MARINE TECHNOLOGY REPORTER

September 2013 www.seadiscovery.com


# Ocean Observation

***Atlas-B, Brazil's first internally integrated buoy & mooring system***

## *ROVs*
MATE Competition Gives a Glimpse to the Future

## *Wind Speed*
Offshore Wind Spend Gains Strength

## *Tony Hall*
One-on-one with CEO of Welaptega Marine

## *UNOLS RV Fleet*
The Research Fleet Needs Recapitalization

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September 2013

# Contents

Volume 56 • Number 7

## Leading Off



## Markets



## One-on-One



## Ocean Observation



## Cover Story




Photo: Welaptega

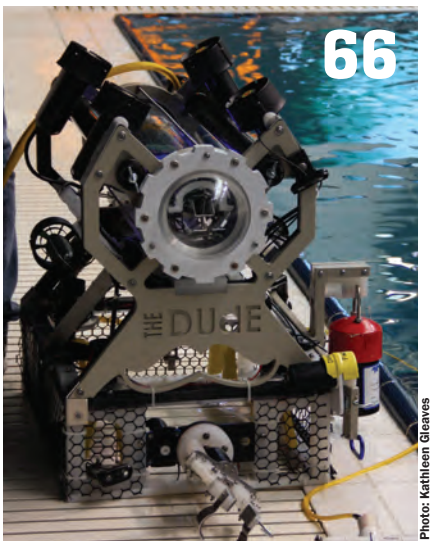
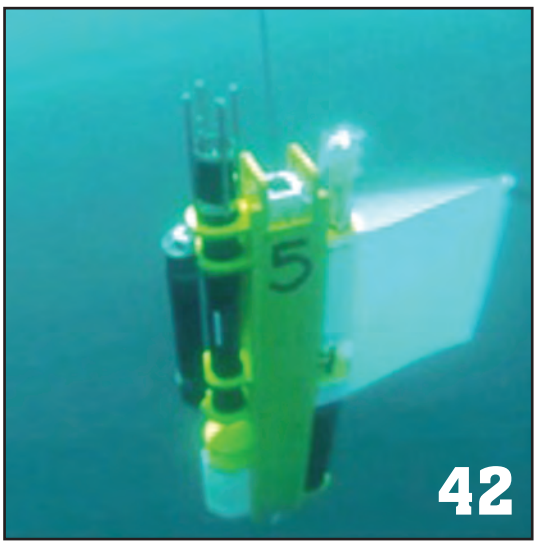



Photo: Kathleen Gleaves

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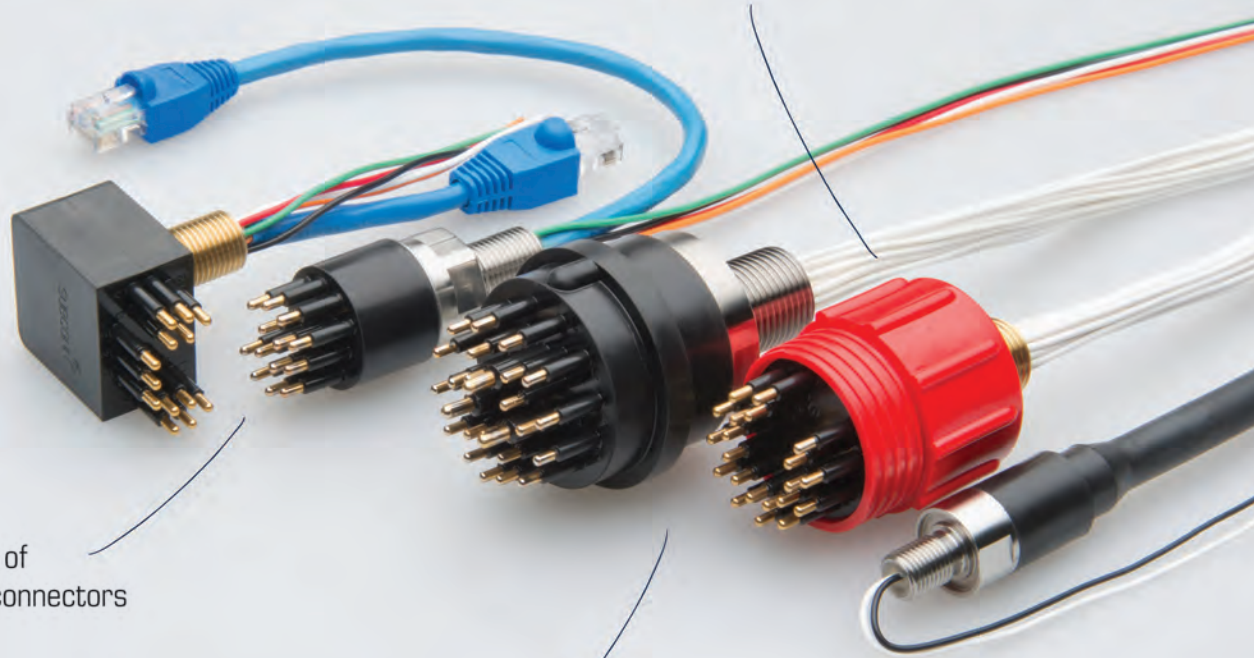


