Xconomy | San Diego
Business + Technology in the Exponential Economy

QUASAR
GEOPHYSICAL TECHNOLOGIES

Quasar Leads Development of Advanced Sensing Technologies for Government

INNOVATION, ELECTROMAGNETIC SENSORS, OFFSHORE OIL AND GAS

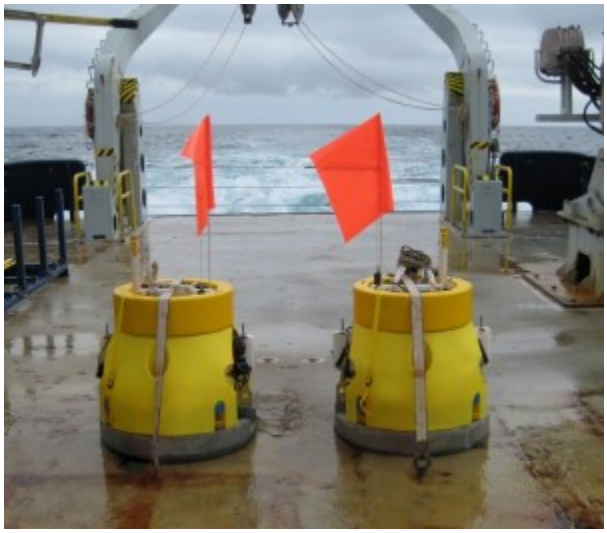
Quasar Unveils Innovative Sensors for Detecting Subsea Oil and Gas Deposits

Bruce V. Bigelow 7/15/09

In its quest to discover new offshore oil and gas deposits, the petroleum industry has achieved some extraordinary technology innovations. Seismic surveys, which collect data about subsea rock formations by bouncing sound waves off the ocean bottom, have become increasingly sophisticated. With advances in sensors, software algorithms, and high-performance computer processing, such surveys have enabled offshore exploration companies to identify oil fields in ever-deeper waters.

Nevertheless, conducting such a survey and drilling an exploratory well in deep water (defined as more than 1,000 feet) to prove the existence of an oil field can cost as much as $200 million, according to George Eiskamp, CEO of San Diego's Quasar Geophysical Technologies. For all its technological prowess, the industry's success rate ranges from just 10 percent to 40 percent.

As a result, Eiskamp anticipates widespread interest in advances that Quasar has made recently in a different type of sensing technology. The company's innovation is intended both to supplement seismic surveys and to improve the overall chances for a successful oilfield strike.



Quasar's ocean-bottom sensors

Quasar’s technology relies on advanced electromagnetic sensors that are sensitive enough to detect seemingly infinitesimal electrical currents flowing through subsea rock—and variations in the conductivity among different types of geological formations. Eiskamp explains that rock permeated with saltwater is conductive, but oil-bearing rock is not—and Quasar’s technology is sensitive enough to tell the difference. In recent months, Quasar has conducted field tests of its technology off the San Diego coast and elsewhere in the Pacific Ocean.

Eiskamp says Quasar’s innovations have succeeded in increasing the sensor’s signal-to-noise ratio, which has enhanced its sensitivity. As a result, the company can install its electronics in a relatively compact container that weighs about 330 pounds and is about 36 inches tall and 36 inches in diameter. The electromagnetic sensors are designed to be deployed on the ocean bottom, as deep as 2.5 miles below the surface, for weeks at a time.

Amazingly, the electromagnetic currents that Quasar’s technology is detecting in deep-ocean bedrock originate in the Earth’s uppermost atmosphere. Using a technique known as “marine magnetotellurics,” Quasar’s sensors are tuned to extremely low-frequency currents in subsea rock that are generated by solar wind striking the ionosphere, a region of the atmosphere that extends from 34 to 190 miles above sea level. Quasar also uses another technique known as Controlled Source Electromagnetics, or CSEM, that involves towing an electric transmitter underwater to generate stronger electromagnetic signals in subsea rock.

In either case, the sensors sitting on the ocean bottom are used to detect these faint electric currents and identify the formations with the highest resistance—offering a new source of data that can help scientists infer which formations are the most likely to contain oil and gas deposits.

“This is a complement to seismic surveys that use acoustics to image the density of subsea rock,” Eiskamp says. The electromagnetic data can help confirm the likelihood of oil and gas deposits by helping to eliminate other possible explanations for a low-density geological formation, such as volcanic activity. “With that and good modeling of the geology that you get with seismic data, you should have a pretty good picture,” Eiskamp says.

Quasar Geophysical is a relatively new division of Quasar Federal Systems, a privately held R&D contractor that bills itself as a world leader in extremely low-frequency electromagnetic sensing systems (frequencies between 0.01 Hz to 5 MHz). Quasar was developing its underwater sensing technology to detect submarines and underwater mines when the team realized the potential commercial applications for the technology.

There are still challenges to using electromagnetic sensing in oil and gas exploration, of course. Much of the undiscovered deposits in the Gulf of Mexico, for example, are hidden under vast salt domes, which render seismic surveys more-or-less useless by reflecting nearly all of the sound waves. Whether electromagnetic sensing alone can pinpoint oil and gas deposits beneath salt domes is another question. But Eiskamp remains hopeful, saying, “We’re at some level of discussion with just about every offshore exploration company.”

Bruce V. Bigelow is the editor of Xconomy San Diego; bbigelow@xconomy.com; 858-202-0492