

Ocean News

News for the Ocean Industry

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September 2013

& Technology

A Worldwide Survey
of Recent Ocean
Observatory Activities

Removing Idle Iron from
the Gulf of Mexico

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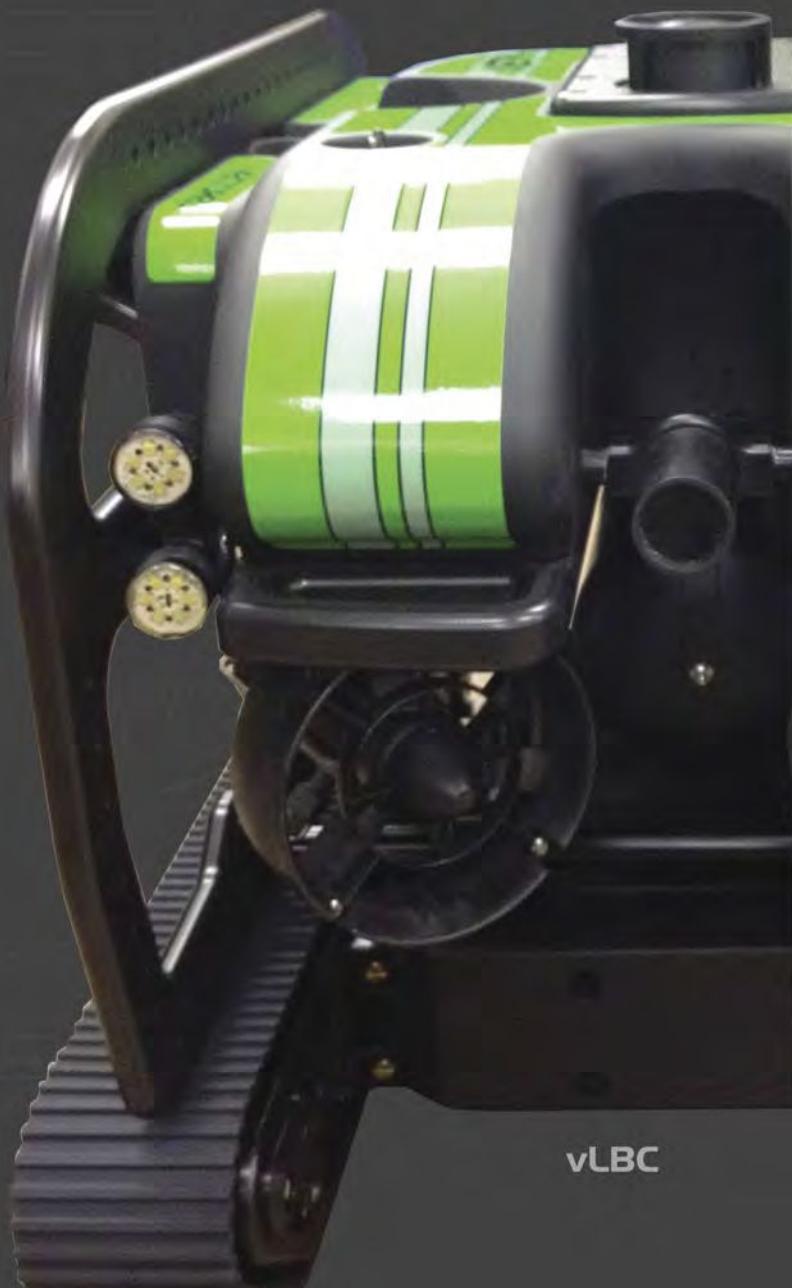
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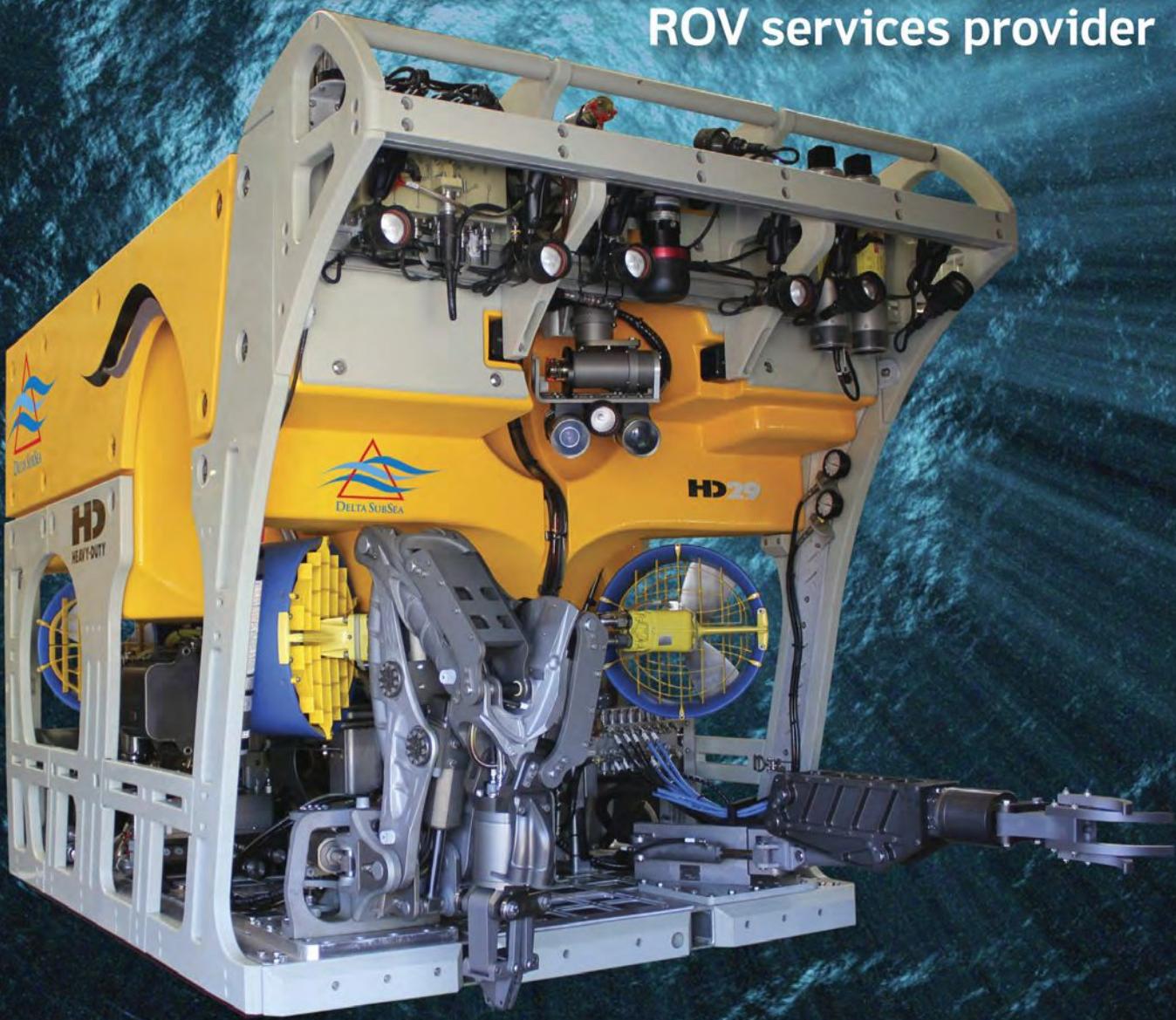
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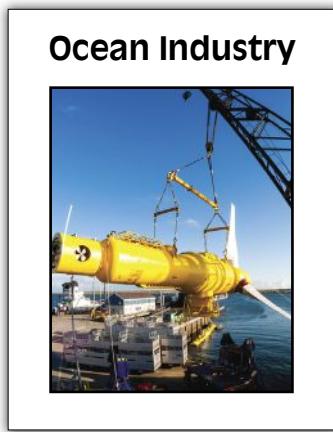
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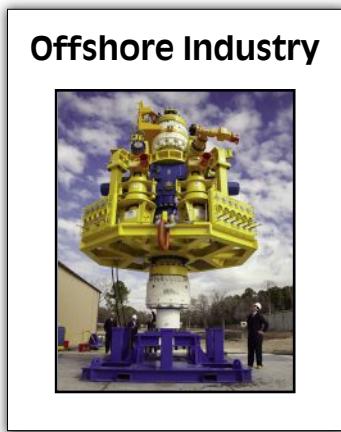


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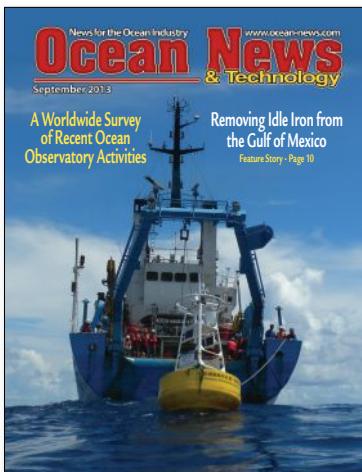
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Cover Photo



The first recovery of "Bai-Long", China's contribution to the "RAMA" Program in the Indian Ocean. Bai-Long is a deep-water ocean climate monitoring system deployed southwest of Java, Indonesia, maintained by China's First Institute of Oceanography (FIO) Qingdao. Support vessel is RV Baruna Jaya III, Jakarta. Bai-Long was designed and built by RDSEA International and Down East Instrumentation (U.S.).

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More News, More Technology, More Data

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Ocean Observing Systems

By: Donna M. Kocak

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Ocean observing systems continue to proliferate worldwide, as you'll see in this year's annual update with reports on new developments in Canada, China, New Zealand, and the United States. Whereas many of the initial systems focused on research and technology development, today's systems are taking advantage of lessons learned and advances in technologies and are being deployed purposefully for both immediate and long-term benefits. A good example is the ocean monitoring buoy recently installed in Hawke's Bay, New Zealand by Cawthon Institute in collaboration with Monterey Bay Aquarium Research Institute (MBARI). Its purpose is to monitor real-time weather conditions to aid fishermen and recreational boaters as well as to monitor long-term coastal water quality to provide an early warning of potential impacts from land-based pollutants and sediments transported by inland rivers and streams. China's collaboration with MBARI and National Institute of Ocean Technology's joint workshop and training held in association with a number of international organizations further illustrate global cooperation in this field.

Many technological advances noted in this year's update relate to new or improved sensors. Maturation of High Frequency (HF) radar systems over the past few decades now allows precise, real-time measurements of surface current speed and direction. Both Canada and the U.S. have reported using these systems to support scientific research, commercial industry, and Federal government agencies. The VENUS Phase II Project continues to test and mature sensors. A large buoy (vertical) profiler system has undergone rigorous testing on the Ocean Technology Test Bed earlier this year and is currently being integrated into the Saanich Inlet array.

There are several examples of commercial industry collaborating with ocean observing systems. In Canada, BC Ferries has integrated shipboard instrumentation capable of simultaneously measuring temperature, conductivity (salinity), oxygen, chlorophyll, turbidity, and meteorological data as the vessel commutes across the Strait of Georgia multiple times a day. After each transit, data are transmitted to Ocean Network Canada where they are displayed in the VENUS

data portal. Researchers are using this data for long-term trending and analysis of phytoplankton bloom occurrences and dominating ocean surface currents in the Fraser River. A not-for-profit maritime organization is working with the Alaska Ocean Observatory to develop and deploy remote stations along Alaska's coast to transmit real-time weather conditions over shipboard Automated Identification System (AIS). A commercial data services and satellite company has joined this effort to extend coverage beyond the coastal regions.

Finally, the benefits of ocean observing systems are beginning to be quantified. Last December, the National Ocean Service (NOS) and Marine Technology Society (MTS) co-hosted a TechSurge event to generate a statement on the value that the U.S. Integrated Ocean Observing System (IOOS®) had on preparations and damage avoidance from Hurricane Sandy. It was determined that "in concert with other authoritative sources, IOOS observing assets and forecast models, both federal and regional, provided critical information needed by decision makers to make key safety of life and property decisions. Decision makers at all levels, ranging from the private sector to the U.S. Navy Headquarters, relied on IOOS information." Prior to Hurricane Sandy's landfall, preparations based on forecast products derived from IOOS observations allowed shipping vessels and containers to be safely moved or diverted (saving nearly \$1 billion in the cost of 6,700 containers alone); Navy vessels to sortie out of ports and shipyards prior to high winds (based on historical data, this could have cost nearly \$500 million); people residing in basement and ground-floor residences in Hoboken, New Jersey to be safely evacuated without harm (up to 34,000 people could have been impacted); and cars from low-lying areas of town to be moved (thousands of cars could have been submerged in salt water).

As worldwide ocean observing systems continue to expand in capability and grow in number over the next few years, we can look forward to a continuing collaboration and sharing of lessons learned, new sensors and technologies, further industry involvement, and many immediate and long-term benefits of these systems.

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Removing Idle Iron from the Gulf of Mexico

Oil companies make major infrastructure investments to tap the hydrocarbons in offshore repositories, but when the flow slows and the cost to operate an offshore platform makes production unprofitable, the platform is typically decommissioned. Under the Outer Continental Shelf Lands Act (OCSLA), operators are obligated to remove seafloor obstructions, such as offshore platforms, with 1 yr of lease termination or prior to termination if either the operator or the Department of the Interior (DOI) deems the structure unsafe, obsolete, or no longer suitable for operations. Furthermore, a 2011 federal mandate to remove around 3,500 non-producing wells and dismantle 650 production platforms is now in place.

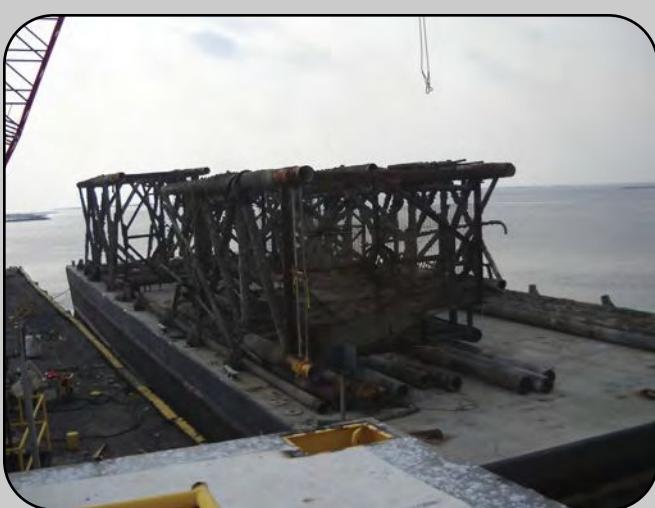
As a result, according to the DOI, 265 platforms were removed in 2011 and 600 are slated for removal by the end of 2015. Of these, 154 are scheduled for onshore disposal in 2013 alone. This decommissioning does not just mean the end of operations at a site, it also represents a lot of iron — and one little-publicized aspect of this mandated removal is what happens to this iron (and other metals) once the platforms are decommissioned and dismantled.

According to the Institute of Scrap Recycling Industries, Inc., 75 million metric tons of iron and steel (ferrous) scrap was processed by the scrap recycling industry in 2012 and utilized used to manufacture more than 60% of the total raw steel produced in the United States. In fact, they say, “Domestic and foreign steel mills, foundries, and other industrial consumers rely on ferrous scrap as a vital, environmentally friendly, and cost-efficient raw material for the production of new steel and cast iron products.”

This month's Spotlight Company, LaRose Scrap & Salvage, Inc. (LaRose), plays a major role in the onshore disposal of decommissioned metal equipment from oil and gas exploration and production companies. As the name suggests, this Louisiana-based operation specializes in the acquisition of decommissioned platforms, pipes, valves, and vessels for the purpose of scrapping. Once it has acquired the decommissioned equipment, LaRose then scraps it for resale on the open metal market. Scrapping the material from these structures is an efficient method of recycling and reuse that keeps tens of thousands of tons of metal annually out of landfills, complies with federal regulations, and boosts the regional economy.

Why Remove Standing Platforms?

Federal regulations aim to “minimize the environmental and safety risks inherent in leaving unused structures in the ocean, and to reduce the potential for conflicts with other users of the Federal OCS.” Non-producing platforms can create serious safety, environmental, and navigational risks if left standing. Removing inactive facilities and structures from the Gulf of Mexico decreases risks to both the marine environment and maritime navigation. Inactive wells and platforms are susceptible to deterioration as well as the adverse effects of severe weather, which may cause platforms to topple or even contaminate the surrounding waters. Other threats include damage to other operating infrastructure as well as navigation and safety hazards. Under certain specific circumstances, a platform may remain in place for the creation of an artificial reef, but only if the conditions in the area and the platform components are such



that this reefing-in-place does not present a threat to the environment, navigation, or nearby infrastructure.

The process of infrastructure removal is stewarded by the Bureau of Ocean Energy Management (BOEM), which prepares a site-specific environmental assessment for each removal application, and the Bureau of Safety and Environmental Enforcement (BSEE), which imposes protective mitigation measures as conditions of permit approval. Under federal regulations, decommissioning an offshore platform entails the following:

- Plugging all wells supported by the platform and severing the well casings 15 ft below the mudline;
- Cleaning and removing all production and pipeline risers supported by the platform;
- Removing the platform from its foundation by severing all bottom-founded components at least 15 ft below the mudline;
- Disposing the platform in a scrap yard (like LaRose) or fabrication yard or placing the platform at an artificial reef site; and
- Performing site clearance verification at the platform location to ensure that no debris or potential obstructions to other users of the OCS remain.



In order to sever bottom-founded objects and their components, operators use either mechanical or explosive severance, depending on the structural components and other factors. Mechanical severance involves sawing or shearing the structure using abrasive-jets, sand-cutters, diamond-wire saws, carbide-cutters, shears, and guillotine saws. Explosive-severance uses charges attached to the platform at a depth 15 to 25 ft below the seabed, therefore requiring fewer people; this is both safer and more efficient than mechanical severance. According to BOEM, neither method creates debris on the seafloor.

LaRose: A Profile of Growth

In 2011, when the U.S. Department of the Interior, Minerals Management Service (now BOEM) mandated that offshore oil and gas lease areas in the Gulf of Mexico be cleared of all non-producing structures, it was not clear at first how efficiently this could be accomplished. One company that has grown and adapted in order to meet the demands codified by these regulations is LaRose Scrap & Salvage, Inc.

LaRose made major investments in its own infrastructure in order to accommodate oil companies' decommissioning offshore facilities. The growth can be seen via the sheer tonnage that LaRose is removing from the Gulf of Mexico. In 2011, the total was about 40,000 tons. In 2012, the total rose to 65,000 tons; in 2013, the company estimates it will remove 85,000 tons of scrap and salvage from the Gulf of Mexico.

In response to this growth, LaRose has doubled its number of coastal service locations that handle structure and scrap removed from the Gulf of Mexico. The company added locations in Grand Isle and Grand Chenier, Louisiana capable of handling an additional 45,000 tons above their previous capabilities, which includes existing locations in Houma and Intracoastal City, Louisiana.



In addition to the coastline property needed to ensure strategic accessibility for the barges floating these giant chunks of steel onto shore, the expansion in response to the federal mandate also required a minimum of a \$7 million investment in new equipment consisting of the following:

- Nine (9) Mack 18-wheel tractor and trailers;
- Four (4) scrap handlers;
- One (1) 350-ton track crane;
- Four (4) all-terrain heavy forklifts; and
- One (1) Kobelco track hoe with a Genesis rotating shear.

Today, LaRose has over 90 employees. The company's expansion and enhanced capabilities means that it has positioned itself to handle large scrap products that many of its competitors are not able to handle safely and profitably. But the story of LaRose is not all about revenue. Simply put, without the capital investment and expertise of LaRose Scrap & Salvage, Inc., cleaning up debris in the Gulf of Mexico would be a much more daunting task. This cleanup and the subsequent reuse and recycling of immense amounts of scrap metal are important to a long-term approach to protecting the environmental integrity of the regional ecosystem.

For more information on LaRose Scrap & Salvage, Inc., visit www.larosescrapandsalvage.com.



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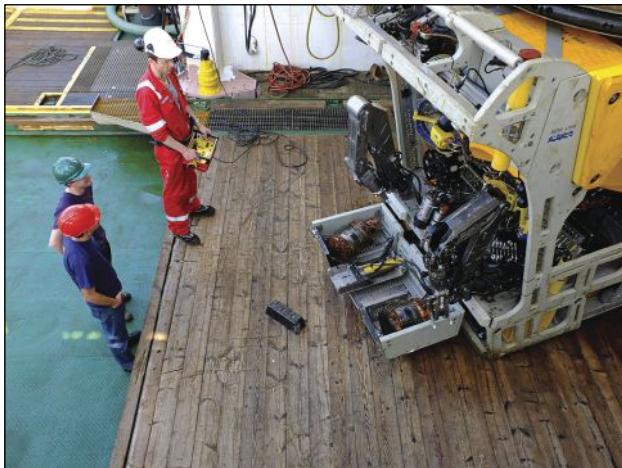


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OCEAN INDUSTRY

Odyssey recovers 1.8 million ounces of silver from shipwreck three miles deep



Odyssey Marine Exploration, pioneers in the field of deep-ocean exploration, has recovered over 61 tons of silver bullion this month from a depth of nearly 3 mi.

This recovery of bullion from the SS Gairsoppa, a 412-ft steel-hulled British cargo ship that sank in February 1941, consists of 1,574 silver ingots weighing about 1,100 ounces each or almost 1.8 million troy ounces

in total, sets a new record for the deepest and largest precious metal recovery from a shipwreck. The silver has been transported to a secure facility in the UK.

Including the silver recovered in 2012, Odyssey has now recovered 2,792 silver ingots from SS Gairsoppa or more than 99% of the insured silver reported to be aboard the Gairsoppa when she sank. Under the terms of Odyssey's contract with the UK Department for Transport, which follows standard commercial practices, Odyssey will retain 80% of the net salved value of the cargo. The contract was awarded to Odyssey following a competitive tender process.

Sources, including Lloyd's record of war losses, indicate additional uninsured government-owned silver may have been aboard the SS Gairsoppa when she sank, but to date no uninsured silver has been located.

"This was an extremely complex recovery, which was complicated by the sheer size and structure of the SS Gairsoppa as well as its depth nearly 3 mi below the surface of the North Atlantic," commented Greg Stemm, Odyssey's chief executive officer. "To add to the complications, the remaining insured silver was stored in a small compartment that was very difficult to access."

"The recovery of more than 99% of the insured silver cargo under these adverse conditions is a testament to the skill and ingenuity of the offshore team led by senior project managers, Andrew Craig and Ernie Tapanes. The expertise demonstrated in implementing this challenging project continues to be applied as we undertake other modern shipwreck projects, deep-ocean mineral exploration, and our best-in-class deep-ocean archaeological work on historic shipwrecks."

Mark Gordon, Odyssey's president and chief operating officer, added, "The ability of our team to deliver on our planned objectives underscores our experience and the tremendous determination of our team. We have accomplished a world-record recovery at a depth never achieved before. We're continuing to apply our unique expertise to pioneer deep-ocean projects that result in the discovery and recovery of lost cultural heritage, valuable cargoes, and important and needed natural resources."

The recovery operations were conducted from the 291-ft Seabed Worker mobilized with 5,000-m depth-rated remotely operated vehicles (ROVs) and heavy launch and recovery systems. Additional specialized deep-ocean equipment was mobilized by Odyssey on the ship for the project. The Seabed Worker has returned to sea to continue Odyssey's 2013 North Atlantic Expedition, which includes the SS Mantola, a 450-ft British-flagged steamer lost in 1917 and found in 2011 by Odyssey, as well as the Gairsoppa. The Mantola reportedly carried approximately 600,000 troy ounces of silver insured under the UK War Risk insurance program.

For more information, visit www.shipwreck.net.

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Marine Technology Society's ROV Committee announced winners of its 2013 Annual Scholarships

Grace Anne Young, Andrew Augustyn, Blake Hoover, and Goh Han Hwee have been selected as recipients of the Marine Technology Society's (MTS') 2013 ROV Committee Scholarships. In addition Christopher Konstad, Kip Hacking, Anne Crago, and Christian Welch received MTS ROV Committee MATE Center Scholarships.

Grace Young was awarded \$8,000 and attends MIT, majoring in Ocean Engineering. Andrew Augustyn was awarded \$6,000 and attends Alpena Community College where he is pursuing an Associates Degree in ROV Technology. Blake Hoover received \$4,000 and attends BYU, majoring in Technology and Engineering. Goh Han Hwee who attends Newcastle University, majoring in Naval Architecture, received \$2,000.

As winners of the MTS ROV Committee MATE Center (Marine Advanced Technology Education) Scholarships, Christopher Konstad was awarded \$8,000 and will attend UCLA. Kip Hacking was awarded \$6,000 and attends BYU, pursuing a degree in Electrical Engineering. Anne Crago received \$4,000 and attends Texas A&M Corpus Christi, majoring in Mechanical Engineering. Christian Welch received \$2,000 and is pursuing degree in Mechanical and Ocean Engineering at MIT.

All will be recognized during the Awards Presentations at Underwater Intervention '14 (10-13 February 2014) in New Orleans, Louisiana.

Since 1994 the MTS ROV Committee has awarded over \$340,000 to deserving students who have an interest in ROVs. Scholarship applications for 2014/15 must be postmarked by 15 April 2014. Details on how to apply and additional information on the MTS ROV Committee can be found at www.rov.org/.

New report provides roadmap to transform Pacific tuna fisheries

A new report, launched by Greenpeace Australia Pacific, provides a blueprint for how Pacific Island governments and regional bodies can promote a more sustainable and locally owned and operated tuna fishery in the region. The report — titled Transforming Tuna Fisheries in Pacific Island Countries: An Alternative Model of Development — makes detailed recommendations for how to develop smaller-scale and locally owned fisheries that will maximize economic returns, create local jobs and better protect countries' precious tuna reserves for the long term.

To view the report, visit www.greenpeace.org.

Ocean Caucus Chairs call for a National Marine Technology Week

Congressman Sam Farr (D-Carmel) and Congressman Don Young (R-Alaska), co-chairs of the House Oceans Caucus, introduced H. Res 324, a bipartisan congressional resolution calling for the week of 22 September 2013 to be designated as "National Marine Technology Week" in recognition of the important contributions marine technology has made in the United States. The resolution coincides with the 50th anniversary of the Marine Technology Society and the OCEANS 2013 conference in San Diego.

"The use of marine technology reduces the destruction inflicted by natural disasters, protects fragile ecosystems from environmental damage caused by pollution, and fosters a better understanding of our marine world, all while providing a needed boost to local economies," said Congressman Farr. "By designating a National Marine Technology Week, hopefully more people will become aware of how we all benefit from investments made in marine technology."

Marine technology is a valuable tool in the management of our ocean economy. Nationally, the ocean economy contributes \$258 billion to our country's GDP and is responsible for over 2.77 million jobs. In Congressman Farr's home state of California, the ocean is responsible for \$40.1 billion of the state's economy and almost 475,000 jobs. In Congressman Young's state of Alaska, those numbers are \$10.6 billion and almost 50,000, respectively.

"Alaska relies heavily on a vibrant marine technology industry, and I am proud to co-sponsor this resolution designating a week in September to recognize the contributions of this vital industry," said Congressman Young. "National Marine Technology Week will help facilitate a broader understanding of the relevance of ocean technology to wider global issues while also helping to advance the development of the tools and procedures required to explore and study our vast oceans."

The resolution was introduced to coincide with the Marine Technology Society's 50th anniversary. MTS launched in 1963 as scientific society of engineers, academicians, business leaders, and scientists all involved in the advancement of technologies that dovetail directly with the oceans, and especially in the areas of energy and environmental technologies. In September, MTS will join with the Institute of Electrical and Electronics Engineers' Oceanic Engineering

Society (IEEE/OES) to host the OCEANS 2013 conference in San Diego. The conference will bring engineers, scientists, academicians, business leaders, and government officials from all over the world to meet on ocean policies and technologies.

On the hunt for a missing piece of Canadian history

The Honorable Leona Aglukkaq, Canada's Environment Minister and Minister responsible for Parks Canada, announced that Parks Canada Underwater Archaeologists will return to Canada's Arctic to continue an expedition of international significance, the continuing search for the lost vessels HMS Erebus and HMS Terror from the ill-fated Sir John Franklin voyage.

"Our government is pleased to pull together for a fifth season both existing and new Canadian partners and researchers to continue the search for HMS Erebus and HMS Terror," said Minister Aglukkaq. "Being from Nunavut, I am especially excited about this project, as it will collectively increase our understanding of early Arctic exploration and its impact on Canada's development as a nation, while showcasing the beauty and unique culture of the Arctic."

The search capacity this year will be the most comprehensive yet. Beginning around 10 August and continuing for almost 6 weeks — the longest amount of continuous time on the water to date — Parks Canada will be joined by a broad array of partners for a fifth season in search for the historic shipwrecks. This year, the Royal Canadian Navy (RCN) and Defence Research & Development Canada (DRDC) will lend their expertise and enthusiasm to the project, which also includes the Arctic Research Foundation, the Government of Nunavut, Canadian Hydrographic Service, Canadian Coast Guard, the Canadian Ice Service, and Canadian Space Agency.

The Parks Canada-led survey team will conduct the underwater search from aboard the Arctic Research Foundation's Research Vessel Martin Bergmann for the full 6 weeks or so and will be further supported during that time by the Canadian Coast Guard Ship Sir Wilfrid Laurier for an additional week. The team's traditional side-scan sonar surveying method will be boosted this year with the addition of a military-grade, side-scan sonar provided by DRDC and by a new autonomous underwater vehicle (AUV) and remotely-operated vehicle (ROV) recently acquired by Parks Canada.

As with all past surveys, the data acquired will be shared among partnering organizations, which contributes to important priorities like safe navigation and environmental knowledge of the Canadian Arctic.

For more information, visit www.pc.gc.ca.

Rear Admiral John Lockwood joins OceanGate Board of Directors

OceanGate Inc. (OGI) a global provider of deep-sea manned submersible solutions, announced the addition of retired U.S. Coast Guard Rear Adm. John Lockwood to the company's Board of Directors. Lockwood brings more than 40 years of maritime expertise to OGI, including extensive work around issues of national defense, homeland security, expertise on safety and regulatory issues surrounding offshore operations, and international diplomacy.

The addition of Lockwood will aid OceanGate's expansion into a diverse set of emerging markets, including offshore oil and gas, "idle iron," AUV retrieval, undersea mining and scientific exploration. Lockwood will also lend his unique insight to the development of Project Cyclops, OGI's planned 3,000-m submersible, assisting in the design of key technical elements that will better serve OGI's client base.

"How to sustainably and economically access the world's oceans is a key emerging problem from a business and political perspective, and OceanGate has a unique vision on how to address that," states Lockwood. "I hope to help bring operational and regulatory expertise to this 21st century emerging industry. I truly believe manned submersibles can help solve some of our country's most pressing issues, including development of offshore energy sources, discovery of new sources of rare minerals, or finding the next generation of biomedical cures."

Lockwood's distinguished military career in the U.S. Coast Guard included a combat tour commanding the patrol boat Point White in the rivers of Vietnam and the South China Sea. He commanded the cutter Basswood in the Western Pacific, Guam, Micronesia, and the Philippines and captained the cutters Juniper, Taney, and Chase in the Atlantic and Caribbean. In 1987, he took over as the first commodore of the Caribbean Squadron, the largest joint Coast Guard/Navy air and surface force assembled since World War II, overseeing maritime drug surveillance and interdiction operations throughout the Caribbean.

For more information, visit www.opentheoceans.com.

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A Worldwide Survey of Recent Ocean Observatory Activities: 2013 Update

Contributed by the Ocean Observing Systems Committee, MTS

This is the fifth annual update of worldwide ocean observatory activities reported by the Marine Technology Society's (MTS's) Ocean Observing Systems Committee. Our goal is to collect newsworthy activities such as these throughout the year and publish them in our monthly newsletters and annual updates. MTS would like to thank all of our loyal contributors for sending in updates and photos each year, as well as the new contributors to this year's update. These contributions help raise awareness of the importance of ocean observing systems around the world.

North America

U.S. IOOS

This past year, the U.S. Integrated Ocean Observing System (IOOS®) saw significant progress towards advancing an integrated system of ocean observing, including major strides in the area of High Frequency (HF) radar. HF radars measure surface current speed and direction to benefit search and rescue operations, vessel tracking, tsunami warnings, oil and hazardous spill response, harmful algal bloom monitoring, water quality assessments, offshore energy planning, ecosystem assessments, and fisheries management.

The U.S. has the largest HF radar network — a total of 132 land-based radars — and encourages international development of similar networks. The Group on Earth Observations launched an effort to develop a Global HF radar network in 2012 to help integrate the roughly 300 HF radars deployed in about 30 countries. Working with other nations will accelerate research in emerging uses for HF radar, including data assimilation by models and ecosystem and climate research. Furthermore, the 2012 World Radio Communication Conference established a frequency range exclusive to HF radar systems that will allow them to operate free from interference of other types of HF band users.

Here at home, our nation's HF radar network is now supporting the U.S. Coast Guard on a broader scale. Back in 2009, the Coast Guard began ingesting HF radar data into its search and rescue planning system for the mid-Atlantic (Figure 1a). Assessments show that incorporating HF radar data into tactical planning and execution can reduce search areas by 66%, translating into greater efficiencies and

more lives saved. Last summer, the Coast Guard began incorporating HF radar data on the west coast and plans to broaden that coverage to include other parts of the country, including the Caribbean.

National Weather Service employees are also reviewing how HF radar can help them. This includes evaluating the incorporation of a new HF radar capability into a system at the cornerstone of its operations to validate currents and wave models for real-time purposes. HF radar data would benefit the National Ocean Service's evaluation of real-time coastal and estuarine model results. In the future, HF radar data are planned to be used in near real-time to address wave/current interactions near harbor entrances and provide current observations for navigational purposes.

The National Weather Service Offices in the Eastern, Southern, Western, Pacific, and Alaska Regions have expressed interest in accessing HF radar data (Figure 1b). Specifically, the Weather Forecast Office in Miami, Florida is interested in comparing HF radar currents to outputs from a real-time ocean forecast system. An expected future benefit is that HF radar data will provide complementary input to the system, which is run once daily. In the future, the National Weather Service may compare HF radar data to the Extra-tropical Surge and Tide Ocean Forecast System output used for local high-resolution wave modeling. HF radar is expected to improve wave models, which is the primary means with which to increase accuracy in wave height forecasts.

NOAA's Weather Ready Nation Plan states that "improved marine forecasts of winds and waves create an economic benefit of \$95 million per year of commercial shipping from transit time savings and cargo loss reductions." Improving depiction of surface currents in nearshore wave modeling systems is essential to the socioeconomic vitality of our nation. HF radar data will strengthen impact-based decision support services for events that threaten lives and livelihoods, such as oil spill response, plume tracking, and water quality monitoring.

HF radar also provides benefits during severe weather, illustrated as Hurricane Sandy raged forth in a broad swath of devastation and destruction last fall. HF radars worked in concert with the rest of the U.S. IOOS® system before, during, and after the super storm. In addition to providing critical data to the 159 search



Figure 1 HF Radar installations on a) the New Jersey coast with U.S. Coast Guard ships and plane looking on, and b) the Alaska coast with reinforced infrastructure for the harsh environment (Photos courtesy of Rutgers).

and rescue responses last October, U.S. IOOS® monitored developments by land and sea to figure importantly in helping predict where one of the worst storms in our nation's history would go. More than 40 land-based coastal HF radars provided ocean current data that contributed to wave and storm-surge forecasts. Buoys and sensors along the mid-Atlantic coast generated hourly updates of wind, wave, visibility, water levels, and air and water temperatures. Unmanned scientific gliders deployed off New Jersey reported water temperature information — all feeding data into the National Hurricane Center. While impossible to divert the storm, IOOS®-managed data contributed to advance warning of where the danger would be most severe, enabling better emergency planning and execution.

In 2013, the U.S. HF radar community updated A Plan to Meet the Nation's Needs for Surface Current Mapping. The plan provides in-depth discussions of the uses of HF radar, defines the requirements that drive the measurement of ocean surface currents, and plans the implementation design for a 5-year build-out to a total of 351 HF radar systems to address critical gaps in coverage.

The Surface Current Mapping Plan explains how HF radar technology provides hourly reports of ocean surface current velocities over hundreds of square miles simultaneously out to about 125 mi unaffected by clouds, fog, or precipitation. This technology uses low-power transmitters and small stationary antennas that are relatively easy to deploy. HF radars generate two-dimensional maps of oceanic flow over a large area. Each pair of HF radars can produce a current measurement coverage area of 6,000 sq. mi, equivalent to a square of about 77 mi on each side. In-service HF radar observations already cover a significant percentage of the Atlantic, Gulf, and Pacific coasts — more than 50% of the U.S. Exclusive Economic Zone. If data from existing radars were fully integrated, the total number of current measurements would increase from about 100 per hour from in situ methods (e.g., moored buoys) to about 60,000 HF radar observations per hour, significantly increasing prediction precision.

For more information, visit www.ioos.gov.

Ocean Observatories Initiative

Having achieved a number of significant milestones in 2012, the Ocean Observatories Initiative (OOI) kicked off 2013 with installation and test activities continuing at a rapid pace and is now transitioning into build and deployment phases.

The OOI, a National Science Foundation (NSF)-funded program, will deliver high-quality data on ocean processes and properties to address critical science-driven questions that will contribute to better understanding and management of the oceans. The OOI Program is managed by the OOI Project Office at the Consortium for Ocean Leadership (<http://www.oceanleadership.org>) in Washington, D.C. and is responsible for construction and initial operations of the OOI network.



Figure 2 Chief Scientist John Delaney (right) narrates the live video stream as ROPOS pilot Josh Chernov approaches ROCLS, the remotely operated cable laying system, on the seafloor (Photo courtesy of Allison Fundis).

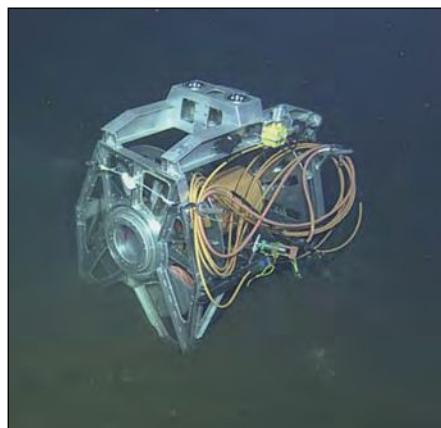


Figure 3 ROPOS approaches the cable laying system ROCLS at the base of Axial Seamount. The drum hosts 600 m of extension cable (Photo courtesy of NSF's OOI/University of Washington/Canadian Scientific Submersible Facility).

The OOI includes three global high latitude sites: two Coastal Global Scale Node (CGSN) arrays — the Pioneer Array on the east coast and the Endurance Array on the west coast — and a cabled array, Regional Scale Nodes (RSN), on Juan de Fuca Plate. To date, the program has deployed 880 km of fiber optic cable for the cabled component of the observatory. Primary nodes were also installed at that site last year in anticipation of seafloor instrumentation, which is currently being installed (in August) as this article is going to press (Figures 2 and 3).

A number of successful coastal and global mooring tests have been conducted, and all major deployable elements of the infrastructure have completed critical design review and are now in the build and deployment phase of the project. In addition, the OOI's unique cyber infrastructure continues to emerge with progressive software releases and the education and public engagement team is building a variety of software interfaces and web-based tools that, ultimately, will allow educators to bring the ocean into their learning environments.

The summer events included the first deployment of a global site at Station Papa in the Gulf of Alaska. In addition to mid-summer deployments at that location, the program has phased deployments planned for the Endurance Array on the west coast and Pioneer Array on the east coast for early and late fall.

As the program moves into 2014, phase two deployments will take place for Pioneer and Endurance and final construction will take place at those locations in the fall. The global deployment in the Irminger Sea in the summer of 2014 will be the first major opportunity for international coordination of work with partners

across the Atlantic. The final two global sites are scheduled for deployment in fall 2014 and early winter 2015 at the Argentine Basin and Southern Ocean, respectively. The construction phase of the program officially ends in 2015.

In March, the OOI Program initiated a series of webinars aimed at providing the scientific community with detailed information on the status of the program, with the first session focused on the 2013-2014 deployments and initial sampling configurations. Tim Cowles, OOI Program Director and Vice President and Director of Ocean Observing at the Consortium for Ocean Leadership, conducted the first webinar for over 100 participants on 19 March. Discussion focused on the OOI's 2013 and 2014 deployments of moored and mobile seafloor instruments and platforms and initial sampling configurations for instruments to be deployed at Station Papa this summer and in the Irminger Sea in summer 2014. A full story on that webinar, along with the audio, is available online as is the OOI deployment schedule and a PDF of the presentation.

The scientific community will have access to OOI pre-commissioned data during these upcoming events. The OOI policy ensures that all data are open and free for all. Data available post-deployment and testing will be made available to the community in a pre-commissioned mode this year and accessed via the OOI website following validated testing. A portal to available pre-commissioned data, detailed instrument tables, and updates on the program milestones are available on the OOI website at www.oceanobservatories.org.

Alaska Ocean Observing System

In 2012, the Alaska Ocean Observing System (AOOS) (www.aoos.org) began a partnership with the Marine Exchange of Alaska (MXAK) to develop a system capable of sending real-time weather conditions over shipboard AIS (Automated Identification System) displays. This initiative, referred to as AIS/WX, addresses the Coast Guard's "Ready for Sea" safety initiative to provide accurate weather information to all mariners.

Many vessels transiting Alaska's coast are equipped with AIS, which maps the location and other critical information about other vessels in the area. This information is currently transmitted through more than 95 shore-side stations scattered along Alaska's coasts. AIS/WX will allow real-time weather information, such as wind speed, temperature, and precipitation, and in some cases wave heights, to show up on a vessel's AIS screen even when it is outside of Internet or cell phone



Figure 2 Chief Scientist John Delaney (right) narrates the live video stream as ROPOS pilot Josh Chernov approaches ROCLS, the remotely operated cable laying system, on the seafloor (Photo courtesy of Allison Fundis).

EDITORIAL FOCUS



Figure 4 AIS weather station at Marmion Island in Southeast Alaska (Photo courtesy of Ed Page).

coverage areas. These up-to-the-minute updates will allow vessels to take precautionary or avoidance measures when caught in unexpected deteriorating weather conditions.

To begin this effort, the MXAK installed three new stations containing joint AIS transmitters and weather stations in 2012 on Portland and Marmion Islands (Figure 4) in Southeast Alaska and Homer. Today, there are nine AIS stations north of the Bering Strait. In an effort to extend coverage beyond the reach of the shore-based stations to the entire North Pacific, MXAK has recently teamed with exactEarth (eE) to add satellite AIS data. These data are distributed several times per day when the satellites pass over Alaska. While not providing real-time data, satellite AIS provides valuable information that aids in the implementation of marine safety measures and response to incidents when vessels are operating well offshore. www.mxak.org/home/news/news061.html

ONC's VENUS and NEPTUNE Canada

In late 2012, Victoria Experimental Network Under the Sea (VENUS) and North East Pacific Time-Series Underwater Networked Experiments (NEPTUNE) Canada began joining forces within the University of Victoria's Ocean Networks Canada (ONC) (www.oceanetworks.ca/). This combination of personnel and infrastructure has expanded the capabilities of the research facility to include eight undersea sites linked by over 850 km of powered fiber optic cable (Figure 5). ONC conducted a total of six maintenance cruises as part of the 2012 operations plan, employing a variety of ship platforms and

remotely operated vehicle (ROV) systems.