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# Contents

Volume 56 • Number 7

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September 2013

# Contents

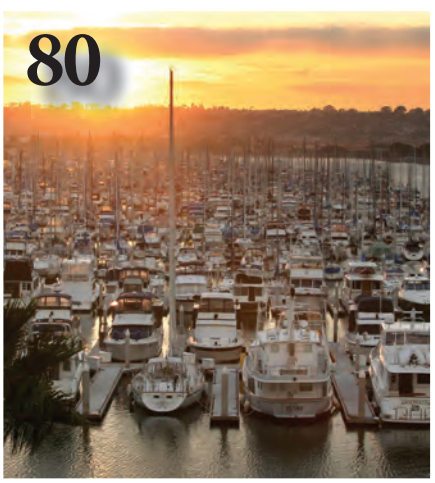
Volume 56 • Number 7


16

**Gulf Copper recently completed the first three in a set of five massive CALM buoys for SOFEC.**







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Having been a b2b publications editor for more than two decades, I must admit that I am a notorious phone and email screener, as the volume of incoming inquiries across our family of maritime and subsea titles is inundation, to put it mildly. There are a limited number of people that I will literally stop immediately to field, with **Rick Cole** of RDSEA International, Inc. of St. Pete Beach, Fla., on that list. Why? I know that when Rick calls he has a great story to tell; a great story backed with solid prose and images that translate favorably into our media products, print and electronic.

This month's cover story is courtesy of one of those calls, and Rick, along with Leonardo Barreira and Edmo Campos, convey the story surrounding the deployment of Brazil's first internally integrated buoy and mooring system, Atlas-B. This serves as a perfect centerpiece for our "Ocean Observation" coverage, and starts on page 46.

We are also pleased to present a glimpse into the future of ROV design and operation courtesy of the **MATE 2013 International Underwater ROV Competition**. Our West Coast contributing editor Kathleen Gleaves did an exquisite job digging into the competition, recording the triumphs and disappointments, including the dismantling (and subsequent damage) of the Egyptian team's vehicle at a security check point in Scotland. I know that many of you are already supporting initiatives designed to attract young minds to a life of science and engineering, and I hope that reading her coverage, starting on page 66, will have you feeling that the future is in good hands.



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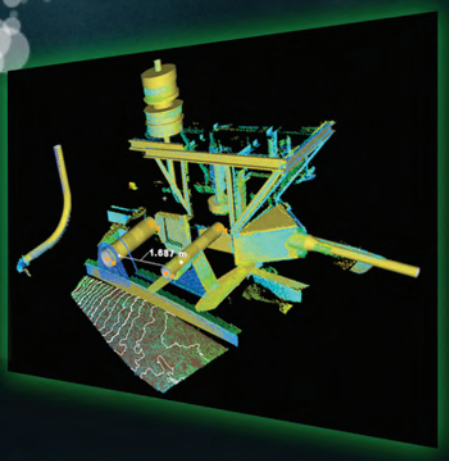

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## Oil Pollution Risk Assessment

# NOAA ID's Lurking Enviro Threats

A new NOAA report that examines national oil pollution threat from shipwrecks has been presented to the U.S. Coast Guard. With as many as 20,000 recorded shipwrecks in NOAA's database, the May 2013 report finds that just 36 sunken vessels scattered across the U.S. seafloor could pose an oil pollution threat to the nation's coastal marine resources. Of those, 17 were recommended for further assessment and potential removal of both fuel oil and oil cargo. Based on vessel contents, condition, environmental sensitivity and other factors, NOAA has determined that six vessels are high priority for a Most Probable (10%) discharge, and 36 are high priority for a Worst Case Discharge **(Table ES-1)**.

NOAA's Remediation of Underwater Legacy Environmental Threats (RULET) project identifies the location and nature of potential sources of oil pollution. Knowing where these vessels are helps oil response planning efforts and may help in the investigation of mystery spills - sightings of oil where a source is not immediately known. In 2010, Congress appropriated $1 million for NOAA to develop a list of the most significant potentially polluting wrecks in U.S. waters, specifically addressing ecological and socioeconomic resources at risk. Those funds were not intended for oil or vessel removal. NOAA maintains the internal Resources and UnderSea Threats (RUST) database of as many as 30,000 sites of sunken material. Initial screening of these shipwrecks revealed 573 that could pose substantial pollution risks.

This includes vessels built after 1891, when U.S. vessels began using fuel oil; vessels over 1,000 gross tons and built of steel, and tank vessels. Additional research narrowed that number to 107.

To prioritize and determine which vessels are candidates for further evaluation, NOAA used a series of risk factors to assess the likelihood of oil remaining onboard, and the potential environmental impact if that oil spills. NOAA used risk factors to assess physical integrity and pollution potential as well as other factors that may impact potential removal operations. Risk factors included total oil volume on board; oil type; if the

**Table ES-1:** Number of vessels in each priority category for the 87 priority wrecks.

| Category Rank | No. Wrecks for Worst Case Discharge | No. Wrecks for Most Probable Discharge |
|---|---|---|
| High Priority | 36 | 6 |
| Medium Priority | 40 | 36 |
| Low Priority | 11 | 45 |

