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AWARDS



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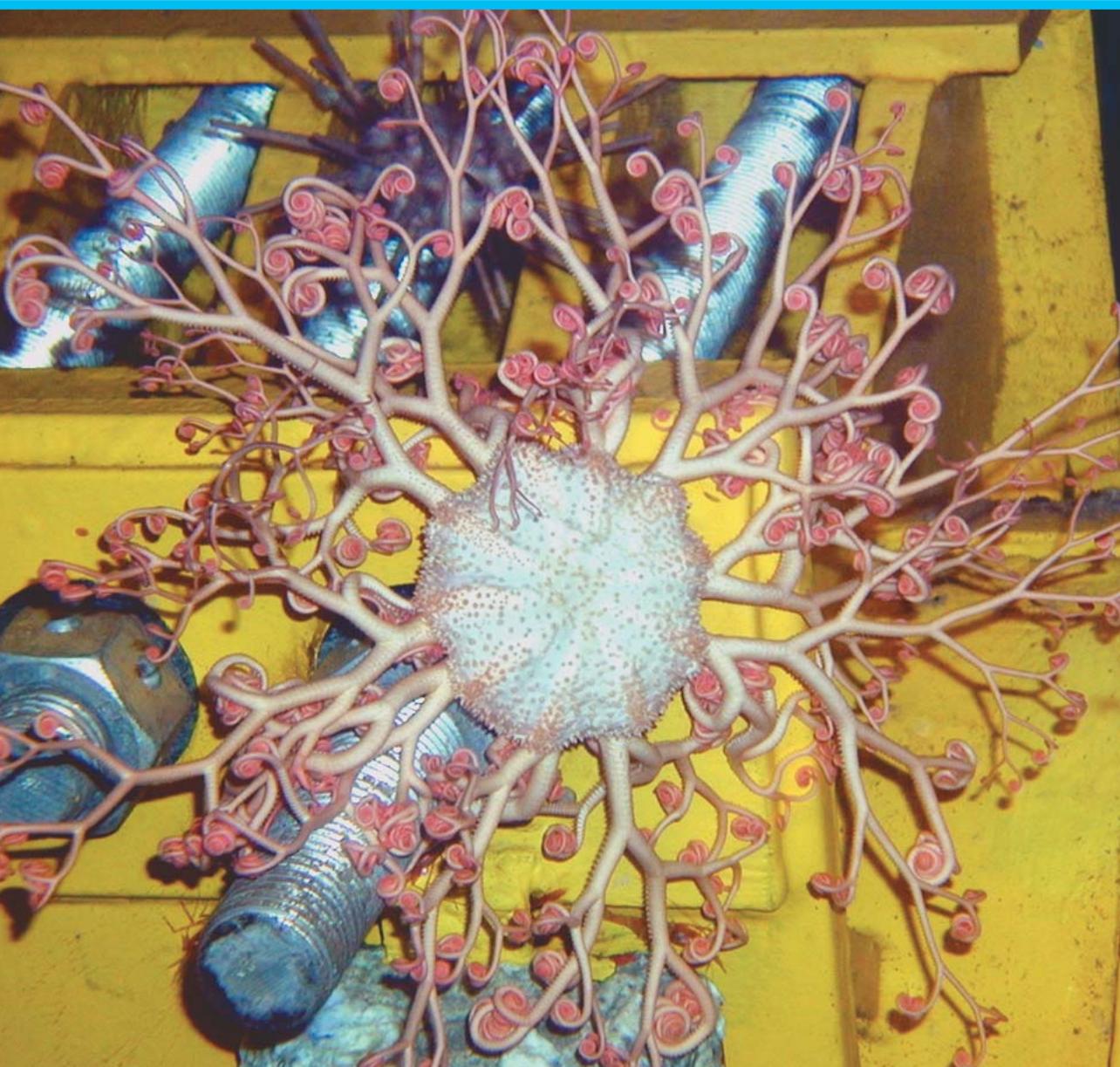
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SEA QUEST

WHEN SCIENCE CROSSES PUBLIC/PRIVATE SECTOR BOUNDARIES, GOOD THINGS CAN HAPPEN.





By RHONDA DUEY, Exploration Editor

The oil industry really needs to toot its own horn a lot more often.