The season began in July 2012 with a NEPTUNE expedition on board R/V Thomas G. Thompson using the Canadian Scientific Submersible Facility's ROPOS ROV. Over 29 days, the operations and science teams conducted routine maintenance at all five NEPTUNE science sites and deployed a new version of Wally the robotic crawler and the first elements of a tsunami warning array. A vertical profiler system was also deployed that featured a buoyant instrument system atop a winch that allows for movement from 400 m depth to the sea surface.

In August 2012, operations shifted to a VENUS cruise on board CCGS Tully with the ROPOS ROV. The VENUS Strait of Georgia (SOG) array had suffered an unexpected engineering failure at the beginning of August, forcing a significant change to cruise plans. The entire secondary infrastructure in SOG was removed to allow for recovery and repair of the main cable and two nodes. Ongoing bottom boundary layer and forensic experiments with pig carcasses were relocated to Saanich Inlet, allowing for a new component of research studying the impact of seasonal low-oxygen upwelling. At the end of August, the NEPTUNE Folger Pinnacle platform was reinstalled after a major overhaul since its March recovery. This was achieved with the experienced Pelagic Technologies dive team on board a Norwespac Industries crane barge and the Oceandynamics team running the small Diversity Consulting ROV Falcon on board the M/V Crown Royal.

A planned late September 2012 NEPTUNE maintenance cruise was cancelled when the R/V Thomas G. Thompson experienced a major engineering casualty.

During October 2012, a 6-km fiber optic extension cable was recovered from the SOG. The cable had been damaged in

July when an underwater event at the Fraser Delta tumbled the Delta Dynamics Laboratory platform over 200 m from its deployed position.

November 2012 saw the completion of repairs to the NEPTUNE primary infrastructure. Using the Global Marine Systems Limited CS Wave Venture, the final splice was completed and the cables buried, restoring the redundant ring architecture of the NEPTUNE observatory.

Finally, February and March 2013 saw the completion of repairs to the VENUS SOG primary and secondary infrastructure.

Throughout 2012, the VENUS Phase II Project was on schedule. A second CODAR HF radar system was installed to monitor surface currents in the SOG. These systems serve not only as a science research tool, but can also supply valuable information to commercial marine operators and Federal government agencies. A buoy vertical profiler system completed integration testing and will be deployed in Saanich Inlet during 2013 to profile the seasonally hypoxic waters from the surface down to 200 m. Also part of Phase II, the first of three SeaKeeper shipboard instrumentation systems was installed in the BC Ferries' MV Queen of Alberni. Oceanographic and meteorological data are collected continuously as the vessel sails across the Strait eight times daily, with the resulting data streaming to ONC's data archive at the end of each trip. The data are now being used by researchers at the University of British Columbia (BC) to analyze the timing of phytoplankton blooms and the role of the Fraser River in dominating ocean surface currents.

NEPTUNE also provides a wide variety of tools for gathering ocean research data. Observatory instruments recorded a variety of earthquakes over the past year, including a magnitude 7.7 earthquake that struck southern Haida Gwaii in late October, generating a small tsunami.



Figure 5 University of Victoria's Ocean Network Canada's Observatories (Image courtesy of ONC).

Observatory seismometers, bottom pressure recorders, and hydrophones all recorded the event with the data providing new insights into near-shore tsunami propagation in coastal BC. On 13 November 2012, at least four humpback whales sang, slapped, and played for over 11 hrs at Barkley Upper Slope, their noise picked up by a hydrophone on the new vertical profiling system.

The Cabled Observatory Vent Imaging System (COVIS), developed by Rutgers University and the University of Washington, reached a milestone in September 2012 by reaching its first year anniversary of continuous data collection. These unique hydrothermal vent data will further advance understanding of hot vent systems.

Last September also marked the installation of ONC's new Arctic mini-observatory at Cambridge Bay, Nunavut. It's the first location in Canada's far north for year-round, continuous undersea monitoring of the northern ocean environment and includes an ice profiler.

Ocean Tracking Network

The Ocean Tracking Network (OTN) (<http://oceantackingnetwork.org>), a global research and technology development initiative headquartered at Dalhousie University, Halifax, Nova Scotia, has added Liquid Robot's Wave Glider® to its repertoire of ocean tracking tools. After several successful test missions since 2011, OTN purchased the first Wave Glider® in Canada. The glider followed the salmon migration in the Strait of Belle Isle between Newfoundland and Labrador. As of August 2012, the glider is headed towards Sable Island where many grey seals have been acoustically tagged as part of OTN research on the Scotian Shelf ecosystem. The Wave Glider® carries an acoustic tracking receiver mounted about 3 m below the surface unit on its submersible frame (Figure 6) that is able to capture an animal's tag code up to 800 m away. Oceanographic and tracking data collected by the glider, as well as OTN's two Slocum electric gliders, are accessible through the website <http://gliders.oceantackingnetwork.org>.

Developments for new glider-mounted tracking capabilities and software are currently underway to enhance pictures of marine animal movements and migration globally. OTN is supported by the Canada Foundation for Innovation (CFI) and the Natural Sciences and Engineering Research Council of Canada (NSERC), operates in 14 countries, and is partnered with more than 200 researchers across the world to track fishes including various

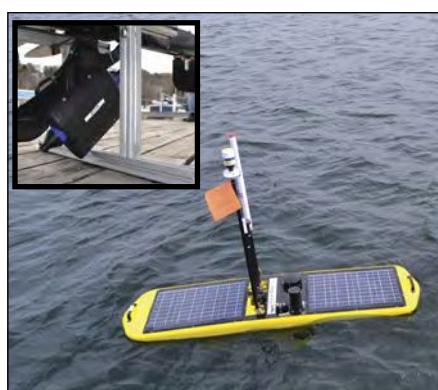


Figure 6 Wave Glider® deployed in Halifax Harbour in March 2013. A VEMCO VR2W acoustic receiver mounted onto the submersible unit of the glider is shown in the inset (Photo courtesy of Nikki Beauchamp, OTN).

species of sharks, sturgeon, tuna, and other marine animals like squid and marine mammals.

Asia

China's Seafloor Observatories

China began the development of ocean observatories to fill the gap of long-term undersea observations with great efforts from both sides of the Taiwan Strait. The Xiaoqushan Experimental Seafloor Observatory in the East China Sea, located at 30°31'N, 122°15'E (about 20 km from the Yangshan International Port of Shanghai), was the pioneer seafloor observatory in mainland China (Figure 7). The observatory has been in operation since April 2009, providing long-term measurements of temperature, conductivity, ocean current velocity profiles, tide and wave levels, pH, chlorophyll, dissolved oxygen, CO₂, turbidity,

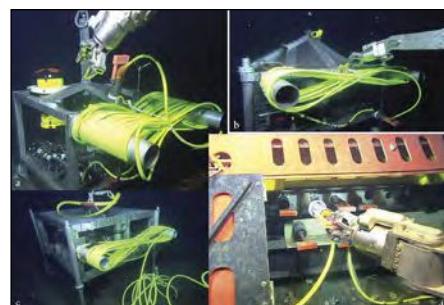


Figure 8 The Chinese system tested on MBARI's MARS seafloor observatory in 2011: a) the physical sensors package; b) the chemical sensors package; c) the junction box; and d) the Chinese system being plugged into the MARS hub (Photos courtesy of Professors Huaiyang Zhou and Pinxian Wang of Tongji University and MBARI).

and ocean bottom seismicity. Real-time data are displayed on a large screen in Tongji University open to the public. Despite its mini-scale (1.1 km long cable, ~15 m water depth), the Xiaoqushan seafloor observatory is not only an operational station, but also a key testbed for ocean observatory development in China.

China is actively collaborating with the international ocean observation community. In April 2011 (also reported in the 2011 annual update), a Chinese team comprising four universities (Tongji University, Zhejiang University, Ocean University of China, and Shanghai Jiao Tong University) came to the Monterey Bay Aquarium Research Institute (MBARI) to test the Chinese deep-sea junction box and instruments nodes (equipped with physical and chemical sensors and a video camera) on the MARS seafloor observatory at 890 m depth in Monterey Bay (Figure 8). MBARI used two research vessels and one ROV to

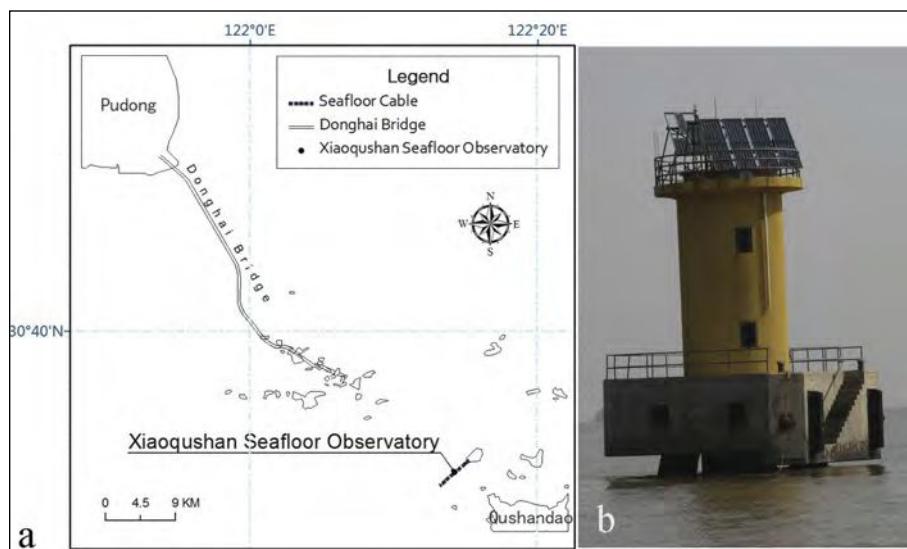


Figure 7 The Xiaoqushan Experimental Seafloor Observatory: a) location and b) the landing platform of the Observatory (Images courtesy of Professors Huiping Xu and Pinxian Wang of Tongji University).

deploy the Chinese system. The Chinese system functioned as designed and generated a real-time data stream for 6 months until recovery.

China is now building larger-scale ocean observatories. An East China Sea integrated seafloor observation system, using a 50-km long cable, is under construction and expected to be completed by the end of 2014. A South China Sea seafloor observation system is also in development under a joint effort of Chinese universities and the Chinese Academy of Sciences.

DONET – Japan

As reported previously, JAMSTEC (Japan Agency for Marine-Earth Science and Technology) completed the construction of DONET (Dense Oceanfloor Network System for Earthquakes and Tsunamis) (www.jamstec.go.jp/donet/e/) on 31 July 2011 and data from all 20 observatories are transferred to JAMSTEC and the Japan Meteorological Agency (JMA) in real-time. The pressure sensor data are vital for JMA's tsunami alert. DONET has been operating flawlessly since its construction. A recent example was the clear detection of seismic waves and tsunami arrival generated by an earthquake in western Canada on 27 October

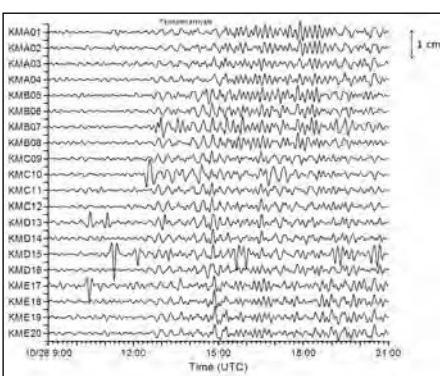


Figure 9 Pressure sensor data of the earthquake in western Canada (sea tide was eliminated) (Image courtesy of JAMSTEC).

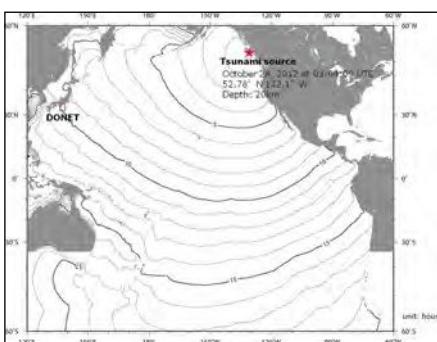


Figure 10 Location of earthquake in western Canada with respect to DONET (Image courtesy of JAMSTEC).

2012 (Figures 9 and 10). In January 2013, a seafloor borehole observatory, C0002, was connected with DONET and real-time data from the borehole observatory is now possible. The construction of DONET2 (the second phase of DONET in the Kii Channel) has been progressing smoothly, and the backbone cable is expected to be installed later this year. All construction for DONET2 is planned to be completed in 2015.

Indian Ocean Observing Systems: Moored Buoys

National Institute of Ocean Technology (NIOT) under Ministry of Earth Sciences, Government of India maintains 23 metocean and tsunami buoys networked in the Indian seas (Figure 11). Though the mandate for maintaining buoy systems are set to 12 for metocean and 2 for tsunami buoy systems, NIOT, with the expertise developed over years of handling oceanographic platforms, deployed additional buoy systems that will also have a spinoff to other activities like surveillance and self powered green buoy systems.

NIOT has carried out nine cruises during 2012-2013, which includes 28 deployments and 24 retrieval operations covering a total distance of 12,976 nmi in the Indian seas, to maintain the moored buoy network. The data collected are available through the Global Telecommunication System (GTS) and are used for scientific applications, validation of satellite data, ocean forecasts, and assimilation of data into models. Many insights about the Indian Ocean have been identified by extensively utilizing the datasets. Coastal buoys are new additions to the conglomeration of buoy systems further at sea and are deployed both at the east and west coasts of India and at Kavatti, Agatii, and Andaman Islands. Coastal buoys are customized for specific needs.

Data and tsunami buoy platforms transmit data 24/7 to the data center at NIOT. A vast amount of data is being received, archived, and dispatched in near real-time to INCOIS (Indian National Centre for Ocean Information Services) for further dissemination. Since the datasets arrive in different structures and are obtained from three different types of buoy systems (74 parameters from OMNI, 34 from metocean buoys, and 25 from tsunami buoys per transmission), at different time intervals (some hourly and some every 3 hours), and contain information on different spatial and temporal scales, mining them for predictive analysis in the required format and tracking the history of a particular sensor is a challenge.



Figure 11 NIOT moored data buoy.

Due to the voluminous flow of data from these unmanned platforms, quality control (QC) mechanisms face many challenges and are prone to manual errors. ADvanced Data Reception and analysiS System (ADRESS) software was developed to avoid erroneous reporting and errors due to data reception; inspect, analyze, clean, transform, and model data; maintain an inventory of consumables used in buoys; and overcome barriers of QC. This specialized software has an integrated dashboard for data visualization, analysis, monitoring buoy positions (watch circle), automated QC based on international standards, quick birds-eye view of platform configurations, inventory, history of components, and cruise operations.

NIOT, in association with Data Buoy Cooperation Panel (DBCP), Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM), and World Meteorological Organization (WMO) UNESCO – IOC along with regional bodies such as Bay of Bengal Program – Inter-governmental Organization (BOBP – IGO) and Bay of Bengal Large Marine Ecosystem, Thailand (BOBLME), organized a regional workshop on “Best Practices for Instruments and Methods of Ocean Observation” held at NIOT, Chennai, India, from 19-21 November 2012. As a continuance of this workshop, national training on ocean data collection was organized and supported by SEABIRD Electronics USA.

In an effort to educate local fishermen on the benefits of these systems, Fishermen Awareness Programme on Vandalism of Buoys was held in Kanyakumari, India on 16-20 July 2012 and the National Workshop on Deep Sea Fisheries: Assessing the Potentialities and Needs was conducted in Chennai, India on 6-8 August 2012 in Chennai in association with BoBP-IGO. National Level Awareness meetings were also organized in Sri Lanka.

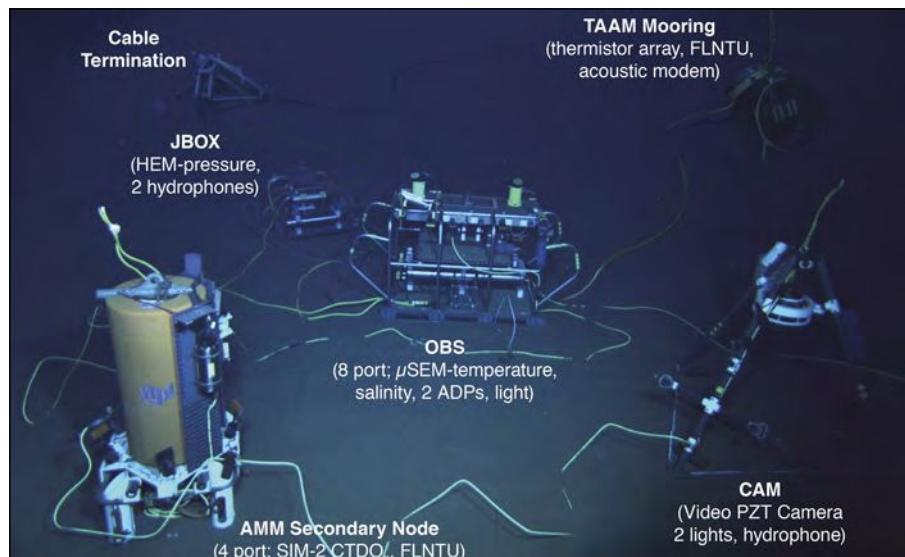


Figure 12 ALOHA Cabled Observatory in 2011 (Image courtesy of ROV Jason, WHOI and Brook Bays, University of Hawaii).

the water column near monthly since 1988.

The abyssal near-bottom acoustic Doppler profiler data are showing stronger than expected internal tide flows and turbulence 20 to 80 m above bottom. Temperature time series clearly show an abyssal cold overflow event with rapid sloshing/wave fluctuations on the order of days, highlighting the need for continuous, unaliased sampling. In this oligotrophic environment, the video camera has detected significant biological activity. Acoustic data clearly show very high call density of baleen whales during October through May and sperm whale choruses spread throughout the year.

Maintenance cruises will be conducted on an annual basis starting October 2013 using the new University of Hawaii ROV. The ACO welcomes new science projects. Over the coming years, it anticipates users with profiling mooring systems, bottom cameras and carbon flux sensors, distributed basic sensor nodes, and more. ACO is supported by the U.S. National Science Foundation.

For more information, visit aloha.manoa.hawaii.edu.

In the future, NIOT has proposed to incorporate pCO₂ sensors into the buoy systems to measure the partial pressure of carbon dioxide in the coastal regions of the Indian Ocean. In addition, NIOT continues to explore potential designs and deployment methods for moorings used in the Arctic. Amid all of the challenges, NIOT will continue to deliver its commitment by maintaining the buoy network and providing valuable data to both the national and international scientific communities.

LORI – Oman

Lighthouse R&D LLC, with a corporate office in Houston, Texas, USA, is preparing to transfer ownership of their subsea fiber-optic cabled observatories located in Oman territorial waters to an Omani-led initiative. Transfer of the technical knowledge and experience obtained from 8 years of sustained operation of these observatories will require a dedicated training effort over an anticipated 3-year transition period.

In support of these efforts, Lighthouse plans to develop a center to oversee training and coordinate system maintenance. The center will also house millions of hours of data already collected and processed from the systems as well as the only three-dimensional oceanographic circulation model available for the region that was developed by Lighthouse and Texas A&M University. The proposed center will use the model in research mode for marine investigations. An added benefit of the center will be to transition the model into an operational model with forecasting capability — the forecast products may be used for many purposes ranging from normal marine operations to mitigating man-made and natural disasters.

The system infrastructure is designed to last for decades and its data will continue to benefit Oman in a myriad of ways by providing world-class information that can be used to shape economic and environmental policies from fields as diverse as deepwater oil and gas exploitation to managing fisheries health and wealth.

Oceania

ALOHA Cabled Observatory

Since June 2011, the ALOHA Cabled Observatory (ACO) is providing 1 kW power, 100 Mb/s network communications, and precise and accurate timing to a seafloor node and instruments at 4,728 m water depth approximately 100 km north of Oahu (Figure 12). Station ALOHA is the field site of the Hawaii Ocean Time-series (HOT) program that has investigated physical and biogeochemical variability of

developing the TASCAM system located on the South Island (ON&T 2011, vol. 17[5]) and will contribute toward a growing network of coastal ocean observation platforms for New Zealand. HAWQi is managed by the Hawke's Bay Regional Council and follows the open sharing ethos of TASCAM, making data accessible to a wide range of end users and the public.

The new system includes a variety of instruments that measure temperature, salinity, turbidity, and chlorophyll — all indicators of the quality and productivity of coastal waters. Future systems in development include a buoy similar to HAWQi planned for deployment in the Firth of Thames. Cawthron has also developed smaller-scale platforms (nicknamed micro-water quality or μWQ buoys) that are being deployed for real-time monitoring of New Zealand's aquaculture growing waters and dredging activities in harbors.



Figure 13 HAWQi system in Hawke Bay (Image Paul Barter, Cawthron Institute).

For more information about this article or to make a contribution, contact dkocak@harris.com.

McDermott to restructure Atlantic operations

McDermott International, Inc. announced that it is substantially consolidating its Atlantic operations and restructuring. The restructuring plan includes the closure of the company's Morgan City fabrication facility and marine base in Louisiana, expected late this year or early next, once the company has completed existing projects in its current backlog at the yard. "After many months of consideration, we have made these decisions which are driven by the evolving market demands of the offshore engineering and construction industry in the Gulf of Mexico," said Stephen M. Johnson, chairman of the board, president and chief executive officer. Approximately 350 employees are expected to be impacted through to the time of closure. McDermott will be providing assistance to these employees over the next several months. McDermott has built a lengthy history of operation in, and service to, Morgan City and its community. Since the beginning, the talents and skills of people from Morgan City have significantly contributed to the success of the company," said Johnson. "We are hopeful and confident that our highly trained, skilled and experienced employees affected by the announcement will find opportunities elsewhere in the marketplace." The Morgan City yard was originally developed to serve an offshore industry that has changed significantly over the past 50 years. As hydrocarbon production technology has advanced, McDermott's customers have increasingly focused on pursuing reserves in greater water depths. The technical demands of deepwater oil and gas developments in the Gulf of Mexico necessitate floating production systems whose size and scope exceed the specification capabilities of the company's Morgan City facility. The yard's location and lack of deepwater quayside access are unable to support McDermott customers' project needs today. "We are entering a new chapter in the development of our company, which is necessary for the profitability of the organization. We are committed to driving a more disciplined culture to respond to the needs of our clients, shareholders, and employees and to increase McDermott's ability to deliver projects competitively across our global operations," said Johnson.

Damen Shipyards invests in efficient supply chain

Damen Shipyards Group, a worldwide shipbuilder with 40 self-managed shipyards, has launched IFS's Enterprise Resource Planning (ERP) system at its Romanian branch in Galati. The IFS 7.5 go-live at the start of this week follows the system's earlier implementation at Damen's headquarters in Gorinchem, The Netherlands. By installing a uniform ERP system, Damen will be able to keep a closer watch on stock levels, plan more expeditiously and transparently, and improve efficiency throughout the supply chain. "Implementing IFS software across our various branches will make it easy for us to track the entire logistical process. By having a better understanding of the supply chain, we can shorten throughput times, optimize procurement, and drastically reduce the number of rush orders. Installing a streamlined supply chain supported by a standard ERP solution will bring calm to the organization. The fact that we are playing a leading role in supply-chain thinking confirms Damen's position as a global player in shipbuilding," says Marc de Thouars, director of group IT at Damen Shipyards Group. In addition to the supply chain elements, IFS includes engineering, planning job preparation, and manufacturing modules. Damen Shipyards Galati is now live with the finance, HR, distribution, manufacturing, and projects applications and will soon implement all other modules. The IFS software will be rolled out at Damen's various branches worldwide in the next few years. The company's brand-new shipyard in Haiphong, Vietnam is scheduled to go live in late 2013. "Site implementation in Haiphong emboldens our ERP implementation in Galati," says Marc de Thouars. "Thanks to the huge number of orders, the new shipyard in Vietnam will be operating full steam from the very start. The IFS solution will play a crucial role there as well."

Crowley announces major expansion of its petroleum fleet and service offerings



Crowley Maritime Corporation announced that it will continue to grow America's largest, most modern fleet of petroleum vessels and enhance service to customers by contracting with Aker Philadelphia Shipyard Inc. (APSI) to build up to eight product tankers for delivery between 2015 and the end of 2017.

Construction contracts have been signed with APSI for the first four 330,000-barrel tankers with deliveries in 2015 and 2016. Additional agreements between the two parties include options for building up to four more tankers and for expanding the cooperation initiated with Aker's sale and delivery of two product tankers, the Florida and Pennsylvania, to Crowley in 2012 and 2013. If all options are exercised, Crowley's industry-leading Jones Act petroleum fleet will grow to 10, 330,000-barrel tankers and 17 articulated tug barges (ATBs), ranging in capacity from 155,000 to 330,000 barrels.

"Through this expansion and cooperative agreement with Aker, we will be providing our customers with more options for transporting their product with greater safety and efficiency than they can get from any other U.S. service provider," said Tom Crowley, company chairman and CEO. "We expect these new ships to be well received by longstanding customers as well as new customers, who should clearly be able to see the advantages of utilizing Crowley's multi-dimensional fleet and operational expertise."

The new 50,000 DWT product tankers are based on a proven Hyundai Mipo Dockyards (HMD) design that incorporates numerous fuel efficiency features, flexible cargo capability, and the latest regulatory requirements. The vessels will be constructed with consideration for the use of LNG for propulsion in the future. HMD and APSI collaborated on the successful construction of 14 product tankers at APSI between 2007 and 2013. Design and procurement activities are already underway to support the start of construction of Crowley's first newly-contracted tanker in January 2014.

APSI expects to invest in the partnership for the first four vessels, consistent with the requirements of the Jones Act. Crowley will maintain control over the ownership, technical operation, and commercial management of the vessels. APSI and Crowley will share in the economics of the operation and chartering of the new vessels.

For more information, visit www.crowley.com.

World's first Modular Capture Vessel, Eagle Texas, sails away from Drydocks World

Drydocks World, the well-established international service provider, announced that the world's first Modular Capture Vessel (MCV), Eagle Texas, sailed away from its yard. The conversion of the AFRA max tanker was carried out by Drydocks World — Dubai and was completed for Singapore-based AET, a global leader in petroleum shipping. It is the first of two similar projects. AET is under a 20-year agreement with Marine Well Containment Company (MWCC), a consortium of 10 world-renowned companies composed of Anadarko, Apache, BHP Billiton, BP, Chevron, ConocoPhillips, ExxonMobil, Hess, Shell, and Statoil — all committed to safe deepwater drilling in the U.S. Gulf of Mexico. The MCVs will operate as normal tankers in the U.S. Gulf of Mexico and would be deployed for containment services in the event of a deepwater well control incident in the region.

The amount of steel used for the project is 2,530 tonnes with 19.68 km of pipes and 292 km of electrical cables also utilized. The MCV will have 700,000 barrels of liquid storage capaci-



ty and can process, store and offload the liquids to shuttle tankers. Modular, adaptable process equipment installed on the MCV will connect to the riser assembly that directs the flow from the subsea components. The process equipment will separate the liquids from gas, safely store the liquids, and flare the gas. Then the liquids will be offloaded to shuttle tankers that will transport the liquids to shore.

For more information, visit www.drydocks.gov.ae.

Study shows U.S. cruise industry a substantial contributor to economy

The North American cruise industry continued to be a substantial contributor to the U.S. economy in 2012 according to an independent study commissioned

by Cruise Lines International Association (CLIA). The study shows that CLIA's 26 North American member lines and their passengers and crew contributed over \$42 billion in total U.S. economic impact, a 4.6% increase from 2011. In addition, the cruise industry generated 356,311 jobs, paying a record \$17.4 billion in wages to American workers.

After a strong rebound in 2010 and 2011 from the recession-induced impacts of 2009, the North American cruise industry continued to expand in 2012. According to the study, CLIA's North American member cruise lines carried a record 16.95 million passengers on cruises worldwide in 2012, a 3.8% increase from the previous year. More than 10 million passengers embarked on their cruises at U.S. ports — another all-time high — delivering significant economic benefits to local and port communities nationwide. Every week, cruise ships provision in U.S. ports prior to embarking on an itinerary and purchase products and services from American business across the nation.

For more information, visit www.cruising.org.

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Kongsberg Globalsim installs world's largest crane simulator

Kongsberg Globalsim completed its multi-year project to build and install the world's largest crane training simulator for the National Ports Agency (ANP) of Morocco. The simulator uses a 10-m dome and 12 projectors to create an immersive virtual training environment in which ANP's crane operators can safely and effectively learn to operate new equipment. As the simulator is integrated into its training regimen, ANP expects to dramatically reduce both the training time required to produce competent operators and the number of accidents caused by poor handling of heavy port equipment.

The simulator boasts one of the most realistic virtual training arenas in the world. Much of that realism comes from detailed customizations produced by Kongsberg Globalsim to replicate the port of Casablanca. The simulated cranes match the cranes used in the port. The simulation's layout matches the layout of the real port. Even the city's skyline, complete with the pointed spires of mosques, is recreated on the horizon.

"Building the arena for ANP was an interesting project," says John Olsen, one of the lead engineers from Kongsberg Globalsim. "The port is very close to the Hassan II mosque. Because of this, we inserted a full 3D model of the mosque into the scene outside the normal port working area, and it is visible from the cab for each of the simulators. In addition to that, our arenas have ground markings and rail placement to match the actual crane models and give the simulator a realistic area in which to work."

The ANP system is one of the most diverse training simulators in the world, being able to simulate six different crane models. This means that it can be used in the morning to train ship-to-shore crane operators and then in the afternoon to train straddle carrier operators.

For more information, visit www.km.kongsberg.com.

Clean hybrid technology gets EPA verification

The EPA has verified the XeroPoint Hybrid Tug Retrofit System (XeroPoint) pioneered by Foss

Maritime of Seattle, Washington and Aspin Kemp and Associates (AKA) of Stratford, PEI. The system captured the attention of the maritime industry for its potential economic and environmental savings as a Foss harbor tug was undergoing extensive testing in the ports of Long Beach and Los Angeles.

The rigorous EPA verification process ensures the XeroPoint hybrid system is an effective choice for use on any U.S. harbor tug seeking to meet the nation's highest environmental standards.

The hybrid retrofit Campbell Foss has been working in southern California since 2012, using ultra-low sulfur diesel fuel. The University of California-Riverside, which has been testing the Foss Maritime/AKA system, found:

- A fuel savings of roughly 30%;
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- A 35% reduction in carbon monoxide.

For more information, visit www.foss.com.

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Deep-sea Miners Engage Physical Oceanography

By: Rick Cole, President, RDSEA International, Inc.

RDSEA International, Inc. (RDSEA) (St. Pete Beach, Florida) has recently been engaged by the Seafloor Massive Sulfide (SMS) exploration community (i.e., deep-sea mining). RDSEA is an oceanographic and ocean engineering consulting company that provides physical oceanographic data and support to the academic, federal, and private oceanographic, engineering, and offshore energy communities worldwide. Deep-sea mineral explorers, new to our list of clientele, search out submarine hydrothermal vents near plate boundaries long recognized to contain SMS deposits of high-grade copper, zinc, silver, gold, and other trace minerals typically found in water depths exceeding 1,000 m. In parallel to AUV and ROV efforts, drilling operations, and multibeam bathymetric surveys of the seafloor, RDSEA is contracted to provide complete water column current velocity and direction of mining tenement areas based on in situ measurements (Acoustic Doppler Current Profiler [ADCP] deployments), including analysis and description of the variation in currents throughout the record. Analysis of water column conductivity/temperature/depth (CTD) data collected during exploration cruises is included. Wind and wave hind-cast modeling is used to complement the full metocean picture and physical structure of the ocean surface within each mining region. Geochemistry studies will also be conducted simultaneously by collecting flux of settling particulate matter from the seafloor within the tenements and on moorings using sediment traps with rotating carousels at specified deployment intervals.

A new ocean industry is quickly forming with much attention being directed towards deep-sea mining. The majority (basically 100%) of the minerals and metals used today in our world come from terrestrial-based mines. Some forecasts show that offshore mining can be more economically efficient and environmentally friendly. Questions concerning environmental sustainability, the impact on ecosystems, and ocean policies are on the table for discussion. Once deemed too deep, SMS deposits are now found within depths worthy of investigation (1,000 to 2,000 m). These deposits are associated with both active and inactive hydrothermal vents containing high concentrations of mineral resources. Venting in the seafloor allows cold water to flow in and hot seawater to flow out, creating a plume or hard chimney-like structure known as a “black smoker.”

Smokers

SMS are formed as cold seawater moves down through cracks in the seafloor and is superheated by the molten magma deep within the crust. This heated water mixes with cold, 2°C bottom water, reacts, and forms iron sulfides and other metals to precipitate along the ridge of the vent fields. Active hydrothermal vents support productive concentrations of various animals and microbes that have evolved under some of the most extreme conditions on Earth. Much research has been conducted surrounding hydrothermal vent ecosystems since the first discovery

in the late 1970s by scientists off the coast of Ecuador along with the unusual sea life that lives in this environment. The first “smoker” was seen by divers on board the submersible Alvin in 1979 along the East Pacific Rise (WHOI).



Black smoker (Photo courtesy of WHOI).

The environment

Potential mining operations now being discussed revolve around “inactive” vent fields where some data already exist and are slightly understood. Environmental concerns are high pertaining to the exploration and extraction of SMS deposits, including physical disturbance of the seafloor, acoustic impacts, waste disposal, surface support vessel, and subsurface machinery issues to name a few. Until all environmental assessments are in and studied, this new industry will not know its full impact on our oceans and seas. Regulations on deep-sea mining are governed through the United Nations Conventions on the Law of the Sea, enacted in 1994. The convention set up the International Seabed Authority (ISA), which regulates deep-sea mining ventures outside of each nation’s Exclusive Economic Zone (EEZ). The impacts of deep-sea mining will ultimately depend on the type of technology used.

Mining technology

Deep-sea mining can begin exploration with successful technology already in use in the field. Active vents can be located by detecting compounds and elements that occur around the source. Locating a plume is also a good lead. Finding inactive venting is more challenging, but they are usually found close by active areas. SMS deposits can then be located using side-scan sonar and/or seismic survey technology along with towed cameras. Sampling a mound is done by employment of ROVs or submersibles that have various tools on board to take samples of

the mining region and transport them to the surface for testing. Full drilling operations are then conducted to determine the volume of deposits throughout the area.



Offshore industry vessel support, such as the Skandi Hawk, designed for offshore construction, ROV, and seafloor survey work in blue-water environments.

SMS extraction

Seafloor terrain may not always be accommodating. Normally, regions of mining have undergone major plate tectonic activity and will require a combination of technologies for removal. The major tool used for SMS mining is the ROV. Breaking up the deposits is done using a “crusher,” similar to that used by the coal mining industry, also known as a “cutter drum.” A lifting system is then installed to get the SMS to the surface and prepared for processing. A couple of designs are planned: 1) a riser pipe using cold deep-sea water transports ore to a surface support vessel, samples are removed, and the lift water is returned to the sea or 2) the continuous-line-bucket (CLB) approach where buckets connected to a wire are conveyed to the surface. All proposed processes are under review as per environmental impact. The SMS will then be transported to shore and prepared for processing.



Rick Cole with RDSEA's “Dual-ADCP Buoy System” (2 x 75kHz and CTD) Provides Water-Column Current Velocity and Direction Profiles of 1,000 Meters or Greater.

RDSEA's tasks

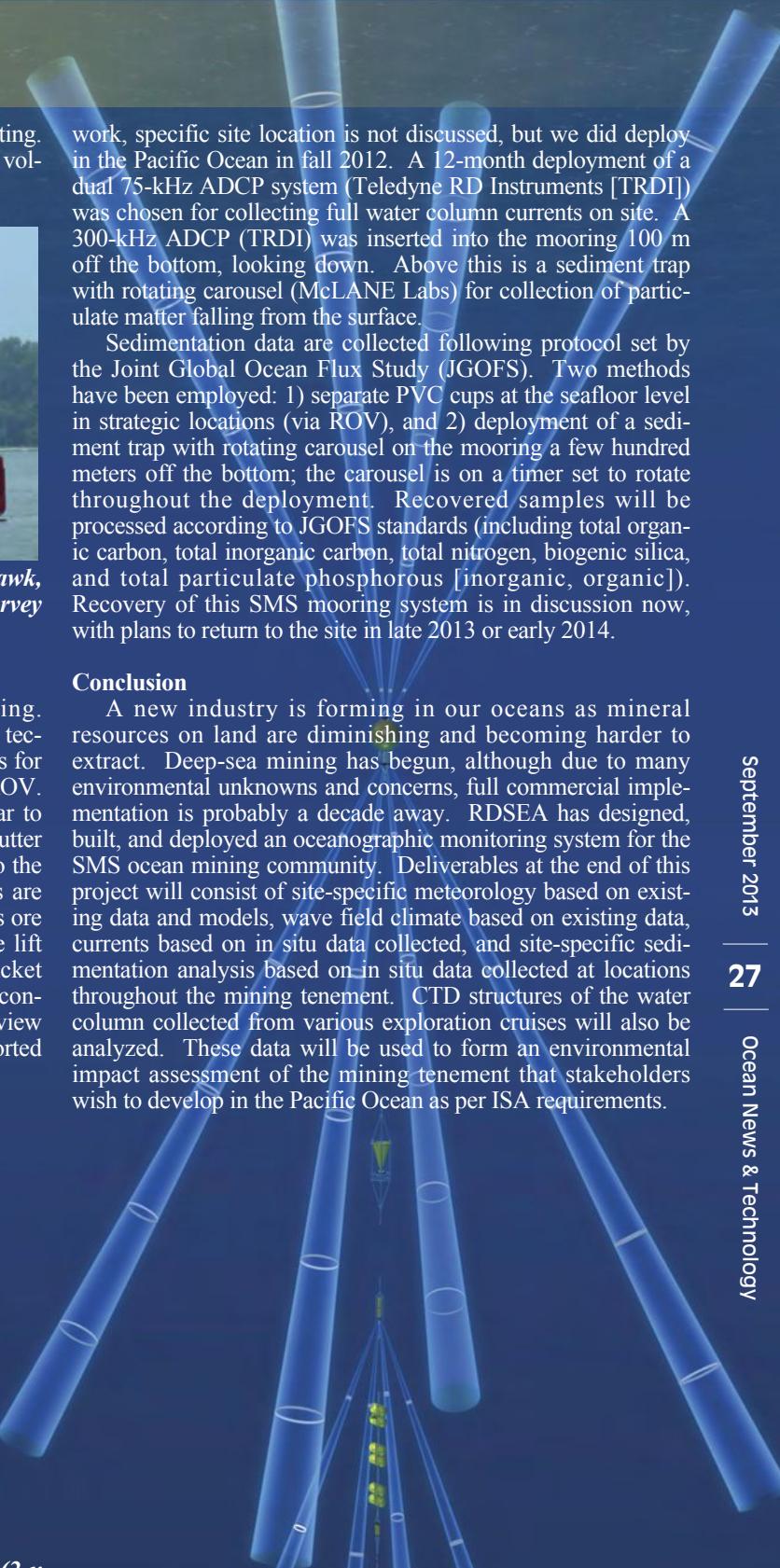
Oceanographic monitoring of deep-sea mining tenements is critical. Understanding water column physics and bottom boundary layer dynamics of the region will help with engineering and infrastructure design. Due to the sensitivity of this

work, specific site location is not discussed, but we did deploy in the Pacific Ocean in fall 2012. A 12-month deployment of a dual 75-kHz ADCP system (Teledyne RD Instruments [TRDI]) was chosen for collecting full water column currents on site. A 300-kHz ADCP (TRDI) was inserted into the mooring 100 m off the bottom, looking down. Above this is a sediment trap with rotating carousel (McLANE Labs) for collection of particulate matter falling from the surface.

Sedimentation data are collected following protocol set by the Joint Global Ocean Flux Study (JGOFS). Two methods have been employed: 1) separate PVC cups at the seafloor level in strategic locations (via ROV), and 2) deployment of a sediment trap with rotating carousel on the mooring a few hundred meters off the bottom; the carousel is on a timer set to rotate throughout the deployment. Recovered samples will be processed according to JGOFS standards (including total organic carbon, total inorganic carbon, total nitrogen, biogenic silica, and total particulate phosphorous [inorganic, organic]). Recovery of this SMS mooring system is in discussion now, with plans to return to the site in late 2013 or early 2014.

Conclusion

A new industry is forming in our oceans as mineral resources on land are diminishing and becoming harder to extract. Deep-sea mining has begun, although due to many environmental unknowns and concerns, full commercial implementation is probably a decade away. RDSEA has designed, built, and deployed an oceanographic monitoring system for the SMS ocean mining community. Deliverables at the end of this project will consist of site-specific meteorology based on existing data and models, wave field climate based on existing data, currents based on in situ data collected, and site-specific sedimentation analysis based on in situ data collected at locations throughout the mining tenement. CTD structures of the water column collected from various exploration cruises will also be analyzed. These data will be used to form an environmental impact assessment of the mining tenement that stakeholders wish to develop in the Pacific Ocean as per ISA requirements.



Acknowledgements

We thank all stakeholders of this particular project for the opportunity to do what we do — “measure the ocean.” Also, Woods Hole Oceanographic Institute, Precious Metals from Deep-Sea Vents, Miningtechnology.com, Buried Treasure, Deep Sea Mining, Infographics: Deep Sea Mining Poses Environmental Risks: A Case Study in Papua New Guinea (K. Birney et al.); and collaboration with the Marine Sediments Research Lab., Dept. of Geological Sciences, Univ. of South Carolina. Manufacturer support from Mooring Systems, Inc., Teledyne RD Instruments, Sea-Bird Electronics, McLANE Labs, ROMOR Ocean Solutions, EdgeTech, and Xeos Technologies, Inc., and PixelPresto.