**Table 1-1:** A sampling of domestic potentially polluting wreck remediation projects.

| Vessel (Year of Sinking) | Project Year | Location | Action | Removed (bbl) | Oil Type | Depth (ft) |
|---|---|---|---|---|---|---|
| Tenyo Maru, 1991 | 1991 | WA | Partial Removal | 620 | Diesel | 540 |
| Union Faith, 1969 | 1999 | LA | Partial Removal | 400 | HFO | 125 |
| Ehime Maru, 2001 | 2001 | HI | Partial Removal | 665 | Diesel | 2,000 |
| Roy A. Jodrey, 1974 | 2003 | NY | Partial Removal | 143 | HFO | 200 |
| Catala, 1965 | 2007 | WA | Removal | 820 | HFO | Surface |
| William Beaumont, 1971 | 2009 | TX | Removal | 380 | HFO | 40 |
| Ex- USS Chehalis, 1949 | 2010 | Samoa | Removal | 1,430 | Gasoline | 160 |
| William McAllister, 1963 | 2011 | NY | Removal | 5 | Diesel | 160 |

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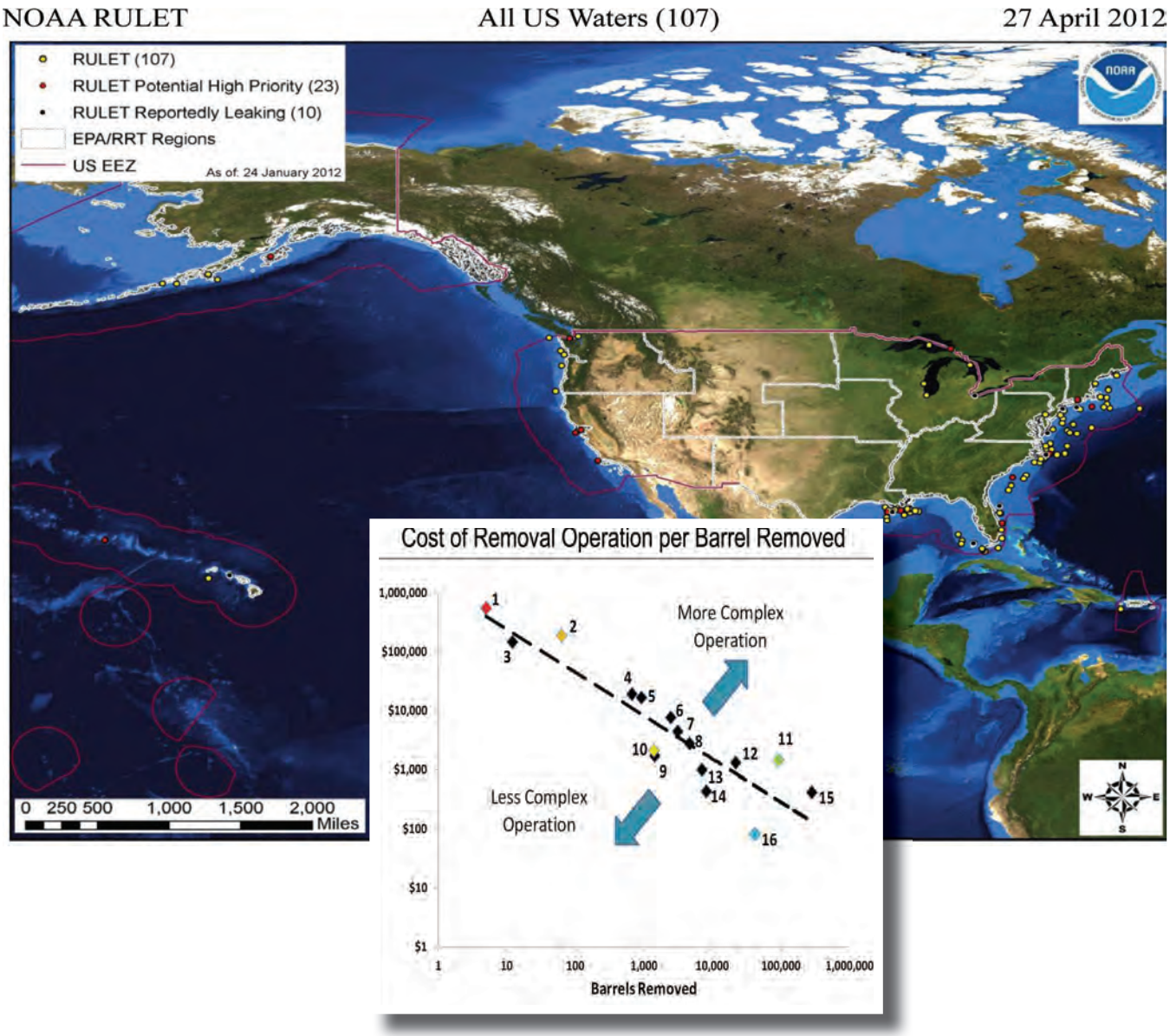


**Table 4-4: Sample of oil removal operation costs in domestic operations.**

| Vessel | Location | Factors in Case | Removed (bbl) | Cost | Cost/bbl. |
|---|---|---|---|---|---|
| *Davy Crockett* | WA | Shallow (not submerged) / Entire Removal | 914 | $15.5M | $17,000 |
| *Princess Kathleen* | AK | 134 ft. depth / Poor vessel condition (rivets) | 2,620 | $14.0M | $5,344 |
| *USS Mississinewa* | Micro. | Shallow depth / Accessible tanks; Low complexity | 42,000 | $3.5M | $83 |
| *Prestige* | Spain | 12,000 ft. depth / Recent wreck; broken in two | 91,000 | $132M | $1,460 |
| *Jacob Luckenbach* | CA | 175 ft. depth; 49-y/o wreck / sensitive location | 2,450 | $19.2M | $7,836 |
| *T/B Cleveco* | Erie | 70 ft. depth; 50-year old wreck | 8,100 | $3.6M | $444 |

