Panama Sees First Modern Seismic Exploration

With oil prices slow to climb back to profitable levels, some operators have begun looking for opportunities that are less dependent on the industry's recovery cycle, taking them to new frontiers.

Panama, a country that has lacked legislation for international exploration until it unveiled a 35-year energy plan in 2015, has generated enough industry interest to prompt the first modern-day collection and processing of seismic data. The effort, spearheaded by ION with financial support from the industry, is currently under way.

"Recent exploration success in offshore Colombia, adjacent to Panama's Caribbean coast, has created interest among E&P companies," said Brian Hanson, president and CEO of ION, which has collected 5,840 linear miles of 2-D seismic data from Colombia to Costa Rica. The data was collected near recent gas discoveries from the Kronos-1, Purple Angel-1 and Gorgon-1 deep-water wells – the latter being the largest gas find in Colombia in 28 years and approximately 12 miles from Panama.

"Companies are interested in Panama because they want to get ahead of the curve," said Andy Bliss, an AAPG Member and director of business development, Latin America for ION.

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"Client interest has exceeded our expectations," he said.

It has been roughly 50 years since seismic lines have been shot in the waters of northern Panama, and only one well, dating back to 1978, has been drilled on the Caribbean side.

Despite the limited data that exists, the Colombian discoveries and new seismic data are pointing to a very diverse range of possible plays, said Antara Goswami, an AAPG Member and geologist at ION.

"We've learned so much in such a short period of time," Bliss said of the preliminary results of the new seismic. "This is groundbreaking. Panama stands out. It's been off the map for so long. Now is a great time for the country to present itself to the world."

Getting in the Game

When Panama's energy secretary announced at the 2015 Offshore Technology Conference that it would be opening its offshore acreage in a January 2018 lease round, the country attracted immediate attention.

"The discoveries of natural gas in the Colombian Caribbean Sea bordering Panama reinforce the existence of conditions in the region to generate hydrocarbons," said David Munoz, Panama's director of hydrocarbons, in an email. "With the necessary investment, the country's oil potential could be determined."

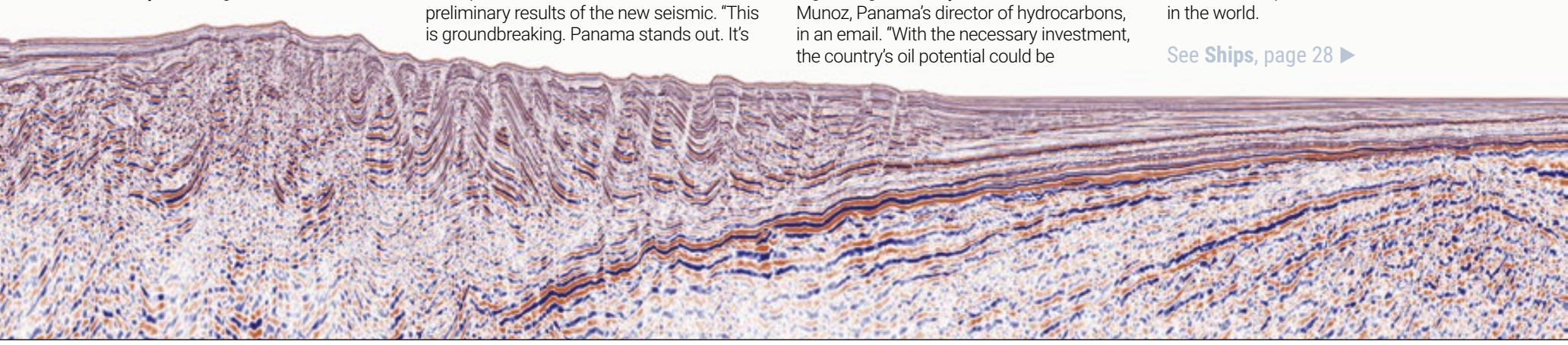
Of all the countries in Latin America, Panama has the fastest-growing economy, according to the World Bank, and contains infrastructure vital to the oil and gas industry. In addition to the Panama Canal and its recent expansion that accommodates LNG tankers, an 80-mile pipeline that transports crude oil provides a crucial connection from the Caribbean Sea to the Pacific Ocean.