NOAA report highlights climate change threats to nation's estuaries

The nation's 28 National Estuarine Research Reserves (NERR) are experiencing the negative effects of human and climate-related stressors according to a new NOAA research report from the National Ocean Service. The national study, Climate Sensitivity of the National Estuarine Research Reserve System, points to three east coast reserves, Sapelo Island NERR in Georgia, ACE Basin NERR in South Carolina and Waquoit Bay NERR in Massachusetts, and the Tijuana River NERR on the California-Mexico border, as the most sensitive to climate change. "The National Estuarine Research Reserves are uniquely positioned across the U.S. to assess ongoing climate change in our nation's estuaries, which is the degree to which the natural resources and the local communities who depend on them are affected by changing climate conditions," said Dwight Trueblood, Ph.D. a co-author and NOAA program manager for the study. "This information is important to helping coastal managers and local community leaders make informed decisions about the best ways for coastal communities to adapt to climate change." Estuaries are places where rivers meet the sea, providing nursery habitat for fish and shellfish while buffering many coastal communities from the impacts of coastal storms and sea level rise. The climate exposure of each reserve provides first alarm indicators about the effects of climate change on the coastal ecosystems. Ongoing research at each of the reserves provides real-time data about how climate change impacts these important natural resources. Almost 40% of all Americans, or about 123 million people, live in the counties directly along the shoreline and depend on these resources for food, jobs, storm protection, and recreation. Approximately 50%, or \$6.6 trillion, of the nation's gross domestic product comes from coastal watershed counties that support more than 51 million jobs. The study, funded by NOAA's Climate Program Office, was conducted by a collaborative, interdisciplinary team of investigators from the University of Wisconsin, NOAA's National Centers for Coastal Ocean Science, and Office of Ocean and Coastal Resource Management working with staff across the National Estuarine Research Reserve System. The full report can be found online at www.nerrs.noaa.gov.

Scientists discover new variability in iron supply to the oceans with climate implications

The supply of dissolved iron to oceans around continental shelves has been found to be more variable by region than previously believed — with implications for future climate prediction. Iron is key to the removal of carbon dioxide from the Earth's atmosphere as it promotes the growth of microscopic marine plants (phytoplankton), which mop up the greenhouse gas and lock it away in the ocean. A new study, led by researchers based at the National Oceanography Centre Southampton, has found that the amount of dissolved iron released into the ocean from continental margins displays variability not currently captured by ocean-climate prediction models. This could alter predictions of future climate change because iron, a key micronutrient, plays an important role in the global carbon cycle. Previously assumed to reflect rates of microbial activity, the study found that the amount of iron leaking from continental margins (the seafloor sediments close to continents) is actually far more varied between regions because of local differences in weathering and erosion on land. The results of the study was published recently in *Nature Communications*. "Iron acts like a giant lever on marine life storing carbon," says Dr. Will Homoky, lead author and post-doctoral research fellow at University of Southampton Ocean and Earth Science, which is based at the Centre. "It switches on growth of microscopic marine plants, which extract carbon dioxide from our atmosphere and lock it away in the ocean." Continental margins are a major source of dissolved iron to the oceans and, therefore, an important factor for climate prediction models. But until now, measurements have only been taken in a limited number of regions across the globe, all of which have been characterised by low oxygen levels and high sedimentation rates. The present study focussed on a region with contrasting environmental conditions — in Atlantic waters off the coast of South Africa.

Rapid upper ocean warming linked to declining aerosols



Deploying a deep-ocean mooring system in the Indian Ocean
(Photo courtesy of CSIRO).

Australian scientists have identified causes of a rapid warming in the upper subtropical oceans of the Southern Hemisphere. They partly attribute the observed warming and preceding cooling trends to ocean circulation changes induced by global greenhouse gas emissions and aerosols predominantly generated in the Northern Hemisphere from human activity.

The research, by scientists from CSIRO and the University of NSW, was published in *Scientific Reports*.

Mr. Tim Cowan, lead author of the study, says his group was initially interested in the three decade long cooling below the surface of the Southern Hemisphere subtropical oceans from the 1960s and 1990s. "But what really caught our eye was a rapid warming of these subtropical oceans from the mid-1990s, most noticeably in the Indian Ocean between 300 m to 1,000 m depth," said Mr. Cowan.

This had the research team asking whether this rapid warming was partly a response to greenhouse gases overcoming the cooling effect of aerosols that peaked globally in the 1980s due to the introduction of clean air legislation across the United States and Europe.

To test this, the researchers examined more than 40 state-of-the-art climate simulations that included historical changes to greenhouse gases and aerosols over the 20th century. "What we found was that the models do a good job at simulating the late 20th century cooling and rapid warming in the subtropical southern Atlantic and Pacific Oceans, however they show an around 30-year delay in the warming in the Indian Ocean," said Mr. Cowan.

"This delay in the modeled Indian Ocean warming is likely due to the presence of atmospheric aerosols generated through transport emissions, biomass burning, and industrial smog, together with natural emissions of sea salt and dust — these were also the main cause of the late 20th century subtropical Indian Ocean below-surface cooling," said Mr. Cowan.

The research has been supported by the CSIRO Wealth from Oceans National Research Flagship, The Australian Climate Change Science Program and the Australian Research Council Centre of Excellence in Climate System Science.

For more information, visit www.csiro.au.

Explorers discover northern-most Atlantic seeps and deep-sea canyon diversity off U.S.

Ocean explorers in July on the NOAA Ship Okeanos Explorer discovered a wide diversity of seafloor features and communities of life in the largely unexplored deep-sea canyons off the northeast U.S. coast.

Canyons represent some of the most striking features of the continental slope off the U.S. east coast and may also be among the most productive areas in the deep sea. Organic matter and nutrient-rich sediments are often concentrated in these areas and strong currents flow through the steep and rugged terrain of the canyons, exposing hard substrates. With an increase in food availability and a variety of different habitat types across varying depths, submarine canyons may contain higher biodiversity and biomass than the adjacent continental slope and are likely places to observe deep-sea corals, sponges, and other deep-sea marine organisms.

During the July leg of the expedition, the ship's multibeam sonar detected bubbles rising from the seafloor in several locations about 90 nmi southeast

of Nantucket, Massachusetts. These water-column plumes were traced to seafloor seeps where explorers observed chemosynthetic communities of life supported by chemicals rather than by sunlight. These are the northern-most seeps detected to date on the U.S. Atlantic margin.

For more information, visit www.oceanexplorer.noaa.gov/okeanos.

Novel worm community affects methane release in ocean

Scientists have discovered a supercharged methane seep in the ocean off New Zealand that has created its own unique food web, resulting in much more methane escaping from the ocean floor into the water column.

Most of that methane, a greenhouse gas 23 times more potent than carbon dioxide at warming our atmosphere, is likely consumed by biological activity in the water, the scientists say. Thus, it will not make it into the atmosphere, where it could exacerbate global warming. However, the discovery does highlight scientists' limited understanding of the global methane cycle — and specifically the biological interactions that cre-

ate the stability of the ocean system.

Results of the study, which was funded primarily by the National Oceanic and Atmospheric Administration and the Federal Ministry of Education and Research in Germany, have been published online in the journal Limnology and Oceanography.

For more information, visit www.oregonstate.edu.

Disappearance of coral reefs, drastically altered marine food web on the horizon

If history's closest analog is any indication, the look of the oceans will change drastically in the future as the coming greenhouse world alters marine food webs and gives certain species advantages over others.

Scripps Institution of Oceanography, UC San Diego, paleobiologist Richard Norris and colleagues show that the ancient greenhouse world had few large reefs, a poorly oxygenated ocean, tropical surface waters like a hot tub, and food webs that did not sustain the abundance of large sharks, whales, seabirds, and seals of the modern ocean. Aspects of this greenhouse ocean could reappear

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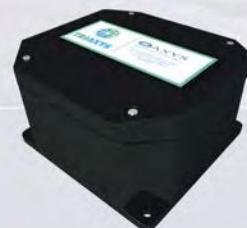
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in the future if greenhouse gases continue to rise at current accelerating rates.

The researchers base their projections on what is known about the “greenhouse world” of 50 million years ago when levels of greenhouse gases in the atmosphere were much higher than those that have been present during human history. Their review article appears in a special edition of the journal *Science* titled “Natural Systems in Changing Climates.”

For the past million years, atmospheric CO₂ concentrations have never exceeded 280 ppm, but industrialization, forest clearing, agriculture, and other human activities have rapidly increased concentrations of CO₂ and other gases known to create a “greenhouse” effect that traps heat in the atmosphere. For several days in May 2013, CO₂ levels exceeded 400 ppm for the first time in human history and that milestone could be left well behind in the next decades. At its current pace, Earth could recreate the CO₂ content of the atmosphere in the greenhouse world in just 80 years.

For more information, visit www.scripps.ucsd.edu.

First global atlas of marine plankton reveals remarkable underwater world

Under the microscope, they look like they could be from another planet, but these microscopic organisms inhabit the depths of our oceans in nearly infinite numbers.

To begin to identify where, when, and how much oceanic plankton can be found around the globe, a group of international researchers have compiled the first-ever global atlas cataloging marine plankton ranging in size from bacteria to jellyfish. The atlas was published in a special issue of the journal *Earth System Science Data*.

The atlas, known as the Marine Ecosystem Biomass Data (MAREDAT), is the first step towards a comprehensive inventory of the marine biota based on counts of individual cells or organisms. It will help researchers better understand marine biodiversity for conservation and monitoring and is the result of collaborations between scientists at the Woods Hole Oceanographic Institution (WHOI), the University of East Anglia, ETH Zurich, University of Manchester, Université d'Angers and CNRS, and the U.S. National Oceanic and Atmospheric

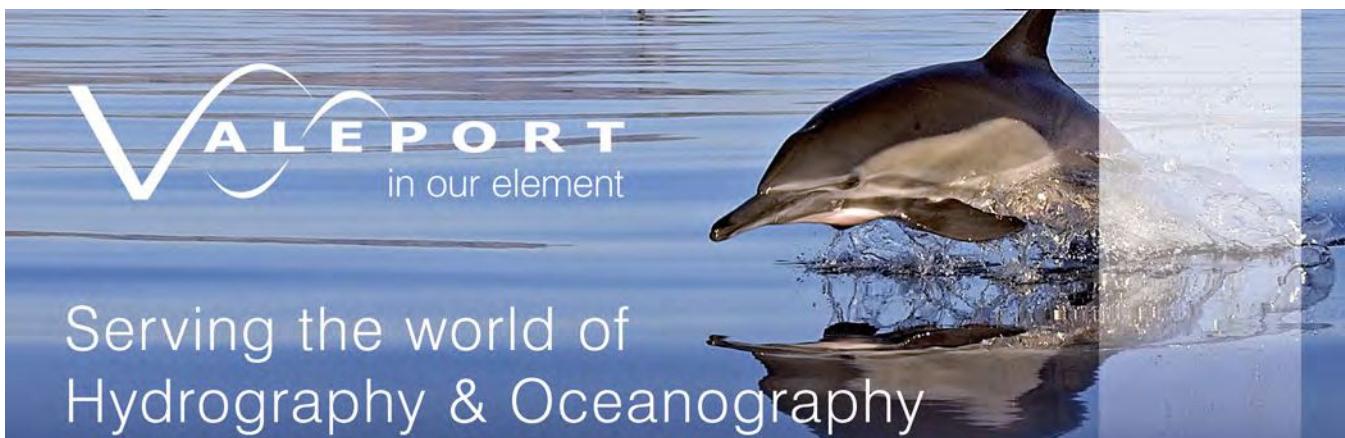
Administration (NOAA), together with many other scientific institutions around the world.

“One of the more surprising findings from the study is that phytoplankton and zooplankton biomass are roughly the same size in the upper ocean. Compare that to more familiar land ecosystems where the biomass of plants greatly exceeds that of animals and it’s pretty illuminating,” says WHOI senior scientist and marine chemist Scott Doney, a collaborator on the project.

The first edition of the MAREDAT global plankton atlas took 3 years to compile and combines information from half a million data points. The data will have a wide range of applications across ocean and climate science, including helping scientists create computer models to predict the impact of climate change and ocean acidification.

The MAREDAT database is open-source and available through a public website. Thus far, it has cataloged about half a million measurements of plankton biomass, which are subdivided into 12 broad plankton groups. Each group has a separate database.

To access the database, please visit www.pangaea.de.



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Innovations in Buoy Design: *Sound Solutions*

By: S.K. Woodbury, ACM, FCMOS

The invention of the autonomous profiling float and its proliferation in the world's oceans in support of such global broad-scale initiatives as the ARGO float array has created an opportunity for engineers, oceanographers, and scientists to adapt the technology to satisfy a number of other ocean data collection needs. An innovative adaptation of the profiling float technology is the Profiling Acoustic Buoyant Lagrangian Observing system (PABLO) Float (Figure 1) developed in 2013 by MetOcean Data Systems and JASCO Applied Sciences in Canada. It collects acoustic, temperature, pressure, and position data for transmission via the Iridium satellite system.

Scientists are interested in evaluating the serious threats of anthropogenic sounds (e.g., sonars, dredging, shipping, and seismic air guns) on marine environments. The PABLO float samples (or measures) environmental acoustic ambient noise. The PABLO float can play a role in the long-term characterization of ocean soundscapes. This information is critical to assessing short- and long-term changes in anthropogenic sound in the ocean.

PABLO gathers acoustic profiles for the purpose of analyzing sound propagation in the top 1,000 m of the ocean. Configured to collect data on a daily basis, PABLO has a long mission life, operating for close to a year while performing 300 profiles called acoustic window cycles.

Acoustic specifications

Acoustic data are processed using JASCO's Advanced Multi-channel Acoustic Recorder (AMAR). Collected acoustic data are the 1/3 octave band noise curve from 10 to 8,000 Hz; 5%, 50%, and 95% histograms; the maximum value; maximum peak-to-peak value; and SPL. The sensitivity range of the acoustic sensor suite is 30 to 165dB re 1 μ Pa across each band. PABLO uses a Geospectrum high-frequency omni-directional hydrophone (see shorter instrument on the top of Figure 1) and an RBR temperature and pressure sensor suite.

Figure 2 shows a schematic representation of PABLO's depth-cycling during the mission. The depths at which the acoustic samples (windows) are taken, the number of acoustics windows at each depth, and the number of cycles the float is to perform in a given day can be programmed. PABLO can be set to a maximum of five acoustic depths, with as many as two acoustic windows per depth — in other words, each cycle could consist of as many as 10 windows. Each acoustic window is 1 min. long and the transmitted data are an average over the recording period. At each acoustic window, PABLO collects acoustic, pressure, and temperature data and saves them in its memory.



Figure 1. PABLO Float.

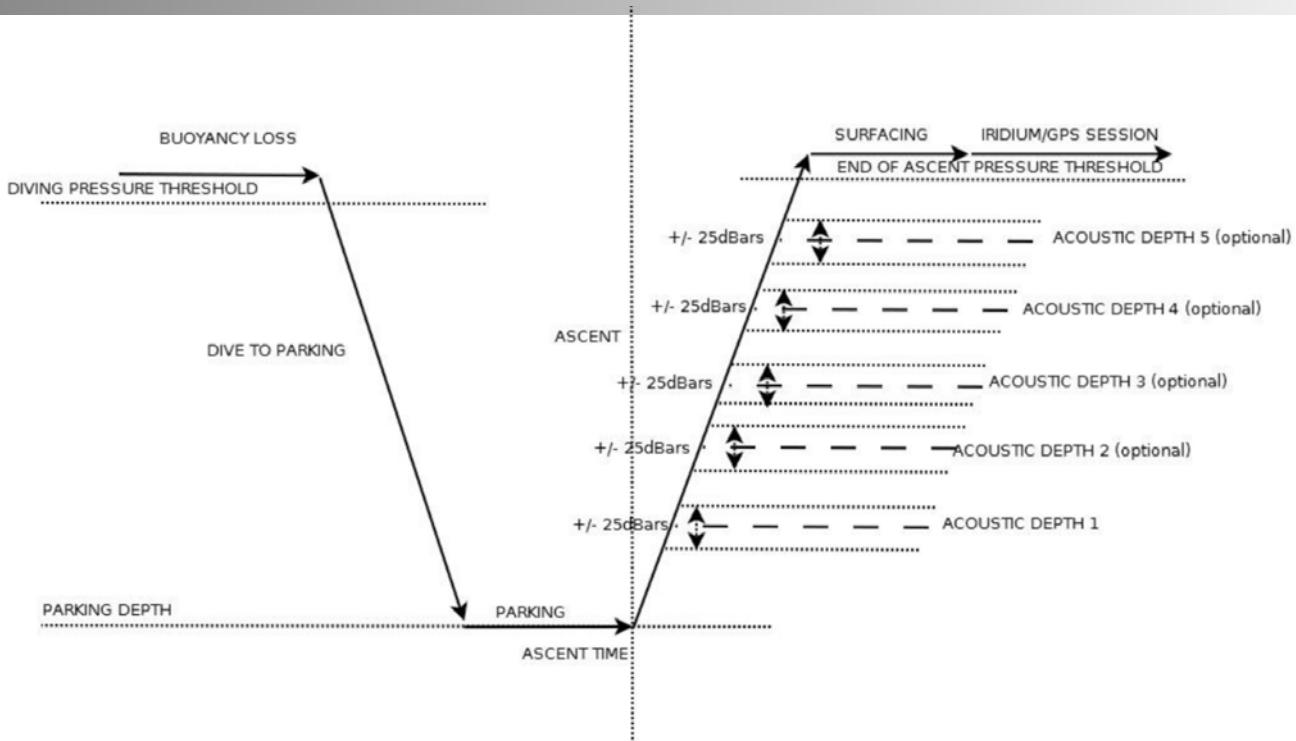


Figure 2. A schematic representation of PABLO's depth-cycling during the mission.

PABLO is designed to drift with the current, meaning it is not stationary. The user can specify the depth at which the system drifts between descent and acoustic windows. Drifting depth is referred to as parking depth. After drifting at parking depth, the float proceeds to the depth at which the first acoustic window is to begin; the first acoustic window depth is not necessarily the same as the parking depth. At each acoustic window, PABLO collects acoustic, pressure, and temperature data and saves them in its memory. After each ascent, PABLO determines its location at the surface using the built-in GPS receiver.

PABLO design

The cylinder-shaped submersible float is a lightweight (48 lb) scientific platform. It moves by changing its buoyancy, which is achieved by a change in its overall volume. To ascend, a high-pressure pump increases the buoyancy by transferring oil to an external bladder. Conversely, a manifold valve is responsible for achieving negative buoyancy by decreasing the volume of the external bladder. It is a closed system that requires no maintenance. This high efficiency and innovative buoyancy management pump and valve system allows for an increased sensor payload.

Acoustic data transmission

After each ascent, PABLO determines its location at the surface using the built-in GPS receiver located on the top of the float. PABLO then transmits its saved data, including the GPS position, to the Iridium satellite system using Iridium's short burst data (SBD) service. Up to 2

KB of data can be sent using SBD. Since Iridium data transfers are generally very fast, the float spends a minimal amount of time on the surface, thereby limiting its vulnerability to shipping and fishing hazards. This allows for quicker and more cost-effective data transmissions. MetOcean uses JouBeh Technologies as its Iridium service provider, and data are readily accessible from the JouBeh back office.

Graphical User Interface (GUI)

A portable GUI is supplied with each float. It allows the user to adjust the mission parameters prior to deployment using wireless Bluetooth technology for communication between the float and the GUI. It includes a validation step to ensure any changes to the parameters will not adversely affect unit operation. After deployment, it is possible to change the mission parameters by using Over The Air Commands (OTA) via the Iridium network. There is an online lifetime estimator to show the impact changing the mission parameters would have on the life expectancy of the float.

Conclusions

The ability to listen to the upper layer of the ocean has been significantly advanced by incorporating acoustic measurement devices into profiling float technology. The PABLO float's innovative buoyancy system showcases a state-of-the-art design. The use of the Iridium SBD transmission system ensures that scientists will receive important new datasets containing sound, pressure, temperature, and position on a daily basis while the PABLO float is in operation.

Offshore Wind Spending Set to Average Almost €15 Billion per Year

By: Dmitry Dovgan, Douglas-Westwood

Douglas-Westwood (DW) has released the 5th edition of the World Offshore Wind Market publication where we forecast offshore wind installations averaging 3.2 GW per year over the next 10 years. Capital expenditure is expected to hit a peak of €18 billion in 2016. The market will remain highly concentrated in the Northern European region, particularly in UK and German waters. The Chinese market will also grow quickly during the forecast period.

Why offshore wind?

Due to low carbon targets and a need to secure new energy supplies, offshore wind has become an important component in the future electricity generation mix for a number of countries, mainly in the European region. Offshore wind developments are potentially attractive to project developers due to a number of factors:

- The large, untapped offshore resource allows building at utility-scale with installed capacities of hundreds of megawatts (MW).
- In comparison to onshore sites, average wind speeds are both higher and sustained over longer periods and wind flow is less turbulent, leading to better energy yields.
- When implemented as part of a balanced energy strategy, offshore wind increases diversity of supply and reduces fuel imports.
- When sited far from shore, the theory is that there will be shorter planning timelines in comparison to other forms of renewable energy such as onshore wind.

Offshore wind projects

The offshore wind project life-cycle can be split into three main phases: 1) the initial phase of capital expenditure (Capex); 2) a lengthy period of expenditure to maintain the offshore wind farm (Opex); and 3) a second Capex phase required to decommission the wind farm.

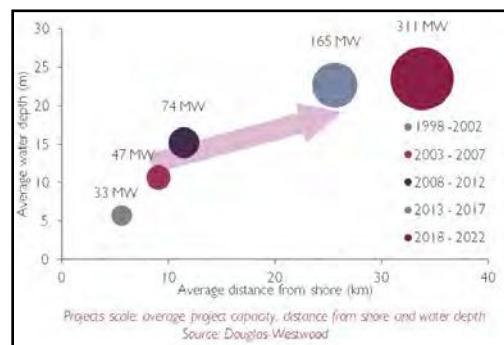
The initial build phase encompasses all investments and activities related to planning, development, procurement, and installation processes, resulting in a fully commissioned, electricity-generating offshore wind farm. The duration of this phase can be highly variable, but timelines of 10 years are not unheard of.

The Opex phase of an offshore wind farm can last 20 years or even longer, at the end of which the operator may decide to "repower" or decommission the project. To date, no large-scale offshore wind farms have been decommissioned.

Increasing project scale has been a major underlying trend in the industry. Early offshore wind farms were located in water depths of 10 m or less and were typically less than 5 km from shore. Capacity, water depth, and distance from shore have all been increasing since these early projects.

The following chart shows how this trend is set to continue over the next 10 years. For example, the majority of UK Round 3 projects are over 30 km from shore and over 1,000

MW in size. In total, the nine designated Round 3 zones represent over 30 GW of potential capacity and would require capital expenditure levels of more than £80 billion (€93.6 billion).



Offshore wind costs

High cost levels are one of the major areas of concern in this emerging industry. At the present time, the cost of energy from offshore wind is significantly higher than for conventional thermal power plants (gas and coal) and even onshore wind.

Due to high cost levels, offshore wind requires financial support, often referred to as subsidies. As a consequence, any uncertainty in this area can cause a slowdown in activity, as is being experienced in the UK market due to the ongoing Electricity Market Reform (EMR) process being undertaken by the current government.

Evidence of cost reduction is limited, although our analysis of upcoming projects indicates that Capex rates may be starting to plateau. Opex rates are more difficult to assess as sustained operational experience is limited and results are opaquely reported.

From a financing perspective, the high cost levels and risks associated with offshore construction, new wind turbine technology, and offshore operations, have made it difficult for project developers to tap into new sources of capital. The current reliance on the public sector to provide financial support, both directly and indirectly, and on global utilities to self-fund projects looks to be unsustainable in the long run.

Offshore wind turbines

The wind turbine represents the largest share of project Capex and is, therefore, a focus area for technology development. In the early years, turbines were variations of onshore machines, whereas the latest models are increasingly designed around the specific requirements of the offshore environment. Examples of an offshore-specific approach can include building redundancy into the system and adding air treatment systems to filter the corrosive marine atmosphere.

Building further from shore also allows wind turbine units to be larger than their onshore counterparts. The average power rating for offshore wind turbines is currently approaching 4 MW, and this trend is expected to continue in the future

as over 75% of the new offshore wind turbine models announced up to 2012 had a rated capacity of over 5 MW. Although the underlying trend is clear, commercialization of larger wind turbines has tended to be slower than expected.

As power capacity increases, the dimensions and weights of the major components also increase, thus creating a unique set of challenges for foundation designers, installation contractors, and maintenance crews. In the medium term, wind turbine blade diameters will increase from 90 m to more than 150 m and the weight of the nacelle (hub unit/generator) will increase from 100 tonnes to more than 300 tonnes.

Offshore wind installation vessels

In order to install offshore wind turbines and their associated support structures, installation contractors and even energy companies have been building a fleet of purpose-designed vessels. At the mid-point of 2011, there were almost a dozen wind turbine installation vessels under construction around the world. Consequently, a large number of highly specialized vessels have come to market in recent times in expectation of future growth.

This present phase of intense construction activity is coming to an end, and new vessel orders have slowed down with at least one major installation contractor stating that it has put a hold on its new-build plans due to potential oversupply in the future.

While the most recently completed vessels are similar in concept, there does appear to be a smaller subset at the very high end of the market, which have been "future-proofed" to carry out installation of very large wind turbines with capacities of 7.5 MW or more. These vessels include the HGO Innovation and Swire's sister ships the Pacific Orca and Pacific Osprey. Project developers feel that these vessels will be the most highly utilized as the market develops.

Market Forecast

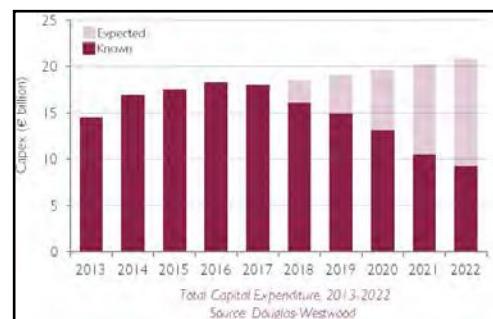
Due to the uncertainties in the industry and the slow growth experienced historically, Douglas-Westwood takes a conservative view when undertaking its market modeling, with particular sensitivity placed on the more speculative projects. However, there is a positive upward trend with significant expenditure expected, which has attracted many of the largest industrial players that are already involved in the onshore wind industry.

We forecast activity both by country and by a multitude of category areas such as wind turbines and installation vessel requirements. Several highlights from the report are provided below:

- The market is anticipated to grow steadily from 2013 to 2022, adding 3.2 GW on average each year;
- Total cumulative capacity is expected to increase more than five-fold in the next 10 years;
- From 2013 to 2022, the UK, Germany, and China will account for 64% of all offshore wind installations;
- Assuming that a solution is finalized with regard to recent grid connection issues, Germany is anticipated to become the largest offshore wind market by 2022;
- New emerging markets, including France and Sweden, are expected to overtake established offshore wind markets such as Belgium and Denmark;

- Based on our database of projects, we forecast that annual Capex levels will exceed €18 billion by 2016; and

- Beyond 2016, the forecast Capex falls due to lower levels of visibility on projects post-2020. However, we believe that due to the strong long-term drivers for new sources of power generation, Capex will be maintained at or exceeding 2016 levels.



Conclusions

The future growth of offshore wind is highly linked to achieving meaningful cost reduction, which would, in turn, unlock investment from both project financiers and the supply chain. Unfortunately, there is no single answer to cost reduction and it will only be achieved through a combination of approaches, including increased competition in the supply chain, higher reliability levels, new maintenance strategies, and optimized wind turbine designs.

There is evidence of new approaches in areas such as contracting strategy and risk sharing between project developers. Several major industrial players, including Samsung and Areva, are also in varying stages of development of new offshore wind turbines. This development should bring increased competition to an area currently dominated by a single player. Leveraging experience from the established offshore oil and gas sector is another promising development, especially in areas such as offshore construction and maintenance activities.

Author – Dmitry Dovgan

Dovgan has a background in strategic management and business analysis, with a wide experience in the energy industry. Before joining Douglas-Westwood, he worked for a major oil and gas service provider and also applied his skills and experience at Scottish Enterprise, Scotland's main economic development agency where he worked on economic evaluation of opportunities for inward investments and delivered industry analysis in both renewables and the oil and gas sector. Prior to these, he pursued a management career with a telecom software vendor, leading business analysis and strategy functions. He studied economics in Russia and Germany and has an MBA from Aberdeen Business School.

World Offshore Wind Market Forecast 2013-2022

The report provides detailed market forecasts through to 2022 and is essential reading for companies working within the offshore wind sector. For report details, visit: www.douglas-westwood.com/shop/shop-infopage.php?longref=1158.

Learning from the First U.S. Offshore Wind Projects

- An *ON&T* Interview
by Greg Leatherman

Ten years ago, Walt Musial started the offshore renewable energy programs at the National Renewable Energy Laboratory (NREL). *ON&T* interviewed Musial about some of the latest tools coming out of NREL and how they are furthering the development of offshore wind in the United States.

ON&T: What are the main accomplishments of your program?

Musial: The Offshore Wind and Ocean Power Systems program builds on over two decades of land-based wind turbine efforts via advanced structural testing facilities and the development of design tools. For example, we developed FAST: an open-source tool for full dynamic system simulation over a range of offshore wind systems. Such tools enable industry to apply lessons learned about design feasibility as the U.S. prepares to install its first shallow water bottom-mounted offshore wind turbines and, eventually, deploys floating platforms for deepwater offshore wind applications.

ON&T: How flexible are the simulations?

Musial: Using FAST, offshore wind developers use computers to model a design and then simulate its performance under varying physical conditions, using the resulting data to improve design and predict feasibility. Not only are floating platforms much more complicated to simulate, but the stakes get higher when we simulate floating technologies because design mistakes are likely to be more expensive on large offshore wind prototypes. The simulation codes can tell us whether a turbine is going to survive in a specific location under specific stresses, and helped us winnow down the design options to only the most feasible concepts. For wind turbines and drive trains, this includes simulating loads and dynamics (like wind inflow, aerodynamics, and elasticity), waves and turbulence, and control systems as well as mooring and anchoring systems, off-design effects and array conditions, and even extreme events. For

floating turbines in particular, the latest simulations also include translational movement in three dimensions — surge, sway, and, heave — along with rotational motions including roll, pitch, and yaw.

Because the computer aided design (CAD) software NREL develops is widely used in industry, research, and consultancy applications, we help turbine designers run the models and interpret the data, especially for unproven technologies. We do this because it is critical that lessons learned from deploying the first set of designs in the field are applied to the next generation of projects: from the environmental effects to mechanical design assumptions. NREL also lends our expertise for economic analysis, for things like determining cost-effective design, to assist developers in demonstrating that new technology and innovations will meet DOE cost goals.

ON&T: How far along is offshore wind in the United States?

Musial: While there are 200 GW of projects in the regulatory pipeline worldwide, we still need to deploy that first project in the United States. In the next few years, we hope to see “steel in the water,” so that the United States can get hands on experience with technologies already successfully demonstrated in Europe. It’s difficult to guess who will be first, but Cape Wind is the first and only project that has been fully approved by BOEM to deploy in federal waters.

Cape Wind will be rated at 468 MW for the combined 130 3.6 MW Siemens-built wind turbines, and it promises to provide 75% of electricity for Cape Cod and the islands (Nantucket



and Martha's Vineyard). As the first of its kind, it's expensive to build, but it's in a relatively low-risk sheltered site, using proven technology in a proven configuration. Generally, the larger the project, the more cost effective it will be, and Cape Wind has successfully negotiated with utility companies in Massachusetts to gain approval for power purchase agreements for the lion's share (78%) of the power they intend to generate long-term. The project is finding financing, and they have all the required approvals and permits. They hope to begin construction soon.

ON&T: What other programs out there are advancing this technology?

Musial: To jumpstart innovation, DOE has sponsored multiple projects through funding opportunities focused on breaking down market barriers and developing technologies. Also, through the Office of Energy Efficiency and Renewable Energy (EERE), DOE is funding a set of Advanced Technology Demonstration Projects by committing \$180 million over 5 years to get "steel in the water." EERE awarded \$4 million via cooperative agreements to each of seven finalists who are competing to get funding for a final three spots. The government is a full-partner guiding development and matching private dollars, but each company will own the technology developed. The government will put in up to \$50 million USD for each project, but the private sector's share of investment will be at least 50%.

These DOE-sponsored demonstration projects are technically and geographically diverse. Right now, most are small, pilot projects ranging from two to nine turbines. Think of them as small-scale commercial projects, but producing energy with full scale, fully functional wind turbines that will produce the same amount of energy per unit as turbines in a large array. Three projects use floating foundations and four are on fixed bottom support structures. Three are in Federal waters and four are in State waters. One is on the west coast, one in Texas, one in the Great Lakes region, two in Maine, and one in Virginia. DOE will select only three of these projects for the final funding stage.

On a dollar per kilowatt basis, these projects are likely to be more expensive than Cape Wind. Vessel mobilization costs, the cost to run the cable to shore, supply chains, and O&M facilities all get cheaper as you move to a larger project, so the smaller projects come at a premium, but this upfront investment will reduce risk for future efforts. There's an element of showing people that it can be done, but we also learn what we can do more efficiently and what we want to do differently in the next generation of projects.

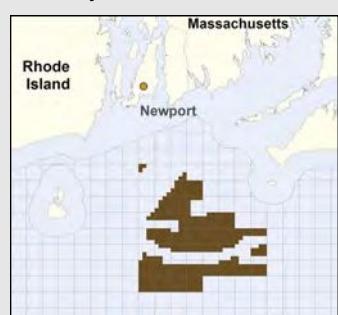
The Block Island pilot project sponsored by Deepwater Wind is another potential U.S. offshore wind project. The project there is in a unique situation because the power purchase agreement is already negotiated, they have the support of the State of Rhode Island, and the project expects to lower the cost of electricity on Block Island significantly because electricity on the island is currently all diesel generated.

Once steel is in the water, more projects are likely to follow in America: BOEM initiated the Smart from the Start program in 2010 and they are using data from that program to define Wind Energy Areas (WEAs) in several states. WEAs will be divided into parcels that BOEM can auction to interested and qualified developers. This should result in developers performing site characterization and selection, and the hope is that the process of project development will take far less time than it has for Cape Wind.

At this point, it's too early to say which projects will have the biggest impact in the United States, but one thing is for sure: tools like FAST will play a critical role in evaluating designs and applying proven best practices as offshore wind moves from concept to commercial reality.

About the National Renewable Energy Laboratory (NREL): NREL is the U.S. Department of Energy's primary national laboratory for renewable energy and energy efficiency. Headquartered in Golden, Colorado, the laboratory partners with private industry, academia, and government on research, development, and demonstration activities. It is managed and operated by Alliance for Sustainable Energy. Learn more by visiting www.nrel.gov.

BOEM conducts first-ever auction for offshore wind site
 The U.S. Department of the Interior and Bureau of Ocean Energy Management (BOEM) held the nation's first-ever competitive lease sale for renewable energy in federal waters on 31 July. The provisional winner of the lease sale, which auctioned two leases for a Wind Energy Area of 164,750 acres offshore Rhode Island and Massachusetts for wind energy development, is Deepwater Wind New England, LLC. When built, these areas could generate enough combined energy to power more than one million homes. The Wind Energy Area is located 9.2 nmi south of the Rhode Island coastline and has the potential to support 3,395 MW of wind generation. BOEM will hold its next competitive lease sale for offshore wind on 4 September, which will auction nearly 112,800 acres offshore Virginia, and is expected to announce additional auctions for Wind Energy Areas offshore Massachusetts, Maryland, and New Jersey later this year and in 2014. BOEM auctioned the Wind Energy Area offshore Rhode Island and Massachusetts as two leases, referred to as the North Lease Area (Lease OCS-A0486) and the South Lease Area (Lease OCS-A0487). The North Lease Area consists of about 97,500 acres, and the South Lease Area covers about 67,250 acres. The sale received \$3,838,288 in high bids. The auction lasted 1 day, consisting of 11 rounds before determining the provisional winner. In addition to Deepwater Wind New England, LLC, the following companies participated in the auction: Sea Breeze Energy, LLC and US Wind Inc. Following the auction, the Attorney General, in consultation with the Federal Trade



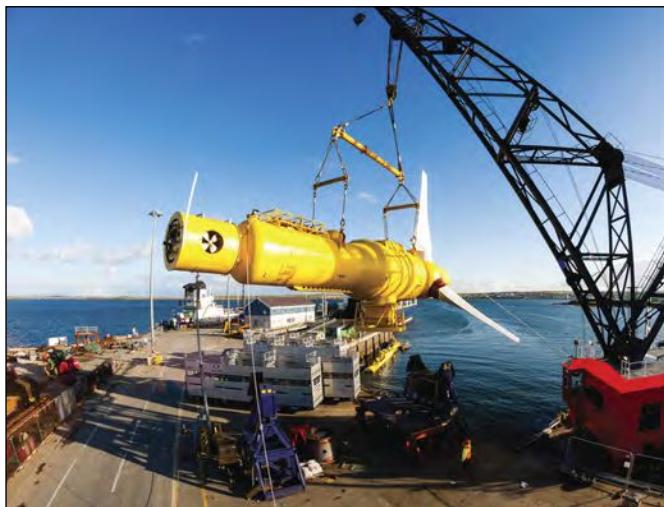
Commission, will have 30 days in which to complete an antitrust review of the auction. Shortly thereafter, BOEM will send unsigned copies of the lease form to the winning bidder, who will have 10 days to sign and return the lease, file required financial assurance, and pay the balance of the winning bid. Each lease will have a preliminary term of 6 months in which to submit a Site

Assessment Plan to BOEM for approval. A Site Assessment Plan describes the activities (e.g., installation of meteorological towers and buoys) a lessee plans to perform for the assessment of the wind resources and ocean conditions of its commercial lease. After a Site Assessment Plan is approved, the lessee will have up to 4.5 years in which to submit a Construction and Operations Plan (COP) for approval, which provides a detailed plan for the construction and operation of a wind energy project on the lease. After the COP is approved, the lessee will have an operations term of 25 years.

Offshore wind in deep waters opens up massive power potential

Deep water wind turbines are key to unlocking the massive energy potential in Europe's Atlantic and Mediterranean seas and the deepest parts of the North Sea, a new report from the European Wind Energy Association (EWEA) shows. The report reveals that floating turbines in North Sea deep waters alone could power Europe four times over. Offshore wind in Europe could be providing 145 million households with renewable electricity and employing 318,000 people by 2030, while providing energy security, technology exports, and no greenhouse gases. "To allow this sector to realize its potential and deliver major benefits for Europe, a clear and stable legislative framework for after 2020 — based on a binding 2030 renewable energy target — is vital. This must be backed by an industrial strategy for offshore wind including support for R&D," said Jacopo Moccia, head of policy analysis at EWEA. This technology is cost-competitive with standard fixed-bottom offshore turbines from 50 m water depth, the report finds. If the requirements are met, the first full-scale deep offshore wind farms could be producing power by 2017, up from the two floating turbines currently supplying electricity from European waters.

Alstom's tidal turbine reaches 1 MW in offshore conditions



From its immersion in January 2013 at the European Marine Energy Centre (EMEC) in Orkney, Scotland, Alstom's full-scale tidal device has reached the full nominal power of 1 MW after a series of gradual increases in power. The turbine connected to the grid has now generated over 10 MWh of electricity in actual operating conditions. Both are major milestones in the development of the tidal stream energy.

The tidal turbine has been tested in different operational conditions through the ReDAPT1 testing program. It has shown a reliability and performance in line with its design models. The next step of the testing program will be to demonstrate the full range of autonomous running capabilities of the turbine (its ability to efficiently operate independently), continue with the planned maintenance, and gather evidence for certification. The endurance and reliability will also be tested into 2014. Tests in pilot farms will follow prior to the start of full commercial production.

Alstom's tidal turbine has a 22-m long nacelle and weighs 150 tons. Its rotor has three pitchable blades and a diameter of 18 m. The tidal turbine is capable of floating. Buoyancy enables the turbine nacelle to be easily towed to and from the point of operation and attached to its pre-installed foundation. Avoiding the need for specialist vessels and divers, this particular technical feature minimizes installation and maintenance costs and reduces the timeframe to install or retrieve the turbine. The unit operates fully submerged with no surface piercing part in a water depth of about 40 m. The nacelle can rotate around vertical axis to face the incoming tide at an optimal angle, and thus extract the maximum energy potential.

For more information, visit www.alstom.com.

DOE announces funding for development of open-water wave testing facility

The U.S. Department of Energy (DOE) announced up to \$1.5 million in funding for projects to design testing facilities to accelerate the development and deployment of wave energy systems. This funding is part of the DOE's effort to bring innovative wave energy technologies to market faster by providing developers with affordable access to world-class facilities for testing components and systems.

Prototype testing is essential to mature existing wave technologies, validate performance against analytic models, demonstrate compliance with applicable design standards, and thereby mitigate the technical and financial risk of developing and deploying mass-produced wave energy devices, plants, technologies, and related products. Construction and operation of a full-scale domestic wave test facility will assist the U.S. industry by identifying design and manufacturing deficiencies early in the development cycle and validate modifications and improvements prior to commercial deployment. Ultimately, this new testing capability will improve the country's competitiveness in MHK energy technology, encourage domestic manufacturing job creation, and provide a new technology that utilizes an untapped renewable resource to help achieve the nation's energy goals.

Through the new funding opportunity, the DOE will support projects that develop designs and cost estimates for an open-water, domestic wave testing facility capable of testing up to full-scale wave energy conversion devices in the open ocean.

This funding announcement is intended to identify possible site locations and evaluate the potential to establish a national wave testing facility within U.S. territorial waters.

For more information, visit www1.eere.energy.gov.

Oxford study shows potential for tidal power in Pentland Firth

Tidal turbines stretched across Pentland Firth, which separates the Orkney Islands from mainland Scotland, could generate up to 1.9 GW of power — equivalent to almost half of Scotland's electricity needs.

A new study, led by Oxford University researchers, provides the first reliable estimate of the maximum energy that could be generated from Pentland Firth. The 1.9 GW figure is considerably lower than some early estimates as it takes into account factors such as how many tidal turbines it would be feasible to build and how a series of turbines would interact with each other and averages out variations caused by the fortnightly and seasonal cycle of the tides.

The new calculations suggest that the prospects of extracting the first 500 MW of energy are very promising. Due to the increasing difficulty of extracting more and more energy towards the max-

imum of 1.9 GW, the researchers believe that a target of extracting 1 GW is realistic.

When looking at the feasibility of a scheme for Pentland Firth, the researchers assumed that, to be viable, the potential energy generated by each tidal turbine would have to be greater than that of offshore wind turbines, owing to the higher loads they would have to endure and higher maintenance costs. They also used mathematical

models to investigate how different rows of turbines would interact, working out how to arrange them so as not to "steal" each other's tidal energy and calculating how power generation for the overall scheme might be maximized.

The researchers found that, averaged over the entire tidal cycle, the theoretical maximum power a Pentland Firth scheme could generate would be 1.9 GW. This is equivalent to 16 TWh per year. Figures from the Scottish gov-

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ernment state that in 2011, Scotland's consumption of electricity was 37 TWh per year.

The work was commissioned and supported by the Energy Technologies Institute. A report of the research, entitled "The available power from tidal stream turbines in the Pentland Firth," is published in Proceedings of the Royal Society A.