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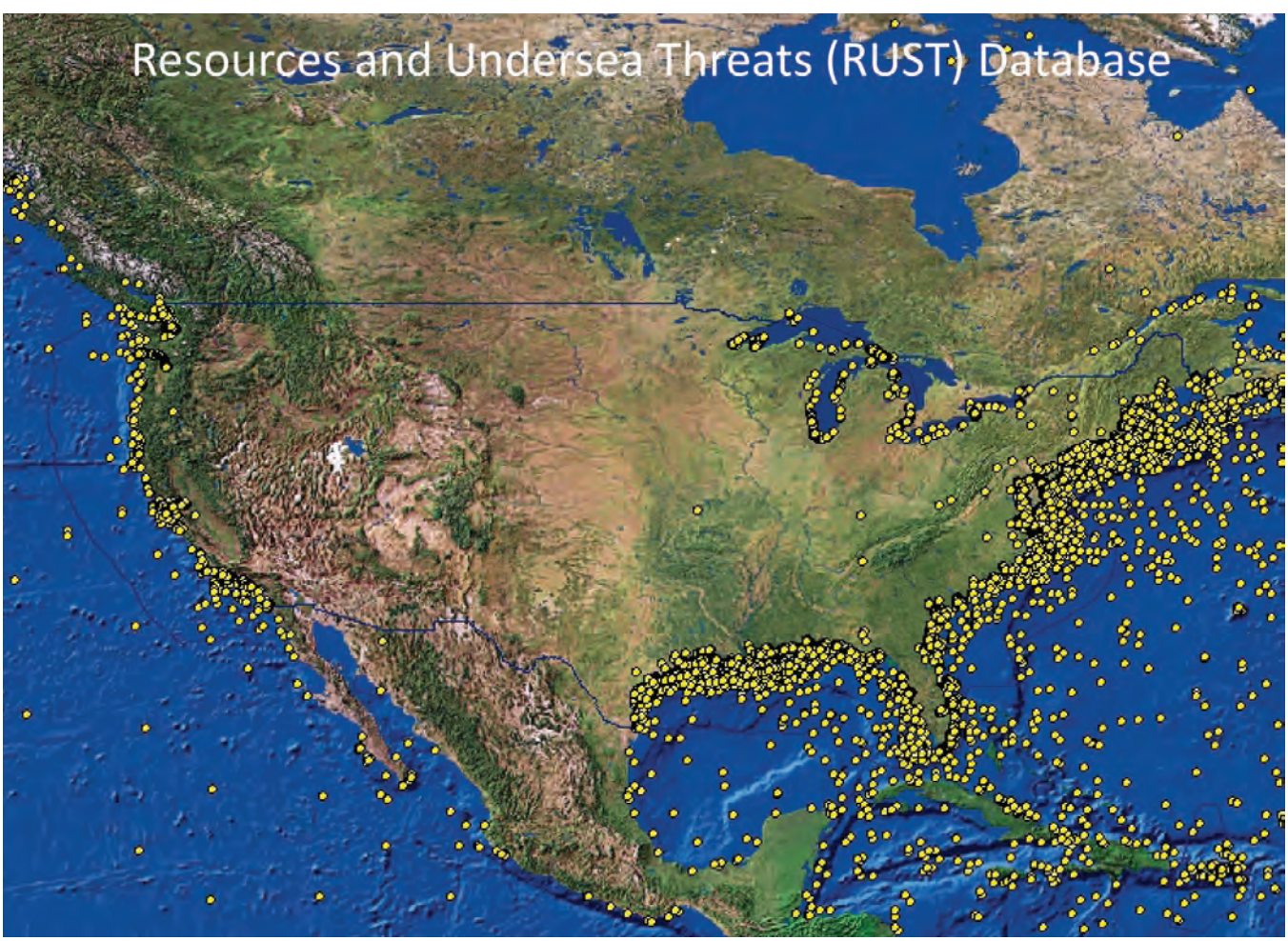
wreck was reported to have been cleared as a hazard to navigation or demolished; if significant amount of oil was lost during the casualty, and the nature of the casualty that would reduce the amount of oil onboard. Factors impacting operations were wreck orientation on seafloor, depth, visual or remote sensing confirmation of conditions; other hazardous materials onboard, if munitions were onboard, and if the wreck is of historic significance and will require special handling. Each factor was also assigned a data quality rating. At the end of the evaluation, each vessel was given an overall vessel risk score of High, Medium, or Low. After this third level of screening, 87 wrecks remained on the priority list.