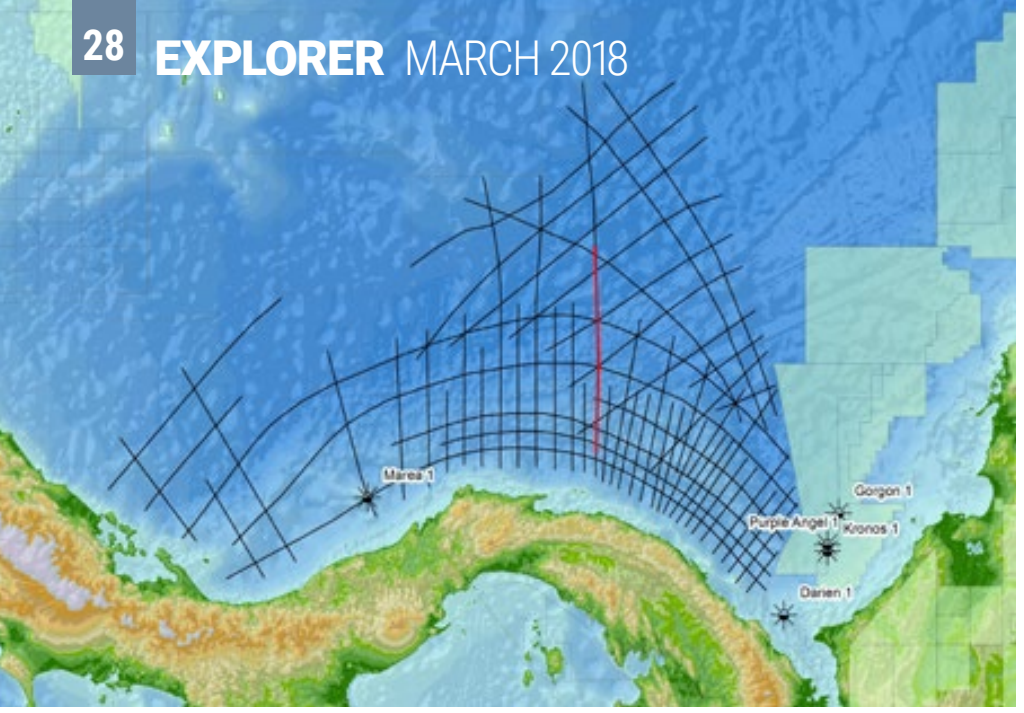
On both banks of the Panama Canal there is infrastructure for fuel storage of up to 29 million barrels, Munoz said. Furthermore, the first terminal for the receipt and storage of LNG is being built and is expected to begin operating in mid-2018.

A Sea of Ships

Unlike most areas of the world, Panama poses quite a challenge for collecting seismic data. Not only must a tailored survey be designed to image a complex geologic isthmus, but the seismic vessel, which carries roughly six miles of cable behind it, needs to collect data without interference from other ships in the second busiest canal in the world.

See **Ships**, page 28 ▶





Ships
from page 10

ION put its Marlin software to use on the project to efficiently guide the seismic vessel around the 35-40 ships that pass through the canal every 24 hours.

"Similar to modern air-traffic control systems, Marlin integrates a variety of real-time data sources that enables multiple stakeholders to share vessel route plans, foresee and avoid conflicts between vessels and fixed assets and adjust their schedules accordingly," Bliss explained. "About 50 percent of the vessels we came into contact with veered their course to avoid potential issues."

The long-offset 2-D seismic data collected with an 18-second record length enabled imaging of both shallow and deep features, including the dense North Panama Deformed Belt, a wide belt of folds and thrusts that originated from the convergence between the Caribbean plate and the Panama block, Goswami explained.

Using technology that is five decades more progressed than the last seismic shoot in Panama, ION is putting together the area's first regional framework using images taken up to 25 miles in depth.

"This data is helping us to fully understand the nuances of the basin before moving in to take a closer look," Bliss said. "It will help companies choose which areas of the basin they want to high grade."

Preliminary Panama

While ION does not expect to complete its seismic processing until mid-2018, preliminary data delivered to the industry suggests there is promise.

First, the geology of northern offshore Panama varies greatly from the west, near Costa Rica, to the east, near Colombia. The western reaches of the basin reveal relatively undeformed, thick stratigraphic intervals that extend in the deep water, Goswami said. In contrast, the eastern reaches include a highly deformed accretionary prism above the NPDB's subduction zone, and the relatively undisturbed sediments of an adjacent forearc basin.

"The subduction zone creates a highly structured environment," said Kyle Reuber, an AAPG Member and geologist at ION, explaining that the seismic imaging will examine its various crustal domains and the overlying sediment packages. "When you have faults and more structurally complex segments, then you have more exploration targets where hydrocarbons may accumulate."

Early observations of the accretionary prism indicate the possible presence of gas hydrates and a petroleum system either thermogenic or biogenic in nature, Reuber said.

"This is a pioneering dataset, and it is intended to tie into available legacy datasets in the Caribbean region, creating a high-quality regional dataset that allows for contiguous interpretation across basins and geologic zones," Goswami said. "Proven petroleum systems in nearby basins can be analogous to systems in Panama and can be de-risked with regional interpretation."

Colombian Connection?

Acknowledging that the geology in the Caribbean margin is complex, Chris Schenk, an AAPG Member and Denver-based geologist who has overseen the U.S. Geological Survey's South American and Caribbean assessments for nearly 20 years, said a discovery in northern offshore Panama could be favorable if the geology in Colombia's productive Guarija Basin extends into Panamanian waters.

"No one really knows yet," he said.

In the USGS's 2012 assessment of undiscovered conventional resources in the region, it found that Colombia's Guarija Basin contains a mean of 6 million barrels of oil and a mean of 3 trillion cubic feet of gas. The assessment did not include the recent discoveries in offshore Colombia.

The USGS plans to update its assessment of the area next year, Schenk said.

"Panama is one of the few basins in the world that is underexplored or has limited exploration," Reuber said. "One of our objectives is to test the continuity of the sedimentary intervals between Colombia and Panama. If they are continuous and if they have relatively coeval units, Panama could very well be prospective. From what we have seen so far, a door to Panama may be opening."