The research was carried out by Dr. Thomas Adcock, Professor Guy Houlsby, and Sena Serhadioğlu of Oxford University's Department of Engineering Science; Professor Alistair Borthwick of University College Cork; and Assistant Professor Scott Draper of the University of Western Australia.

For more information, visit www.ox.ac.uk.

All turbines installed at Thornton Bank

The last turbine at the Thornton Bank offshore wind farm was successfully installed. This means that the installation of all 48 wind turbines off the Belgian coast, with a combined capacity of 325 MW, is now complete.



With the generated electricity, the power plant can supply some 600,000 Belgian households every year. In the third and final phase of the wind farm, a total of 24 turbines of the 6-MW class have been erected, which together have an installed capacity of 148 MW. Six of these had already been connected to the grid in 2012. The 18 turbines installed in the spring are planned to be commissioned in the upcoming weeks.

Thornton Bank offshore wind farm is situated 30 km off the Belgian coast in waters up to 30 m deep. The first phase of the wind farm, comprising six 5-MW plants, first came into operation in 2009.

Thornton Bank wind farm is one of the largest project-financed offshore wind farms in Europe. In all, eight com-

mercials European banks, the European Investment Bank, and the German and Danish export credit agencies have provided approximately €900 million in finance and venture capital. The total investment amounts to approximately €1.3 billion. With 27%, RWE Innogy is the biggest shareholder of the Thornton Bank wind farm.

For more information, visit www.rwe.com.

Carnegie Wave Energy wins Australian government grant

Wave energy developer Carnegie Wave Energy Limited announced the receipt of \$852,511 from the Australian Government for the completion of Milestone 2 of the Perth Wave Energy.

Milestone 2 involved the completion of the detailed design and approvals for the Perth Wave Energy Project. The milestone involved an independent engineering review of the project's design commissioned by the Australian Renewable Energy Agency (ARENA). This is the second milestone payment to be received from the Australian Government and takes the total funds received to date to

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\$1.1 million. There are eight further milestones, with associated payments, through the course of the project.

Carnegie Wave Energy Limited is an Australian wave energy technology developer. Carnegie is the 100% owner and developer of the CETO Wave Energy Technology intellectual property.

The CETO system is different from other wave energy devices because it operates underwater and is anchored to the ocean floor. Several fully submerged buoys are tethered to seabed pump units. The buoys move with the motion of the passing waves and drive pumps. The pumps pressurize water that is delivered onshore via a subsea pipe.

Onshore, high-pressure water is used to drive hydroelectric turbines, generating zero emission electricity. The high-pressure water can also be used to supply a reverse osmosis desalination plant, replacing greenhouse gas-emitting, electrically driven pumps usually required for such plants. The technology is also capable of generating power offshore should the specific characteristics of a project site require it.

For more information, visit www.carnegiewave.com.

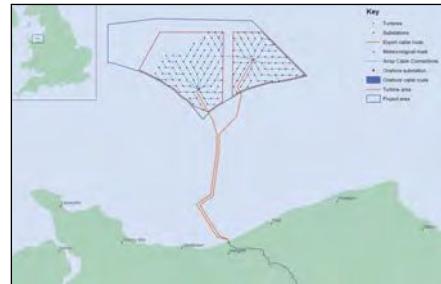
Balfour Beatty consortium appointed preferred bidder for OFTO asset

Balfour Beatty has been appointed preferred bidder for the transmission assets of the Gwynt y Môr offshore wind farm project, located off the north coast of Wales as part of the Offshore Transmission Owners (OFTO) regulatory regime.

Gwynt y Môr has an indicative transfer value of £346 million. Balfour Beatty will invest 60% of the equity stake required for the project upon financial close, which is expected during the first half of 2014.

Once financial close has been achieved, Balfour Beatty, in a consortium with Equitix, will jointly own the 576-MW offshore high-voltage transmission asset and will be responsible for the asset's operation and maintenance as well as connecting the wind farm to the onshore electricity transmission system. The OFTO will carry out its responsibilities through a 20-year license awarded by Ofgem, the UK Government's regulator for gas and electricity markets.

Combined with the Thanet and Greater Gabbard offshore transmission assets that



are expected to reach close later this year, Gwynt y Môr gives Balfour Beatty a leading investor position in this new and growing market, with responsibility for OFTO transmission assets worth £830 million with a combined transmission capacity of 1,380 MW.

Balfour Beatty has also recently been selected by Ofgem to participate in the next round of bidding, which will commence later this year for the West of Duddon Sands project that has an estimated transfer value of £310 million.

The announcement follows the competitive tender process initiated by Ofgem for the Gwynt y Môr offshore electricity transmission assets.

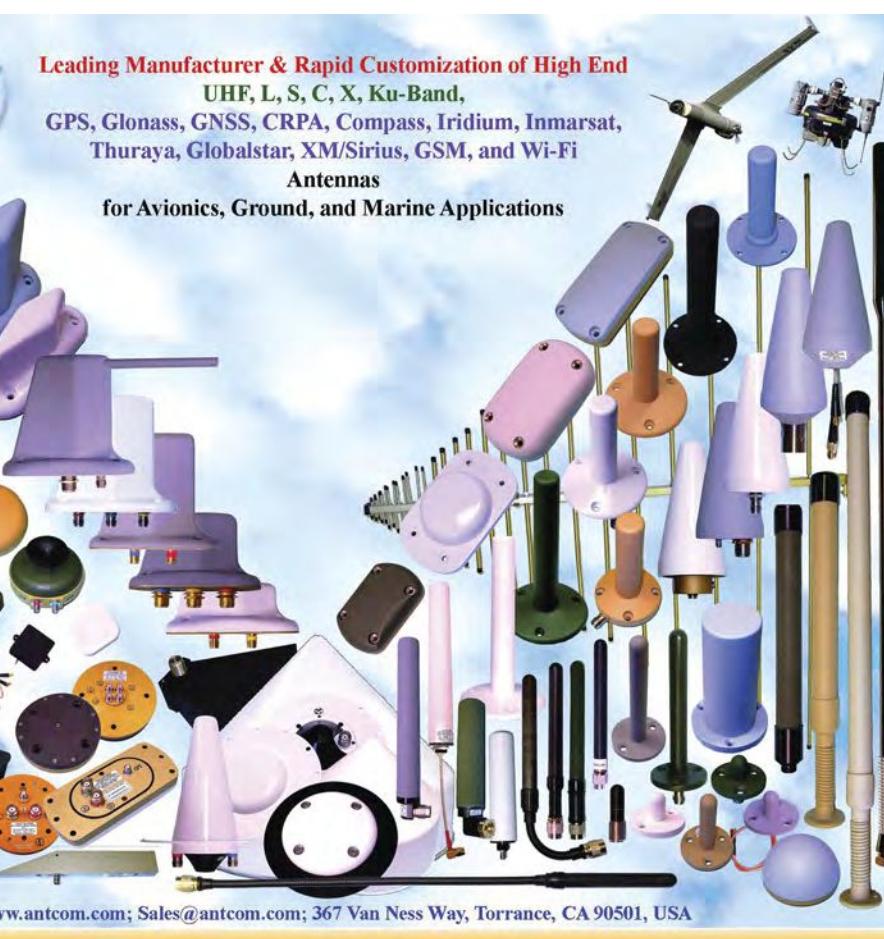
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Power Conversion System Design for Tidal Stream Generators

*By: Dr. Adrian West, Optima and
Dr. Mark Knös, Ocean Flow Energy*

This report describes the development of a power conversion system to capture energy with a floating horizontal axis tidal stream generator.

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Ocean News & Technology

Generating energy from ocean tidal flow is an emerging technology that could contribute between 6 to 12 GW of clean power to the renewable energy mix in the UK. Tidal flows are highly predictable, and the power generation cycle can be calculated years in advance. However, there are many technical challenges that must be overcome before placing electrical-generating devices in the hostile marine environment. Tidal generators can be located in the sea at a distance of 1 km or more from shore. They are susceptible to the effects of fast tidal streams and must survive waves generated by storm activity. In addition, a robust electrical transmission system is required to transmit generated power back to shore with minimal losses.

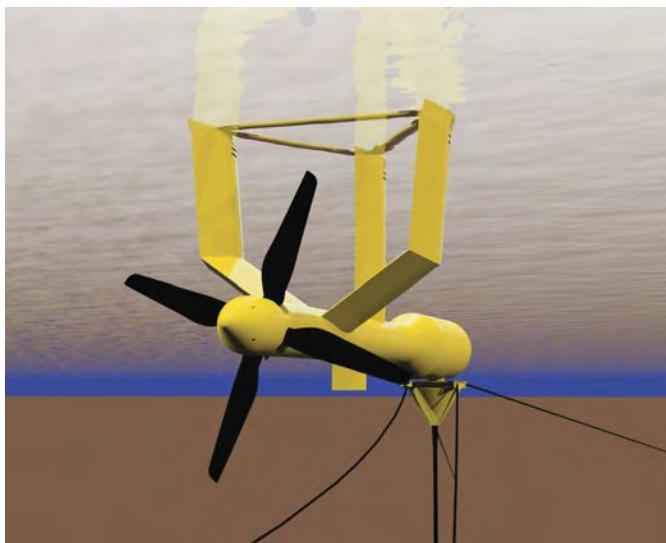
Ocean Flow Energy Ltd. (Oceanflow) has been working on the design of a floating tidal stream generator for approximately 5 years. This project is funded in part with the support of a Scottish Enterprise WATERS grant and consists of a mono turbine floating device known as the Evopod™. This patented device floats with most of the structure just below the sea surface and is moored to the seabed using cables. As the tide flows past the submerged hull, the turbine turns and this generates electrical energy from an on-board generator. When the tide changes direction, the Evopod™ hull swivels in a way similar to that of a boat at anchor. Energy is then generated on the return tidal flow in a similar way.

A prototype quarter-scale Evopod™ device is currently being constructed that will generate approximately 25 kW steady state in nominal tidal flows. Using this prototype, the effect of the marine environment will be studied in preparation for a full-scale device that is expected to generate 1 MW at nominal tidal flow.

Approximately 1 year ago, Optima Control Solutions received the contract to design and deliver the power conversion and transmission equipment for the prototype Evopod™ tidal generator to be located in Sanda Sound, South Kintyre, Scotland. A number of challenges were immediately apparent, such as how to deliver the power to shore at minimal losses and the fact that some elements of the power conversion equipment would be within the submerged hull and not accessible between the scheduled annual maintenance slots.



After much discussion about power conversion equipment topologies, it was decided to locate a fully regenerative power converter within Evopod's hull. This transmitted power via the mooring swivel slip rings to an umbilical cable down to a transformer located on the seabed. The 400-V supply was boosted to a high voltage and sent over a custom-designed, submerged 1-km long cable to the shore. This approach considerably reduced the cost of the seabed cable and minimized transmission losses.



Siemens was chosen as the preferred supplier for all power conversion and low-voltage switchgears. A 37-kW rotor induction generator was used with Siemens SINAMICS S120 drive and active interface modules to generate power at close to unity power factor with low harmonics.

A full computer-based simulation was designed by Optima using existing models of a drive and motor, together with a new model of the turbine using data supplied by Oceanflow. The software model was written within a National Instruments LabVIEW programming environment and operated in real time.

With any tidal flow (or wind) generation device, a protection mechanism is required to protect the power conversion equipment from overload due to excessive flow rates. The turbine is designed to cope with steady state flow rates occurring during spring tides. However, storm-induced wave activity causes transient disturbances in the flow rate due to the additional wave particle velocity that varies in magnitude and direction as the wave passes. If the disturbances are added to the steady state flow rate, then the resultant peak flow rate may exceed the maximum designed value and an overload condition will exist.

In order to simulate the torque produced by the turbine, a 37-kW test motor was connected to the generator using a belt drive. The software model was run on a laptop computer such that the test rig could be operated under exactly the same flow and sea state conditions as the original software simulation.

The images show the complete development test rig with the sub-sea transformer within the yellow enclosure. The Sinamics power conversion equipment is shown located within the Evopod™ equipment skid, and the shore transformer, shore control panel, and test drive are also shown. Optima provided complete hardware design, software, and construction services for the shore panel and equipment skid. The modular system design has made testing easier as it can be completed away from the Evopod™ hull.



The test rig was used extensively to further refine the control algorithms to cope with all expected flow and sea states. Sufficient tests were performed to prove operation and provide confidence that the generator, power conversion, and transmission equipment would operate correctly when the tidal generator is deployed. The power generated from the generator matched exactly with the calculated values produced by Oceanflow using estimated turbine characteristics. A turbine calibration algorithm was developed to allow fine tuning of the control algorithms based on the actual turbine in real tidal flow conditions.



A triple redundant communications system was designed to allow basic control of the remote Evopod™ device. The extensive software running in a Siemens PLC within the equipment skid is responsible for complete control of the generator independently of the communications link. A comprehensive alarm system is used to shut down the generator in case of equipment failure or extreme operating conditions.

In conclusion, the extensive use of software simulation and a comprehensive dynamometer test rig has ensured that the overall hardware and software design has been tested to a level where minimal commissioning will be required during sea trials of the tidal generator. An additional benefit is that the on-board equipment has been used sufficiently to expose any early life failures and provide a more reliable solution. Considering the marine operations costs involved during recovery and deployment of the tidal generator, the additional design costs incurred during this design approach are negligible.

For more information on this Evopod™ device and its capabilities, visit www.oceanflowenergy.com or www.optimacs.com.

Indian Submarine sinks with 18 sailors on board

An explosion resulting in a major fire took place on board INS Sindhurakshak, a Kilo-class submarine of the Indian Navy, shortly after midnight on 14 August 2013. Fire tenders from the Naval Dockyard as well as the Mumbai Fire Brigade were immediately pressed into action. However, due to as-yet-unknown damage suffered as a result of the explosion, the submarine has submerged at her berth with only a portion visible above the surface. About 18 persons were on board the submarine at the time of the accident. A Board of Inquiry is being instituted to investigate the causes of the accident.

General Dynamics awarded \$209M for future Virginia-class submarines

The U.S. Navy has awarded General Dynamics Electric Boat a \$208.6 million contract modification to buy long lead-time material for three Virginia-class submarines. Electric Boat is a wholly owned subsidiary of General Dynamics. Recognized as a model defense-acquisition program for its technical excellence and schedule performance, the Virginia-class submarine program provides the Navy with the capabilities required to dominate both the open ocean and the littorals. In partnership with the Navy, Electric Boat is driving innovative cost-saving efforts, without impacting capabilities, through overall efficiency improvements, decreased ship construction labor costs, and shortened ship-construction cycle times. As a result of this successful program performance and demand for the versatile capabilities of the Virginia-class submarine, the Navy authorized Electric Boat to start construction of two submarines per year beginning in 2011. This contract provides funding for the second fiscal year (FY) 14 Virginia-class submarine, SSN-793, and two FY 15 submarines, SSN-794 and SSN-795. Items funded include steam and electrical-plant components, main propulsion unit and ship-service turbine generator sets, and miscellaneous hull, mechanical and electrical-systems components to support construction of the submarines. With this modification, the overall contract is worth \$595 million.

BAE Systems gets \$7M award

BAE Systems, Jacksonville, Florida, is being awarded a \$6,995,080 modification to a previously awarded multi-ship, multi-option cost-plus incentive fee contract (N40024-10-C-4406) to provide for the availability of USS Vicksburg (CG 69) to include ship repairs, hull, machinery, electrical, electronics, ship alterations, and piping as required. The primary focus of this repair package is to accomplish structural repairs and accomplish the 5-year boiler certification and the flight deck certification. Work will be performed in Jacksonville and is expected to be completed by September 2013.

General Dynamics Bath Iron Works awarded \$212M

The U.S. Navy has awarded General Dynamics Bath Iron Works \$212 million for the design and construction of a steel deckhouse and hangar and construction of aft Peripheral Vertical Launching System (PVLS) modules for integration into Lyndon B Johnson (DDG 1002), the third ship of the U.S. Navy's Zumwalt-class of guided missile destroyers. General Dynamics Bath Iron Works is a business unit of General Dynamics. "The design and production of these critical components of DDG 1002 will help maintain our specialized engineering and design skills and provides additional stability to our manufacturing workload," said Jeff Geiger, president of Bath Iron Works. "We are pleased to have been selected for this important work." The Zumwalt-class deckhouse includes the ship's bridge, radars, antennas, and intake/exhaust systems in a structure with a significantly smaller radar cross-section than other ships in the modern Navy fleet. The enclosed hangar is designed to accommodate two medium-lift helicopters or other mission-related equipment. The PVLS modules distribute the ship's missile launchers in separate four-cell launcher compartments along the ship's hull. There are currently three DDG 1000 class destroyers in production at Bath Iron Works: Zumwalt (DDG 1000), Michael Monsoor (DDG 1001) and Lyndon B. Johnson (DDG 1002). Zumwalt is scheduled to be delivered to the Navy in 2015. The keel laying ceremony for DDG 1001 took place in May 2013 and Start of Fabrication for DDG 1002 was in April 2012.

India's first indigenous aircraft carrier launched

Amidst chanting of hymns from the Atharva Veda, Vikrant, India's first aircraft carrier, decommissioned on 31 January 1997, was reborn as Smt Elizabeth Antony, wife of the Defence Minister Shri AK Antony, christened India's first Indigenous Aircraft Carrier (IAC) as Vikrant meaning "courageous" or "victorious" in Sanskrit.

Vikrant marks a special feather in indigenous defence capabilities — this being the first-ever aircraft carrier to be designed by the Directorate of Naval Design of the Indian Navy, the first warship to be built by Cochin Shipyard Limited, and the first warship to be built entirely using indigenously produced steel. The construction of the ship is a truly pan Indian effort with active participation of private and public enterprises.

Vikrant will be capable of operating an aircraft mix of the Russian MiG-29K and LCA (Navy) fighters being developed indigenously by HAL. Its helicopter component will include the Kamov 31 and the indigenously developed ALH helicopters. The ship's ability to sense and control a large air space around it will be enabled by modern C/D band Early Air Warning Radar, V/UHF Tactical Air Navigational and Direction Finding systems, jamming capabilities over the expected Electro Magnetic (EM) environment and Carrier Control Approach Radars to aid air operations. Long Range Surface to Air Missile (LR SAM) systems with Multi-Function Radar (MFR) and Close-In Weapon System (CIWS) will form the protective suite of the ship. All weapon systems on board the carrier will be integrated through an indigenous Combat Management System (CMS) being manufactured by Tata Power systems. The ship's integration with Navy's Network Centric Operations will provide force multiplication.

Vikrant will now enter the second phase of construction, which will see the outfitting of the ship, fitment of various weapons and sensors, integration of the gigantic propulsion system and integration of the aircraft complex (with the assistance of M/s NDB of Russia). The ship will then undergo extensive trials before she is handed over to the Indian Navy by around 2016-17.

For more information, visit www.indiannavy.nic.in.

Ingalls Shipbuilding launches fourth U.S. Coast Guard National Security Cutter

Huntington Ingalls Industries' Ingalls Shipbuilding division recently launched the company's fourth U.S. Coast Guard National Security Cutter (NSC), Hamilton (WMSL 753).

NSCs are the flagship of the Coast Guard's cutter fleet, designed to replace the 378-ft Hamilton-class High-Endurance Cutters, which entered service during the 1960s. Ingalls has delivered three.

"The NSC is a proven hull, and our Coast Guard customer is pleased with the performance of the first three ships currently operating in the fleet," French said. "We continue to improve across the board in the construction of these cutters, and this trend should continue."

Hamilton will be christened on 26 October in Pascagoula by ship sponsor Linda Kapral Papp, wife of Adm. Robert J. Papp Jr., commandant, U.S. Coast Guard.

Keel laying for Ingalls' fifth NSC, James (WMSL 754), took place on 17 May. The ship is currently 32% complete and will launch the spring of 2014.



Ingalls has started construction on nine units for NSC 6. An advance long-lead material procurement contract has also been awarded for a seventh NSC.

NSCs are 418 ft long, with a 54-ft beam, displacing 4,500 tons with a full load. They have a top speed of 28 kts, a range of 12,000 mi, an endurance of 60 days, and a crew of 110.

For more information, visit www.huntingtingalls.com.

General Dynamics completes comprehensive risk reduction program for Knifefish UUV

General Dynamics Advanced Information Systems has successfully completed the comprehensive risk reduction program for the U.S. Navy's Knifefish Surface Mine Countermeasure Unmanned Undersea Vehicle (UUV) program. Designed to discover any potential systems defect early on in the program's development phase, the configuration item test (CIT)

successfully verified key components within the UUV system, including the hardware architecture and critical areas of hardware and software integration.

The test program included subsystem tests of key payload components (high-fidelity SONAR and ultra-high-density data storage/recording), key propulsion components (quieter, more powerful propulsion), and key software interface elements. By performing the CIT effort at this phase of the Knifefish program, the team can identify critical elements that could be detrimental to the delivery and operational availability of the Knifefish program if left to the later program phases.

Knifefish will be a critical part of the Navy's Littoral Combat Ship mine warfare mission package, providing the fleet mine warfare commander and sailors with enhanced mine-hunting capabilities. Scheduled for operations beginning in 2017, Knifefish will reduce risk to personnel by operating in the minefield as an off-board sensor while the host ship stays outside the minefield boundaries.

For more information, visit www.generaldynamics.com.

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Ocean News & Technology

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SeeByte's SeeTrack Military to be integrated with ASVs Unmanned Marine Systems

SeeByte, the global leader in creating smart software for unmanned maritime systems, and ASV, the world leading manufacturer of Autonomous Surface Vehicles, have announced that they will be collaborating to integrate SeeByte's SeeTrack Military software to ASV's ASView control system software for use on Unmanned Surface Vehicles.

SeeTrack Military is an open-architecture platform solution for planning, rapid on-site analysis, and data fusion that can be easily adapted for specific user needs. This software technology has been successfully deployed on numerous surveys, military and security operations. At this time, SeeTrack Military is actively used by 16 navies globally.

The ASView Control System provides a safe and reliable means of controlling unmanned vehicles. The system has been designed to be intuitive, easy to use, scalable to suit vehicles of varying size and capability and has, to date, been deployed on over 30 USVs.



Alastair Cormack, technical client manager at SeeByte, commented: "We are excited to work with ASV Ltd and to have Unmanned Surface Vehicles (USV) become part of the overall off-board solution that SeeTrack Military supports. By collaborating with ASV, we are another step closer in bringing multiple systems together in response to emerging requirements, evidenced by the US LCS, the UK's MHPC, and the FR/UK MMCM."

Managing director at ASV, Dan Hook, also commented: "We envisage this to be the first step of many through which we hope to incorporate SeeByte's innovative software solutions into ASV's ASView control system to improve the operation of unmanned maritime systems."

For more information, visit www.seebyte.com.

U.S. Navy purchases 6 Iver AUVs

OceanServer Technology announced that it has received purchase orders for six new Iver AUVs across three different contracts. The vehicles will be utilized by four different Navy directorates for a variety of defense-related applications. All six systems have or will be delivered within the next few months. The Iver platform has gained strong acceptance from Navy customers around the globe for high-resolution imaging in littoral waters. OceanServer continues to lead the AUV industry in driving costs lower while offering world-class sonar solutions from five different recognized vendors. The flexible vehicle design also allows for a wide range of water quality sensors, remote helm applications and in-water communications. Early this year, OceanServer delivered the 200th AUV system, which marks a milestone attained by a select few companies.

For more information, visit www.ocean-server.com.

HNLMS Johan De Witt joins EU Naval Force Operation Atalanta

The Dutch Landing Platform Dock HNLMS Johan de Witt joined the EU Naval Force (EU NAVFOR) Somalia — Operation Atalanta on 6 August 2013.

For the next 4 months, Johan de Witt will be the EU Naval Force flagship, hosting the Force Commander, Commodore Peter Lensink, and his multinational staff on board.

HNLMS Johan de Witt is a Landing Platform Dock, 176.5 m in length and 16,948 tonnes displacement. She can accommodate up to 600 persons and has many different assets, teams and capabilities on board, such as an enhanced medical facility, with a fully equipped operating room and a specialized medical team. Two Cougar helicopters are embarked, a Landing Craft Task Element and a Scan Eagle UAV, an unmanned aircraft. The warship also has a team from Belgium on board, who operate a specialized boarding craft known as a Fast Raiding Interception and Special Forces Craft (FRISC), and a Maltese Special Duties Enhanced Boarding Team (MSDEBT), who are trained to execute maritime awareness and security operations and are able to board ships when necessary.

Before joining EU Naval Force, HNLMS Johan de Witt conducted an intensive program of training, including Operational Sea Training (OST) in Plymouth, United Kingdom and specific training for counter piracy operations in The Netherlands.

For more information, visit www.eunavfor.eu.

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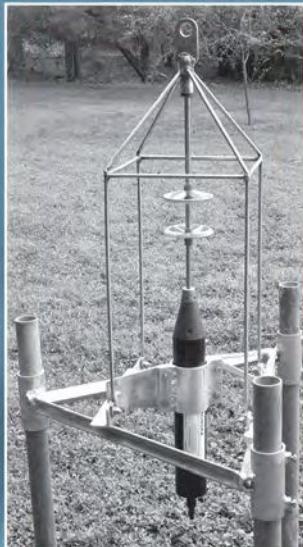
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KEYNOTE SPEAKER ANNOUNCEMENT



Pierce Cohen
Subsea Specialist
Chevron Energy
Technology Company

Pierce is a member of the Subsea Survey and Positioning team at Chevron, and currently serves as the project manager for their AUV Development Program. Pierce began his career with Chevron Energy Technology Company after graduating from the University of Texas with a B.S. in Mechanical Engineering.



R. Michael Haney
Director
Douglas-Westwood

R. Michael Haney founded Douglas-Westwood's Houston office in 2012 and has more than a dozen years' experience consulting for energy and chemicals clients with Accenture, Arthur D. Little and Booz Allen Hamilton. Mike has completed consulting projects for most of the IOC's, many NOC's, and several oilfield service clients, working on projects around the world.



Don Ross
Integrity Management
Specialist & Surveyor
Petrobras America Inc.

As a Project Surveyor for Petrobras America, Don Ross is working on the Cascade and Chinook Project, and is a member of The Cascade and Chinook Integrity Management Team. Mr. Ross is a Texas Registered Professional Surveyor, is a Certified Hydrographer from the American Congress on Surveying and Mapping, and a Certified Project Management Professional from the Project Management Institute.

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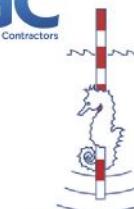
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The Importance of GIS in Greenfield and Brownfield AUV Surveys (A Case Study)
Sean Halpin - DOF Subsea USA, Len Ricketts and Andy Docherty - DOF Subsea S&P UK

Data Harvesting from Seafloor Sensors for Reservoir Production Monitoring using an Acoustic Modem on a Liquid Robotics Wave Glider
Captain Virginia Anne Newbem - Liquid Robotics Oil & Gas - A joint venture with Schlumberger

Seeing Through the Environment: Real-time 3D Imaging for Subsea Projects
Jesus Zertuche III - Fugro Chance, and Blair Cunningham - Coda Octopus Products

Reduced Survey Costs and Increased Data Resolution using Advanced WROV Control System
Dr. Mahesh Menon - SMD

Large Unmanned Underwater Vehicle for the Oil and Gas Industry
Gregory Gregoriades - Battelle

Sabertooth a Seafloor Resident Hybrid AUV / ROV System for Long Term Deployment
Jan Siesjo - Saab Seaeye

Acoustic Beamforming Methods for Sub-Bottom Imaging
Gary Dinn - PanGeo Subsea

Sparse LBL aided INS
Will Padden - Sonardyne

Cost Effective Method to Achieve Significant Expansion of Open Ocean Seismic Survey Coverage Area Using Low Cost Sonobuoys
Seibert Murphy and Neal Baitzer - Guide Star Engineering, and Ken Powell - Reliability Engineering

ROV and Diver-less IRM Work on Risers
Christian Hagen - LBO

Inspection Methods, Equipment and Software Needed to Reach Deep Energy Reserves
George Sfeir - Technical Industries, Inc.

Wireless Integrity Management: Using Subsea Wireless to Optimize Asset Life and Performance
Ian Crowther - WFS

Safer, Effective and Efficient Decommissioning
Graham McKay - Unique

Subsea Inspection of Vibration and Acoustic Noise
Geir Instanes, Audun O. Pedersen and Øyvind L. Rørtveit - Clampon

AquaPix - A Low-Cost Interferometric Synthetic Aperture Sonar for AUVs
David Shea, Peter Crocker, Jeremy Dillon, and Sean Chapman - Kraken Sonar Systems

A Video Revolution in Subsea 3D Inspection
Patrick Raymond and Arnauld Dumont - DimEye

Subsea Survey IMMR Inspection Standards in the Gulf of Mexico
Travis Cummins - Wood Group Integrity Management

Unique Uses for 3D and Multibeam Sonar
Chuck Webb - Tetra Technologies, Inc.

TBD
Omer Poroy and Deanna Talbot - Bluefin

TBD
Jens Steenstrup - R2Sonic

Speakers are subject to change until the Final Program has been released.

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Large-scale Projects Needed to Address "Renewable Resources Gap"

By: John Manock, Ocean News & Technology Magazine

The northeastern United States needs large-scale renewable projects by the end of the decade to meet growing demand in the region, and offshore wind farms may fill that need according to Ronald T. Gerwatowski, National Grid USA's Senior Vice President for Regulation and Pricing, who presented the keynote address at the Energy Ocean International conference in June.

A unit of the UK's National Grid Ltd., National Grid USA Service Company Inc. is primarily an energy delivery company in the United States that operates in Massachusetts, Rhode Island, and New York. The company has been involved in offshore wind projects in New England waters since the projects' early stages — specifically Cape Wind off the coast of Massachusetts and Deepwater Wind off Rhode Island. These two projects are likely to be among the first offshore wind farms in the United States.

Cape Wind calls for the building of a 130-turbine wind farm in Nantucket Sound that will generate 420 MW of electricity. Deepwater Wind plans a demonstration-scale project, with a five-turbine, 30-MW wind farm about 3 mi southeast of Block Island. This project would also include a cable connecting the island with the mainland, allowing the largely tourist community on Block Island to connect to the mainland grid and end its reliance on electricity generated by expensive diesel fuel shipped from the mainland.

Both projects have generated more than their share of controversy. Cape Wind has endured a decade-long battle of regulatory struggles, questions about costs, and public opposition to the potential visual impact of the turbines off the coast of picturesque Cape Cod. Deepwater Wind has had similar issues, particularly concerning the cost of the electricity to be generated by the project. This opposition has taken both projects to their respective state Supreme Courts, and, in both cases, the courts decided in favor of the offshore wind farm developers.

Looking forward, Gerwatowski noted a critical issue that utilities in the northeastern United States could face later this decade. Gerwatowski calls this the "Renewable Resources Gap." National Grid is required by regulations set forth by each state to ensure that a specified percentage of its electricity comes from renewable energy sources by a certain date, known as the Renewable Portfolio Standard (RPS), which can vary by state. Utilities are working to meet these requirements through a large number of small-scale projects using a variety of technologies — solar, onshore wind, etc. These small projects have fewer regulatory issues and less public opposition. They do not, however, generate enough electrici-

ty to meet future RPS requirements, especially considering the region's growing demand for power.

"If we don't set up a system that allows renewable technologies to advance, then they will never become a reality because it will always be about the cost," Gerwatowski said. "The gap is forcing the policy makers to ask themselves if they really believe in having renewable energy make up a significant portion of their state's energy resources."

To meet RPS obligations, Gerwatowski said that large-scale projects, defined as over 400 MW, are necessary. Assuming that Cape Wind will be online by 2018, the region still needs more large-scale projects to meet future demands. While National Grid intends to continue its support for all types of renewable technologies, offshore wind has the potential to provide renewable power on the scale needed to address the gap.

A development that may help in this area is a recent announcement by the Department of Interior, Bureau of Ocean Energy Management (BOEM) that will open a large tract of federal waters off the coast of Rhode Island and Massachusetts to wind farm developers. The Wind Energy Area covers about 164,750 acres and will be auctioned as two leases. According to a report by the Department of Energy's National Renewable Energy Laboratory, the two lease areas have the potential for installed capacity of well over 3,000 MW.

Meanwhile, Gerwatowski called for cooperation to encourage new, large-scale projects. Given the small size of the markets of many New England states and the large initial costs of these projects, such cooperation is essential. By going regional, the states and the utilities within those states can spread the costs among a much larger population, thus lessening the impact on any particular group of energy users. The New England States Committee on Electricity (NESCOE) is working towards integrating the procurement of electricity on a regional basis.

"NESCOE is the ideal solution for this issue. It can be like herding cats sometimes, but I think they are making progress," Gerwatowski said.

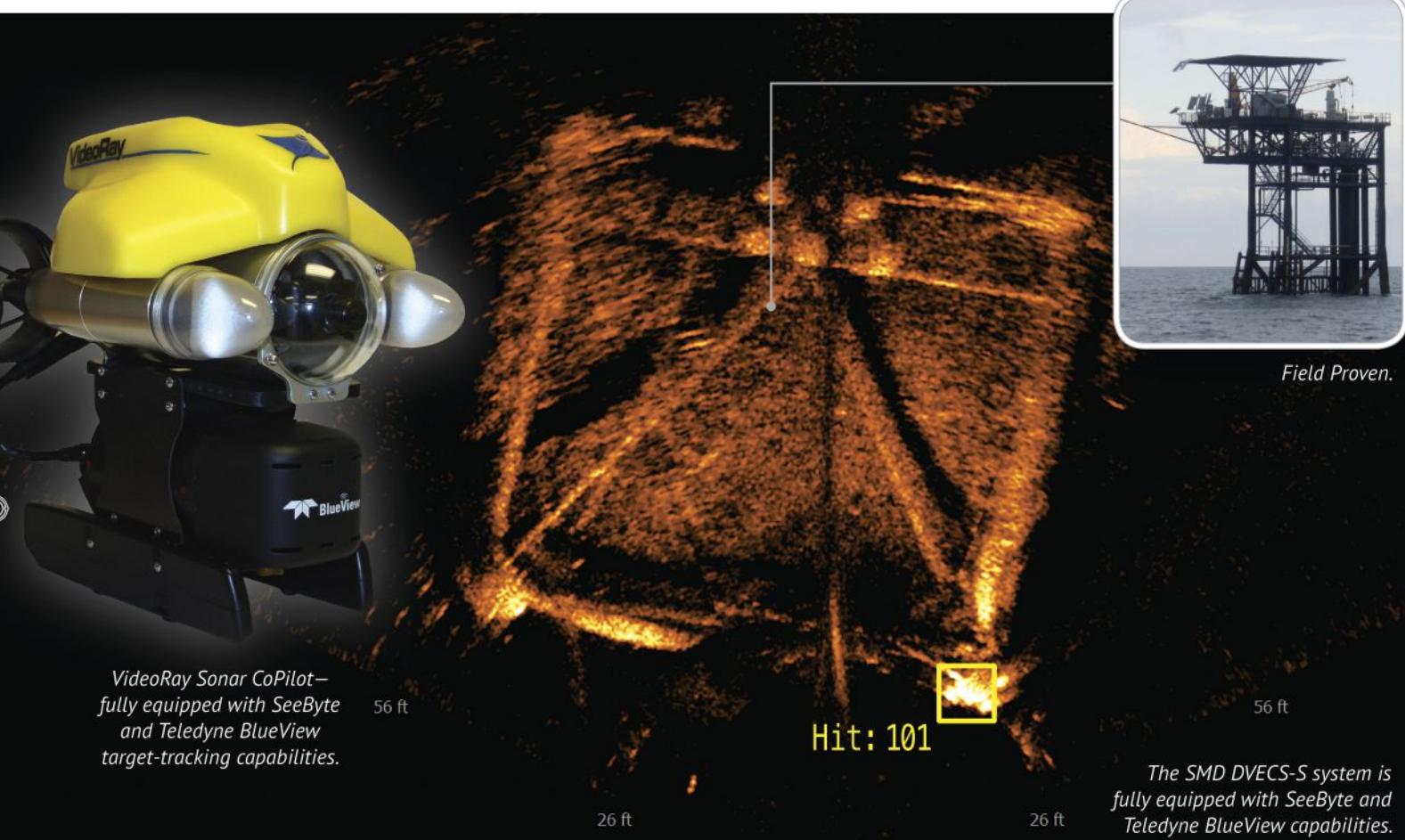
To make large-scale offshore wind projects a reality will require a concerted effort on the part of utilities, policy makers, and developers. Policy makers need to understand the concerns of the utilities when determining policy, while utilities from the various states must find common ground.

"Offshore wind is a huge resource that just sits there unused," said Gerwatowski. "I can only hope that we can develop the policies in the near term to make it a reality."

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HERITAGE

Delta Marine Technologies, Inc. (DMTI), the predecessor company to Delta SubSea LLC. (DSS), was founded in 2004 as an international project management and service provider to the world's offshore energy industry. We employ experienced professionals with a proven track record in the offshore drilling, construction, and IRM sectors who combine their engineering, subsea, and marine knowledge with practical experience to provide clients with innovative solutions through excellence in project management services.

Delta began operations in 2004 working for Heerema Marine Contractors on the BP Thunderhorse installation, providing bid evaluations and diving oversight support. Delta SubSea continues to place specialist personnel on many deep-water developments around the world, working with offshore contractors and major and independent oil companies.



NEW ROV BUSINESS LINE

Eighteen months ago, Delta identified a need in the deepwater market for an independent ROV solution provider that was not vertically aligned with any subsea contractor or vessel owner (e.g., ROV operator/vessel owner, ROV operator/contractor/construction company).

To realize the scale of their vision, Delta's management decided to bring in an equity funding partner. This has enabled Delta to enter the market as the leading international independent ROV solutions provider. Delta SubSea is backed by CSL Capital Management, an oil & gas equity group located in Greenwich, Connecticut and Houston, Texas that has previously backed several leading oilfield services companies. CSL has committed significant capital to Delta SubSea's development. With the successful close of our funding transaction 1 May 2013, DMTI has been rebranded as Delta SubSea.

MANUFACTURING PARTNER

DSS has completed months of rigorous evaluation to select a manufacturing partner to ensure that our new ROV division is successful. DSS' vision is to leverage best-in-class equipment, highly trained and experienced personnel, and fast and reliable technical support to deliver clients the industry's highest uptime.

The result of our research has led us to select FMC Schilling Robotics as our partner. The Schilling team has embraced DSS' vision and the idea of partnering with DSS to provide us with equipment, training, and worldwide support to achieve that dream.

Delta's management has worked diligently for a decade to build an organization from the ground up with the vision of becoming the best-in-class independent global ROV solution provider. Our team has devoted these years to developing partnerships, relationships, trust, and confidence with our clients. Our clients come to us with challenges and problems; Delta brings cost-effective, timely, and

reliable solutions. Delta has over 57 MSAs in place with major and independent operators and domestic and international offshore contractors.



GROWTH TRAJECTORY

With our equity and manufacturing partners, Delta SubSea has the financial strength and state-of-the-art equipment to realize its growth vision. Delta SubSea has executed a frame agreement with Schilling for its first 24 ROV systems and has taken delivery of four Schilling HD 150 HP ROVs systems with the potential for two more by the end of October 2013. The frame agreement encompasses an additional 18 ROVs through calendar year 2015 (including HD 150 HP and the new Generation III UHD 250 HP ROVs).

Considering the quality of the equipment, spares inventory, distribution centers, training centers, and under-1-hr repair philosophy/replacement of most ROV components, the partnership with Schilling is the logical choice for Delta to maximize client uptime. This is the Delta SubSea commitment to our clients.



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Wave Energy Harvesting Systems for Remote Ocean Platforms

By Douglas Gemme, Ocean Engineer, Electro Standards Laboratories

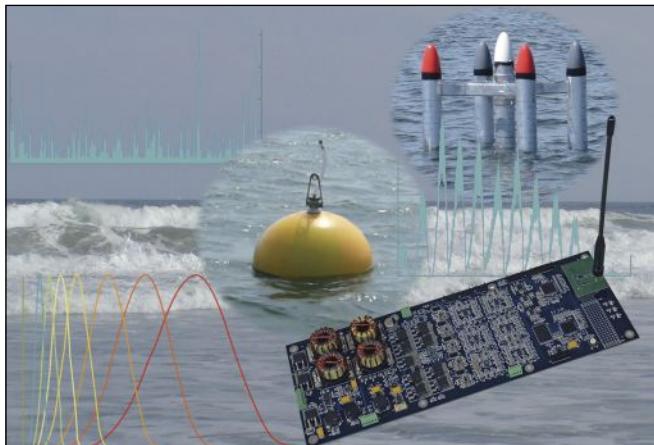
While most of the work in the field of ocean wave energy harvesting has focused on developing wave energy converters capable of generating large amounts of power for grid applications, there exists a large market for the technology of powering remote ocean sensor buoys and other platforms. Electro Standards Laboratories (ESL) and the Department of Ocean Engineering at the University of Rhode Island (URI) have formed a research team to address this scientific area. Their work is focused on the development of wave energy harvesting buoys designed to extend the operation of autonomous sensor buoys and other remote ocean platforms.

ESL's main expertise is in the electro-magnetic systems modeling and development applied to the Linear Electric Generator (LEG) used for power take-off, the battery charging/grid transmission and controlling circuits, and the development of various control systems and algorithms to optimize wave energy harvesting. URI's main expertise is in the hydrodynamic modeling of wave and wave structure-mooring interaction problems, siting optimization of ocean energy systems, ocean energy resource evaluation, ocean surface reconstruction, ocean instrumentation, and laboratory and field testing.

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Ocean News & Technology



ESL and URI have developed several different wave energy harvesting design approaches to best match the form factor and operational modes of the target system.

Targeted applications

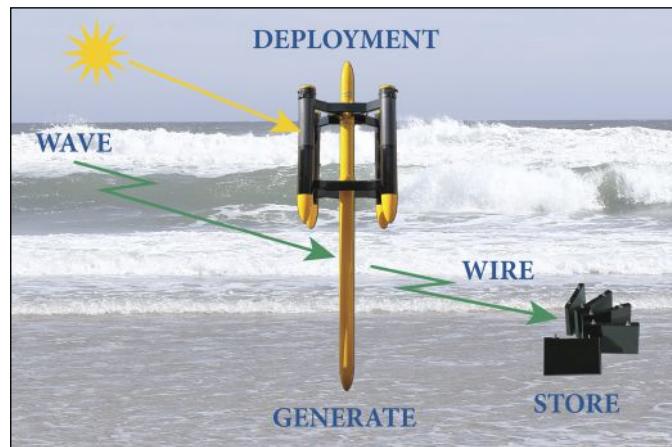
Targeted applications for this technology include sonar listening stations, weather monitoring buoys, wave monitoring buoys, tsunami warning stations, and port monitoring buoys, among others. These applications generally require low power levels, 1 to 10 W, with more complex applications requiring up to 250 W. Funding support for the projects has been provided in part by the Office of Naval Research, the Space and Naval Warfare Systems Command, and a Rhode Island Collaborative Research Grant from the Rhode Island Science and Technology Council (STAC).