Oil discharges from shipwrecks are typically in the "Most Probable" category or smaller. Funding for any assessment or recovery operations determined to be necessary is dependent on unique circumstances for the wreck. If a wreck still has an identifiable owner, that owner is responsible for the cost of cleanup. If no responsible party exists, the Oil Spill Liability Trust Fund would likely be accessed. Selecting any vessel for proactive response requires further analysis including spill trajectory studies and monitoring or oil removal feasibility studies. While the salvage industry and oil spill response organizations have demonstrated great advancements in underwater oil removal technologies, in many cases the best alternative may not be removal of oil, but rather to monitor the wreck and plan for potential spills. The cost of removing oil from a wreck varies widely, depending on conditions and as depicted in Table 4-4 (on page 12).

Based on the NOAA report, there is plenty of business out there – literally lurking just under the surface.
**http://sanctuaries.noaa.gov/protect/ppw/pdfs/2013_potentiallypollutingwrecks.pdf**



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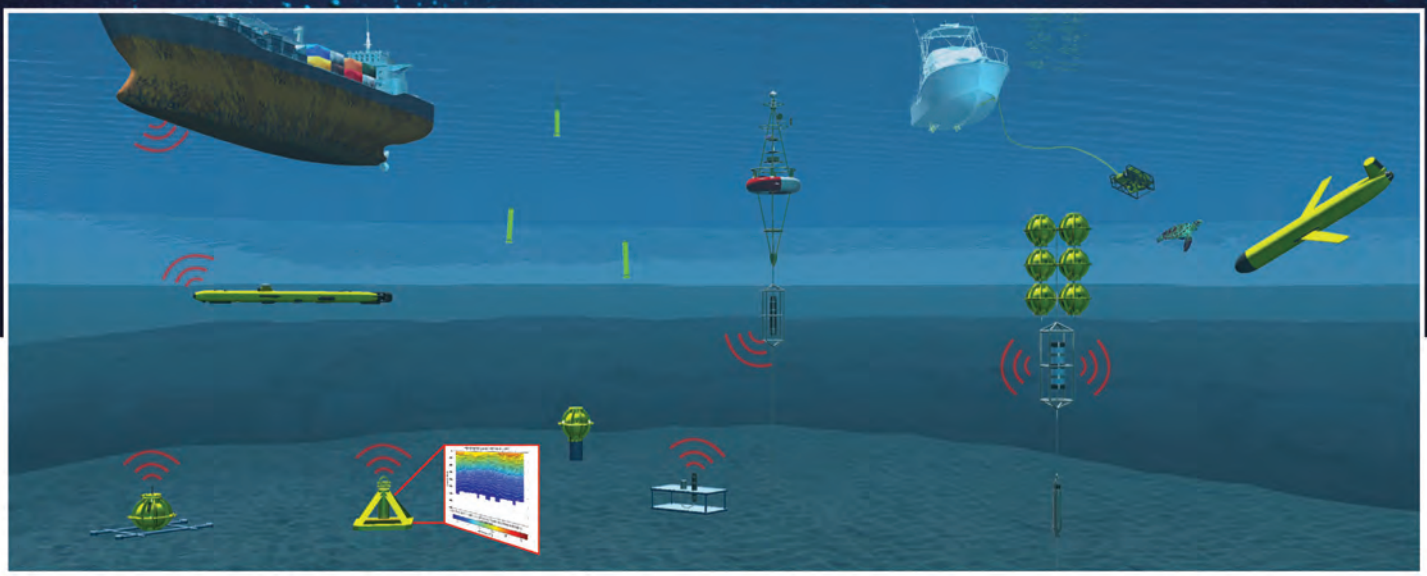

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# SOFEC Completes CALM Buoys at Texas Shipyard

***By Greg Trauthwein, Editor***

Gulf Copper's Port Arthur facility earlier this year completed a unique 10-month project to build the three massive buoys for SOFEC, buoys which will be used to offload liquid product such as diesel or gasoline in places lacking deepwater ports.

In total Gulf Copper received two separate contracts to build a total of five CALM buoys (3 and 2), for SOFEC. The order is of particular interest from the yard's view as they are a new line of business for the company.

The massive buoys pictured here are Catenary Anchor Leg Mooring System, or CALM buoys, and SOFEC is a global leader in the supply of CALM and SALM terminals globally. Each unit weighs in at 230-260 tons (depending on the number of heads) and the floating hull of the buoy is tethered to the ocean floor offshore of a storage or processing facility.

"SOFEC Inc. has manufactured and delivered a total of 44 CALM buoys to date," said Claude Signori, Project Manager, SOFEC, when *Marine Technology Reporter* checked in with him last month. "These have been delivered and installed evenly between Latin America, the Middle East and South East Asia. The demand for CALM buoys has been fairly steady since the early 80s and is expected to remain steady for the foreseeable future.

Prior to the arrival of the offshore terminal, vessels were obliged to moor to Jetties in a harbor/port. This would mean the construction of Jetties, the addition of transfer hoses or mechanical loading arms and in most cases the expensive dredging and upkeep of channels to accept the medium to very large vessels used for the transport of liquid hydrocarbons."


Being surrounded by a vast, resource-rich expanse of ocean has shaped every aspect of our history, culture and existence for over 500 years. That undeniable connection to the sea, and the creativity and persistence required to turn its challenges into opportunities has led this place to develop a cluster of ocean technology expertise that are second to none.

