

Electromagnetic surveys help to find what's down there

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Nick de la Torre: Chronicle

Norway's EMGS recently brought one of its new ships, the BOA Galatea, to Galveston to show it to potential customers.

Drilling for oil thousands of feet below the ocean floor will always involve a certain amount of risk. But an emerging method of mapping subsea formations aims to remove some of the guesswork.

It uses electromagnetic waves to highlight oil and natural gas deposits, in contrast to more common seismic surveys that rely on sound waves to pinpoint hydrocarbons.

When combined, data from the two techniques can provide better images of subsea reservoirs, potentially saving oil companies millions in drilling costs, electromagnetic survey providers say.

That's why some of the world's biggest oil companies, including Exxon Mobil Corp., are using electromagnetic, or EM, surveys in the field and many others are experimenting with it.

While several companies offer electromagnetic technology today, Norway's EMGS is the market leader and has recently moved to be a bigger player in the business, adding the industry's first custom-built ships for 3-D electromagnetic surveys, as well as expanding its Houston office.

Recently, the company brought one of its two new ships to Galveston to let potential customers come kick the tires. The \$80 million BOA Galatea will also collect EM data for oil companies in the Gulf of Mexico, said Dave Ridyard, president of EMGS' Americas division in Houston.

When working, the Galatea tows a device called a dipole transmitter that sends low-frequency electromagnetic signals through the sea floor toward a suspected reservoir. Those signals bounce back to dozens of receivers placed on the seabed.

Scientists then retrieve the receivers and analyze the data gathered.

That data gives a snapshot of the “resistivity” of the earth. It can show whether the signals hit a poor conductor for electricity, such as oil, or if it contains a good conductor, like salt water or brine.

“The vision of this company is that we would like to give you a resistivity log before you drill the well rather than after,” Ridyard said. “That way, hopefully, you don't drill a \$100 million dry hole.”

Seismic surveys, by contrast, produce images of underground rock formations by passing acoustic shock waves into the strata and detecting and measuring the reflected signals.

Though still the industry standard, seismic surveys have been criticized by environmental groups that claim they are the equivalent of exploding dynamite underwater and are harmful to marine life.

Electromagnetics are likely to have a far smaller environmental footprint than seismic testing, said Kate Slusark, spokeswoman for the Natural Defense Council in Washington, D.C. The environmental group, however, opposes opening more U.S. waters to offshore drilling.

Companies such as oil field services giant Schlumberger have used electromagnetics in the well logging industry for decades to take downhole measurements once a well is drilled. But in recent years, Norway's StatoilHydro and Irving-based Exxon Mobil have made strides with offshore applications, spurred by new interest in exploring for oil and gas in deep-water regions in the Gulf of Mexico, Brazil and elsewhere.

Today, a handful of oil services companies including Schlumberger's WesternGeco unit and the U.K.'s OHM, both with offices in Houston, provide electromagnetic surveying.

EMGS, after opening a small sales office in Houston in 2005, has added 20 geo-scientists here and is preparing to open a bigger office in West Houston.

One of its customers is Focus Exploration, a Houston-based oil and gas exploration company, which searches for prospects in the Gulf of Mexico, then sells them to companies that develop them.

“If we've done everything we can, and we know hydrocarbons are in the area, but we don't know if they're in commercial quantities, this is the tool that we think will let us know if we have a go-forward project,” said Michael Scherrer, president of Focus.

But electromagnetics surveys have drawbacks. For one, they've historically been more expensive than seismic surveys, though costs are roughly comparable now. They also have trouble distinguishing between oil and gas deposits and other resistive rocks like salt domes, which are common in subsea areas of the Gulf of Mexico. And they can only take readings from rocks above a certain depth.

“There is a growing sense that the jury is still out on EM, and it is not yet clear on its delivery,” said Arthur Weglein, a physics professor at the University of Houston who is working to solve technical challenges posed by seismic surveys.

Ridyard, with EMGS, acknowledges his industry had previously oversold the potential of electromagnetic technology as a replacement to seismic. Now it's clear the two technologies work best when used together, he said.

As Ridyard puts it, “We're learning to play nicely together.”

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