Current technology

Most of the existing remote ocean platforms and buoys are powered by batteries, which eventually run out of energy and need replacement. Replacement of these batteries is extremely costly, requiring extensive ship travel. Solar power was one solution to the problem and can be fairly effective; however, little or no energy can be harvested at night or in bad weather. Vandalism, fouling, and theft of solar panels are also issues in certain areas of the world, mainly in the best regions for solar harvesting.

Advancing technology

Wave energy harvesting provides a solution that can potentially harvest energy 24 hr/day and is a natural and viable option to augment or replace any of these electrical-power-providing systems deployed in the ocean environment. ESL has worked closely with URI to develop two types of buoys for this purpose, both employing an LEG and each providing reliable operation without the need for additional gearing. Both systems have the ability to harvest electrical power in small sea states. The LEG converts the mechanical energy from the wave-induced heave motion of the buoy into electrical energy by passing a permanent magnet armature through a series of conductive coils. This method is similar to that used in flashlights that are powered by manual shaking. The development process took advantage of URI's expertise with floating body hydrodynamics and ESL's extensive knowledge of controls and linear generators.



The buoys utilize linear electric generators with novel load controls to convert mechanical energy from ocean waves to useful electrical energy, which is stored on lithium ion capacitors instead of batteries.

Direct drive approach

The first design is a traditional direct-drive buoy that relies on the differential motion of a float and a resistance plate sea-anchor to drive the LEG. A wave-compliant inflatable surface float provides buoyancy to the system and is rigidly connected to a submerged, watertight buoy canister. The permanent mag-

net generator is housed and rigidly mounted inside the water-tight canister. A resistance-plate with rigid connection is used to provide the anchoring, which allows free-floating applications. Fixed anchoring is also possible using a slack-mooring that eliminates the requirement of length adjustment in changing water depth due to tides. The canister, surface float, and resistance plate can all be relatively small and contained in a pre-deployment package of low volume.

This configuration provides reliable operation without the need for additional gearing and has the ability to harness electrical power in the 1 to 10 W range in small sea states (WMO Sea State 1: Calm). The buoy response in the direct drive system is designed to match a wide range of expected ocean wave spectra based on the deployment location. A key part of the design is the system response that allows the resistance plate and buoy to move in contrary motion, effectively amplifying the drive range. Direct drive of the system with wave motion results in broad band response with high efficiency. Other benefits of this system include low acoustic noise and stealthy operation.



The direct-drive buoy utilizes the differential motion between a surface float and weighted resistance plate to drive an internal linear generator. The deployment of the buoy was in Narragansett Bay in Rhode Island.

Resonance-based approach

The second design is a novel resonance-based system, completely sealed with no external moving parts, which uses the heave motion of the buoy to drive an inertial mass/spring system to drive the LEG. The buoy contains multiple spars, with one long central spar containing the LEG and surrounded by four shorter satellite spars. The satellite spars provide both form stability, reducing the amount of roll motion, and a reduction in the overall draft of the buoy. This design must be tuned by adjusting parameters such as buoy draft and LEG spring constant to match the natural resonant frequency of the system to the average peak spectral wave period of the sea state at the location of deployment. When excited by the correct wave conditions, the buoy's heave motion will be amplified, leading to better performance of the generator and greater amounts of electrical power.

Electrical power is extracted from the generator using ESL's proprietary adaptive load circuit that optimizes the load on the generator to harvest the maximum amount of power. The power is then stored on supercapacitors, reducing or eliminating the need for batteries that would need to be replaced.

The design process

The first step in the design process was to create a wave-to-wire numerical model to demonstrate the feasibility of such systems. Using given sea state parameters as input, the model sim-

ulates the hydrodynamic response of the buoy to the wave conditions, while using the buoy response to force the motion of the LEG armature, which determines the electrical energy produced by the generator under given load conditions. The motion of the LEG is affected by the process of extracting electrical power, which, in turn, has an effect on the buoy's heave motion and must be included in the model for accurate results.

Small scale mini-prototypes were then constructed and tested in the wave tank at URI for the purpose of model calibration. Larger prototypes, roughly one-quarter the size of the anticipated full-scale buoys, were constructed for at-sea testing in Narragansett Bay, Rhode Island. The sea trials showed promising results, with the buoys performing as expected, with buoy and armature motion as well as mean extracted power comparing favorably with model simulations.

Recent work at ESL has focused on improving the linear electric generators to increase their efficiency and power. In addition, the quarter-scale resonant buoy has been modified with solar panels to diversify the available energy sources and create a hybrid energy harvesting buoy. Solar energy harvesting, which is expected to produce a few watts on average, is specifically meant to be supplemental to the main mode of energy harvesting from waves. By combining wave and solar energy harvesting, it is reasonable that electrical power could be generated in most weather conditions, whether it is stormy with large waves and little sunlight or a calm sunny day.



Hybrid energy harvesting buoy deployed in Narragansett Bay in Rhode Island.

Additional at-sea testing of the quarter-scale hybrid resonant buoy is planned to take place in late 2013. Dry testing of the new linear electric generator and model simulations suggest that the quarter-scale hybrid resonant buoy should be capable of harvesting up to 10 W of sustained power. This amount of power is sufficient for many instrument/sensor and burst communications applications.

Conclusion

ESL is continuing to work on a full-scale design, roughly 40 to 50 ft in length, that will be capable of harvesting hundreds of watts of energy. This opens up the possible applications to include more complex systems, such as recharging stations for unmanned underwater vehicles. The company is engaging organizations with applications for this technology for both scientific study and commercialization. Dr. Raymond Sepe, Jr., is the lead scientist and a principal in the company. For more information, e-mail eslab@electrostandards.com or call 401-943-1164.



OFFSHORE INDUSTRY

China poised to become the world's largest net oil importer later this year

The U.S. Energy Information Administration's August 2013 Short-Term Energy Outlook (STEO) forecasts that China's net oil imports will exceed those of the United States by October 2013 on a monthly basis and by 2014 on an annual basis, making China the largest importer of oil in the world.

The imminent emergence of China as the world's largest net oil importer has been driven by steady growth in Chinese demand, increased oil production in the

United States, and a flat level of demand for oil in the U.S. market. U.S. total annual oil production is expected to rise by 28%

between 2011 and 2014 to nearly 13 mmbbl/d, primarily from shale oil, tight oil, and Gulf of Mexico deepwater plays. In the meantime, Chinese production increases at a much lower rate (6% over this period) and is forecast to be just a third of U.S. production in 2014.

On the demand side, China's liquid fuels use is expected to grow by 13% between 2011 and 2014 to more than 11 mmbbl/d while U.S. demand hovers close to 18.7 mmbbl/d, well below the peak U.S. consumption level of 20.8 mmbbl/d in 2005.

Looking beyond 2014, higher U.S. oil production and stagnant or declining U.S. oil consumption, coupled with China's projected strong oil demand growth and slow oil production growth, suggest that once China replaces the United States as the world's largest net oil importer, the gap between net oil imports in China and the United States will grow.

Deep, ultra-deepwater capex growth expected through 2017: Infield

Infield Systems' ninth Global Perspectives Deep and Ultra-deepwater Market Report to 2017 sees capital spending in depths greater than 1,640 ft to grow over the next 5 years.

Demand is pushing exploration further offshore into harsher and deeper waters, Infield said, noting that deepwater reserve additions are expected to remain a marginal proportion of overall global

production, rising from a 7% cumulative share of global reserves in 2012 to 10% by 2017. In capital spending terms, the deepwater market, which requires higher capital expenditure than its shallow water counterparts, is expected to rise from a 38% share in 2012 to a 53% share of global offshore capex by 2017.

Even with attention centered on the Deepwater Triangle of Brazil, West Africa, and the Gulf of Mexico, Infield sees support coming from less traditional deepwater arenas as Southeast Asia, Australasia, and Europe. Substantial growth is also predicted for the Middle East and Caspian.

Brazil is expected to lead the deepwater market with spending on the Lula and Franco developments.

Gulf of Mexico deepwater action will be led by Shell, with a 24% market share of capex including the ultra-deepwater development at Stones and Appomattox, according to Infield.

While West Africa will continue to lead the continent, deepwater activity should increase offshore East Africa, particularly the Prosperidade complex offshore Mozambique.

UK oil and gas workers' opinions mixed on Scottish independence

Oil and gas workers in the UK have mixed opinions about investment levels, wages, and job opportunities on the potential impact of Scottish independence on North Sea exploration, according to new research. On 18 September 2014, a national referendum will be held to decide whether Scotland will become an independent country.

The Scottish independence oil and gas survey, conducted by technical manpower specialist, NES Global Talent, was commissioned in July 2013 and completed with a sample size of 199 oil and gas workers.

The report found that 53% believe it would have a negative impact and 47% said it would have a positive impact.

Similarly, when asked about job opportunities, 54% said more jobs would be created, while 46% said fewer would be created.

Around 56% of oil and gas workers believe that wages would stay the same if Scotland became independent, with 25% believing they would fall and 19% saying they would rise.

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University introduces new Interactive Offshore Oil Rig

The Petroleum Extension Service (PETEX) at the University of Texas at Austin has launched its new Interactive Offshore Oil Rig. This innovative, 3D e-product provides a learning perspective on the inner workings of a semi-submersible oil rig, which PETEX considers to be one of the most intricate and powerful units used in offshore drilling operations. PETEX is considered a leading instructor of oil and gas industry workers in Texas and around the world.

The Interactive Offshore Oil Rig gives users an inside view to see and hear about each component of the rig — what it does and where it is located — and lets users zoom in for expanded views. Options include visuals and



detailed audio describing 10 different areas of the rig including a 360° rig view, power and hoisting equipment, circulating and cementing equipment, and much more.

The product includes an online assessment that tests the learning progress of the user. A passing score earns users a completion certificate from PETEX and the University of Texas at Austin. Developed by PETEX learning specialist Itzel McLaren with assistance from the university's Faculty Innovation Center at the Cockrell School of Engineering, this product is the result of a collaboration between scholars and oil and gas professionals.

"With thousands of offshore rigs actively drilling for oil and gas around the world, effective training is now more critical than ever," PETEX's director Zahid Yoosufani said, noting that the Interactive Offshore Oil Rig simulator "is especially useful for oil and gas industry personnel seeking a better understanding of individual parts of this extremely complex mechanical unit."

OFFSHORE INDUSTRY HEADLINES

Research & Development • Environmental Assessment • Discovery

U.S. proved oil and natural gas reserves were up sharply in 2011

U.S. proved crude oil reserve additions in 2011 set a record volumetric increase for the second year in a row, according to recently published estimates in the federal Energy Information Administration's Crude Oil and Natural Gas Proved Reserves 2011.

Natural gas proved reserve additions fell short of setting a record, but still ranked as the second largest annual increase since 1977. Crude oil reserves rose 15% (almost 3.8 Bbbl) to the highest level since 1985, and natural gas reserves were up almost 10% to 31.2 tcf.

Proved oil reserves, which include crude oil and lease condensate, increased to 29 Bbbl, marking the third consecutive annual increase and the highest volume of proved reserves since 1985. Proved reserves in tight oil plays accounted for 3.6 Bbbl (13%) of total proved reserves of crude oil and lease condensate in 2011.

Texas recorded the largest increase in proved oil reserves among individual states, largely because of continuing development in the Permian Basin and the Eagle Ford formation in the Western Gulf Basin. North Dakota had the second largest increase, driven by development activity in the Bakken formation in the Williston Basin.

600,000 new jobs supported by oil, natural gas industry in 2 years

The American Petroleum Institute (API) released a new study from PwC US showing the oil and natural gas industry supported 9.8 million American jobs in 2011, an increase of more than 600,000 jobs in just 2 years.

"Game-changing innovations in hydraulic fracturing and horizontal drilling are creating hundreds of thousands of new jobs every year," said Jack Gerard, API's president and chief executive officer. "For the first time in generations, America's path to true energy security seems clear, if we get our energy policy right today."

The industry now supports 8% of the U.S. economy, up from 7.7%, according to the PwC study commissioned by API. The study examined the oil and natural gas industry's economic contributions in 2011, an update to a previous report from 2009.

"We need Congress and the administration to unlock additional opportunities by expanding access to domestic energy resources, speeding up permitting, and ending the broken ethanol mandate," Gerard said. "By doing so, we will create even more American jobs, grow our economy, protect consumers, and take full advantage of our

nation's vast energy resources."

The industry supports jobs in all 50 states, according to the study. Texas remains American's oil and natural gas leader, with the industry supporting nearly two million jobs in the state and making up 23% of the state's economy. California is second with nearly 800,000 jobs and nearly 7% of the state's economy, followed by Louisiana with 400,000 jobs and 35% of the state's economy.



Dhirubhai Deepwater KG1

Transocean Ltd.'s 'KG1' sets new offshore water depth drilling record

Transocean Ltd. reports that the ultra-deepwater drillship Dhirubhai Deepwater KG1 has set a new world record for the deepest water depth by an offshore drilling rig.

The rig recently spudded a well in 10,411 ft of water while working for ONGC off the east coast of India. This accomplishment surpasses the company's prior world record of 10,385 ft of water also set by the KG1 in February while working for ONGC in India.

Shell's spill plans for Arctic are upheld by federal judge

Royal Dutch Shell Plc oil spill plans for drilling in Alaska's Beaufort and Chukchi seas do not violate environmental laws, a federal judge in Anchorage ruled in rejecting a challenge by conservation groups.

The U.S. Interior Department's approval process was not flawed or based on erroneous assumptions, and the approvals do not violate the Endangered Species Act, the Clean Water Act, or other environmental laws, U.S. District Judge Ralph Beistline ruled.

Shell halted operations off the Alaskan coast after accidents in 2012. Environmental groups, including Greenpeace, criticized the plans, saying oil spills above the Arctic circle would be almost impossible to clean up.

"The first court in the country said

these spill plans were sufficient, but this is only the beginning of the effort to define the obligations to address oil spill prevention and response, especially in remote, isolated areas like the Arctic Ocean," Holly Harris, an attorney for Earthjustice, a public interest law organization representing conservation groups that sued, told Bloomberg.

U.S. could miss export window for natural gas: Senior Republican

The top Republican on the Senate Energy and Natural Resources Committee warns that the United States could easily miss its chance to be a major player in global liquefied natural gas (LNG) export markets.

Senator Lisa Murkowski (R-Alaska) released a report that warns against "any legislation requiring additional economic studies, more restrictive rulemaking at the Department of Energy, or any other policy that serves to delay or prohibit the exporting" of LNG.

"The window for the United States to join the global gas trade will not be open indefinitely. In fact, it is narrowing, and there is a real possibility that the nation will miss out on a historic opportunity," the report states. The Energy Department (DOE) is reviewing around 20 industry applications to export LNG to nations that lack formal free-trade deals with the United States.



Sen. Lisa Murkowski

Those applications are more heavily vetted than exports to free-trade partners, but Murkowski and other export advocates have chafed at what they call an overly long DOE review process. Energy Secretary Ernest Moniz has said decisions will come this year, but it is not clear how many.

In mid-May, before Moniz arrived at the DOE, the department approved its second application to export gas to nations that lack a trade deal with the United States. It was the first such approval since 2011.

Meanwhile, a group of Democrats is urging the DOE to review the effects that an export surge would have on climate change. Burning natural gas for power creates far less carbon emissions than burning coal. But leaks of the potent greenhouse gas methane from gas wells and related infrastructure are a major concern for climate advocates.

The Bicameral Task Force on Climate Change recommends that DOE conduct a thorough analysis of the climate change impacts of proposed LNG exports.

Spill containment system headed for Texas coast

The centerpiece of a more than \$1 billion system for containing oil spills will be stored and maintained at a site in Ingleside, Texas, creating additional jobs in the coastal region known for its platform-building capabilities. Marine Well Containment Co. (MWCC) announced the decision.

The company said its system will be capable of containing oil spilling from wells in waters up to 10,000 ft deep and can contain oil flowing at a rate of 100,000 bbl/d. The system includes a large collection of components that will be stored and maintained either at Kiewit Offshore Services in Ingleside or at a facility in Mobile, Alabama, MWCC said.

The key pieces of the system, including the capping stack equipment that would go on top of a problem well, will be located in Ingleside, the company said. Kiewit Offshore Services also will store, test, and maintain modular capture vessels that will be used to collect spilled oil.

"Kiewit is a leader in construction, engineering, and design, and we are proud to join them in the Ingleside community," Marty Massey, MWCC's chief executive officer, said in a statement. "We are confident Kiewit will help us continue to carry out our mission of being continuously ready to respond."

In the event of a spill, the system's components would be deployed from Mobile and Ingleside, according to MWCC.

"For years at our (Kiewit Offshore Services) facility, we've been able to construct state-of-the-art oil and gas equipment and structures for clients operating in the Gulf," Fuat Sezer, president of Kiewit Offshore Services, said in a statement. "This project taps into the expertise of our workforce, which is excited to help develop and maintain this crucial deepwater well containment equipment."

MWCC is advancing this capability and is currently developing an expanded containment system that further increases capacity. Engineering and procurement are well advanced and fabrication has been initiated on all key components. The expanded containment system will be available for use in 2013. As MWCC's members look for new and deeper sources of oil, the company said it is committed to progressing technology that keeps pace with its members' needs.

In July 2010, following the massive Macondo oil spill, ExxonMobil, Chevron, ConocoPhillips, and Shell committed to providing a new containment response capability. These founding companies of MWCC recognized the need to be better prepared in the event an operator lost complete control and subsequent containment of a well.



Capping stack for well blowouts

UK's Q2 drilling results bode well for second half of year: Deloitte

North Sea drilling activity remains steady, with a positive forecast for the next two quarters, according to a new report into offshore activity from Deloitte, the business advisory firm.

The report, compiled by Deloitte's Petroleum Services Group (PSG), found that although the number of new wells drilled on the UK Continental Shelf (UKCS) has fallen slightly in comparison to the same period last year, the level of exploratory activity remains healthy.

A total of 16 exploration and appraisal wells were drilled in the UK during the

second quarter of 2013, seven more than during the first quarter but two fewer than the same period last year. Despite the slight fall on 2012's figures, the second quarter of 2013 has still produced two more new wells than the quarterly average since the end of 2011, a year which saw the lowest activity since 2003. Across northwest Europe as a whole, 35 new exploration and appraisal wells were drilled, 10 more than in the first quarter but only matching the second quarter of 2012.

Graham Sadler, managing director of Deloitte's PSG, said the latest figures are in line with what would be expected from a mature region such as the UKCS.

"These figures indicate the UKCS remains a strong and productive sector, which bodes well for the final two quarters of the year," he said. "I fully expect to see further positive figures in quarters three and four as the region recovers from a prolonged and harsh winter, which was followed by an unusually late spring."

One of the notable features of the second quarter's report is the significant increase in farm-in style agreements, where one company takes a stake in another company's field, often to assist with drilling or development costs. Farm-ins accounted for around 70% of the total northwest Europe deal landscape during the second quarter. A total of 30 deals were completed in the region, slightly down on the 35 that were completed during the same period last year.

"The number of smaller companies operating in the North Sea, as many major firms move to less mature areas, in part explains the significant increase in the number of farm-in deals," Sadler said. "Farm-ins allow smaller companies to benefit from pooling resources and equipment such as drilling rigs, enabling them to access existing North Sea reserves."

Development activity is also holding strong, with six fields being granted development approval and four actually coming onstream across UK and Norwegian waters. Although the number of fields coming onstream in the UK (three) is down on the same period in 2012 (five), innovative technologies mean that previously "sub-commercial" developments — those which might not have been considered economically viable — are beginning to provide real prospects, further incentivizing the exploration and development of the area.

Apache will sell GoM shelf assets to Riverstone Holdings for \$3.75B

Apache Corp. said it will sell its Gulf of Mexico shelf operations and properties to private equity firm Riverstone Holdings for \$3.75 billion in cash. The oil and gas exploration and production company said Riverstone's Fieldwood Energy unit will assume the obligations for the eventual retiring of oil production for the properties. Apache estimates those obligations at \$1.5 billion. It expects the deal to close 30 September. Fieldwood Energy said the assets have 239 mmboe in proved reserves. The companies will investigate deep exploration opportunities. Apache said production from shallower assets has become harder to achieve. The company said earlier this year that it planned to divest \$4 billion in assets and focus on newly acquired properties. Apache wants to reduce debt and repurchase shares.

Technip to supply pipe to Egina field offshore Nigeria

Technip has received two contracts to supply flexible piping to the Egina field operated by Total Upstream Nigeria offshore Nigeria. These contracts cover the qualification and supply of 12 dynamic flexible jumpers from 3.5 in. to 12.5 in. for oil production, gas lift, water injection, and gas export, to connect the single top tension risers to the FPSO, two 20.5 in. unbonded flexible pipes as oil offloading lines (OOL) connecting the FPSO to the offloading buoy, and associated equipment. Flexi France, the group's facility in Le Trait, will manufacture the flexible pipes, which are scheduled to be delivered in 2015 for the jumpers and in 2016 for the OOL. "These contracts cover complex dynamic applications and include the largest flexible pipes manufactured to date by Technip..." said Jean-François Niel, vice president of manufacturing. DUCO will be supplying the steel tube umbilicals for the development.

Statoil opts for managed pressure drilling upgrade

AGR subsidiary Ocean Riser Systems has a \$20 million letter of intent from Statoil to supply its next-generation EC-Drill managed pressure drilling system. According to AGR, the technique uses state-of-the-art control system capability, enhanced riser integration, and other features. Testing is due to start in the fall, with eventual deployment offshore Norway. EC-Drill addresses the typical deepwater drilling issue of a narrow pressure window. It manipulates bottomhole pressure by changing the level of drilling mud in the riser, allowing the operator to "walk the line" between pore and fracture pressures. It provides more control than conventional drilling while enhancing safety and makes it possible to cost effectively hit deep targets that are out of reach of more conventional drilling techniques.

Chevron awards £550M for two North Sea projects

Chevron has awarded contracts worth £550 million for two North Sea projects. The work for the planned, multi-billion pound Rosebank and Alder developments is to be carried out in the UK. Both projects stand to benefit from tax breaks unveiled by the government to stimulate investment in more challenging projects. The Rosebank field, 80 mi northwest of the Shetland Islands, lies in water depths of 3,600 ft and will require a floating production, storage and offloading vessel. It is thought 240 mmbbl of oil could be recovered from the field. Chevron awarded a contract for work on Rosebank to OneSubsea UK, part of a joint venture between U.S. firms Schlumberger and Cameron. The manufacturing work will be carried out at various UK locations, including Leeds. The Alder field, about 100 mi east from the Scottish mainland, contains gas condensate, a light, petroleum-like type of oil, at high-pressure and high-temperature. It was found in 1975 but only now appears technically and economically viable to develop.

Offshore Group Newcastle to design jacket for MonArb

UK-based energy services provider, Offshore Group Newcastle (OGN), has secured a contract worth £50 million from Talisman Sinopec Energy UK to design and fabricate a 120-m long steel offshore platform support structure jacket for the MonArb project in North Sea. OGN also secured a multi-million pound contract to design and manufacture the jacket castings, which include two pad eyes of 27-ton capacity each, and two trunnion nodes of 55-ton capacity each, to connect the main leg and brace tubulars, which make up the jacket structure that can support a 10,000-ton deck. The jacket is expected to be ready in spring 2014, while installation is likely to take place in the summer of 2014.

Shell to halt production at Auger TLP, tie-in new wells to Cardamom field

Royal Dutch Shell was planning to shut down production at its Auger tension-leg platform (TLP) in the deep waters of the Gulf of Mexico to begin tie-in of new wells to the Cardamom field in the fourth quarter of 2013.

The Cardamom field is located in Garden Banks Block 427, about 225 mi southwest of New Orleans, Louisiana, in more than 2,720 ft of water depth. The Auger TLP currently produces some 55,000 boe/d. The platform has produced more than 300 mmboe in its lifetime.

Shell said the completed subsea system will include five well expandable manifolds, a dual 20-cm, 8-in. flowline, and eight well umbilicals.

Modifications to the platform will include additional subsea receiving equipment, upgrade of an existing process train, and weight mitigation to increase the liquid handling, cooling, and production capacities of the host facility.

Shell Upstream Americas deep water executive vice president John Hollowell said the Gulf of Mexico remains an important part of Shell's portfolio and strategy, and it is expected to generate substantial growth in the next several years.

"Cardamom is a great example of using existing infrastructure to increase oil and gas production in a less capital intensive way," Hollowell added.

Once back to production in 2014, the Cardamom field, where Shell will hold a 100% share, is expected to produce at a peak rate of 50,000 boe/d. Earlier oilfield service company Technip was awarded a lump sum contract for the development of subsea infrastructure for the Cardamom field. The contract covered the project management, engineering, fabrication, and installation of the East and West Loop 12.8-km pipe-in-pipe flowlines with associated PLETs and steel catenary risers.

The Cardamom discovery well features a measured depth of 9,642 m, a horizontal reach of more than 4,570 m, and a vertical depth of more than 7,620 m.

Meanwhile, Shell's Olympus TLP reached its destination at the deepwater Mars field and was safely secured in place at the end of July.

The 120,000-ton structure, said to be the largest TLP ever developed for the Gulf of Mexico, is expected to start production in 2014 at a rate of 100,000 boe/d. Olympus, the centerpiece of the Mars B development, will be moored in 3,000 ft water depths in the Mississippi Canyon area, about 1 mi from the existing Mars platform, which has been producing since 1996. The new TLP hosts 24-slot drilling unit supplied by Nabors Industries and includes capacity for six subsea wells to gather production from the nearby West Boreas and South Diemos fields. The project, operated by Shell with a 71.5% interest, is expected to extend the field life of Mars to at least 2050. BP holds the remaining 28.5% interest.



Shell's Auger TLP in U.S. Gulf



Shell's Olympus TLP

Relief well continues drilling at site of well blowout in U.S. Gulf

Crews continued drilling a relief well at the site of a gas well that blew wild 23 July off the Louisiana coast but eventually was choked off by sand and sediment. The Rowan EXL-3 rig was moved to the site, about 55 mi southwest of Grand Isle, and began drilling the relief well under contract to well owner Walter Oil & Gas Co. The work to drill into and then plug the well with mud and cement was expected to take about 35 days.

The federal Bureau of Safety and Environmental Enforcement (BSEE) opened an investigation into the cause of the blowout, working with the Coast Guard. Investigators were expected to examine the blowout preventer, which may have failed.

The Hercules 265 rig, owned by Houston-based Hercules Offshore, was drilling at the site when the well blew out. All 44 workers aboard the rig were safely evacuated, but natural gas spewing from the above-water wellhead later caught fire. The fire was extinguished the next day when sand and sediment naturally plugged the well hole, shutting off the flow of gas.

A small amount of oil also was dis-



A cloud of natural gas flowing from an undersea well forms over the Hercules 265 drilling rig. Workers evacuated the rig after a loss of well control

charged after the blowout, producing a sheen that appeared and then quickly dissipated several times. BSEE said that a sheen was no longer visible on the surface of the Gulf of Mexico.

Authorities had not expected an environmental disaster similar to the massive BP crude oil spill, in part because the Walter well was discharging mostly gas and because its location was in relatively shallow water — 154 ft — making it easier to deal with.

W&T makes subsalt discovery below Mahogany field in GoM

W&T Offshore, Inc. has made a subsalt discovery in a deep shelf exploratory well beneath its producing Mahogany field. The field is located in Ship Shoal Block 349 in the Gulf of Mexico.

The SS 359 A-14 well "has exceeded our expectations and is currently producing from the targeted T-Sand at an initial flow back rate of 3,030 bbl/d and 5.6 mmcf/d of gas for a total of 4,000 boe/d," the company said.

The T-Sand is the deepest sand, at a depth of 17,200 ft vertical depth. While drilling the discovery well, W&T discovered additional pay in three sand levels, all of which will add to the company's estimated reserves. Well SS 359 A-14 also penetrated thicker main field pay sand and will serve as a future recompletion. More than 370 ft of net oil pay was logged from the A-14 well, the company said, and additional drilling will occur in 2014 to further appraise the find.

The company, which wholly owns and operates the field, anticipates that the unrisked reserve potential of the well is in the range of 1.8 to 6.2 mmboe. The Mahogany field has been producing oil and gas since March 1997.

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OIS' Wellintel helps fulfill decommissioning plans

Offshore Installation Services Ltd. (OIS), an Acteon company, has launched a new service designed to help operators fulfill their suspended well decommissioning plans. Wellintel is a well data collection and review service that gathers and prepares the information operators require before they start a decommissioning program. OIS engineers with extensive well abandonment knowledge and detailed understanding of the entire decommissioning process will deliver the service.

Operators having an up-to-date well inventory and regulatory documentation ready for submission to the UK government's Department of Energy and Climate Change (DECC) and the HSE can take advantage of commercially efficient opportunities such as multi-client abandonment campaigns that may arise at short notice.

Decommissioning offshore assets is a key challenge for the UK's offshore oil and gas industry. DECC is prompting operators with assets that require permanent abandonment to expedite the process.

For many operators, the main obstacles are lack of time or limited in-house resources to deal with the critical tasks required to prepare for decommissioning. The Wellintel team will help by collating well-specific data, such as end-of-well reports and well status diagrams, and the initial assessment of well categorization in accordance with O&G UK guidelines, which is required to identify which assets are available and suitable for vessel-based abandonment, thereby

easing the burden on operators.

The Wellintel service can also support operators with preparing the submissions to DECC and the HSE that are required before starting a decommissioning program. These submissions include the oil pollution emergency plan, PON 5 (application to abandon a well), PON 15f (permit to use and/or discharge chemicals during well abandonment), the Marine Coastal Access Act licence, and the HSE notification. Since its launch, Wellintel has attracted a high degree of interest among North Sea operators who recognize the value of this approach. One operating company has already started using the service as part of its decommissioning strategy.

One of the key features of the proposition is that the costs of the Wellintel service are deductible from future abandonment work by OIS, as Tom Selwood, OIS vice president commercial and business development, explained.

"Once the Wellintel process is complete, OIS can provide well abandonment solutions, including vessel charter, marine management, equipment and personnel, and full offshore project management for any suspended wells that are suitable for vessel-based abandonment. Operators that use OIS for back-of-boat suspended well abandonment work within 18 months of using Wellintel can recover the costs incurred against the project management fees associated with the well abandonment project."



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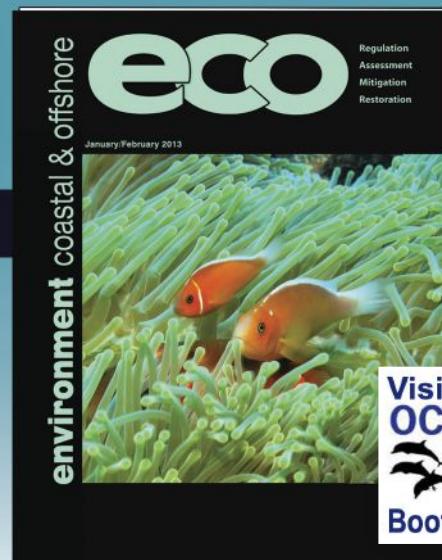
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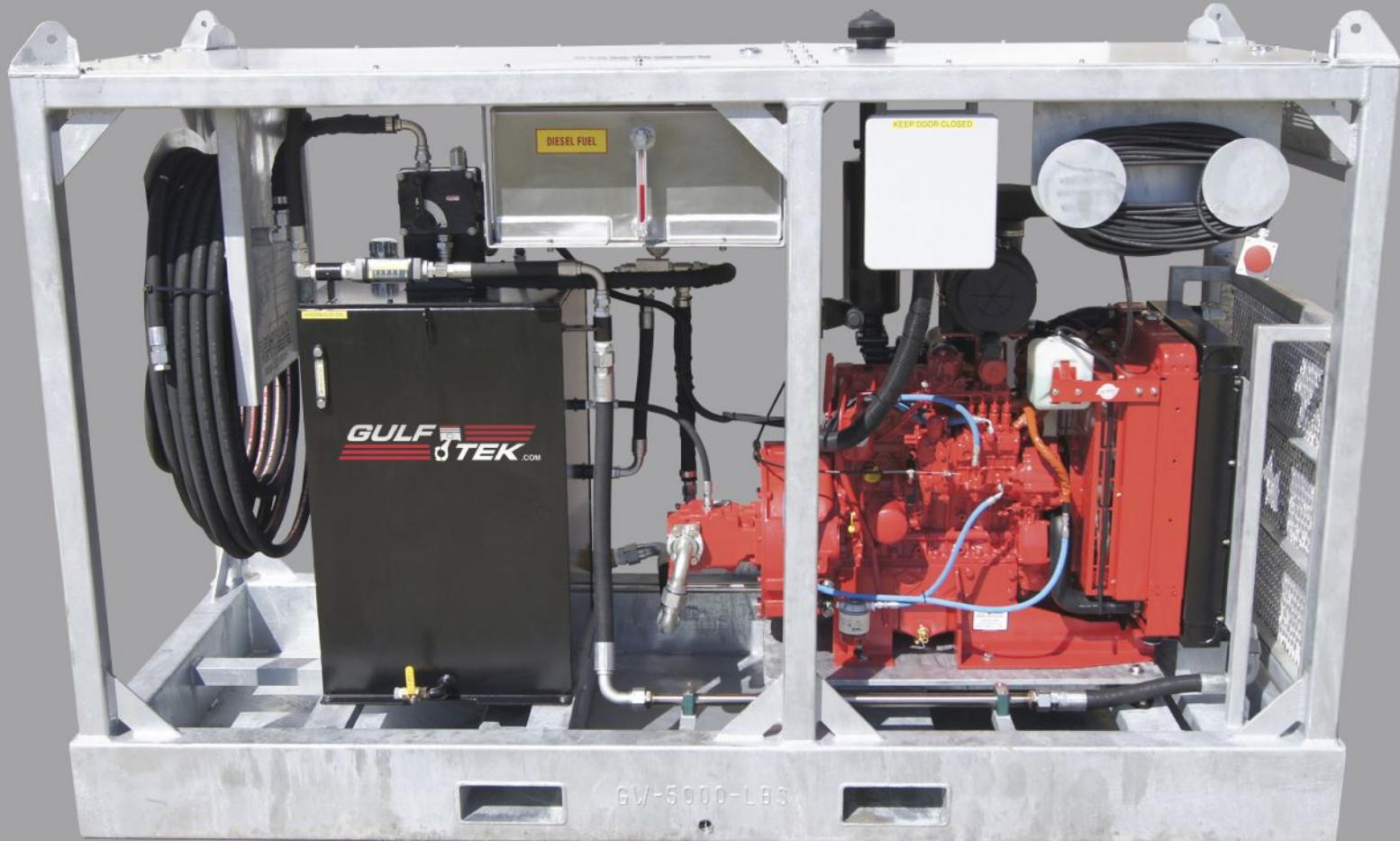
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Dana Petroleum replaces mooring chains on Triton FPSO vessel

UK-based Dana Petroleum, a wholly-owned subsidiary of Korea National Oil (KNOC), has replaced nine mooring chains on its Triton floating production, storage and offloading (FPSO) vessel.

The nine mooring chains, each with capacity of 150 tons, were replaced in 24 days by a team of professionals from Dana, InterMoor, Subsea 7, Wood Group PSN, and Optimus. The chains were produced by Viciñay in Bilbao, Spain before being transported to the North Sea.

The replacement work was completed less than a year after the approval of the project, which was started to maintain the safety of Dana's offshore teams and the integrity of the FPSO. Three specialist vessels were involved in the work to replace the chains on a like-for-like basis.

Dana Petroleum said the replacement will support its safe operation well into the 2020s and potentially for the remainder of the vessel's lifetime.

Located in the UK central North Sea at Block 21/30 at about 120 mi east of Aberdeen, the Triton vessel produces oil and gas from the Bittern, Guillemot West and Northwest, Clapham, Pict, and Saxon fields.



Triton FPSO vessel

Dana Petroleum, Shell UK, Esso Exploration and Production, and Endeavour are joint venture partners in Triton FPSO, with 51.966%, 26.42%, 20%, and 1.614% interest, respectively.

Saipem jack-up drilling rig Perro Negro 6 sinks offshore West Africa

The Saipem jack-up drilling rig Perro Negro 6 has sunk offshore West Africa in 131 ft of water. The company said the seabed under one of the three legs collapsed, causing the rig to tilt and suffer hull damage, which caused water intake. The event came during rig positioning on 1 July prior to the start of drilling.

As of last the report, Saipem had evacuated all personnel. One person was missing, and six had minor injuries. No

environmental damage was reported. The rig was near the mouth of the Congo River between Angola and the Democratic Republic of Congo.

Petrobras orders three pipelay support vessels from Subsea 7

Subsea 7 has won three contracts from Brazil's Petrobras to build and operate three new flexible pipelay support vessels. Combined value is around \$1.6 billion. Work scope for each of the 5-year contracts comprises project management, engineering and installation of flowlines, umbilicals, and equipment to be supplied by Petrobras.

The three new vessels, of similar design to Subsea 7's Seven Waves, will be constructed at the IHC Merwede shipyard in The Netherlands and are due to be delivered in 2016 and 2017. They are designed to operate in water depths of up to 9,842 ft and to lay flexible flowlines and umbilicals.

Equipment will include a lay system tower with 550 mt top tension capability, twin underdeck baskets capable of storing up to 4,000 mt of flexible flowlines, and two ROVs. Total cost of the three vessels to Brazil is around \$950 million.

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Suncor to rectify damage to Terra Nova mooring chain

Suncor Energy will extend its planned maintenance program this September on the Terra Nova FPSO, which is stationed offshore Newfoundland and Labrador. An underwater inspection at the end of May revealed that one of the vessel's mooring chains is broken. Loss of one chain does not impact the vessel's safety, integrity, or stability, the company stressed. However, the component will be repaired and maintenance will be completed on the remaining eight mooring chains. Remediation work will start in early September and continue for 11 weeks, seven more than previously planned.



Helix Energy to build additional semi-sub well intervention vessel

Helix Energy Solutions Group, Inc. plans to add a second newbuild semi-submersible well intervention vessel — the Q7000 — to its fleet. The Houston-based company is expecting to take hold of the Q5000 semi-submersible intervention vessel from Jurong Shipyards in 2015, according to the company.

"Based on strong market demand and our proven success for delivering specialized deepwater well intervention services, we are moving forward with the Q7000, which is consistent with our strategy of expanding our well intervention fleet around the world," said Owen Kratz, Helix's chief executive officer.

The semi-submersible will have the capability to perform top-hole drilling operations across multiple locations, without the extensive mob and demob times of a traditional drilling unit. The company's first well intervention vessel, the MODU Q4000 DP3 semi-submersible vessel, achieved 86% utilization in the Gulf of Mexico in the second quarter of 2013.

Crane barge Saipem 7000 installs Golden Eagle jacket in North Sea

The crane barge Saipem 7000 has installed the wellhead jacket for Nexen's Golden Eagle development in the UK central North Sea. In late May, the 7,165-ton, 426-ft tall steel jacket sailed from the Heerema Vlissingen yard in The Netherlands to its offshore location 43.5 mi northeast of Aberdeen.

The jacket was secured to the seabed on 12 June with 96-in. diameter piles driven around 164 ft into the seafloor. It was ready to receive the wellhead deck, which was being prepared for transportation from Lamprell's fabrication yard in Jebel Ali, Dubai.

Next to be loaded out and installed from Vlissingen was the Golden Eagle production, utilities, and quarters jacket, which was fabricated in parallel with the wellhead jacket — a first for the yard, according to the company.

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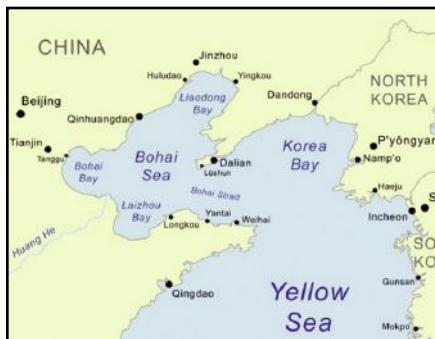
CNOOC exploration leads to oil and gas discoveries in Bohai Sea

China National Offshore Oil (CNOOC) has made two new exploration discoveries, Bozhong 8-4 and Kenli 10-4, in the Bohai Sea, offshore China. Bozhong 8-4 is in the west slope of Bozhong Sag in Bohai with an average water depth of about 28 m, while Kenli 10-4 is on the south slope of Laizhou Bay Sag in Bohai with an average water depth of about 15 m.

Discovery well Bozhong 8-4-4, which was drilled to a depth of 1,962 m, encountered oil pay zones and a gas reservoir with a total thickness of about 50 m and 11 m, respectively. During the test period, oil production of the well was around 660 b/d.

Discovery well Kenli 10-4-1, which was drilled to a depth of 2,395 m, encountered oil pay zones with a total thickness of about 45 m. During the test period, oil production of the well was around 2,800 b/d.

COONC executive vice president and exploration department general manager, Zhu Weilin, said discovery of Bozhong 8-4 and KL 10-4 has extended the company's effective exploration activities in



Bohai and further proven the rich oil and natural gas resources in the area.

Santos hits 4th consecutive gas well offshore Western Australia

Santos's Winchester 1 exploration well in the Carnarvon basin is the company's fourth gas discovery offshore Western Australia. Wireline logging and pressure testing confirms 131 ft of net gas pay in the Jurassic Angel and Triassic Mungaroo formations between 11,854 ft and 11,854 ft. Multiple gas samples are being analyzed, the company said.

The well will now be deepened to evaluate further objectives in the Mungaroo section. Winchester is 84 mi

northwest of Dampier in 246 ft water depth. Potential commercialization could include expanding Santos' existing production through jointly owned infrastructure or via the existing third-party LNG infrastructure surrounding WA-323-P. Santos holds 75% of WA-323-P and is the operator. The remaining interest is held by Octanex N.L.

Oil explorers looking to test Atlantic mirror with \$3B Angola wells

BP, ConocoPhillips, and Statoil are among oil explorers investing at least \$3 billion in wells off Angola next year in the country's biggest deepwater drilling campaign, Wood Mackenzie Ltd. said.

The companies will drill 20 wells beneath a layer of salt about 3 mi under the seabed at a cost of about \$150 million each. The drilling will test the industry's Atlantic mirror theory that there may be huge deposits of oil deep beneath the sea off West Africa similar to those across the ocean in Brazil, where some of the biggest finds of the last decade have been made.

Angola hopes it can tap offshore reserves to help it surpass Nigeria and become Africa's biggest oil producer.

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Bangladesh to sign initial deal for exploration of shallow sea blocks

Bangladesh-based Petrobangla has received approval from the cabinet committee on economic affairs to sign an initial agreement with two international oil companies (IOCs) for exploring three shallow sea blocks — four, seven, and nine — in the Bay of Bengal.