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**The CALM Buoy**

CALM refers to Catenary Anchor Leg Mooring, and the CALM Buoy is a floating hull with a rotating head to which vessels can moor. The CALM buoy falls under the category of a Single Point Mooring (SPM) typically with a turntable positioned above the geostationary hull mounted on a roller bearing. Flexible large bore rubber hoses are used to connect the subsea pipeline to the hull. Similar floating hoses are employed when connecting the buoy to a tanker prior to transferring liquid hydrocarbons. Central to the main bearing is a product swivel which allows fluid to transfer between the geostationary hull and rotating turntable while the moored vessel weathervanes. The primary benefit of a CALM Buoy over a SALM Buoy is ease of maintenance. The mechanical U-Joints of a SALM are removed, and the fluid swivel is located above the water surface. The vast majority of Marine Terminals installed since the mid 1990s have been CALM Buoys because of these design improvements.

While the technology is proven and accepted, demand can be tricky to gauge, according to Signori. "We have seen various increases and decreases that are very difficult to predict. These marine terminals are not market followers since delivery from concept can be 24 months or more. What we do see is a high demand for new refineries and power plants in remote regions where ports are not part of the local infrastructure. It is much less costly to develop a system using a marine terminal than building a new port or harbor."

One advantage of the CALM buoy for the operators is the ability to locate these terminals offshore in a suitable depth of water with an easy installation of the buoy connected to shore to via a pipeline. Another advantage, the environmental signature of an offshore installation is considerably less than a shore side terminal. These two factors, coupled with an expected operating life of 30 plus years will continue to drive the future market, according to Signori. "Also, as developing countries rely on importation of crude or refined product, we continue to see an increase in demand. For instance, as India invests in relative remote areas with refineries for their internal needs, the supply of marine terminals to import the feedstock has increased. The same will be true of power plants that rely on liquid hydrocarbons for operation."


The project was a first for Gulf Copper, and according to Eric Callarman, Gulf Copper & Manufacturing Corp., it presented its fair share of challenges along the way. But he credits SOFEC, their technical expertise, experience and willing to partner to resolve issues as they arose as helping the yard to build its best practices even further.

According to Callarman, challenges started with the schedule which demanded a 10-month production deadline. In addition, it was the biggest fabrication project to date for the Port Arthur facility, and construction far exceeded simple fabrication, involving electrical, mechanical, critical machining and FAT testing. "With the help of our client, we raised our level of quality to meet project requirements. We actually look forward to utilizing this new level of quality on projects moving forward." For example, "We originally thought that the fabrication of the CALM Buoys was going to be the most difficult and time consuming portion of the project but as we started the mechanical and integration portion of this project, we quickly learned that this was actually the most difficult and time consuming." The final challenge is one familiar to most any ship construction facility on every continent: the location and hiring of qualified craftsman to execute the contract. In total Gulf Copper added 50 positions for this project alone. But by the account of the client, all challenges were met.

"SOFEC is very pleased with Gulf Copper's performance," said Signori. "The quality is very good, and financial performance solid. Some of the mentioned challenges appeared in the form of schedule challenges, but these were overcome with hard work and more than a couple long days. Nonetheless, the project met both the Owner and SOFEC expectations.

"We were interested in contracting this work on the Texas Gulf Coast," Signori said. "We were sure the proximity of SOFEC in Houston to a Gulf Coast fabricator would provide an advantage. And given that the local fabrication would support the end user with regards to transportation and importation obligations at the final destination, it was an easy decision to try to work locally. The difficulty would be to choose the right partner."

Two additional CALM buoys are currently being fabrication at Gulf Copper and will be delivered in December 2013. "There is every reason to believe we will work with Gulf Copper on more projects in the future," Signori concluded.

## AGOR 27 & 28: Construction of New Oceanographic

# Research Vessels Progressing

Guido Perla & Associates, Inc. (GPA) reported that construction of the AGOR 27 R/V Neil Armstrong is progressing according to plan at Dakota Creek Industries (DCI) in Anacortes, WA. A major milestone was achieved recently with the completion of the hull assembly after the stern block was set, followed by the installation of the pilot house.

