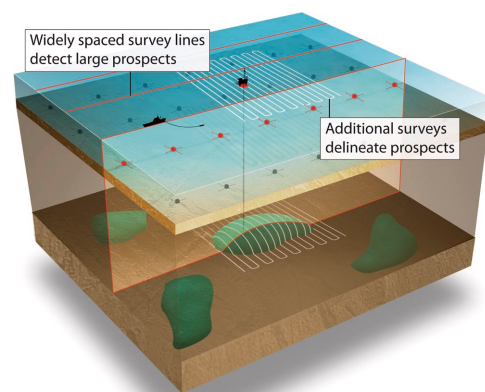


IMAGE 2: PROSPECT SCANNING

Seabed logging data recorded using coarse survey patterns can quickly and cost-effectively detect reservoirs of commercially significant sizes in frontier regions or mature basins. Additional surveys can then be designed to define the extent of leads identified from prospect scanning results

Quite often, 2D seabed logging data acquired to confirm a prospect have also indicated the presence of hydrocarbons elsewhere in the survey area that had not been detected by traditional seismic-only surveys. Now several leading oil companies, thinking differently about how to apply seabed logging methods, are using the technique to survey frontier areas. They achieve this with low cost, sparse grids of seabed logging data that can establish the presence of commercial hydrocarbon reservoirs. This means that the subsequent investment in seismic data can be focused on the areas with demonstrated hydrocarbons in place.

This technique, referred to as electromagnetic (EM) prospect scanning, is creating a lot of excitement in the exploration community. Seabed logging has been successfully applied in water depths of less than 100 meters but it is in deep and ultra deep water, where drilling risks are highest, that scanning offers the greatest returns.

Summary

Seabed logging has already established itself as a critical tool for explorationists seeking to reduce risk, and rank drilling prospects most effectively. New seabed logging applications, such as EM prospect scanning, offer the exciting possibility of rapidly evaluating new acreage and creating new drilling and production opportunities. ■