Petrobangla chairman, Hossain Monsur, was quoted by Dhaka Tribune as saying the company will send letters to ConocoPhillips and ONGC Videsh in this regard. "After the initial signing, the cabinet committee will approve the signing of production-sharing contract (PSC)," Monsur added.

Last December, global tenders were invited to bid for exploring oil and gas prospects in 12 blocks under Offshore Bidding Round 2012. U.S.-based ConocoPhillips and Indian energy company ONGC took part in the bidding process for exploration of nine blocks; however, the oil companies showed interest in only three of them. As part of the process, ConocoPhillips submitted its tender for block seven while ONGC submitted for blocks four and nine.

Under its exploration program, ConocoPhillips has offered to invest \$23.5 million to conduct a 2D seismic survey of 2,347 line-km, a 3D seismic survey of a 500 km² area, and drill one exploration well in block seven.

ONGC has offered to invest \$38.4 million to conduct a 2D seismic survey of 2,700 line-km, a 3D seismic survey of a 200 km² area, and drill two wells in block four. The company is also expected to invest \$64.8 million to conduct a 2D survey of 2,850 line-km, a 3D survey of a 300 km² area in block nine, and drill three wells.

Partners settle offshore Israel license impasse, set drilling plans

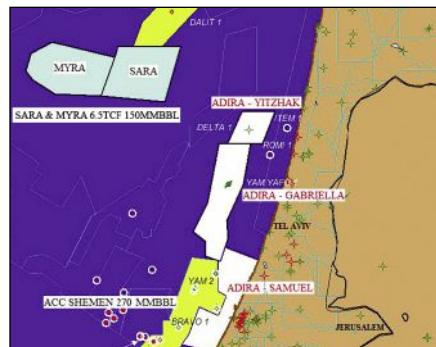
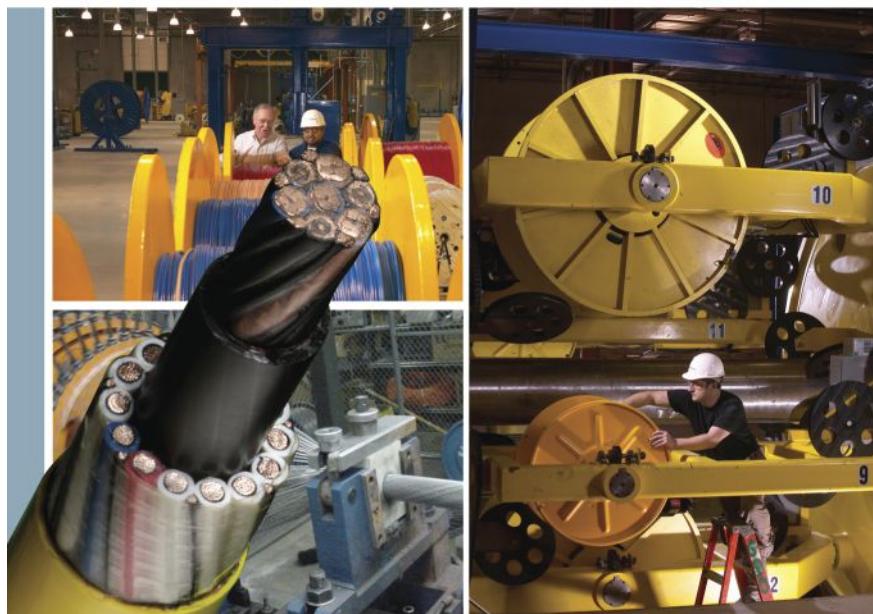
Partners involved in the Gabriella license offshore Israel have agreed to resolve their disputes over their respective funding obligations. These caused drilling of a first exploratory well earlier this year to be suspended.

Under the settlement and release agreement, Adira Energy, Modi'in Energy, and Brownstone Energy were to waive and release each other from any claims and demands they had with respect to the license. Additionally, they were to finance their proportionate share of costs in connection with the attempted drilling of the first well.

The agreement also gives the partners rights to participate in any farm-out of their interests in the concession realized by the other members for a period of 1

year. Adira also agreed to relinquish its 15% buy back option and management fee and reduce its overriding royalty interest to 2.625%.

Adira has applied to Israel's Ministry of Energy and Water for an extension of the date for execution of the drilling contract to 28 February 2014 and for the spud of the first well to 31 December 2014. As for the Yitzhak license, the company is seeking an extension to firm up a drilling contract to 30 September 2014 and for the spud of the first well to 30 June 2015.

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Providing high-pressure drilling riser in deepwater

Speed was critical when Statoil wanted to use the West Elara jack-up rig to install a high-pressure drilling riser for two wells in 132 m of water at a Gullfaks satellite field, Norway. The riser had to be ready for installation in 8 months to meet the rig's operational schedule.

Claxton Engineering, an Acteon company, managed the project with support from sister companies 2H Offshore, Pulse Structural Monitoring, and Subsea Riser Products, who manufactured sections of the riser and supplied the riser spider. The companies jointly delivered a detailed drilling riser solution, bespoke engineering work and a monitoring system to track performance.

This project was in unusually deep water for jack-up rigs, as Darren Bowyer, project manager, Claxton, explains: "For jack-up operations, deep water is over 80 m. Leg length determines the depth that jack-up rigs can operate in but average jack-up rigs like the West Elara are for 80 to 100 m of water, so 132 m was challenging. The main issue is scaling up to the needs of deeper water. Depth increases the current and wave deflection of the jack-up rig and the drilling riser, and increases loading on the whole system."

According to Bowyer, "The industry has little experience of jack-up rigs in depths greater than 100 m and in harsh environments. This makes for conservatism in design and operations. Furthermore, during high-pressure operations, well control considerations require a large blowout preventer, which adds a stiff component to the drilling riser and changes the dynamics of the string."

Drilling riser designs aim to minimize the risk of failure and meet design code and standard safety margins, but often have a large built-in "comfort factor" for coping with complex and



The West Elara jack-up rig

unpredictable loading.

The loading that a riser will face is difficult to model and is usually simplified for the design process because some of the factors are not well understood. For example, engineers must make assumptions about weather patterns in their model's input data. The fatigue information used is often based on standard industry codes rather than component tests and monitoring. Consequently, designers can find it difficult to calibrate their models with data gathered during operations.

For this project, 2H improved the model for riser loading, as experience shows that detailed modeling delivers an answer more than 30% closer to reality.

The project team also recommended changing operational procedures to reduce riser deflections in the splash zone caused by waves and currents. The modeling indicated the potential for very high-fatigue in the original riser design, so it was necessary to change the riser, the rig, and the air gap.

The alterations to the drilling riser design included adding a vortex-induced-vibration suppression system, using forged rather than welded joints in high-stress and fatigue-prone areas, and upgrading the tensioning system to 500 tons.

Bowyer says, "Adding special fairings to reduce vortex-induced-vibration and drag was a first for a high-pressure drilling riser in the North Sea."

The rig design changes included increased load capacity for the Texas deck. The rig's overshot capacity was also reviewed, but it was found to be fit for purpose.

This project was the first use of Claxton's NT-2 tool for deploying a riser and enabled it to be pressure tested before make-up to the blowout preventer.

Monitoring and integrity management have become key focus areas, so Pulse developed a riser monitoring system to gather field data, enable integrity management, verify the predicted models, and enable the operator to drill safely. The system included topside and subsea sensors for recording movement, load, and dynamic bending parameters.

This project has provided valuable insights into the use of jack-up systems in deeper water. Bowyer says, "This project had a challenging time frame and about 90% of the riser was changed after the contract award. By drawing on successful projects like this, it should be possible to extend jack-up drilling deeper."

Occidental, QP Petroleum agree to next-phase offshore Qatar

Occidental Petroleum of Qatar and Qatar Petroleum have agreed on the Phase 5 field development plan for the Idd El Shargi North Dome field (ISND) offshore Qatar. The two parties have collaborated on the field since signing a development and production-sharing agreement with Qatar's government in mid-1994. Their goal is to sustain oil production levels at around 100,000 b/d over the next 6 years.

ISND Phase 5's program will include implementing or improving water-flooding practice in all the field's oil-producing reservoirs. The partners plan to drill more than 200 new production, water injection and water source wells and

install associated facilities to support these wells, including minimum facilities platforms, wellhead jackets, fluid processing equipment, and pipeline debottlenecking and water source projects. In addition, they will implement pilot studies to support produced water re-injection and enhanced oil recovery projects. Total costs could exceed \$3 billion.

NPCC secures EPC contract for Umm Lulu field

UAE-based National Petroleum Construction Co. (NPCC) has secured an engineering, procurement, and construction (EPC) contract worth about \$766 million from Abu Dhabi Marine Operating Co. (ADMA-OPCO) to develop Umm Lulu field.

Under the first package of the contract, NPCC will build and install a 124-km, 20-in. subsea pipeline and 86.7 km of additional subsea pipelines in different sizes. The scope of the contract also includes 89 km of subsea composite and fiber optic cables and six new wellhead towers, plus a raiser platform jacket weighing 17,000 tons.

ADMA-OPCO plans to improve production by an additional 300,000 bbl to 1 mmbbl/d with development of the Umm Lulu field during the next 5 years. Detailed design and engineering, procurement, fabrication, and installation contract is expected to be completed in November 2015. ADMA-OPCO produces oil and gas from offshore areas of the Emirate of Abu Dhabi.

Gumusut-Kakap field production system on site offshore Sabah

MISC and Malaysian fabricator MMHE have delivered a semi-submersible floating production system for Sabah Shell Petroleum's deepwater Gumusut-Kakap field development offshore Sabah. The Gumusut-Kakap field is Malaysia's second deepwater development after the Murphy-operated Kikeh oil field, also offshore Sabah.

The semi-FPS, claimed to be the largest such facility ever fully built and integrated on land, left the Malaysia Marine and Heavy Engineering yard in Pasir Gudang, Johor on 13 May. It sailed to Desaru waters where a sea trial and an inclination test were completed on 24 May. The platform then undertook a 919-mi journey to arrive at the field on 12 June.

Following installation (the moorings are already in place), this will be the largest offshore operating facility anywhere in Asia, according to one of Shell's partners Petronas Carigali. MISC, as EPC contract holder, performed the full project management scope.

SSPC is responsible for the offshore installation and commissioning activities. The semi-FPS, designed to remain on station for 30 years, will operate in a

water depth of around 3,937 ft and will be linked to 19 subsea wells gathered together via seven subsea manifolds. The system is designed to process up to 150,000 b/d, with a subsea pipeline taking the oil to the Sabah terminal onshore in Kimanis. In time, the new platform could serve as a hub to tie in production from other accumulations in the area. Petronas has formed a new subsidiary, Vestigo Petroleum, to focus on development and production activities from small, marginal, and mature fields in Malaysia and elsewhere.

Saipem installs 11,684-t Gudrun platform deck offshore Norway

Saipem has installed the 11,684-ton deck for Statoil's Gudrun platform in the Norwegian North Sea. Following mating to the 7,716-ton steel jacket, work was to start on preparation for first production of oil and gas early next year. Development is estimated to cost \$337 million less than the originally budgeted \$3.53 billion.

Aibel had the engineer, procure, install, and commission contract for the deck. Two of the deck modules were constructed at the company's shipyard in Thailand and one at the yard in Haugesund, western Norway, with sup-



Saipem installs Statoil's Gudrun deck

port from Poland.

The helicopter deck was produced in China and the living quarters by Apply Leirvik. Gudrun, discovered in 1975 in the central Norwegian North Sea, is in license PL025, about 34 mi north of the Sleipner offshore complex.

Statoil estimates recoverable reserves at 126.5 mmboe, comprising around two-thirds oil and one-third gas and NGLs. The 16-slot Gudrun platform will have process facilities for partial stabilization of oil and gas, both of which will be sent to the Sleipner A platform for onward export.

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G-882 TVG - TransVerse Gradiometer Marine Magnetic Survey System

The G-882 TVG TransVerse Gradiometer is a rugged, high performance marine magnetic mapping system. The TransVerse Gradiometer provides simultaneous dual inversion to accurately position targets and depth of burial between survey lines.

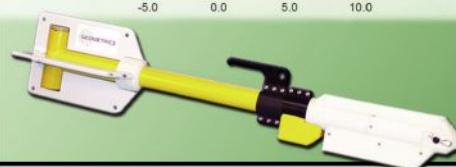
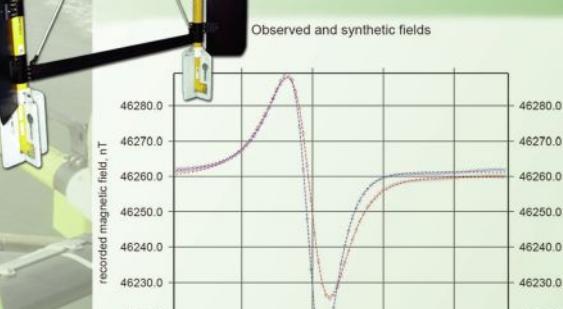
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North Sea Juliet field heading toward start-up in Q4 of 2013

The jack-up Noble Ronald Hooke has drilled and completed the first of two horizontal subsea production wells for the Juliet field in the UK southern North Sea.

According to partner Hansa Hydrocarbons, the well flowed at a stabilized rate of 63 mmcfd following cleanup, with the rate constrained by the capacity of the test separator.

It has since been suspended and will be connected for production following installation of the subsea pipelines and facilities, and completion of topsides works at the host Pickerill A platform later this year. Drilling of the second well is expected to start this fall.

In advance of commercial production — Hansa's first anywhere — the company has secured a 3-year gas sales agreement with RWE Supply and Trading for its share of production from Juliet. The point of sale will be at the entry to the UK's National Transmission System at the Theddlethorpe gas processing plant on England's east coast.

Juliet, operated by GDF Suez E&P UK, is in block 47/14b. The development project was sanctioned in July 2012. First



The jack-up rig Noble Ronald Hooke

gas is expected in the fourth quarter of 2013, peaking at 80 mmcfd. First Oil Expro is the other partner.

Production at deepwater Jubilee off Ghana headed to 120,000 b/d

Oil production from the Jubilee field offshore Ghana has reached about 110,000 b/d, according to operator Tullow Oil. This summer, work to rectify a gas-handling constraint was expected to be completed to allow production to rise above 120,000 b/d. A gas injector well should be drilled and completed by this fall, providing additional reservoir pres-

sure support and gas disposal ahead of start-up of gas export facilities next year.

Following the expiry in May of the Deepwater Tano exploration license, the company and its partners have relinquished remaining non-prospective acreage. The Jubilee Unit Area, the newly approved TEN development and production area, and the Wawa discovery area have all been retained.

Apache Corp.'s North Sea Bacchus well doubles total field production

Apache Corp. said the newly onstream B-1 development well has pushed total production at the Bacchus field in the UK central North Sea to more than 17,600 b/d of oil. Currently, the well is delivering 9,400 b/d. Apache logged 2,057 ft net oil pay along a horizontal completion segment in Jurassic-aged Fulmar sandstone in the field's western fault block. Production heads to the Forties Alpha platform via a subsea tieback. Following the recent drilling success at Bacchus, Apache has extended its current Forties 3D seismic survey program to cover other Jurassic development and exploration targets in the Bacchus area.

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Further production increase for Dragon offshore Turkmenistan

Dragon Oil Plc has completed four more wells, including one side track, at its Cheleken Contract Area development in the Turkmen sector of the Caspian Sea.

A leased, platform-based rig completed the Dzheitune (Lam) 28/182 development well as a single producer in April, testing at an initial rate of 1,876 b/d of oil. Last month, the Dzheitune (Lam) 28/151A side track was completed as a single producer, testing at an initial rate of 869 b/d.

Currently, the rig is on transfer to the Dzheitune (Lam) 22 platform to drill two more wells before the end of the year.

The contracted jack-up has drilled the Dzheitune (Lam) 21/180 and 21/181 development wells in batch mode. The Dzheitune (Lam) 21/180 well encountered a high-pressure gas zone and was temporarily suspended, the company said.

The Dzheitune (Lam) 21/181 well was completed as a dual producer in June. It is being optimized and producing at a rate of 960 b/d from both strings. The rig has since mobilized to drill three slots on the Dzheitune (Lam) C platform, starting with the Dzheitune (Lam) C/183 well.

Dragon has continued its workover

campaign on old wells using the hydraulic workover unit on the Dzheitune (Lam) 4/4 and 4/8 wells with recompletions in new horizons and added perforations in the Dzhigalybeg (Zhdanov) 60/68 well. Combined incremental production from these activities was 450 b/d.

Average Cheleken field production for the first half of 2013 was 73,600 b/d, compared with 64,200 b/d in the same period last year.

Shell makes decision to boost deepwater output offshore Brazil

Shell has decided to move forward with two deepwater offshore Brazil production projects. Parque das Conchas and Bijupirá/Salema fields will both enter new development phases, Shell said.

At Parque das Conchas (BC-10), Phase 3 will include installation of subsea infrastructure at Massa and Argonauta O-South fields. These will be tied-back to the Espírito Santo FPSO.

Phase 3 is expected to boost production to a peak of 28,000 boe/d. Phase 2 is on schedule to tie-in Argonauta O-North online late this year with a peak production of 35,000 boe/d. Ownership of BC-10 is 50% Shell, 35% Petrobras, and 15% ONGC.



Espírito Santo FPSO

A redevelopment at Bijupirá/Salema is under way and includes drilling four new production wells. Peak production is expected to reach 35,000 boe/d in 2014. Shell holds 80% and Petrobras holds 20%.

Otway Gas Project's Geographe field goes onstream in Bass Strait

Production has started from the Otway Gas Project's Geographe field in the Bass Strait. Origin Energy, speaking for the VIC/L23 joint venture, said the Geographe gas field consists of development wells, subsea facilities connecting to the existing Otway Gas Project subsea pipeline, and an onshore plant. Geographe is in Victorian coastal waters 34 mi south of Port Campbell and 9 mi north of the Thylacine offshore platform.

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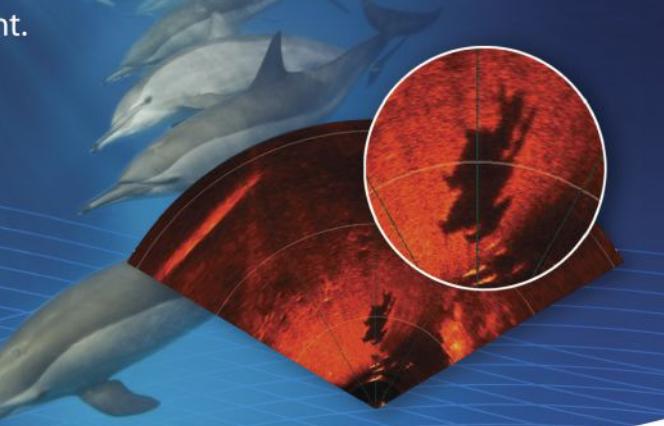
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Glacier Energy Services opens first international base in Singapore

International oilfield specialist Glacier Energy Services offshore division has opened its first international base, in Singapore, investing £250,000 to set up office, workshop, and warehouse facilities to support ongoing growth across the Asia-Pacific region.

Glacier is targeting turnover of £3 million in year one of operations in the Asia-Pacific and is embarking on a recruitment campaign to build its staff in the Far East, after appointing Tony Pont as regional general manager and Kwok Kin Yuen Gary as operations manager.

They will lead the business' service delivery to the region from its new facility in Jurong, Singapore, which covers 1,500 sq. ft of office and 4,000 sq. ft of warehouse and workshop space.

Glacier's client base in the region includes Bredero Shaw, Cameron, Wasco, Oilstates, FMC, Technip, Franks International, FTV Proclad, and Saipem.

Assets from Glacier's Roberts pipeline machining and site machining Services businesses, including a complete range of portable flange facing, drilling, Clyde pipecutting, and milling machines, as well as spares, are being stocked in



Kwok Kin Yuen Gary, Tony Pont, and Glacier Offshore MD Mark Derry at Glacier's headquarters at Clyde, Gateway East, Glasgow. Glacier opened its first international base in Singapore

Singapore, ready for mobilization across the region.

"This is a significant investment in a region where we are seeing major growth across our operations, with rising demand for rent and purchase of our machines, as well as the skills of our specialist on-site technicians," said Mark Derry, Glacier's managing director.

"Securing an in-country management team was vital to establishing our first international base and ensuring the immediate availability of our machines

and associated services from Singapore is a key factor of our growth plan for the region," he said.

"We are now pressing forward with a recruitment campaign to establish a highly competent team of locally-based site machining technicians to support work for key tier 1, 2, and 3 contractors on and offshore."

"As we continue to augment the range of services we deliver through the offshore division's HQ in the UK North Sea, our offering in the Asia Pacific will also expand."

Glacier Energy Services' offshore and engineering divisions have combined turnover of more than £10 million, following the group's formation in 2011. It has more than 100 staff working across the North Sea and international markets from its operational bases in Aberdeen, Glasgow, and Newcastle in the UK and now Singapore.

Backed by private equity providers Maven Capital Partners and the Simmons Parallel Energy Fund, Glacier relocated its headquarters to bespoke premises at Clyde Gateway East, Glasgow, Scotland in 2012, and earlier this year its Engineering division opened a new base in Boldon, Newcastle, UK.

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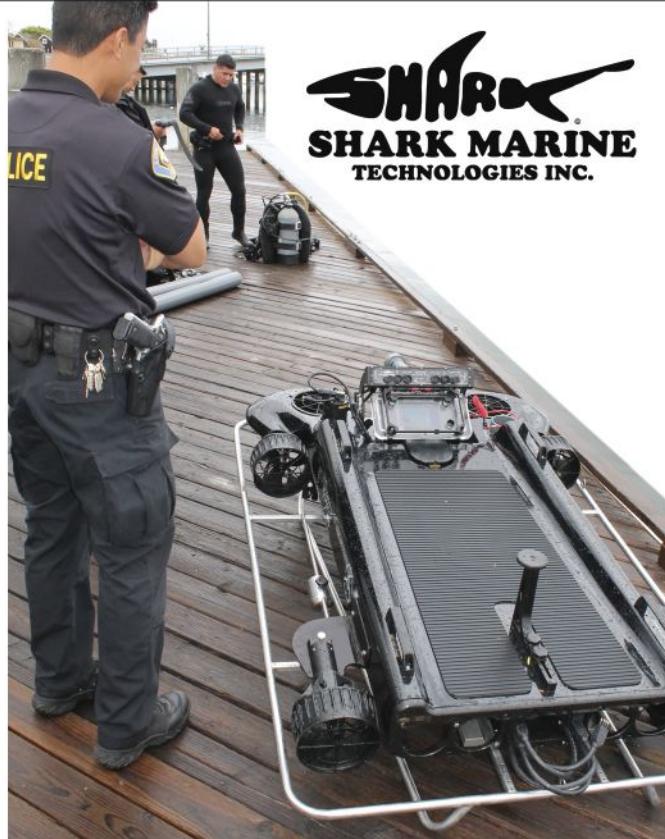
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Sinopec Group buys Marathon Oil's Angola oil fields for \$1.52B

China's Sinopec Group has agreed to buy Marathon Oil Corp.'s Angolan offshore oil and gas field for \$1.52 billion, Asia's largest refiner producer said.

Sonangol Sinopec International Ltd., the group's subsidiary, will acquire Houston-based Marathon's 10% stake on the Angolan field called Block 31, it said in a recent statement.

China's oil majors have been on an aggressive hunt for overseas assets to bulk up their energy reserves to meet future demand from the world's second-largest economy.

CNPC agreed in March to buy a \$4.2 billion stake in a Mozambique offshore natural gas field and recently agreed to buy a 20% stake in Novatek's \$20 billion Yamal-LNG project in northwest Siberia.

The Angolan Block 31 field, operated by BP, has estimated proved and probable reserves of 533 mmbbl barrels, Sinopec said, adding that it would hold a stake of 15% in the block when the transaction was completed.

The \$1.52 billion due to be paid by Sinopec is part of a \$3 billion asset disposal target set by Marathon in 2011 to shore up its balance sheet to finance fur-

ther exploration and development projects. The deal is subject to approval by the Chinese and Angolan governments.

Reliance Industries to invest \$6.5B in KG-D6 fields in Bay of Bengal

Indian energy firm Reliance Industries (RIL) has announced it will invest about \$6.5 billion in its KG-D6 gas fields to re-achieve natural gas production of up to 60 mmcm/d by 2019-20. RIL president and chief operating officer (E&P) B. Ganguly was quoted by PTI as saying that the company can achieve a production level of 40 to 60 mmcm/d by 2019-20, once they get timely approvals and the right gas price.

The Bay of Bengal KG-D6 fields, which commenced gas production in April 2009, have a current production of more than 14 mmcm/d.

The block reached a peak output of 69.43 mmcm/d in March 2010 before water and sand ingress led to a shutdown of more than one-third of the wells. With fresh investment, RIL plans to earmark \$3.155 billion for producing 20 mmcm/d of gas from R-Series discoveries in the block and a further \$1.529 billion in four satellite fields to produce 10 mmcm/d.

The company will carry out remedial

measures to boost production from the currently producing Dhirubhai-1 & 3 (D1&D3) and MA fields. Ganguly said RIL is planning to invest an additional \$1.2 billion in other discoveries in the block, while the company will invest \$747 million in increasing production from D1&D3 and MA fields by carrying out booster compressor and repair work at the closed wells. Another \$6.15 billion is expected to be spent as operating expenses.

Melita Exploration backs into study area offshore Malta

Melita Exploration Co. has acquired a 40% interest in an exploration study agreement (ESA) related to three blocks offshore Malta. Cairn Energy subsidiary Capricorn operates offshore blocks 1, 2, and 3 in Malta Area 3. All are north of Malta in the Sicily Channel and cover a total area of roughly 2,471 sq. mi, with numerous prospective leads. The ESA, which started last December, has an initial two-year period that calls for geological studies, reprocessing of existing 2D seismic data, acquisition of new 2D data, and other programs. Melita is a subsidiary of Mediterranean Oil & Gas.

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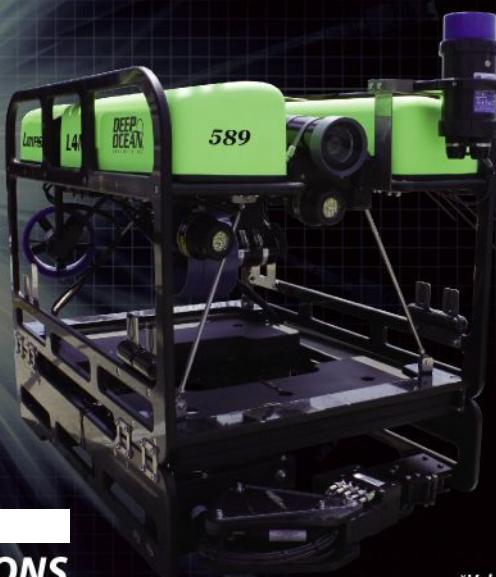
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Unique Hydra receives largest air dive system order from Subtech Offshore Services

Unique Hydra, a Unique Maritime Group (UMG) company which is one of the world's leading integrated turnkey subsea and offshore solution providers, recently delivered the largest single order for air dive systems to its client Subtech Offshore Services.

Based in Cape Town, Unique Hydra is a leading manufac-



turer and supplier of marine and diving equipment to the oil and gas industry. Unique Hydra personnel have substantial experience in marine engineering, hyperbaric, military defense, aerospace, and nuclear and chemical engineering. Their experience has given the Unique Maritime Group a leading edge in obtaining contracts involving the design, production, supply, and maintenance of its specialized equipment.

Subtech Offshore is a leading provider of subsea engineering services to the offshore oil and gas industry worldwide. The company provides turnkey project solutions to the industry as well as component solutions to multi-party projects.

Subtech successfully contracted the long-term diving and support services contract in Saudi Arabia and, with the specific tender and technical requirements for high quality and durable build, Unique Hydra was successfully selected from the bid program to supply the diving equipment. The order included six complete SL3.1 air diving controls and chamber systems as well as the relevant SL 3.6 machinery packages.

For more information, visit www.uniquehydra.com.

First autonomous underwater vehicle joins Modus' subsea fleet

Modus Seabed Intervention, the leading subsea engineering and specialist Unmanned Underwater Vehicle (UUV) service provider, has taken delivery of its first Autonomous Underwater Vehicle (AUV) as the company expands its technology-led subsea capabilities.

The acquisition is part of a planned investment programme by the northeast England-based company to develop a dedicated division operating a fleet of AUV units to provide survey and inspection services across offshore field development life cycles.

The division is headed by the Royal Navy's recognized AUV authority, former Senior Mine Warfare Officer and Officer in Command Fleet Unmanned Underwater Vehicles Richard Hill.

Modus have recently appointed two further AUV specialists, former Royal Navy AUV operator Bernard Carroll and former Kongsberg AUV technician, Rob Cowdrey.

The launch of the AUV division is part of Modus' commitment to be at the forefront of unmanned subsea and seabed intervention technologies. It will complement its existing subsea operations and enhance the services it offers to the global oil and gas, renewable energy, defense, and telecommunications markets.

The company is actively involved in subsea trenching, survey, IRM (inspection, repair, and maintenance), and construction support operations across the world, operating a fleet of state-of-the-art trenching and work-class ROV spreads and equipment.

Jake Tompkins, Managing Director of Modus Seabed Intervention, said: "The requirements of the offshore industries demand innovative, technology-led solutions. Modus applies focussed solutions to meet the challenges of offshore developments and the AUV capability will play a major part in the support we can offer to the industry."

"The combination of expertise that Richard and his team

bring to our AUV division and Modus' extensive offshore track-record will ensure that this technology will be an effective addition to our services and we look forward to demonstrating its capabilities to the offshore industry."

Launched in 2008, Modus Seabed Intervention Ltd provides comprehensive seabed intervention services to the offshore industry. It is the leading subsea engineering and UUV specialist.

Seabed intervention is a universal approach to the application of geological sciences, engineering, and advanced remotely operated technology for subsea trenching, survey, and construction support.

Operating a fleet of state-of-the-art trenching and work class ROV spreads and AUVs, Modus aims to provide technical and operational excellence to the offshore industries through professional, safe, innovative, and cost-effective services.

For more information, visit www.modus-ltd.com.



KONGSBERG Seaglider™ AUV debuts at AUVSI 2013

Following its acquisition of the Seaglider™ exclusive commercial license from the University of Washington in May this year, leading subsea technology developer Kongsberg Maritime is proud to launch the KONGSBERG Seaglider™ AUV at AUVSI 2013.



As the first vehicle from the new Kongsberg Maritime business unit, underwater glider systems, KONGSBERG Seaglider™ is a comparatively low-cost, very long endurance AUV that is capable of deployment durations in excess of 9 months. The technology uses changes in buoyancy for thrust, which combined with an extremely hydrodynamic shape results in very low-energy requirements, hence its ability to partake in much longer missions than propeller driven AUVs.

The system is capable of deploying a diverse range of sensors making it a cost-effective instrument for collecting a wide variety of ocean data. This makes the KONGSBERG Seaglider™ a very attractive option to the many organizations that are facing the challenge of operating on smaller budgets.

"As the sole holder of the commercial rights to this highly successful, field-proven glider technology, we are keen to maximize its potential for the marine research community by combining the extensive specialist knowledge and experience we have gained from developing HUGIN and REMUS AUVs," comments Rich Patterson, general manager underwater glider systems, Kongsberg Underwater Technology Inc.

Full production of KONGSBERG Seaglider™ is expected by December 2013, although there is capacity for delivery of special orders before this date.

For more information, visit www.km.kongsberg.com.

EvoLogics underwater modems connected a fleet of autonomous vehicles into an acoustic network

In late July 2013, partners of the Marine Robotic System of Self-Organizing, Logically Linked Physical Nodes (MORPH) European Project concluded 5-day sea trials in Toulon, France, having successfully integrated several AUVs and ASVs into a coordinated multi-node MORPH system using EvoLogics underwater acoustic communication devices.

The MORPH project was launched in February 2012 under coordination of Atlas Elektronik GmbH. It advances a novel concept of an underwater robotic system composed of spatially separated mobile modules, each carrying complementary underwater sensors. The modules are connected by an acoustic underwater communication network. Without constraints of rigid links, the nodes can reconfigure themselves and place sensors in an optimized way in response to the shape of the seabed.

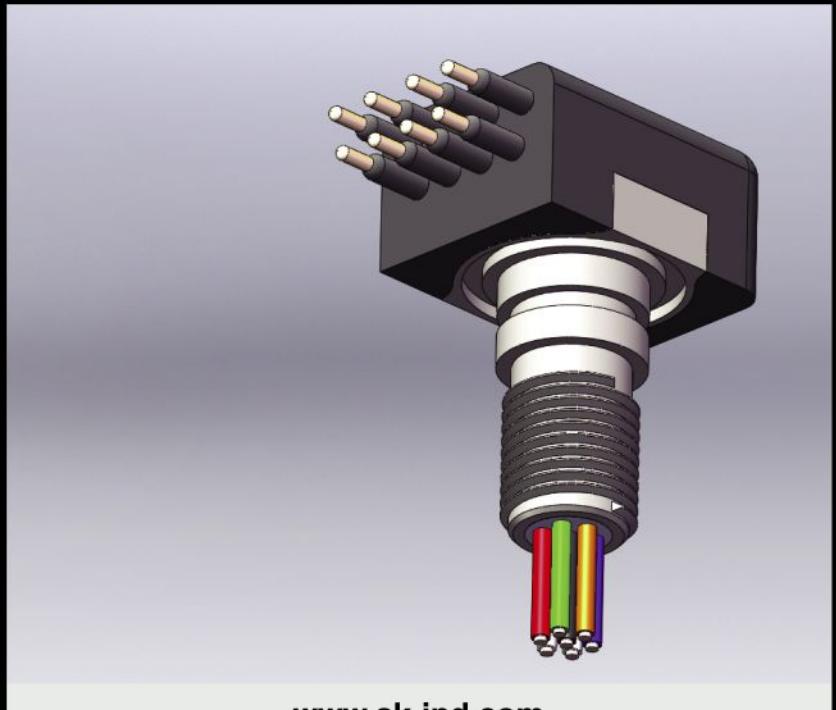
Such system pioneers underwater habitat mapping in rugged terrain, where existing methods and technologies fail to yield good results.

Toulon experiments were dedicated to testing the MORPH simplified horizontal survey configuration, intended for mapping 3D seafloor structures — a formation of two USVs (Unmanned Surface Vehicles) that control and guide two AUVs. In this configuration, the USVs communicate over Wi-Fi and use GPS, whereas the AUVs are connected



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through an underwater acoustic network and use range-only acoustic navigation.

The partners succeeded in programming and running a fleet of vehicles, performing cooperative path following maneuvers of the USVs and range only formation maneuvers of the AUVs. To demonstrate the system's efficiency, the experiments were performed with different sets of marine vehicles from different MORPH partners — six vehicles overall. The team reached all objectives, having integrated all hardware and software systems required for mission planning and control as well as all aerial and acoustic communications.

For more information, visit www.evologics.de.

Fugro Chance completes time-saving acoustic metrology

Fugro Chance Inc. recently performed non-typical acoustic metrologies on four proposed jumpers in the Gulf of Mexico. By industry standards, the measurements were completed in a substantially short time frame.

A typical metrology takes approximately 12 hrs for one measurement, resulting in an anticipated operational time of around 48 hrs in total. However,

these non-typical acoustic metrologies were completed with accurate results in just 33 hrs.

Two standard Sonardyne Compatt 6 transponders and two Sonardyne Lodestar GyroCompatts (LGCs) were used to acquire tilt magnitude and direction from manifold pressure caps to wellhead casings. Four Compatts were used to ensure repeatable results. The LGC technology integrates acoustic positioning, attitude and heading reference, and sound velocity technologies all in one instrument. It provides wireless updates and extremely accurate measurements of attitude, heading, heave, surge, sway, pressure, and acoustic positioning of any subsea object. By utilizing these LGCs, Fugro saved the client both time and money while providing highly accurate data.

For more information, visit www.fugro.com.

2012 ROV statistics from IMCA

Newly released ROV statistics from the International Marine Contractors Association (IMCA) show there has been an increase of members' ROV-based construction, drill support, and

cable laying activities since IMCA started collecting figures on a worldwide basis in 2009. Additionally, cable laying activity, though a relatively minor part of members' work overall, has more than doubled since 2009. Inspection activity has stayed on much the same level as in 2009.

In February 2012, there were a total of 595 ROVs operating involving 3418 personnel; by August 2012, this figure had risen to 640 with 3,712 individuals involved. The personnel figures do not include personnel on leave, sick, or not working for any reason and only include those actually working on the 2 days of the survey. Overall looking back annually to 2009, the figures show that although there was a dip, or slower year in 2011, members report an increase in ROV-based construction, drill support, and cable laying activities.

Predictions suggest that demand will continue to rise and members are always looking for ROV personnel at all grades.

For more information, visit www.imca-int.com.

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Astrium to build new satellite for Telesat

Astrium has been awarded a contract by global satellite operator Telesat to build the latest addition to Telesat's fleet of communications satellites. This satellite will use Astrium's highly reliable Eurostar E3000 platform. Telesat's new, multi-mission satellite will replace and significantly expand on Telstar 12° West and 15° West. Scheduled to be launched at the end of 2015, Telesat's newest satellite will have powerful coverage of the Americas and EMEA regions as well as maritime zones in Europe, the Caribbean, and South Atlantic. Telesat's satellite will utilize high throughput capabilities and offer superior performance to meet growing needs of broadcast, corporate, government and enterprise users, including demand for aero and maritime services. The satellite will provide high levels of flexibility with coverage of Europe, the Americas, the Middle East, Africa, the Caribbean, North Sea, Mediterranean, and South Atlantic regions. The new satellite will have a launch mass of under 5 tons with 11 kW of electrical power. It has been designed to have a nominal service life of more than 15 years in orbit.

Sailor 800 VSAT antenna sets small-form performance standards

Cobham has announced the forthcoming launch of a brand new SAILOR VSAT antenna. SAILOR 800 VSAT is a high performance 3-axis stabilized Ku-band antenna system with an 83 cm reflector dish, which provides the same radio performance as competing 1 m antennae. The unique, class-leading performance of SAILOR 800 VSAT opens up a world of high-quality, reliable communications for a wider range of applications, including work-boats and fishing vessels, while providing installation flexibility for vessels of all types and size. SAILOR 800 VSAT competes in the 1 m VSAT antenna market, offering significant benefits by being lighter and more compact than the competition, but offering equal or even higher RF performance ($G/T > 18 \text{ dB/K}$). SAILOR 800 VSAT is based on the same technology platform as Cobham's established SAILOR 900 VSAT 1 m VSAT antenna, which itself sets class-leading performance standards within the 1 to 1.2 m antenna sector. Cobham's newest VSAT antenna offers the same significant benefits as SAILOR 900 VSAT in terms of uniquely simple procurement and installation in addition to top of the line RF performance. After ordering a complete system with a single part number, each SAILOR 800 VSAT leaves the factory fully tested and configured, with all RF equipment installed, which reduces the time needed on board for installation. This results in lower start-up costs, while the SAILOR build quality ensures reliability and increased up time. With SAILOR 800 VSAT, vessel operators or maritime VSAT service providers can now enjoy the benefits of a 20% smaller and lighter antenna and the performance of a 1 m antenna, including easier and quicker installation on a wider range of vessels.

Telemar, NSSLGlobal launch BBC World News on commercial vessels

Beginning in the fall of 2013, BBC World News bulletins will be available on board commercial maritime vessels via Telemar Scandinavia and NSSLGlobal Ltd. BBC World News will be broadcast several times daily to all vessels that opt into the service, providing marine crews with access to BBC's unparalleled coverage of international news, current affairs and sport.

Customers using Telemar and NSSLGlobal's Ku- or C-Band network will be able to watch BBC World News' daily bulletins without impacting on high broadband speeds through the use of the Multicast service. The agreement will allow Telemar and NSSLGlobal to offer BBC World News to over 800 vessels around the world and will be able to deliver the news that marine crews need to remain connected to the wider world. The deal also emphasizes the importance of crew retention for ship owners. Providing additional TV services will improve morale for crew and also be done without amassing an unexpected airtime bill or imposing on a broadband package.



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RigNet to acquire Inmarsat's Energy Broadband business



RigNet, Inc. announced a strategic deal with Inmarsat plc involving the sale of Inmarsat's Energy Broadband business to RigNet and the appointment of RigNet to become a key distribution partner to deliver Inmarsat's Global Xpress (GX) and L-band services to the energy sector worldwide.

RigNet has reached a definitive agreement to acquire Inmarsat's Energy Broadband business for \$25 million in cash, adding to RigNet's technology solutions, customer base, and geographic footprint. The business being acquired represents one of the largest pure play providers of remote communications to the oil and gas industry, making it a natural and strategic fit with RigNet's complementary business. Under the terms of the deal, Inmarsat will carve out and sell to RigNet all of its energy broadband assets, which include microwave and WiMAX networks in the U.S. Gulf of Mexico serving drillers, producers, and energy vessel owners; VSAT interests in Russia, the United Kingdom, U.S., and Canada; an M2M SCADA VSAT network in the continental U.S. serving the pipeline industry; a telecommunications systems integration business operating worldwide; and a global L-band MSS retail energy business. The energy carve-out includes assets, employees, contracts, and working capital.

In addition, RigNet has agreed, simultaneous with the closing of the acquisition, to become a key distributor of Inmarsat's GX satellite communications network services, which will enable RigNet to offer the next-generation satellite services to existing and new customers in the global energy sector. RigNet has agreed, under certain conditions, to a significant purchase of capacity from the high-throughput GX network during the 4 years after it becomes operational. RigNet expects to utilize GX and L-band services across its own business as well as that of the acquired Energy Broadband business.

The business being acquired had revenues of \$81 million in 2012. The company expects the acquired business to

achieve, on a run-rate basis within the first year of closing, an EBITDA contribution margin of 8% to 10%. As RigNet integrates the operations, it anticipates that it will incur \$5 to \$6 million of integration expenses through 2014. Based upon past history, annual capital expenditures for success-based opportunities and maintenance has averaged \$5 to 6 million. RigNet expects that it will make additional capital investments of \$5 million in 2014 to continue the network upgrade projects in the acquired business that are currently underway. RigNet expects to finance the transaction with a new credit facility and existing cash.

Both companies have approved the transaction, which is expected to close during or before the first quarter of 2014 after customary conditions have been met and regulatory approvals obtained. Deutsche Bank acted as RigNet's exclusive financial advisor and Norton Rose Fulbright acted as RigNet's lead legal advisor on the transaction.

For more information, visit www.rig.net or www.inmarsat.com.