While Greenpeace protestors chain themselves to drilling rigs and actor Robert Redford sends out a public letter claiming that US President George Bush plans to turn the Arctic National Wildlife Refuge (ANWR) into a “vast, polluted oil field,” the oil and gas industry is quietly offering its resources — money, facilities and personnel — to a wide variety of research projects designed to help the scientific community learn more about the planet’s oceans.

And why not? Other than the shipping industry and the world’s navies, the oil industry probably has more exposure to and familiarity with the offshore environment than any other segment. It certainly has more permanent offshore installations than anyone else. And lessons learned by the scientific community about the offshore environment can be useful to the folks who have to work there.

Though we’re kind of preaching to the choir here, the editors of *E&P* would like to salute these collaborative efforts by highlighting a few of the dozens of projects underway worldwide.

SERPENT strikes

To conduct marine research in deep water typically requires a multi-million dollar vessel that visits an area for a few weeks, grabs some samples and then heads back to shore.

In addition to being almost cost-prohibitive, these studies don’t really capture the essence of underwater life. They’re not able to stay in a place long enough to understand what really goes on miles under the ocean, and it’s hard to study the animals and plants in their natural environment.

Wouldn’t it be great to have a permanent installation with underwater vehicles? Wait — the oil and gas industry already does.

Thus the logic behind SERPENT, the Science and Environmental ROV Partnership using Existing Industrial Technology. The project is hosted out of the Southampton Oceanography Centre in the United Kingdom, and its stated mission is to increase access to remotely operated vehicle (ROV) technology and data for the world’s science community. Launched in March 2004, SERPENT already has had considerable success.

The concept is disarmingly simple, partly because it requires no huge investment in personnel or equipment. Part of the mission is to place scientists onboard platforms and drillships to use the ROVs to take pictures when they’re not being utilized for operations. The other part is to encourage offshore personnel to take their own pictures during operations and send them to the SERPENT scientists for evaluation.

“Oil and gas operations are in some of the most distinct biological areas on the planet,” said Dr. Ian Hudson, SERPENT project coordinator. “That sets the scene for natural synergy between science and industry.”



◀ Bottom left: A basketfish clings to a blowout preventer in this shot taken by a remotely operated vehicle in the Gulf of Mexico (Photo courtesy of SERPENT). Bottom right: Monarch butterflies cluster on a rope during a migration break on a Gulf of Mexico platform. (Photo by Gary Ross) Top right: Even the Least Bittern — normally an extremely reclusive resident of freshwater marshes — found itself at home on offshore platforms during spring and fall migrations. (Photo by Alan Wormington)

Advances in Offshore Facilities



Venezuela's Gulf of Paria is the subject of an ongoing study by ConocoPhillips and Conservation International. (Photo courtesy of Conservation International)

SERPENT has received a great deal of cooperation from the oil and gas industry. Founding partners were Transocean, Subsea 7 and BP, and recently ChevronTexaco and Texas A&M University have accepted invitations to participate. So far studies have been conducted in the Foinaven field West of Shetland, Australia and the Gulf of Mexico.

Hudson said that offshore personnel have been viewing some of these creatures for years and simply assumed that scientists must know about them too. "We tell them no, a lot of the things you see are brand-new to us. I think they're starting to realize that the things they're used to seeing every day might actually be dramatically important and really crucial. One of the biggest breakthroughs has been realizing people's expertise offshore."

Standard camera equipment aboard the ROVs has proven to be more than adequate for the studies being undertaken. "You can see the detail of life that you couldn't get any other way," Hudson said. "These photographs tell a story. You could drag the seafloor with nets, and these creatures would be shredded to pieces."

Videos help the researchers learn about the animals' behavior. For instance, a species of crab that was thought to be a mud eater was videotaped grabbing krill with its claws,

ripping their heads off and sucking out their brains. "It's set the science world talking," Hudson said. "We're not just taking great pictures and videos — they actually mean something."

For more information, visit www.serpentproject.com.

Migratory rest stops

It's long been known that offshore platforms become artificial reefs and attract a host of marine life. But they've also proven to be an unanticipated haven for migrating birds and insects. Dr. Gary Noel Ross began studying the migration of monarch butterflies across the Gulf of Mexico in the early 1990s and learned a great deal about the behavior of these tiny creatures. Operating on a shoestring, he secured agreements with Unocal and Petroleum Helicopters Inc. (PHI) to spend a couple of weeks during migration season on the West Cameron 280 platform, then owned by Unocal.