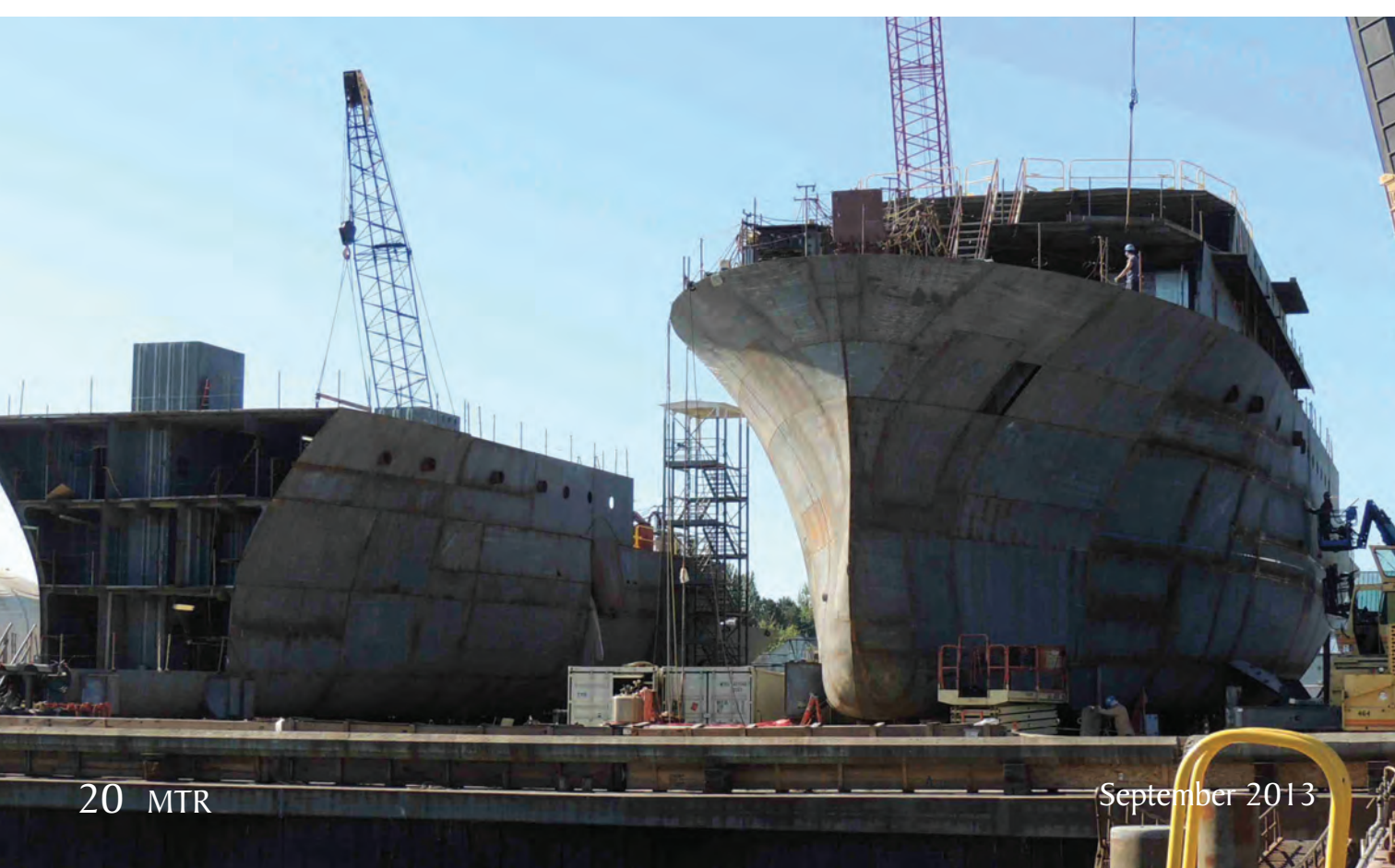
The complex vessels, AGOR 27 and sister vessel AGOR 28 R/V Sally Ride, also well under way at DCI, meet the latest standards in shipbuilding technology, complying with the highest safety standards and providing unprecedented capabilities for advanced oceanographic research.

After developing the Basic Design, Regulatory Design and Detail/Production Engineering for the navy-owned, advanced oceanographic research vessel, GPA now supports DCI onsite throughout the construction and delivery of the 238-ft. vessels. "DCI is producing vessels of outstanding quality and together, we are meeting our timelines and are on schedule for the launch of AGOR-27 in the 1st quarter of 2014." said Eric Engelbrecht, GPA's Project Manager for these vessels.

Delivery is scheduled for late 2014 for AGOR 27 and early 2015 for AGOR 28.

Once completed, AGOR 27 will be operated by the Woods Hole Oceanographic Institution, and AGOR 28 will be managed by the Scripps Institution of Oceanography under charter party agreements with ONR. Both ships will be supporting scientists with ongoing research worldwide, including in the Atlantic, Western Pacific and Indian Ocean regions in a wide variety of missions.

**AGOR 27 R/V Neil Armstrong and AGOR 28 R/V Sally Ride (left) under construction at Dakota Creek Industries (DCI) in Anacortes, WA.**



# Incat Crowther Designs DSV Trio

Incat Crowther has been contracted to design a trio of 42.5m Monohull Dive Support Vessels. The design is a new concept borne of the latest ideas from designer, builder and operator. The design has been developed to be a dedicated DP-2 capable Dive Support Vessel, featuring fully integrated ROV launch and recovery, dive compressors and decompression chamber. The vessels, currently under construction at SeaSafe Barcos Manufaturados, in Angra do Reis, Brazil, will be delivered to Sistac. The first of the three vessels, to be named Sistac Vitória, is due to be delivered in the first quarter of 2014.

The aft deck will feature a large working deck, which will house the ROV crane and reel, a pair of dive platforms and two deck cranes. Inside the main deck house are functional areas such as toilets and showers, dive shop (housing compressors and decompression chamber) and ROV shop.

Forward of these spaces are an office, TV room, meeting room, mess areas and two single-berth cabins for senior personnel and a designated officer cabin.

A spacious wheelhouse is located upstairs, with forward and aft facing vessel control stations, ROV and dive control workstations. Overhead windows are fitted both fore and aft for high-angle visibility.

Four Scania D13 main engines, each producing 410kW, will power the vessels. The vessels will have a service speed of 13 knots and a top speed of 15 knots. The DP-2 capability ensures the vessel can hold station in the event of a failure in any single component of the system, enhancing both safety and reliability.