KVH more than doubles mini-VSAT broadband capacity in Asia-Pacific region

Continuing the network expansion strategy outlined with the announcement of its new TracPhone® V-IP series satellite communications systems and IP-MobileCast™ service (expected to be available later this year), KVH Industries, Inc. has more than doubled the capacity of its mini-VSAT Broadband network in the Asia-Pacific region. The ongoing global network upgrade involves deployment of Variable Coding, Spreading, and Modulation (VCSTM) technology provided by ViaSat, Inc., KVH's partner in the mini-VSAT Broadband network. This is the fourth major capacity increase in less than 8 months, following upgrades in the Caribbean, EMEA,



and African and Brazilian regions that began in late 2012.

Increasing mini-VSAT Broadband network capacity in the Asia-Pacific region is a key step in our strategy to provide mariners with the connectivity they need at sea. The area is a major hub for commercial shipping, and the vessels travelling there need affordable, fast, and convenient connections in order to optimize their operations. The mini-VSAT Broadband network, particularly with the new TracPhone® V-

IP series terminals and upcoming IP-MobileCast™ service, provides those connections at an affordable price.

KVH recently announced a four-part strategy for the mini-VSAT Broadband network, which is designed to bring a variety of economical and convenient content services to mariners for the first time. It involves deployment of VCSTM technology to significantly increase effective network capacity, upgrading the TracPhone® terminals used to deliver the mini-

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VSAT Broadband service, creating a first-of-its-kind content delivery service, and building alliances with application providers to deliver a variety of high-quality content via that service.

KVH's solutions provide downloads as fast as 4 Mbps and uploads as fast as 1 Mbps, as well as crystal clear Voice over IP (VoIP) telephone lines with optimized service and prioritization of applications. Expanding network capacity and offering new services like IP-MobileCast™ will help these mariners to improve onboard efficiency as well as crew morale.

For more information, visit www.kvh.com.

STM Group expands operations in Brazil

STM Group Inc announced they are expanding their operations in Brazil given many recent successes. To date, STM has deployed over 6,000 installations in Brazil, serving the needs of large telecom companies, government agencies, the maritime and oil & gas industry, and other commercial enterprises. With a proven track record of deploying several large networks, both

nationwide and provincially, STM has been serving brand name customers such as Oi-Telemar, Brazil Telecom, Hispasat, Queiroz Galvao Oleo & Gas, HRT Group, the Secretary of Health for the state of Minas Gerais, and international clients roaming in Brazilian maritime territories. STM continues to deploy hundreds of sites per month.

Over the last decade, STM has built many land-based networks and is now growing rapidly into the maritime and offshore communications markets, driven in large part by the growing energy sector. STM currently serves many brand-name commercial vessels and fleets, both national and foreign-based in Brazilian waters. STM's maritime services enable global roaming with automatic hand-offs with smart beam switching among STM's many international teleports.

To support the growing needs of Brazil, STM is adding a third teleport in Hortolandia, complementing its existing teleports in Sao Paulo and Belo Horizonte. The satellite networking technology for the new teleport is the most advanced and efficient TDM/TDMA technology available and

is conformant with the open international standards.

STM recently achieved new milestones for the network in Minas Gerais, the second most populous state in Brazil, reaching over 2,000 sites. This network now provides reliable communication for a wide variety of health-related and social services.

STM has the VSAT networking licenses required by ANATEL, the Brazilian Agency of Telecommunications, including the nationwide operator license known as SCM and the maritime license known as SLE. STM operates in Brazil through its subsidiary Vodanet, which is based in Sao Paulo.

The company provides the most up-to-date communication services for private IP networks and public Internet access, including maritime roaming, VPN access, MPLS extensions, cellular backhaul, VoIP, Wi-Fi Hot Spot solutions, video and voice conferencing, business continuity services, disaster recovery, security, and other tailor-made services.

For more information, visit www.stmi.com.

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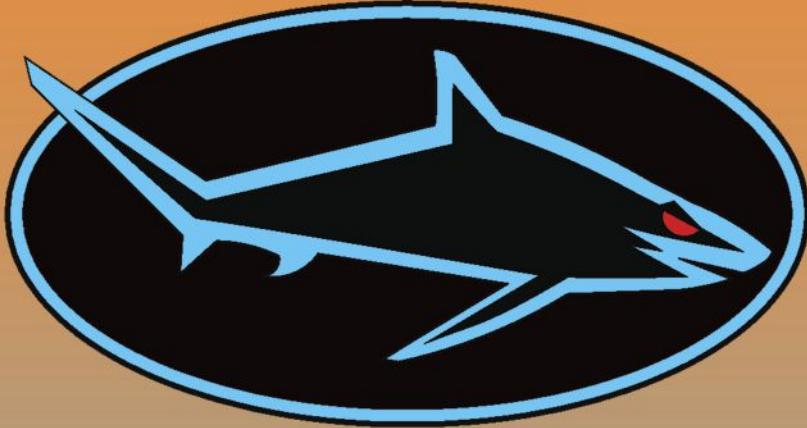
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NTT Com deploys 100G digital coherent technology on PC-1
NTT Communications Corporation (NTT Com) announced the world's first deployment of 100 Gbps digital coherent technology on a transpacific submarine cable system linking the U.S. and Japan, increasing the design capacity of the company's PC-1 system by more than 2.5 times to 8.4 tps. Data traffic has been growing rapidly due to the increased use of smartphones and tablets, music/video downloading, cloud computing, and services such as social networking. In response, NTT Com demonstrated 100 Gbps optical transmission using digital coherent technology on the company's U.S.-Japan route in October 2011. Despite the technology's attractiveness as a method for rapidly expanding optical network capacity, it initially was difficult to provide stable 100 Gbps communication over long distances due to the characteristics of light. By optimizing the PC-1's network architecture, including with strategically placed optical repeaters and an enhanced optical fiber lay-out, NTT Com has now achieved the world's first commercial deployment of 100 Gbps digital coherent technology on a transpacific route. By the end of 2014, 100 Gbps optical transmission technology also will be deployed in NTT Com's Asia Submarine-cable Express (ASE), linking major cities in Asia via the shortest possible route for industry-leading low-latency. The PC-1 optical submarine cable, the shortest transpacific link, is operated by PC Landing Corp., an NTT Com group company. It has a total length, of 21,000 km, configured in a ring-topology network with landing stations in Japan and the U.S.

Huawei Marine completes Philippines cable

Huawei Marine Networks Co, Ltd. announced the successful completion of the Boracay and Palawan Submarine Cable System in the Philippines. The domestic system, with a total length of over 330 km, consists of two segments: one linking Boracay and Caticlan, the other linking Taytay, Palawan and San Jose, Mindoro with a branching unit towards the island of Coron. For Globe Network Technical Group, this enables them to complement the modernization of their transport backbone network. According to Globe, this major upgrade, under the company's \$700 million nationwide modernization initiative, replaces the existing SDH microwave equipment with fiber optic technology using DWDM system in these two vital areas of growth in the Philippines. The cable roll-out now forms part of the fiber optic footprint of the company, currently at 30,000 km, spanning the archipelago, from Aparri to the Zamboanga region, and will extend further as modernization progresses. The 12-fibre pair submarine cable brings the optical fiber communication era to Boracay and Taytay, and creates a foundation for revenue growth by servicing demand from business and tourism in the Palawan region. The system is designed to accommodate transmission of 40 wave-lengths at 40 Gbps capacity per fiber pair, scalable to 100 Gbps per fiber pair. This is equivalent to a massive 19.2 Tbps, which will provide sufficient bandwidth to serve customers' data telecommunications requirements such as for 3.5 G/HSPA+ and 4G Long Term Evolution (LTE) services.

UK law firm advises BTG Pactual on acquisition of Globenet
UK-based law firm DLA Piper has advised an infrastructure investment fund managed by BTG Pactual, the Brazilian investment bank, asset manager, and wealth manager, on the central "take or pay" contract part of the acquisition by BTG Pactual of the Globenet submarine cable network from Brazilian telecoms operator Oi. The acquisition is valued at over \$750 million, and is one of the largest ever submarine cable acquisitions. Oi has sold all of its interest in Brasil Telecom Cabos Submarinos and its subsidiaries, located in Venezuela, Colombia, Bermuda, and the U.S., which are jointly known as GlobeNet. The acquisition includes the transfer of a 22,500 km system of submarine fiber optic cables held by GlobeNet and supply of capacity by GlobeNet to Oi and its subsidiaries through a fixed-price, long-term "take or pay" contract with volume guarantees. The work was led by London-based telecom partner Mike Conradi and supported by colleagues Gianluca Bacchicocchi, a partner in the firm's Chicago office; Sydney White, of Counsel in Washington DC; Andrew Davies, corporate partner in Leeds; and Gerry Rokoff, tax partner in New York.

Intertek completes cable management support at London Array



Intertek has successfully completed a long-standing cable package engineering and support contract at London Array, the world's largest offshore wind farm.

Now in full operation, London Array is set to provide renewable energy to over half a million British homes each year and, as part of this extensive project, Intertek provided valuable construction, cable engineering, and installation support.

The activity began in 2001 and has seen Intertek Energy & Water Consultancy Services (formerly Metoc) carried significant cable routing and feasibility studies during the evolution of the project. These vital studies helped aid the installation of the four export cables, each over 50 km in length, to the on and offshore substations, saving vital time and helping the project to meet scheduled completion deadlines.

Throughout the lifecycle of the brief, Intertek provided dedicated on-site cable engineering expertise and resource to the project, thereby enabling the developer and all associated project partners to help reduce risks and maintain schedule.

For more information, visit www.metoc.co.uk.

Hawaiki signs deal to land in New Zealand

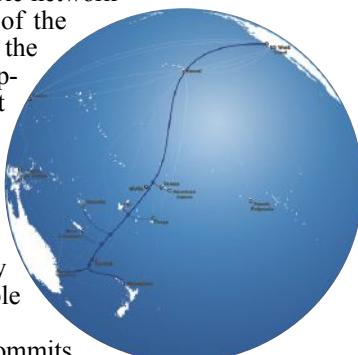
Hawaiki has picked the northern New Zealand city of Whangarei as one of the landing points for a proposed international submarine cable project worth hundreds of millions of dollars.

New Zealand-based Pacific submarine cable developer and owner Hawaiki Cable Limited is planning to build a \$350 million submarine cable system to carry vast quantities of electronic data between Australia, New Zealand, Hawaii, and the west coast of the United States.

The cable could be operating within as little as 2 years and will be the second fiber optic cable network linking New Zealand with the rest of the world, bringing true competition to the market and providing security of supply necessary for the country to host international data centers.

In what is being described as a huge coup for the North, Hawaiki has signed a memorandum of understanding with regional economic development agency Northland, Inc. to land the new cable in the Whangarei area.

Under the agreement, Hawaiki commits



to bring its cable ashore in the Whangarei area and build associated land-based infrastructure (including its cable landing station) in Northland.

Northland, Inc. will aid both the landing and the funding of the cable, including sourcing local investors and promoting funding through the Northland Regional Council's Investment and Growth Reserve. The agency will also facilitate consents and permits required to land the cable, including the necessary addition to the east coast's undersea cable protection area.

Hawaiki Cable Limited CEO Rémi Galasso said the system, which has a design life of 25 years, will be based on 100 Gbps wavelength technology and deliver more than 20 Tbps of design capacity. That's enough speed to send about 468 DVDs in one single second, and it is hoped that as well as accelerating the development of a potentially lucrative data centre industry in this country, it will also ultimately lead to much cheaper Internet access for end-users.

Galasso said the way the system has been designed means it will also have the option to connect to the main trunk a number of Pacific Islands located next to the cable route, including Norfolk, New Caledonia, Vanuatu, Fiji, Wallis, Samoa, and American Samoa.

Northland, Inc. said that the MoU has been under discussion for almost 6 months and while its finer points have still to be negotiated, construction of the Hawaiki submarine cable would mark a critical milestone for both Northland and New Zealand's economy.

Galasso said the Hawaiki cable would remove the sole remaining barrier to the development of a data center industry in this country and complement the existing cables its competitors owned, which land in the Auckland area.

For more information, visit www.hawaikicable.co.nz.

New cable announced for Western Australia

Western Australia's Commerce Minister, Michael Mischin, welcomed a new \$400 million private sector proposal to establish an international subsea cable that will boost competitive telecommunications connectivity in the State and, in particular, the Pilbara region.

Trident Subsea Cable unveiled its plans in Melbourne as the Beijing Construction and Engineering Group, with the support of the China Development Bank, signed a \$320 million financial commitment with the company towards the project.

Trident has proposed the establish-



ment of an underwater southeast Asia link to connect Perth, via Onslow in the Pilbara and Jakarta in Indonesia, to Singapore. The proposal also includes an onshore connection from Perth through to Port Hedland and a subsea cable loop around the Northwest Shelf.

Mischin said the State Government recognized the need for increased telecommunications infrastructure, capac-

ity, and competition in WA and had engaged with industry to explore a range of options.

"The Government supports any proposal to improve telecommunications infrastructure, particularly in Western Australia's Northwest, as the region is significantly important to the State's economy and to Australia," he said. "Trident's project will support the increasing bandwidth and international connectivity needs of the numerous multinational companies now operating out of Western Australia. It

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will also be beneficial for the State's planned involvement in global projects, such as the Square Kilometre Array International Telescope."

For more information, visit www.wa.gov.au or www.tridentsc.com.au.

Arctic Fibre begins Nunavut route surveys

In mid-August, Arctic Fibre Inc. will begin its physical landing site surveys at seven locations across Nunavut and one site in northern Quebec.

Starting 19 August in Iqaluit, a seven-person survey team composed of Arctic Fibre staff as well as its advisors and consultants, will visit the Nunavut communities of Iqaluit, Cape Dorset, Hall Beach, Igloolik, Taloyoak, Gjoa Haven, and Cambridge Bay.

The determination of the cable landing locations and Boothia Crossing route will form part of the company's submissions to the Nunavut Impact Review Board (NIRB) and the Nunavut Planning Commission (NPC). Approvals from NIRB and NPC are prerequisites to the issuance of an International Submarine Cable Landing Licence from the Minister Responsible for Industry Canada.

Arctic Fibre submitted its license application to Industry Canada last October, but finalization of the survey schedule required ice clearance at all landing points. The finalization of landing site locations will enable Arctic Fibre to refine its undersea routes and undertake the detailed marine studies later this year, with the bulk of the work being completed in 2014. The scheduled in-service date for the \$620 million backbone network between London and Tokyo is December 2015.

By combining an Arctic broadband network in the same cable sheath with a trans-continental link between Asian and European financial centers, Arctic Fibre hopes to build a backbone network serving half of the population of Nunavut without government subsidy.

In February, the company submitted a \$237 million proposal to Industry Canada that would extend the fiber cable to 23 additional northern communities with the assistance of nine microwave hops. This secondary network expansion, which would require some form of government

support, would ensure the provision of virtually unlimited bandwidth to 98% of the combined Nunavut and Nunavik population, thereby supporting both economic and social development, while contributing significantly to Canada's nation-building in its Arctic region.

For more information, visit www.arcticfibre.com.

SJC strengthens Philippines' regional connectivity

The Southeast Asia-Japan Cable (SJC) submarine fiber optic cable system is now fully operational, strengthening Globe Telecom's connectivity with the region and the rest of the world. The Filipino telecommunications company, which forms part of the consortium, said the SJC cable system will enhance its customers' growing need for international connectivity as the undersea cable facility dramatically increases bandwidth capacity.

The submarine cable system also provides resilient connectivity to other submarine cable systems, which will further enhance the company's global link. The cable system is expected to further enrich the way the Asia Pacific region, including the Philippines, interacts and communicates with the rest of the world.

Operated by a global consortium of telecommunications and technology companies, the SJC cable system links the seven countries or territories of Brunei, mainland China, Hong Kong, Japan, Singapore, and the Philippines, including the option to link with Thailand. The SJC is an 8,900-km cable system, which can further extend to 9,700 km.

At a project cost of around \$400 million, the SJC cable system consists of six fiber pairs with the initial design capacity of 28 Tbps, the fastest speed an undersea cabling system can provide, to meet bandwidth-intensive applications such as Internet TV, online games, and enterprise data exchange. To illustrate, the cable's design capacity can support simultaneous streaming of up to 3 million high-definition videos.

Increased transmission capacity of the SJC cable system, in tandem with the company's network modernization initiative, will further boost network coverage for its subscribers nationwide. Globe Telecom's \$700 million network modernization program includes an aggressive roll-out of its own fiber optic transmission system.

This will further enhance Globe's customers' experience in terms of high-speed Internet surfing, seamless video streaming, and fast uploads of photos and videos, in addition to a more reliable network for both local and international text and voice calls.

SJC will supplement Globe Telecom's capacity on other regional and transpacific cables, including EAC/C2C, APCN, TGN-Intra Asia, Unity, TGN Pacific, and the Japan-U.S. Cable Network.

In addition, existing domestic cable systems of Globe Telecom, serving the transmission requirements between Luzon and various islands in Visayas and Mindanao, include the Fiber Optic Backbone Network1 (FOBN1), FOBN2 and the Boracay, Palawan and Coron submarine fiber optic cable systems.

For more information, visit www.globe.com.ph.

Southern Cross completes 100G expansion powered by Ciena

As part of its latest capacity expansion, Southern Cross Cable Network announced the successful implementation of Ciena's 100G transmission equipment across the entire Southern Cross network.

The implementation of 100G technology is a major milestone in the ongoing expansion and enhancement of its 30,000 km submarine network in continued support of the development of high-speed broadband in Australia and New Zealand. The 100G transmission equipment increases total lit capacity across the two cables to 2.6 Tbps. If deployed on all Southern Cross fibers, along with gridless optical networking, the potential capacity capability increases to 12 Tbps between Australia/New Zealand and the U.S.

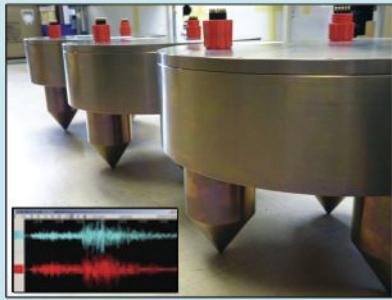
Southern Cross first introduced the Ciena 6500 Packet-Optical Platform in 2011 to future proof the network, support expanding demand, and enable product enhancement. That decision has already paid dividends, enabling the transition of the network from 10G optics to 40G in 2012, and now to 100G, while allowing the network capacity to be augmented without adding significant complexity.

With direct connectivity to Southern Cross capacity now available from key Internet data centers such as Equinix in Sydney, CoreSite in San Jose, California, and the Westin Building in Seattle, Washington as well as the nine traditional cable stations, it is easier than ever for customers to access high-capacity connectivity.

For more information, visit www.southerncrosscables.com.



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Offshore Communications Backbone

The OCB is a modular seafloor communications network that is directly connected to the Internet. Clients can provide and control their own sensors and data outputs, or CSnet can provide a suite of sensors from the surface to the seafloor with data directly forwarded to the client's onshore facilities. CSnet's OCB allows for individual component and end to end networked testing of power and communications functionality during the buildup and pre-deployment phases, ensuring a cost effective and successful installation. The OCB represents a proven network module that has been designed, constructed and tested, eliminating upstart time and cost. Each OCB module is expandable and so can be configured to accommodate large or small applications at a predictable cost.

NSW hands over Borkum Island cable



The submarine power cable for the new link between the North Sea island of Borkum and the mainland grid is ready for use. Norddeutsche Seekabelwerke GmbH (NSW) handed it over to EWE NETZ GmbH in Nordenham. The 25-km long medium-voltage submarine power cable was loaded onto the work pontoon of the construction company Bohlen & Doyen Bauunternehmung GmbH for installation. The 33-kV submarine cable contains three 120 sq. mm power cores plus two optical fibers for transmitting data.

For the submarine cable, a new route was prepared. In the area of the dikes in Manslagt and on Borkum, EWE NETZ had, in 2012, performed the requisite horizontal drilling work and installed the appropriate conduits into which the cable will, starting from Manslagt, be pulled. Between the conduits, the cable will be laid in the seabed at a depth of 1.5 to 3 m. The submarine cable will reduce the load on existing systems and assure the continuing dependability of the island's power supply.

NSW met all the scheduling and quality-related requirements for the cable. Its completion was a key milestone for the overall project.

For more information, visit www.nsw.com.

Cable installation at Meerwind wind farm completed on time

VSMC recently installed the last cable for the Meerwind Süd/Ost wind farms by successfully accomplishing the final pull-in. It was an impressive achievement in which three load-outs, 88 inter array cables, and 176 pull-ins were completed on time. With safety and quality as a top priority, VSMC finished the challenging project with no recordable incidents.

The offshore wind farms Meerwind Süd/Ost are a 288-MW project located in the German Bight in the North Sea, 23 km north of the island of Heligoland. The wind farm consists of 80 wind turbines with a power output of 3.6 MW each. The location is one of the most promising in the emerging offshore wind market in Germany. RWE Innogy recently contracted VSMC to lay and bury the infield cables for the Nordsee Ost offshore wind farm, also located in the German Bight.

Separately, VSMC said that it has completed a complex export cable repair

off the coast of Liverpool. The repair was carried out from the Stemat 89 anchor barge using the Tessa W and the newly purchased Fenna B as supporting vessels.

The repair presented some big challenges, one of which was the local environment. The work was to be carried out in the unpredictable Irish Sea during the month of April. The rise and fall of the tide in the area was 9 m with a LAT of only 5 m. The repair work was affected by the weather and, once both cable ends were fixed on the barge for jointing, the team had to work fast to complete the joint in unpredictable conditions. Assisted by EDS, NKT worked to ensure the jointing work was completed before the weather closed in. Once this was done, VSMC prepared for the over boarding of the joint. Again, this was not without its challenges due to a heavy tide and a strong current.

After waiting for the optimal water depth so that the over boarding could be performed safely, the VSMC crew suc-

cessfully placed the jointed cable back on the seabed. The joint and cable bight were surveyed following the lay-down and the cable was tested, providing evidence of a successful repair job for VSMC.

For more information, visit www.vsmc.nl.

NKT opens Rotterdam logistics center

NKT Cables' new submarine cable Logistics Centre at Rotterdam's deep-water port in The Netherlands has just gone online. The NKT Cables Logistics Centre, with its present 9,000-ton and 4,600-ton turntable capacity has been implemented within the NKT Cables' production flow in order to provide a substantial logistics capacity. With NKT Cables' unique cable splicing technology, NKT Cables can connect long single cable lengths together to form extra-long continuous submarine cables, enabling load-outs of up to 6,000 tons — and even more — in one campaign to any cable laying vessel, adapting optimally to each specific project.

NKT Cables' new Logistics Centre finalizes submarine cable production within the NKT Cables flow process and forms the interface to the project execution phase. In this respect, the new NKT Cables offshore site in Rotterdam is designed to serve ongoing European wind farm evolution with high and medium voltage submarine cables throughout the year, and is, by its conception, able to secure on-time deliveries to any barge or sea-going cable-laying vessel, supported by NKT Cables' own highly skilled logistics team.

To achieve this high level of flexibility and to prepare for future demands with growing cable volumes, sufficient further space for extensions and additional turntable capacities has been foreseen. At the end of 2012, NKT Cables started with the installation of the 9,000-ton turntable, highlighted by a flexible storage concept offering the possibility of partitioning into variable sections, and a safe and reliable driving technology to secure an undisturbed load-out service.

Until now, several load-outs from and to different barges and sea-going, cable-laying vessels have been successfully executed, and even extra-long lengths up to more than 30 km of submarine cable have been produced and, just recently, loaded in a single, continuous length from the new site in Rotterdam.

For more information, visit www.nktcables.com.





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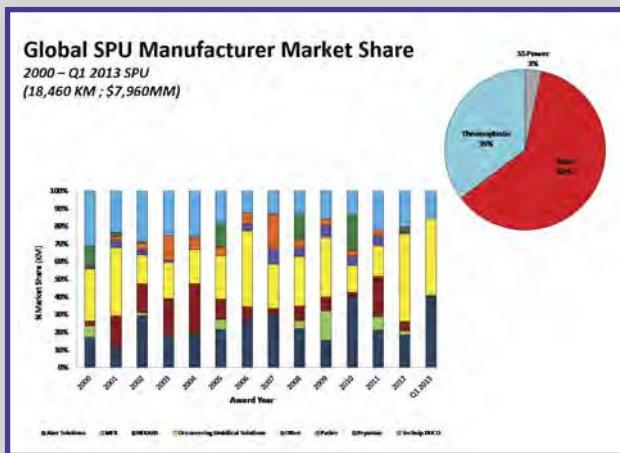
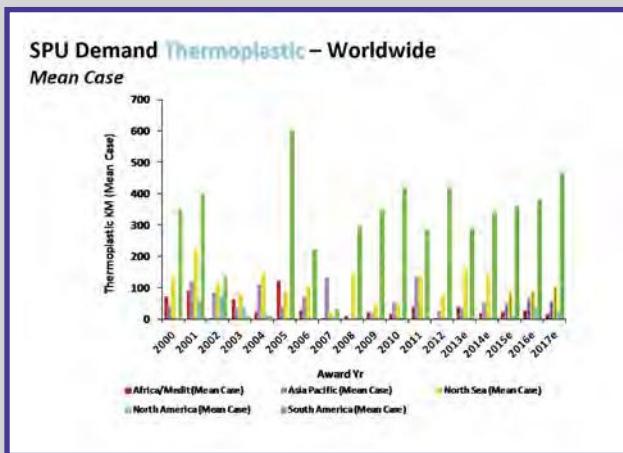
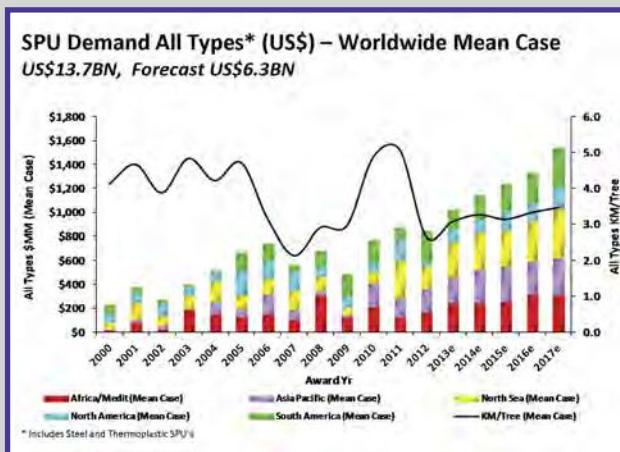
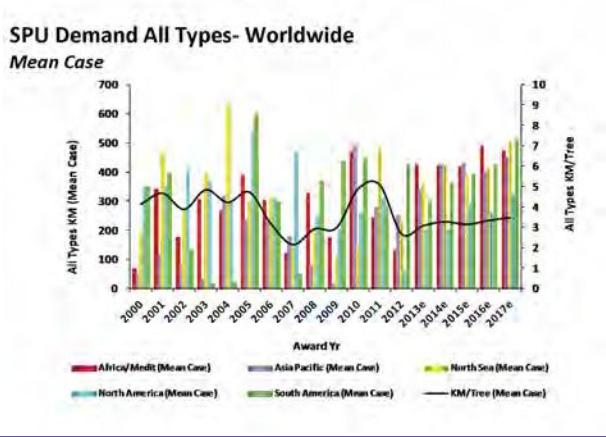
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Gulf of Mexico Data

Current Deepwater Activity

Operator	Area	Block	OCS Lease	Rig Name	Prospect Name	Water Depth (ft)
Petrobras America, Inc.	WR	425	G16987	VANTAGE TITANIUM EXPLORER	Chinook	8,843
Anadarko Petroleum Corp.	DC	535	G23520	ENSCO 8506	Raptor	8,169
Petrobras Amercia, Inc.	WR	206	G16965	ENSCO DS-5	Cascade	8,147
Statoil Gulf of Mexico LLC	WR	970	G26420	MAERSK DEVELOPER		7,438
Shell Offshore, Inc.	MC	393	G26254	T.O. DEEPWATER NAUTILUS	White Ash	7,371
Noble Energy, Inc.	MC	699	G33169	ENSCO 8501	Toro	7,285
BP Exploration & Production, Inc.	GC	743	G15607	T.O. DEVELOPMENT DRILLER II	Atlantis	6,824
Anadarko Petroleum Corp.	KC	875	G21444	ENSCO 8500	Lucius	6,809
Chevron USA, Inc.	KC	736	G22367	T.O. DISCOVERER INDIA	Moccasin	6,537
Chevron USA, Inc.	KC	829	G25814	T.O. DISCOVERER CLEAR LEADER	Buckskin	6,428
Exxon Mobil Corp.	WR	282	G33364	T.O. DEEPWATER CHAMPION		6,354
BP Exploration & Production, Inc.	MC	778	G14658	THUNDER HORSE PDQ	Thunder Horse South	6,040
Shell Offshore, Inc.	WR	95	G31943	NOBLE GLOBETROTTER	Yucatan North	5,847
Eni US Operating Co., Inc.	MC	214	G24059	T.O. DEEPWATER PATHFINDER		5,815
BP Exploration & Production, Inc.	MC	777	G09867	T.O. DISCOVERER ENTERPRISE	Thunder Horse South	5,613
LLOG Exploration Offshore, LLC	MC	816	G33178	ENSCO 8502		5,528
Cobalt International Energy, LP	GC	896	G31765	ENSCO 8503	Ardennes	5,510
BP Exploration & Production, Inc.	GC	743	G15607	T.O. DEVELOPMENT III	Atlantis	5,405
Anadarko Petroleum Corp.	GC	768	G21817	ENSCO 8505	Ticonderoga	5,256
BP Exploration & Production, Inc.	KC	93	G25780	SEADRILL WEST CAPRICORN	Gila	4,853
Anadarko Petroleum Corp.	GC	683	G16783	T.O. DISCOVERER SPIRIT	Caesar	4,485
Shell Offshore, Inc.	MC	899	G09896	CAL-DIVE Q-4000	Crosby	4,393
Hess Corp.	MC	725	G22898	STENA FORTH	Tubular Bells	4,328
BHP Billiton Petroleum (GOM) Inc.	GC	654	G20085	GSF C.R. LUIGS	Shenzi development	4,300
Chevron USA, Inc.	GC	640	G20082	T.O. DISCOVERER INSPIRATION	Tahiti 2	4,298
Chevron USA, Inc.	GC	640	G20082	T.O. DISCOVERER DEEP SEAS	Tahiti 2	4,292
BP Exploration & Production Inc.	KC	57	G25777	SEADRILL WEST SIRIUS		4,065
Chevron USA, Inc.	GB	973	G32911	PACIFIC SANTA ANA		3,960
Hess Corp.	GC	379	G22947	ATWOOD CONDOR	Hornet	3,887
Shell Offshore, Inc.	MC	809	G05868	NOBLE DON TAYLOR	Princess	3,845
Shell Offshore, Inc.	MC	894	G24122	NOBLE DANNY ADKINS		3,787
Shell Offshore, Inc.	MC	721	G33171	NOBLE JIM DAY		3,688
Eni US Operating Co., Inc.	GC	385	G25142	DIAMOND OCEAN VICTORY	Pegasus	3,585
BHP Billiston Petroleum (GOM) Inc.	DC	726	G32014	T.O. DEVELOPMENT DRILLER I		3,567
Shell Offshore, Inc.	VK	956	G08475	NABORS 202	Ram-Powell	3,214
Shell Offshore, Inc.	MC	762	G07957	NOBLE BULLY I	Deimos	3,147
Shell Offshore, Inc.	GC	158	G07995	H&P 202	Brutus	2,985
Shell Offshore, Inc.	GC	245	G05916	NOBLE DRILLER	Olivella	2,908
Shell Offshore, Inc.	GB	427	G07493	NOBLE JIM THOMPSON	Cardamom	2,719
Chevron USA, Inc.	VK	786	G12119	NABORS 87	Petronius	1,754
Dynamic Offshore Resources, LLC	GC	65	G14668	H&P 206	Bullwinkle	1,353
Stone Energy Corp.	MC	109	G05825	HYDRAULIC WORKOVER UNIT N	Amberjack	1,030
SandRidge Offshore, LLC	EB	110	G02650	NABORS S.D. IV	Tequila	660

Deepwater prospects with drilling and workover activity: 43

Current Deepwater Activity as of Monday, 12 August 2013

Activity by Water Depth

Water Depth (m)	Active Leases	Approved Applications	Active
0 to 200	1,636	35,154	2,650
201 to 400	119	1,116	20
401 to 800	295	862	10
801 to 1,000	395	575	9
1,000 & above	3,473	1,852	26

Rig Activity Report 16 August 2013

Location	Week of 8/16	Week +/- Ago	Week +/- Ago	Year Ago
Land	1706	9	1697	-137
Inland Waters	23	-1	24	3
Offshore	62	5	57	11
U.S. Total	1791	13	1778	-123
Gulf of Mexico	59	4	55	11
Canada	358	0	358	32
N. America	2149	13	2136	-91
				2240

Activity by Water Depth Information current as of Monday, 12 August 2013

Maximum number of rigs operating in the deepwater Gulf of Mexico. The rig unit includes platform rigs operating on deepwater production facilities in addition to the MODU's. The numbers do not distinguish between rigs drilling and those in service for completion and workover operations.

Information provided courtesy of the U.S. Bureau of Ocean Energy Management

Monthly Stock Figures & Composite Index

Industry Company Name	Symbol	Close(Mid) August	Close(Mid) July	Change	Change %	High	52 week	Low
Diversified, Production Support and Equipment Companies								
Baker Hughes, Inc.	BHI	47.01	47.07	-0.06	-0.1%	50.97	39.44	
Cameron Intl. Corp.	CAM	55.75	65.32	-9.57	-14.7%	67.42	47.62	
Drill-Quip, Inc.	DRQ	103.58	94.32	9.26	9.8%	103.79	65.16	
Halliburton Company	HAL	47.32	45.15	2.17	4.8%	47.38	29.83	
Tenaris SA	TS	46.20	44.57	1.63	3.7%	47.83	36.01	
Newpark Resources, Inc.	NR	11.61	12.52	-0.91	-7.3%	12.88	6.29	
Schlumberger Ltd.	SLB	81.03	81.81	-0.78	-1.0%	85.02	66.85	
Superior Energy Services, Inc.	SPN	25.38	27.56	-2.18	-7.9%	29.22	18.00	
Weatherford International, Inc.	WFT	14.58	14.16	0.42	3.0%	15.08	8.84	
Deep Down, Inc.	DPDW	2.23	1.80	0.43	23.9%	2.24	1.05	
FMC Technologies	FTI	53.06	57.00	(3.94)	-6.9%	59.27	39.25	
Total Diversified, Production, Support and Equipment.....		487.75	491.28	-3.53	-0.7%	521.10	358.34	
Geophysical / Reservoir Management								
Dawson Geophysical Company	DWSN	36.00	40.11	-4.11	-10.2%	40.86	20.77	
Mitcham Industries, Inc.	MIND	17.00	17.97	-0.97	-5.4%	18.79	11.51	
Compagnie Gnrale de Gophysique-Veritas	CGV	25.23	24.70	0.53	4.5%	34.84	20.00	
Total Geophysical / Reservoir Management.....		78.23	82.78	-4.55	-5.5%	94.49	52.28	
Offshore Drilling Companies								
Atwood Oceanics, Inc.	ATW	56.99	56.99	0.00	0.0%	59.49	43.21	
Diamond Offshore Drilling, Inc.	DO	65.40	71.98	-6.58	-9.1%	76.85	63.95	
ENSCO International, Inc.	ESV	55.66	60.71	-5.05	-8.3%	65.82	51.01	
Nabors Industries, Inc.	NBR	15.88	15.40	0.48	3.1%	18.24	12.75	
Noble Drilling Corp.	NE	38.21	40.65	-2.44	-6.0%	42.34	33.02	
Parker Drilling Company	PKD	5.97	5.46	0.51	9.3%	6.42	3.61	
Rowan Companies, Inc.	RDC	35.29	35.61	-0.32	-0.9%	39.40	30.05	
Transocean Offshore, Inc.	RIG	47.02	49.51	-2.49	-5.0%	59.50	43.65	
Total Offshore Drilling.....		320.42	336.31	-15.89	-4.7%	368.06	281.25	
Offshore Contractors, Services, and Support Companies								
Helix Energy Solutions Group, Inc.	HLX	25.98	25.88	0.10	0.4%	26.76	15.54	
Gulf Island Fabrication	GIFI	23.33	22.93	0.40	1.7%	30.09	18.76	
McDermott International, Inc.	MDR	7.34	8.83	-1.49	-16.9%	13.56	6.68	
Oceaneering International	OII	79.68	73.77	5.91	8.0%	84.63	50.87	
Subsea 7 SA	SUBCY.PK	20.46	18.90	1.56	8.3%	25.90	17.05	
Technip ADS	TKPPY.PK	29.22	26.99	2.23	8.3%	30.21	24.46	
Tetra Technologies, Inc.	TTI	11.76	10.85	0.91	8.4%	11.78	5.35	
Cal Dive International, Inc.	DVR	2.00	2.17	-0.17	-7.8%	1.00	2.38	
Total Offshore Contractors, Service, and Support.....		199.77	190.32	9.45	5.0%	223.93	141.09	
Offshore Transportation and Boat Companies								
Seacor Holdings, Inc.	CKH	85.42	86.53	-1.11	-1.3%	100.00	71.59	
Gulfmark Offshore, Inc.	GLF	49.19	49.71	-0.52	-1.0%	52.22	27.17	
Bristow Group	BRS	67.60	69.20	-1.60	-2.3%	70.00	45.55	
PHI, Inc.	PHII	36.00	35.80	0.20	0.6%	36.03	23.43	
Tidewater, Inc.	TDW	55.36	60.87	-5.51	-9.1%	62.38	42.33	
Trico Marine Services, Inc.	TRMAQ.PK	0.04	0.04	0.00	0.0%	0.11	0.01	
Hornbeck Offshore	HOS	56.45	56.59	-0.14	-0.2%	59.10	31.96	
Total Offshore Transportation and Boat		350.06	358.74	-8.68	-2.4%	379.84	240.04	

September 2013

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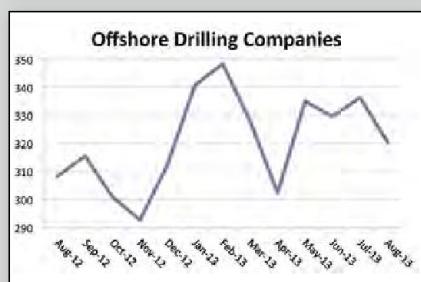
Ocean News & Technology

Monthly Stock Figures & Composite Index

Industry	Close(Mid) August	Close(Mid) July	Change -3.53	Change -0.7%	High 52 week	Low
Diversified, Production Support & Equipment Companies	487.75	491.28	-4.55	-5.5%	521.10	358.34
Total Geophysical / Reservoir Management	78.23	82.78	-4.55	-5.5%	94.49	52.28
Total Offshore Drilling	320.42	336.31	-15.89	-4.7%	368.06	281.25
Total Offshore Contractors, Service and Support	199.77	190.32	9.45	5.0%	223.93	141.09
Total Offshore Transportation and Boat	350.06	358.74	-8.68	-2.4%	379.84	242.04
Total Offshore Source Index	1,436.23	1,459.43	-23.20	-1.6%	1,587.42	1,075.00

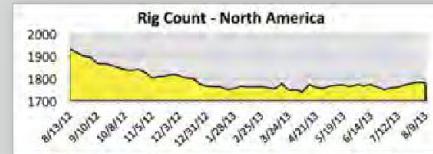
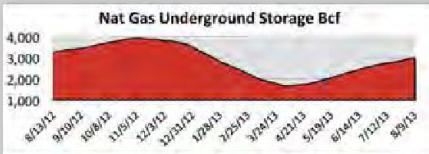
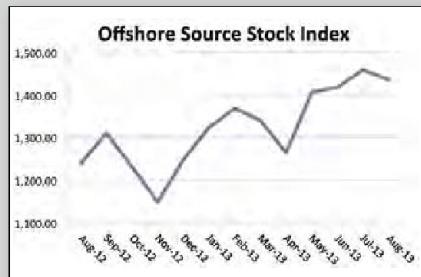
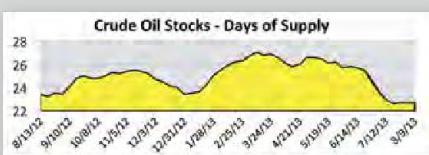
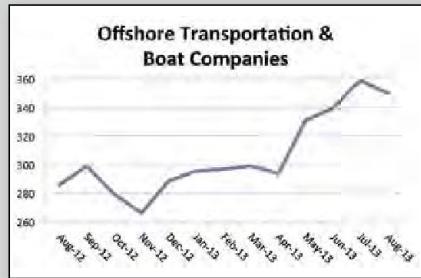
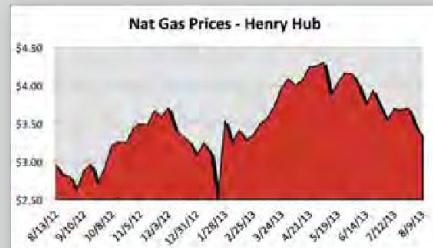
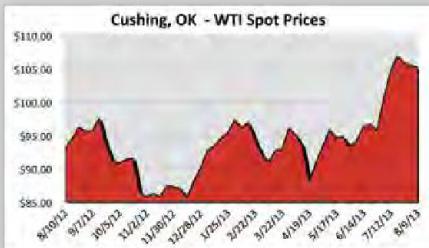
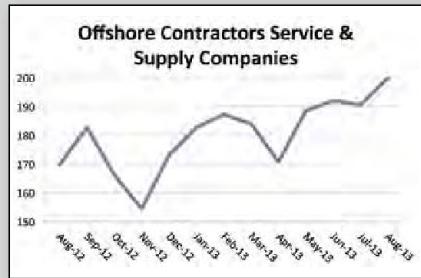
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Oil & Gas Industry Trends

Monitoring the Pulse of the U.S. Offshore Oil & Gas Industry



Positive trend, at least 3 weeks
Changing trend, less than 3 weeks
Negative trend, at least 3 weeks

Trimble launches AP15 GNSS-Inertial board set for high-performance positioning

Trimble recently introduced the Trimble® AP15, the latest member of the AP series of OEM GNSS-Inertial board sets. Reaching a new level of price performance capability, the AP15 uses a custom Micro Electromechanical Machined (MEMS)-based Inertial Measurement Unit (IMU). It is the first product to take advantage of Applanix's proprietary calibration process — Applanix SmartCal™ — a new software compensation technology that allows Trimble to achieve exceptional performance from IMUs manufactured specifically for mobile mapping applications.

The AP15 combines high-precision Global Navigation Satellite System (GNSS) positioning with Applanix IN-Fusion™ GNSS-Inertial integration technology, all running on a powerful, dedicated Inertial Engine (IE) board. AP products provide the performance and functionality of Applanix's POS systems in an embedded form-factor that is specifically designed for third-party manufacturers and systems integrators. The AP Series is ideal for a variety of commercial mobile positioning and orientation applications, including airborne, terrestrial, and marine



mapping and guidance for unmanned vehicles.