According to Ross, the study was not some multi-year, grant-sponsored undertaking. Unocal gave him free run of the platform, the helicopter rides were gratis, and in general he had a great working relationship with the platform personnel.

"I didn't impose on their space, and because of the sort of amusing nature of collecting butterflies and tagging them, they viewed me as their comic

relief," Ross said. "They gave me the nickname 'Monarchzilla.'"

He said the relationship was mutually beneficial — he got a lot of good science out of the project, and Unocal and PHI got free advertising. "I always made sure that photographs taken on the platform had the Union 76 logo in the background," he said.

Monarchs winter in the high mountain forests about 70 miles (112 km) west of Mexico City every year, and in fact that country's "Day of the Dead" ceremony coincides with their arrival, leading many locals to believe that the monarchs are the spirits of their dead relatives. Research over the years by numerous scientists has indicated that the butterflies actually land on the same trees as their grandparents did the year before, and Ross suggests that perhaps some sort of genetic imprinting takes place to help them find the same spot. He's also convinced that the platforms in the Gulf are beneficial to the butterflies that choose the over-water route, which he's dubbed "the Trans-Gulf Express."

"For those butterflies that fly across the Gulf of Mexico, there's a distinct advantage because they get to Mexico faster and expend less energy," he said. "And in the spring when they come back, they get to the milkweed plants [where they lay their eggs] faster."

It seems like a leap of faith for those first butterflies who headed out over open ocean, but Ross said they can detect magnetic fields, and a huge structure made of iron creates a large magnetic field. Whether they sense that before they leave shore can only be conjectured. But reports of platforms being completely covered by monarchs during migration implies that they appreciate the rest stop along the way.

Migratory birds find them similarly useful. Persistent reports of large fallouts of migrants on platforms during storms led the US Minerals Management Service (MMS) to conduct a study to evaluate the possible impacts (both adverse and beneficial) of platforms on the species that fly over the Gulf in their yearly migrations. In

conjunction with Louisiana State University's Coastal Marine Institute, MMS initiated the study in 1998, and its results have recently been reported.

Though the birds had been studied in detail while they were in the United States, little was known about their behavior during the migration. Dr. Robert Russell was hired to design, organize and implement the study.

"The MMS wanted to make sure that there weren't any adverse impacts affecting the bird populations that weren't being documented," Russell said. "A secondary goal was to learn more about the trans-Gulf bird migration because it hasn't been studied directly."

Overall, he said, the study concluded that platforms are beneficial to most species of migratory birds. One surprising aspect is that during both spring and fall migrations, large quantities of terrestrial insects drift offshore and end up on the platforms, making them not only a rest stop but a restaurant as well. "The birds stop at the platforms because they're too tired to keep going, and luckily for them there are insects for them to feed on," he said. "Many migrants that were running on empty were able to refuel on bugs and take off again successfully."

In the North Sea, 12 years of research on migratory birds has prompted Shell to change the color of the lighting on its platforms from white to green. Though a relatively rare occurrence, birds on occasion were reportedly flying into gas flares. Shell scientists recommended that a bird watcher be hired if a platform needed to flare during the migration season.

Despite these precautions, it was noted that even when no flaring took place, songbirds in particular were attracted to the platforms at night, often milling around them for hours. After examining several options, Shell hired biology student Hanneke Poot to conduct an experiment to determine if birds respond differently to different colors of light. She determined that, while white light attracted the most

birds, blue and green light attracted the fewest. Red light, meanwhile, attracted fewer birds than white but had a negative effect on their sense of direction.

Embracing biodiversity

For years those who camp or backpack have been encouraged to leave their campsites "better than they found them." ConocoPhillips has taken this message to heart in its work in Venezuela's Gulf of Paria.

The company teamed with Conservation International to launch a Biodiversity Action Plan to promote environmental protection and regional economic development in the area. The Gulf of Paria is home to more than 200 species of mollusks, 50 species of crustaceans and at least 400 species of fish, including the discovery of seven new species of fish and crustaceans during the research phase of the project. Many of the local communities, including the indigenous Warao group, rely on this marine life for economic survival, but their livelihood is being threatened by rapidly expanding petroleum production and unsustainable fishing practices that are depleting local fish and shrimp stocks.

The plan includes several key recommendations:

- Petroleum companies operating in the Gulf of Paria make positive contributions to local economic development and biodiversity conservation by implementing best operational practices and supporting improved resource management;
- Development of important practices that conserve key commercially important and/or threatened species and promote sustainable development adopted by artisan and industrial fisheries;
- Information on biodiversity, ecosystems and the socio-economic activities in the Gulf of Paria is generated, made publicly available and data gaps filled with additional studies where necessary; and

- Implementation of a regional plan that conserves biological resources while promoting activities that contribute to sustainable development of Gulf of Paria communities.
- The two groups plan to work with local communities; governments; non-government organizations; and the private sector, particularly petroleum companies and fisheries; to implement the recommendations and attract additional support for promoting biodiversity conservation and sustainable development in the region.

To view the full report, visit www.celb.org.

Resolution for research

For approximately 20 years the *JOIDES Resolution*, a drillship operated by a joint venture half-owned by Transocean and dedicated to scientific research, has been delving into the Earth's secrets buried in the sediments beneath the oceans of the world. Operated in a riserless mode under a contract with the Texas A&M Research Foundation (TAMRF), the drillship hosts scientists and technicians aboard as it goes forth on new adventures.

The ship has covered more than 350,000 nautical miles providing research opportunities for both the Ocean Drilling Program, which ran from 1985 through 2003, and now for Phase 1 of the US-operated portion of the Integrated Ocean Drilling Program, which commenced scientific operations in 2004. Both programs are an international partnership of scientists and research organizations. Primary among the objectives of the group is the study of core samples which provide clues to the Earth's evolutionary history.

Among the many major discoveries made so far, the group found evidence during a scientific mission in 1995 suggesting that the dinosaurs were, indeed, killed by a large meteor or asteroid that struck the planet 65 million years ago. The ship also aided



Starfish cluster on a rock deep below the surface of the ocean. (Photo courtesy of SERPENT)

in the study of underground “bugs,” microscopic bacteria that manage to survive deep below the surface. Microbiologist Dr. Bo Barker Jorgensen estimated after sailing on the vessel that 10% of the Earth’s living biomass occurs in the deep sea surface.

Gas hydrates are another area of continuing research, not only for their energy potential but also for climate-related issues such as if and how they might contribute to underwater landslides. And the core samples provide important clues about changes in climate, sea level, polar ice cap size and ocean currents. Sediments recovered by the drillship are located in areas where geophysical evidence indicates that the effects of erosion are minimal, thereby providing a continuous record of our planet’s history.

Finally, the ship drilled a borehole to be used for an installation of a seismometer. The location for this geophysical observatory is midway between San Diego, Calif., and the Hawaiian Islands and is known as the Hawaii-2 Observatory. This observatory

will be connected to an abandoned communications cable and will eventually transmit seismic data to Hawaii. By locating seismometers on the seafloor, seismologists will markedly improve their ability to image the deep structure of the planet and resolve fundamental questions about its dynamic processes (core-mantle topography; nature of convection, etc.).

Scoping the seafloor

BP Americas and Scripps Institution of Oceanography at the University of California, San Diego, recently signed a 3-year, US \$3 million partnership marking the beginning of a long-term research collaboration. The organizations hope to learn more about the seabed and the processes that shape it by combining a variety of surveying technologies such as electromagnetics, fiber optics, acoustics, autonomous underwater vehicles and ocean-bottom seismographs.

Subject to tides, storms, earthquakes and other factors, the seabed is constantly being shaped, and a better

understanding of these forces will lead to better offshore facility designs. The instrumentation and technologies will also be used in academic ocean observing programs.

According to Neal Driscoll, a scientist at Scripps, continental margins provide a home to a variety of ecosystems and marine habitats, and their movement and change affects these communities. “The geology and nature of the seafloor play important roles in governing marine biodiversity and, at present, these relationships remain poorly defined,” he said.

The collaboration is part of a strategy at Scripps to work more closely with the private sector in areas where there are mutual interests. It broadens the base of institutional funding for Scripps and provides educational opportunities for its students. BP gains the expertise of the world’s largest oceanographic institute.

This is a tiny sampling of good things happening around the world, and the benefits extend far beyond the oil and gas industry. It’s nice to feel like “the good guys” for a change. **ENR**