Combined with a wheel-mounted Distance Measurement Instrument (DMI), the AP15 provides a full 6-degrees-of-freedom navigation solution for land vehicles that is capable of providing robust position and orientation information regardless of obstructions to GNSS-only positioning such as multipath or complete signal loss. Applanix IN-Fusion technology produces uninterrupted position, roll, pitch, and true heading measurements of moving platforms by combining IMU data with raw GNSS observables and DMI velocity.

GNSS functionality is provided by a Trimble GNSS module, a dual-antenna, 440 channel, multi-frequency survey-grade GNSS receiver that supports a wide range of satellite signals, including GPS L1/L2/L2C/L5 and GLONASS L1/L2 signals. The module also supports Satellite-Based Augmentation Service (SBAS) corrections, including the U.S. Wide Area Augmentation System (WAAS), European Geostationary Overlay Service (EGNOS), Japan's Multi-functional Satellite Augmentation System (MSAS), and the OmniStar VBS, HP and XP/G2 corrections.

For more information, visit www.trimble.com.

CSA demonstrates capabilities of Advanced Diver Navigation System

CSA Ocean Sciences Inc. (CSA) recently deployed its Advanced Diver Navigation System to conduct numerous projects with differing purposes. The CSA system includes the Shark Navigator, a self-contained, highly portable, diver-operated mapping system with high accuracy positioning.

CSA's Diver Navigation System is designed to give the diver complete autonomy from topside sensors or support vessels, aid in locating targets, and support seafloor feature and resource mapping. Divers can plot pre-determined survey lines, seafloor features, resources, targets, and pipeline

routes or simply map any points of interest as needed. The computer software easily integrates with Hypack® navigational software, allowing divers to streamline data collection and processing. Divers are able to log the track while collecting still photographs and HD video, thereby providing exact locations of any abnormalities. If a diver's GPS position is lost due to water depth or wave action, the Doppler Navigation System automatically updates the position data until the GPS returns online.

Utilizing the Diver Navigation System, CSA divers conducted a detailed inspection of sewer outfall pipelines in shallow water depths normally considered inaccessible by support vessels and ROVs. This system was also recently used to perform a benthic habitat characterization study in Key West for the U.S. Navy. Using the on-screen navigation, divers were able to swim to pre-plotted points and transects, designate points of interest, and map the perimeter of the habitat. The system is currently being used for a coral reconnaissance survey in Puerto Rico where a given search area has been designated proximal to pre-existing coral monitoring stations. These monitoring stations are used to identify any of the seven proposed endangered coral species of the Atlantic and Caribbean found within the 66 Reef-building Coral Species designated by the Endangered Species Act.

The Shark Navigator is manufactured by Shark Marine Technologies Inc. For more information, please visit www.csaocean.com.



Kraken announces DataPod™

Kraken Sonar Systems Inc. announces DataPod™ — a removable data storage module for subsea marine applications. The rugged unit combines the ease of use of network attached storage with the reliability of a RAID array and solid state storage all in one compact unit.

Data-critical sensor information must be delivered quickly and reliably. Military operators not only require as much, if not more, storage capacity as a commercial user, but also must take into consideration a variety of other requirements, such as a security concerns; size, weight, and power considerations; and the ability to withstand harsh environmental conditions.

DataPod™ utilizes the latest solid-state disk drive technology to provide a high-density, reliable, removable data storage solution. The unit enables high bandwidth recording with up to 2.5 TB of storage (2 TB in RAID configuration) in a 1,000-m depth rated pressure module. It weighs less than 3 kg and is built to withstand extremes in temperature, shock, vibration, and water integrity.



No tools are required to remove the module making it ideal for applications where removal and replacement of onboard storage must be quickly accomplished. DataPod™ modules can be easily transported and used interchangeably. A wet-mateable connector enables operators to “hotplug” and “hotswap” the module without powering down the host system to change modules. DataPod™ uses a standard Gigabit Ethernet interface to plug directly into a personal computer or a local/wide area networks.

For more information, visit www.krakensonar.com.

NCE develops portable buoy system for underwater noise measurements of ships

Noise Control Engineering, Inc. (NCE) has created a highly portable system for measuring underwater radiated noise from vessels and offshore platforms. The system was developed



using internal research and development funds as NCE sees an increasing need for underwater noise assessments given the planned construction of new fisheries research vessels worldwide and a growth in awareness of underwater noise issues as they relate to the marine industry.

The system uses a floating buoy that supports measurement hydrophones and data acquisition electronics. NCE engineers connect with the buoy electronics remotely to collect and process data, providing the ability to calculate underwater noise signatures within minutes of the measurement.

The buoy can be deployed from the ship being tested by using a small crane or A-frame; this removes the need for additional support vessels, reducing the planning and operational costs of the test. The measurement system can be broken down and shipped in conventional cases, allowing for measurements to be performed in locations convenient to a particular port or shipyard.

NCE has successfully used the system in two tests thus far, which were performed on nearly opposite sides of the globe. NCE has plans to use the system to measure noise from five different vessels in the next 12 months. This system can take measurements in accordance with the Grades B and C requirements of ANSI's underwater measurement standard — S12.64 (2009).

For more information, visit www.noise-control.com.

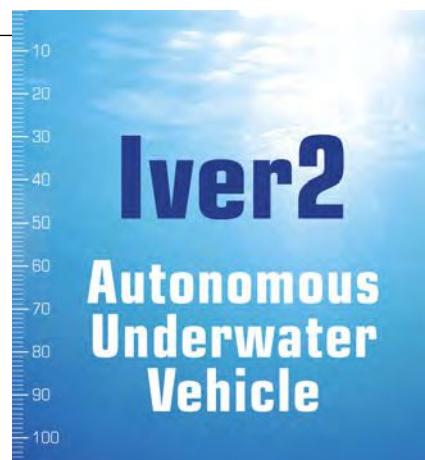
University of Kiel acquires MacArtney CORMAC winch for use on multiple research vessels

The MacArtney Group is pleased to announce the delivery of a CORMAC 4 Stainless Steel Winch system to the Institute of Geosciences at the Christian Albrechts University of Kiel.

The winch system, which was acquired through German MacArtney Group member, MBT GmbH, will be put to good use onboard various research vessels, hereunder the R/V Alkor, which is operated by the GEOMAR Helmholtz Centre for Ocean Research Kiel.

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A rugged and flexible winch system housed within a self-contained and compact stainless steel structure, the COR-MAC winch is rugged, easily portable and offers extensive flexibility to scientific operators such as the Christian Albrechts University of Kiel (CAU), who require the winch to be used on multiple different vessels. The winch is delivered as a plug and play system, spooled with 500 m of Rochester coaxial cable and complete with termination, slip ring, wireless remote control, cable sheave and cable status indicator.

In the hands of scientists and scholars, the new COR-MAC winch will be used to launch and recover oceanographic and acoustic equipment, hereunder, primarily, a Benthos C3D side-scan sonar.

For more information, visit www.macartney.com.

SBG Systems adds a Dual antenna GNSS inertial system to its Ekinox Series

SBG Systems added a new inertial system to its Ekinox Series. With integrated Dual Antenna GPS + GLONASS receiver, the Ekinox-D is a ready-to-use Survey Grade inertial navigation system that provides consistent true heading (0.05°).



The Survey Grade Ekinox-D is a high performance inertial navigation system that embeds a Dual Antenna L1/L2 GNSS receiver to deliver more robust heading and position, while increasing satellite reception availability. Ekinox-D is an integrated system. GNSS data and inertial information are fused by an Extended Kalman Filter (EKF) to improve data integrity. This computation allows the system to achieve 0.05° roll, pitch, and true heading; 5 cm Heave; and 2 cm RTK GNSS position.

Instead of mounting the GNSS receiver and inertial systems separately on your boat, car, or plane, just install the Ekinox-D and connect it to your system (e.g., camera, SONAR, LiDAR, etc.). With its 8-GB data logger and its high output rate (200 Hz), Ekinox-D joins simplicity and performance for applications where robust heading is required such as surveying and hydrographic applications, unmanned system Navigation, car testing, etc.

The IP68 Ekinox Series brings robust, maintenance-free, and cost-effective MEMS to the next level thanks to a drastic selection of high end MEMS sensors, an advanced calibration procedure, and powerful algorithm design. Compromise is no longer required between high accuracy and cost.

For more information, visit www.sbg-systems.com.

Remote Ocean Systems adds new camera features and new deep water positioner

Remote Ocean Systems has added next generation features to its ROVER and NAVIGATOR cameras. The new technology offers higher resolution and better clarity to enhance deep water inspections and observations. In addition to the camera upgrades, ROS has developed a new positioning system, the PT-10-4K, featuring advanced operational software for smooth and precise positioning to depths up to 4,000 m.

These new products and more will be on display at the ROS Booth #118 at OCEANS 2013 in San Diego.

exactEarth offers new online data galleries

exactEarth Ltd., the leading provider of satellite AIS data services, announced the release of a set of web galleries to provide an online environment for the exploration of satellite AIS data. Through this new interactive experience, users are given access to selected subsets from the exactAIS® 3-year global archive through interactive maps, sample web services for use in GIS platforms, and downloadable sample files.

exactEarth Horizon provides an interactive map of a sampled single day's position reports for the whole globe, allowing users to gain an understanding of the breadth of information available from the exactAIS® data service. The exactEarth Gallery provides sample maps, OGC certified web services, and downloadable files from exactAIS® Archive and exactAIS® Arctic Archive, including historical points and tracks, as well as density maps. For Esri users specifically, the gallery is replicated on ArcGIS Online.

These galleries offer the ability to explore sampled ship movement information with the full AIS collected attributes available such as heading, course over ground, and flag. The vessel density mapping feature showcases how it is possible to use the AIS data to analyze shipping patterns and trends at

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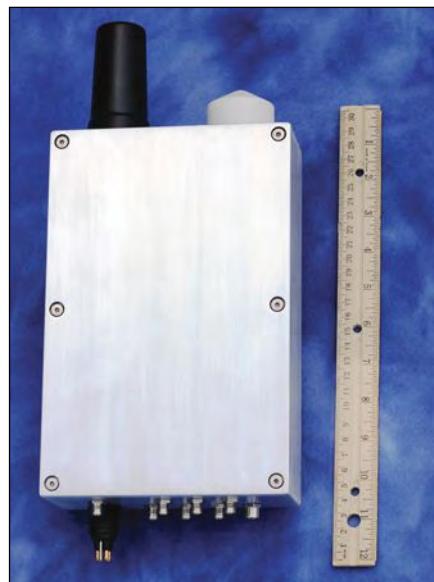


differing scales while the data from exactAIS® Arctic Archive gives a complete look into the vessel traffic patterns of this remote region.

For more information, visit www.exactearth.com.

New DANTE buoy controller offers unprecedented ease in building and operating real-time buoys

DANTE is a purpose-designed data buoy controller and telemetry system in an extremely rugged waterproof enclosure. The configurable and expandable controller supports any sensor and includes a GPS receiver, accelerometer, magnetometer, multiple telemetry modems, a backup battery for communications, and provides watchdog, alert, and remote buoy management capability. Data are forwarded to users through TCP-IP, FTP and / or email.



The DANTE system includes configuration, management, and data visualization software for near real-time and archived data. The manufacturer offers GSM cellular and Iridium data telemetry, data hosting service, and offers a software license to users preferring to operate a data server.

DANTE is produced by Soundnine Inc. (S9), headed by ex-Sea-Bird Electronics colleagues Darius Miller and Doug Bennett. Guided by decades of combined experience in oceanographic instrumentation and its application to ocean measurement platforms, S9 focuses on serving the marine science and environmental monitoring community by enabling more stakeholders to implement and sustain high-quality monitoring systems. "Effectively," Bennett says, "we have developed a

build-it-yourself buoy kit that takes the most difficult parts of the system integration and data delivery burden off the customer's back and makes it possible to buy a real-time data solution that bolts-on to a suitable floating object and produce a real-time data buoy."

DANTE is typically shipped pre-configured for each customer's selected sensor suite and telemetry requirements. For customers using S9 telemetry and data hosting services, data starts flowing when the user applies power for the first time. Alternatively, if DANTE cannot be pre-configured before shipment, it can "phone home" on power up, and S9 will configure it remotely per the payload details, sampling and transmission intervals, and data delivery points (e.g., email distribution list, FTP login) provided by the customer.

For more information, visit www.soundnine.com.

New Macartney LUXUS compact low light camera

In appreciation of the continuous development of ever more compact ROVs, underwater systems, and equipment — along with an emerging demand for a low light, diver inspection options — MacArtney is pleased to introduce the new LUXUS Compact Low Light Camera.



Like the original MacArtney Low Light Camera, the new and considerably lighter compact version is designed especially for use in harsh and turbid conditions, where light is limited or artificial. Within such demanding environments, the black and white sensor (0,005 LUX) offers impressive light sensitivity, image quality, and viewing performance.

Featuring the same dimensions as the successful LUXUS Compact Camera, the new LUXUS Compact Low Light Camera is designed to function perfectly in combination with remaining LUXUS series, including the LUXUS Compact LED, LUXUS Compact Media Controller, LUXUS pistol grip, diver helmet dove tail, and the universal mounting brackets.

This makes the new LUXUS Low Light Camera a highly versatile and flexible choice, ideal for use in diving applications and as mounted on small inspection ROVs, diver habitats, and other underwater vehicles and systems.

The LUXUS Compact Low Light Camera is robustly designed and rigorously tested to perform unfailingly in the harshest underwater environments. As with all other cameras and lights within the MacArtney LUXUS range, the housing for the LUXUS Compact Low Light Camera is made from sandblasted titanium and features a depth rating of 4,000 m. Finally, the camera consumes just 2 W and can handle DC power units from 12 to 24 VDC.

For more information, visit www.macartney.com.

Meridian gyros achieve China type approval

The Meridian Standard and Meridian Surveyor gyro compasses manufactured by Teledyne TSS have been given type approval by the China Classification Society. The approval was granted after the Society inspectors completed a detailed study of the gyros, their performance and reliability, and the manufacturing processes and quality control methods employed at the Teledyne TSS factory in Watford, UK. The approval will now open the Chinese shipbuilding and offshore survey markets for these products where it is expected that their performance and pricing will be welcomed.

The need for commercial shipping to carry type-approved mechanical gyrocompasses has maintained a demand for the high-quality products manufactured by Teledyne TSS. The company has responded to this demand by pursuing a sustained development program that has resulted in a range of products that set benchmarks for performance while being built to the highest standards of precision engineering. The Meridian range is already IMO, Wheelmark, and Russian Maritime Register of Shipping approved and includes versions with High Speed Craft certification.

The Meridian Surveyor is positioned at the top of the Teledyne TSS range and is a high-precision gyrocompass capable of providing dynamic heading accuracies of $\pm 0.2^{\circ}$ even in extreme sea conditions. With a settle time of 40 min, the Meridian Surveyor is a British-built precision instrument capable of maintaining heading accuracies through turn rates as high as 200° per sec. By using state-of-the-art digital electronics and advanced manufacturing processes, exceptional reliability is built-in by Teledyne TSS so that users can benefit from a mean time between failures of more than 30,000 hrs.

For more information, visit www.teledyne-tss.com.

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CodaOctopus releases Dynamic Position Controller for USE™

Developed in conjunction with leading position-controller manufacturers, this module allows a pan and tilt unit to be used to move the orientation of the Echoscope® and to be controlled seamlessly and directly from within the USE™ application. As such, there is no need to have a second computer or software package running. This simplifies operations and ensures optimum accuracy and movement control while allowing the user to use the Echoscope® to full effect.

Additionally, the module precisely compensates for any motion in real time (both for the change in angular offsets, and also for the change in lever arm position induced by the rotation), allowing the pan and tilt head to be used in a dynamic environment while still maintaining precisely calibrated offsets to positioning and motion sensors.

Compatibility with leading pan and tilt units as well as the capability to add bespoke custom configurations for specific installation requirements have been designed into this product enhancement.

For more information, visit www.codaoctopus.com.

See More with the Super Wide-i SeaCam®

DeepSea Power & Light®, the market leader in underwater imaging systems, has enhanced its already versatile Wide-i SeaCam®. The newly designed version, the Super Wide-i SeaCam, has a smaller housing, proprietary lens, and a dome port that eliminates vignetting and minimizes image distortion.

This compact camera is only 104.9 mm (4.13 in.) long, weighs 0.23 Kg (0.51 lbs), and provides an astonishing 150° horizontal by 120° vertical field of view in water. Combining the wide field of view with its low-light capability has created a perfect camera for day to day underwater applications. The Super Wide-i SeaCam is directly interchangeable with the standard Wide-i SeaCam® and the Multi-SeaCam family of cameras.

For more information, visit www.deepsea.com.

InterMoor Inc. – DNV certified for mooring chain inspections

InterMoor Inc., an Acteon company, has extended its capabilities and service

range by becoming the first U.S.-based company to achieve certification under Det Norske Veritas (DNV) 413: Service Suppliers Engaged in Renewal Survey Examination of Mooring Chain Intended for Mobile Offshore Units.

This means that InterMoor Inc. can now inspect, certify, and recertify mooring chains and related components such as connecting links and wire rope for mobile offshore units that have or will have DNV classification (DNV-OSS-101 and 102). There is also scope to include water blasting of chain, visual inspections, measurements, and mechanical and non-destructive testing.

Approval under the certificate is for 3 years, and renewal audits are conducted at the end of the period.

The service will be available in the Gulf of Mexico, Central and South America, and West Africa and will be headed by operations coordinator Bruno Amann. InterMoor Inc. currently has five qualified inspectors with plans for more in the near future.

For more information, visit www.intermoor.com.



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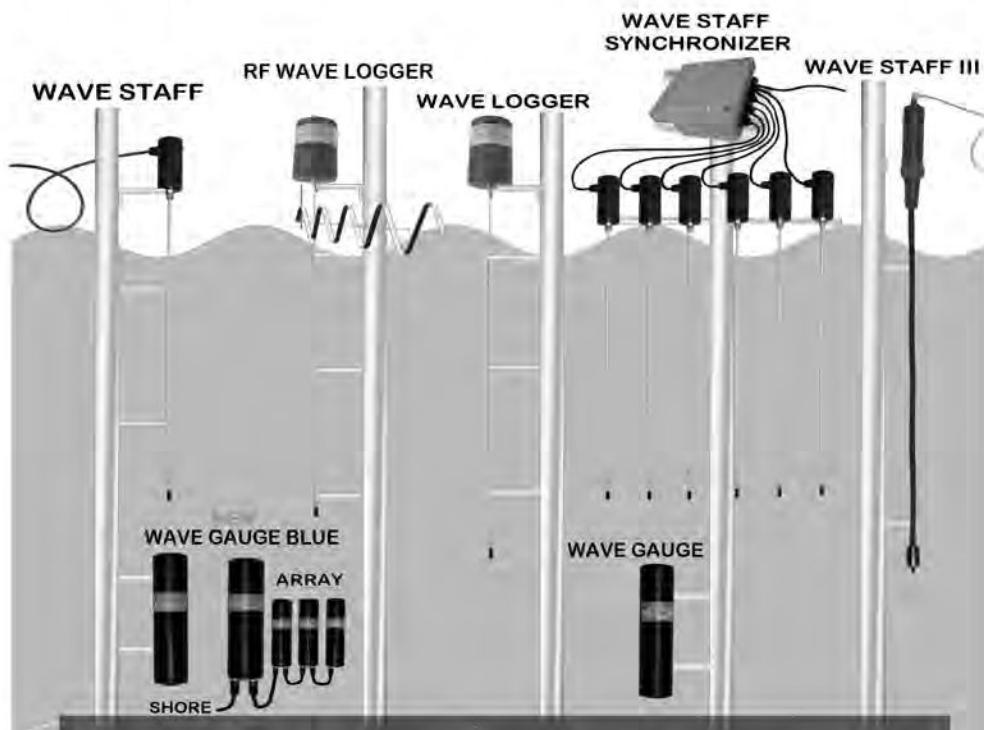
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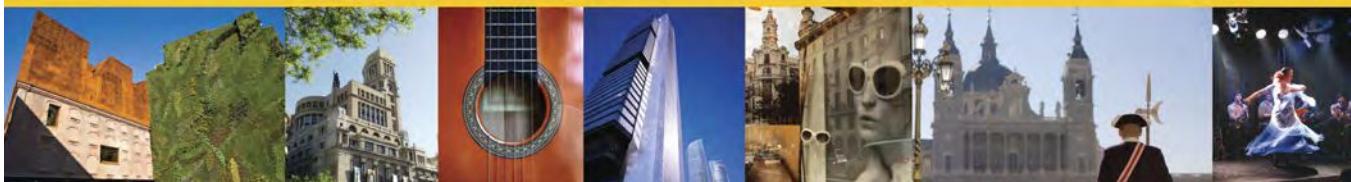
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Jon Holvik has taken over as president of the Houston, Texas-headquartered Kongsberg Maritime Inc., the U.S. subsidiary of supplier of dynamic positioning (DP) and automation-control systems for offshore vessels, rigs and merchant shipping. Norwegian born Holvik, an electronics graduate from the Technical College in Kongsberg, Norway has been a Kongsberg Maritime employee since the late 1980s. Starting his career as a service engineer he became part of Kongsberg Maritime when it acquired his then employer, Shipmate Norway. He became a DP hardware and software engineer in 1990, and in 1993 through 1995 served as service manager for Kongsberg in Singapore, responsible for service of all Kongsberg products in SE Asia. He moved into sales in 1996 upon returning to Norway. As sales manager for Kongsberg Maritime, his responsibility was for Scandinavia, Middle East and Brazil from 1996 to 1998. In 1998, Holvik moved to Houston to become vice president of sales for Kongsberg Maritime Inc. After 10 years, he had an 18-month guest appearance as VP rig broker for RS Platou in Houston from July 2008 until February 2010 but returned to Kongsberg Maritime Inc. as

vice president of sales in February 2010, a position he held until being named president of the company.

UniversalPegasus International (UPI), a leader in engineering, project management, and construction management for the energy industry, named **Tim Brown** as senior vice president, business development. Brown has more than 30 years of experience in the engineering and construction sectors. He comes to UPI from Jacobs Engineering where he held the position of global vice president, inside sales and marketing. Brown was responsible for downstream, upstream, chemicals, and pharmaceuticals-biotechnology business unit sales, with regional focus on North America, India, and the Middle East.

KBR said that **Jan Egil Braendeland** was appointed president of KBR's oil and gas business unit. Braendeland will play a key leadership role in extending KBR's involvement in oil and gas projects and to substantially grow the business unit. He brings a consistent record of leadership success and more than 20 years of experi-

ence in the upstream industry. Braendeland was previously employed by KBR for 18 years, where he held various leadership positions, the last being senior vice president, business development for KBR's oil and gas business unit. He rejoins KBR after a brief period at another firm where he served as senior vice president, global business development, upstream. Braendeland holds a master of science degree in naval architecture and marine engineering from the Norwegian University of Science and Technology.

Flare Industries, LLC appointed **Mark Zyskowski** as senior vice president of global sales and marketing, a new position at the company. Flare is an industry leader in design, manufacturing, and installation of vapor recovery, combustion, and pollution-control technologies as well as after-market service support. Zyskowski, a chemical engineer graduate from the University of Toronto, has 30 years of experience in the energy industry, mostly in a sales leadership capacity. Most recently, he was vice president of global sales for Honeywell Process Solutions. From 2005 until 2013, Zyskowski was working with Honeywell Process Solutions in various senior leadership roles.

The advertisement features a large blue graphic on the left with white text: "23RD ANNUAL CLEAN GULF CONFERENCE & EXHIBITION". Below this is a smaller white graphic with a blue outline of the Gulf Coast states (Texas, Louisiana, Mississippi, Alabama, Florida) containing the word "CLEAN". To the right is a dark blue rectangular area with white text: "PREPARE. PREVENT. RESPOND: Real-world solutions for oil spill prevention and response". Below this is a photo of a crowd of people. At the bottom, it says "NOVEMBER 12-14, 2013". On the far right, it says "TAMPA, FL TAMPA CONVENTION CENTER". At the bottom left, it says "Register today with VIP code OCEAN" and "www.cleangulf.org/oceannews". A list of tracks is at the bottom right: TRACK 1: RESPONSE, TRACK 2: PREVENTION, PREPAREDNESS & PLANNING, TRACK 3: INFORMATION & RESPONSE TECHNOLOGIES, TRACK 4: DEEPWATER PREVENTION & RESPONSE, and TRACK 5: SPECIAL INTERESTS.

HB Rentals, a Superior Energy Services company, has named **Peter Armstrong** as vice president of business development. Armstrong will work closely with international customers in both the onshore and offshore remote living accommodations markets to identify needs and analyze potential solutions. Armstrong's prior experience in business development is specifically within strategic planning, market analysis, research, new product development, and corporate marketing. Based in Houston, Armstrong's responsibilities include new market analysis, managing the corporate marketing function, and driving growth through global customer relationships.

Seatrionics do Brazil, an Acteon company, announces the appointment of **Thiago Montanari** as sales manager. Montanari is based in Rio de Janeiro and will report directly to Seatrionics vice president, Fabio D'Agostino. Montanari has 6 years of experience in the offshore industry, working extensively in the Caspian (Kasakhstan), Mediterranean, Adriatic, and Caribbean (Cuba) seas, as



Armstrong

well as in Angola, Patagonia, and Libya. Montanari will be responsible for maturing existing relationships while growing and developing global business opportunities with existing and potential clients. Before joining Seatrionics, Montanari worked at Ambipetro, where he was an operations supervisor and party chief for its offshore operations. Prior to this role, he spent 4 years at GASITALY as an offshore surveyor, responsible for MBES, side-scan sonar and sub-bottom profiling data acquisition and positioning.

BMT Group Ltd, a leading international design, engineering, and risk management consultancy, is pleased to announce that **Wendy Barnes** has joined the board of directors as a non-executive director. Barnes is presently a non-executive member of the main board of OFWAT, the economic regulator of the water industry in England and Wales, the Foreign & Commonwealth Office Services, at the Met Office, and of two government security departments. She was interim chief operating officer for the UK Government's Department of Energy &



Barnes

Climate Change with responsibility for corporate services and nuclear decommissioning and security policy until December 2012. She was also previously a member of the main Board of the Ministry of Defence's Defence Equipment and Support organization. Prior to this, Barnes spent 11 years with United Utilities and previously 10 years with British Nuclear Fuels in a wide range of roles, including customer service, marketing and business development.

SEA CON® has opened new Encapsulating & Molding facility in the West Houston area to develop even greater levels of support both to the Gulf Coast region and internationally.

iXBlue extends a warm welcome to Photline, a company in which the group already had a large stake and that now holds almost 100% equity. Photline is now a wholly owned subsidiary of the group. Founded more than 10 years ago by former researchers at CNRS and University of Besançon, France, Photline designs, develops, and manufactures integrated optical components and products for scientific and industrial applications in the instrumentation, telecommunications, aeronautical, spatial, and defense sectors.



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Falmat designs and manufacturers cables for commercial and military projects ensuring performance and reliability specifically in harsh environments. Innovative cable solutions for dynamic and static applications. Ruggedized Deep-Water XtremeNet composite Ethernet cables, proven XtremeGreen video cables, miniature XtremeLight fiber optic cables are high performance products representing our versatile manufacturing capabilities serving the marine industry. We recently launched a new line of off-the-shelf subsea instrumentation cables. We offer installing braided hairied fairing, single and multilayered steel armored cables in short lengths. Falmat is a Certified ISO9001/AS9100 company. Visit our web site www.falmat.com or contact our sales team for a prompt quotation

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Website: www.teledyne-tss.com
Contact: Carolyn Jones



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OCEAN INDUSTRY DIRECTORY

ON&T's Product & Service Directory

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PMI Industries, Inc.

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Cleveland, OH 44103 USA
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Fax: (216) 881 4920
E-mail: sales@pmiind.com
Website: www.pmiind.com



Specializing in the design, manufacture & testing of highly reliable **Cable Systems & Hardware** for harsh marine environments since 1969; **PMI Industries, Inc.** is committed to providing Engineered & Custom Designed Cable Systems for all types of applications in the marine industry including Cable Installation, Terminations & Protection Products, Defense & Surveillance, Monitoring & Fisheries, ROVs & Ocean Equipment, Salvage, Search & Recovery Operations and Seismic & Survey Exploration. Work directly with our **Engineering & Design** team from initial product concept to production. Our state-of-the-art **Cable Testing** facility simulates at-sea conditions and offers complete testing services from product design verification through acceptance testing. **PMI Underwater Cable Solutions:** performance, reliability, peace of mind.

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AK Industries

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Contact: Allan Kidd



AK Industries is an agile high tech manufacturer of rugged low cost underwater electrical connectors. The HydroVolt line of connectors is the most rugged and reliable low cost connector available. AK Industries is also ideally suited to provide unique solutions engineered to customer requirements.

BIRNS, Inc.

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Fax: 1 401-753-6342
E-mail: sales@birnsaquamate.com
Website: www.birnsaquamate.com
Contact: Eli Bar-Hai



Birns Aquamate design and manufacture underwater electrical connectors, cable assemblies, and cable terminations. The company produces a wide range of standard industry connectors such as the 5500 Series, SC, MC, LP, FAWL/FAWM, Rubber Molded, etc. BIRNS Aquamate is the only underwater connector producer that guarantees compatibility with other manufacturers. Birns also specializes in fast turn-around for custom design of special connector solutions. Stocking dealers in the UK (Scorpion Oceanics), South Africa (Marine Solutions) Holland (Seascape) as well as dealers in Canada, Italy, Russia, China, and Brazil.

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The **SEA CON®** Group are world leaders in underwater connector technology and provide an extensive and diverse range of electrical, optical and hybrid connector assemblies, submersible switches and cable system solutions for many applications within the Oceanographic, Defense, Oil and Gas and Environmental markets. With locations in California, Texas and Rhode Island in the USA, Mexico, Brazil, the United Kingdom and Norway and a worldwide network of agencies and representatives, **SEA CON®** is able to supply very quick solutions to any requirements across the globe.

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Tel: +45 7613 2000
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Contact: Ross Johnson



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Ocean Marine Industries (OMI) specializes in strategic product distribution and sales representation with special emphasis on working with U.S. Federal and State Government Agencies, Scientific Research Institutes, Academia and commercial organizations. OMI's primary product line is multi-beam imaging sonars made by Sound Metrics of Bellevue, WA www.soundmetrics.com

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Website: www.km.kongsberg.com/seatex
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nke Instrumentation

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OCEAN INDUSTRY DIRECTORY

ON&T's Product & Service Directory

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MA 02559-4900, USA
Tel: 508-563-6565
Fax: 508-563-3445
E-mail: glester@hydroid.com
Website: www.hydroid.com
Contact: Graham Lester



Hydroid, a subsidiary of Kongsberg Maritime, is the world leader in manufacturing advanced Autonomous Underwater Vehicles (AUVs). REMUS AUVs provide innovative and reliable systems for the marine research, defense, hydrographic and offshore/energy markets. Hydroid vehicles represent the most advanced, diversified and field-proven family of AUVs and support systems in the world.

UNDERWATER VEHICLES/ROVs

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Fax: 408-436-1108
E-mail: sales@deepocean.com
Website: www.deepocean.com
Contact: Bill Charbonneau



Deep Ocean Engineering, Inc. provides remotely operated and unmanned surface vehicle (ROV / USV) solutions which are used by a broad range of industry applications - security, military, nuclear and hydroelectric power plants, inshore dams and lakes, oil and gas, scientific research, fisheries, salvage, search / recovery, and pipeline inspections.

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E-mail: sdingman@deltausubsea-rov.com
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Tel: +1 530.753.6718
Fax: +1 530.753.8092
Contact: Peter MacInnes
E-mail: peter.macinnes@fmctech.com
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Fax: +44 (0)1224 226598
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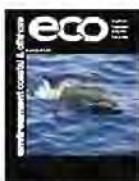
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September 2013

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Ocean News & Technology

CALENDAR & EVENTS

OCEANS '13 MTS/IEEE Update

MTS/IEEE's big show returns to San Diego, 23-26 September 2013, with the theme, "An Ocean in Common." It is on track to be among the most dynamic Oceans conferences ever organized. Registration is now open.

There will be over 450 papers, presentations, and posters, plus an extraordinary exhibition by industry, academia, non-profits, and government agencies. Numerous special events complement the rich technical and scientific presentations.

The Technical Program, which runs Tuesday through Thursday, will feature 23 Special Sessions, including Ships-to-Reefs, Ultra-deep Exploration, International Business, San Diego Maritime History, and Technology Transfer.

Monday's tutorials are available to the general public at a nominal cost, without having to register for the full conference. Check out the 13 compelling course descriptions, which include IEEE CEU credits.

More than 200 exhibit booths fill the two exhibit halls. Admission is free to the exhibits, just register to get a complimentary badge.

The opening Plenary Session is also free to attend. UCSD Chancellor Dr. Pradeep Khosla will join Oceans Advocate Dr. Sylvia Earle and Dr. Greg Kusinski, DeepStar® Director, Chevron Energy Technology Company to give their separate perspectives on ocean initiatives.

For more information, visit www.oceans13mtsieesandiego.org.

E-marine to host 2014 ICPC

E-marine has announced that it will host the 47th Plenary Meeting of the International Cable Protection Committee (ICPC) in Dubai, United Arab Emirates in early 2014.

The ICPC Plenary event is a major forum for the exchange of technical, legal, and environmental information about submarine power and telecommunications cables that is held every year in a region specifically chosen to facilitate wider participation among ICPC's members.

The strategic location of the UAE is fitting, not only because of its excellent international connections, but also because it has many subsea cables running through the region, making it the ideal place to promote and discuss developments and issues facing the sub-

marine cable industry. The Arabian Peninsula has been a critical location in the progress of submarine telegraphy between the East and the West since the end of the 19th century. More recently, the Middle East region has seen substantial growth in the construction and announcement of new submarine cable systems and competing terrestrial systems, along with the total demand for international capacity from the Persian Gulf countries. E-marine was born out of a need to serve the region, from the region, and has over 25 years of subsea cable experience in the Middle East.

The ICPC Plenary event will offer stakeholders a chance to interact and discuss present and future issues related to submarine telecommunications cables and submarine power cables, since these are increasingly critical components in today's global communications networks and power grids.

For more information, visit www.iscpc.org.

EdgeTech announces 2013 sonar training seminar

EdgeTech, the leader in high-resolution sonar imaging systems and underwater technology, will be holding their annual sonar training seminar in New Bedford, Massachusetts 24-26 September 2013. This comprehensive course will cover sonar theory, operational training, system maintenance, and post-processing data for all of EdgeTech's standard side scan sonar, sub-bottom profiling, and combined systems. The format for the 3-day seminar includes 2 days of classroom instruction and 1 day at sea. Topics and systems to be addressed include the following:

- 4125 Side Scan Sonar Shallow water side scan sonar operations
- 4200 Side Scan Sonar Offshore multi-faceted side scan sonar solutions
- 3100 Sub-bottom Profiler Sub-bottom profiling system for various operations
- 4600 Side Scan/Bathymetry Combined side scan sonar and bathymetry system
- 2000 Series Combined Systems Combined side scan/ sub-bottom profiler systems

For additional information or to reserve your spot, please contact Amy LaRose at +1-508-291-0057 or Amy.Larose@EdgeTech.com.

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Offshore Europe Oil & Gas
Aberdeen, UK
www.offshore-europe.co.uk

September 22-27, 2013
SEG Annual Meeting
Houston, TX
www.seg.org

September 23-27, 2013
Oceans '13 MTS IEEE
San Diego, CA
www.oceans13mtsieesandiego.org

September 30-October 2, 2013
SPE Annual Technical Conference
New Orleans, LA
www.spe.org

October 8-9, 2013
MTS Dynamic Positioning
Houston, TX
www.dynamic-positioning.com

October 9-13, 2013
International Workboat
New Orleans, LA
www.workboat.com

October 22-24, 2013
Deep Offshore Technology
Houston, TX
www.deepoffshoretotechnology.com

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Lafayette, LA
www.lagcoe.com

October 22-24, 2013
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Providence, RI
www.offshorewindexpo.org

November 5-7, 2013
Deepwater Operations
Galveston, TX
www.deepwateroperations.com

November 6-8, 2013
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Houston, TX
www.oilcomm.com

November 11-13, 2013
Subsea Survey IMMR
Galveston, TX
www.subseasurvey.com

November 12-14, 2013
Clean Gulf
Tampa, FL
www.cleangulf.org

November 19-20, 2013
North Sea Decommissioning Conference
Aberdeen, UK
www.decomworld.com/nsd

November 19-21, 2013
EWEA Offshore
Frankfurt, Germany
www.ewea.org/offshore2013

2013 EDITORIAL CALENDAR

January/February 2013

Editorial: Decommissioning & Abandonment, Subsea Fiber Optic Networks
Distribution: Decommissioning & Abandonment Summit, NACE, Offshore Mediterranean, U.S. Hydro
Product Focus: Navigation, Mapping & Signal Processing

March

Editorial: Oceanology & Meteorology, Maritime Security
Distribution: Ocean Business, SubOptic 2013
Product Focus: Ocean Instrumentation, Diver Detection Systems

April

Editorial: Offshore Technology, Ocean Mapping & Survey
Distribution: GMREC, IDGA Maritime Homeland Security, OTC
Product Focus: Connectors, Cables & Umbilicals

May

Editorial: UW Imaging & Processing, Marine Salvage
Distribution: EnergyOcean, Oceans '13 Bergen, Sea Work Intl, UDT
Product Focus: Cameras, Lights & Imaging Sonars

June

Editorial: Workclass ROVs, Deepwater Pipeline & Repair & Maintenance
Distribution: TBA
Product Focus: Subsea Tools & Manipulators

July

Editorial: AUVs & Gliders, Marine Construction
Distribution: AUVSI
Product Focus: Tracking & Positioning Systems, Seismic Monitoring

August

Editorial: Defense & Naval Systems, Corporate Showcase
Distribution: TBA
Product Focus: Multibeam & Side Scan Sonars

September

Editorial: Ocean Observing Systems, Ocean Renewables
Distribution: Oceans MTS IEEE, SPE ATCE, MREC, MTS Dynamic Positioning,
Product Focus: Buoys & Monitoring Instrumentation

October

Editorial: Offshore Vessels, Offshore Communications
Distribution: International Workboat, LAGCOE, Oil Comm, OTC Brazil, North Sea Decommissioning, AWEA/Offshore Windpower
Product Focus: Acoustic Modems, Releases & Transponders, Marine Communications

November

Editorial: Subsea Inspection, Monitoring, Maintenance, Repair; Subsea Telecom
Distribution: SUBSEA Survey IMMR, Clean Gulf
Product Focus: Handling Equipment, Winches & Control Systems, Battery Technology

December

Editorial: Light Workclass ROVs, Commercial Diving
Distribution: Subsea UK, Underwater Intervention
Product Focus: Diving Equipment & Buoyancy Materials

Serving the Ocean and Offshore industry, Ocean News & Technology has a long, rich history as the primary information resource executives around the world rely on.

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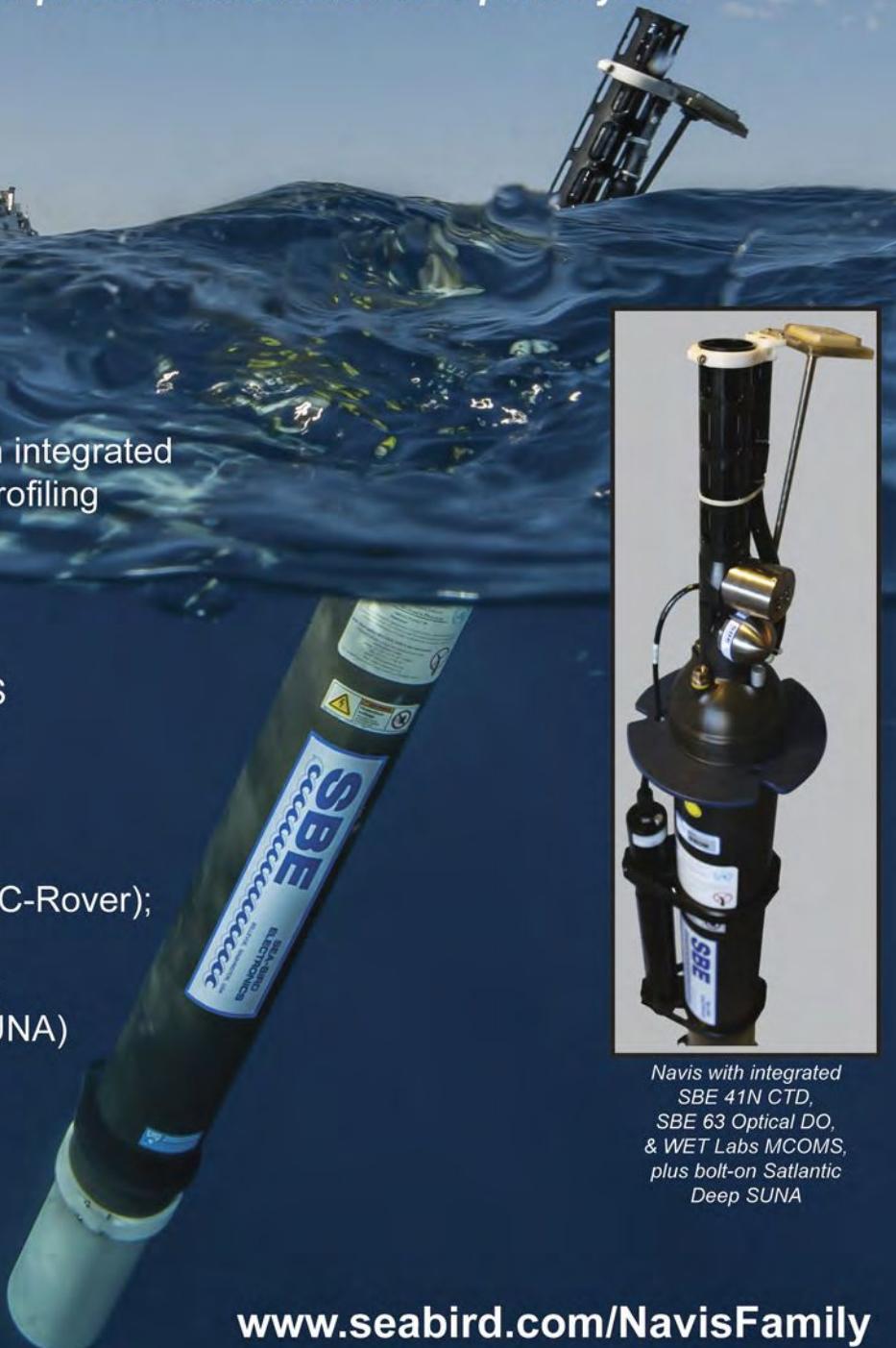
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