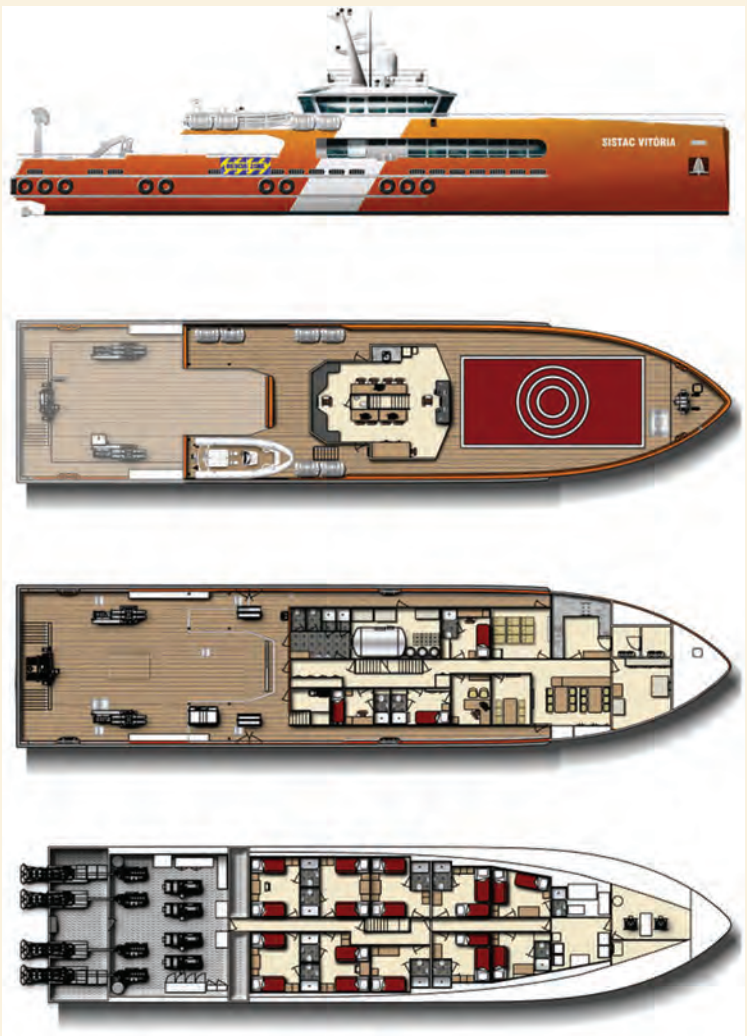



Photo: Incat Crowther

| Specifications – 42.5m DSV | | | |
|---|---|---|---|
| Lengt, o.a. | 42.5m | Sullage | 3,000 liters |
| Lengt, w.l. | 38.5m | Personnel | 36 |
| Beam, o.a. | 9.3m | Speed (Service) | 13 knots |
| Draft (hull) | 1.85m | Speed (Max) | 15 knots |
| Draft (prop or max) | 1.85m | Main Engines | 4 x Scania D13 |
| Depth | 4.25m | Power | 4 x 410kW @ 1800rpm |
| Construction | Aluminum | Propulsion | Hamilton Water Jets |
| Fuel Oil | 112,000 liters | Generators | 4 x Scania DI13 |
| Fresh Water | 20,000 liters | Flag | Brazil |
| | | Class | RINA |

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## ABB to Power Vessels for

# Sevan Offshore Accomodation

Power and automation technology group ABB won an order to provide integrated solutions that include the electrical propulsion system, Azipod CZ and automation system onboard two offshore accommodation vessels.

The 1+1 accommodation vessels will be built by COSCO (Nantong) Shipyard Co., Ltd for Singapore-registered owner Logitel Offshore, which is a subsidiary of Norwegian company Sevan Marine. The cylinder-shaped vessels will each have a displacement of about 40,000 metric tons and capacity to accommodate 490 persons.

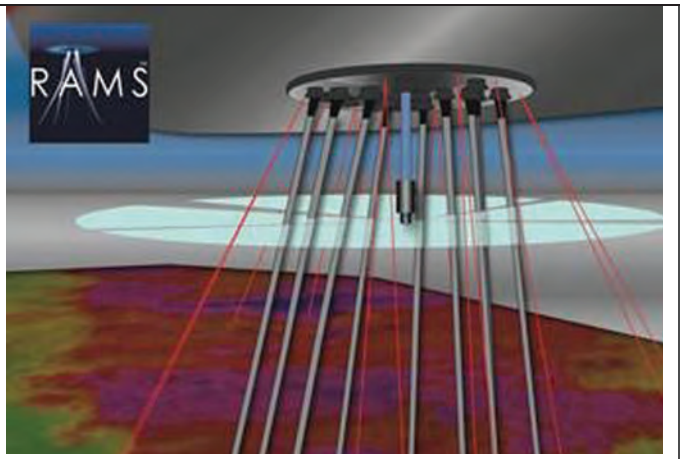
ABB has extensive experience in providing electrical propulsion systems and Azipod units for various offshore vessels. However, this is a breakthrough order for ABB in the floater business to provide an integrated solution that combines not only electrical propulsion system and Azipod, but also the automation system. This integrated package will be delivered to the shipyard by October 2014.

ABB will provide power distribution systems for the two Logitel vessels, including generators, switchboards and main transformers, as well as propulsion transformers and frequency converters. The order also calls for the installation of six Azipod CZ units, conferring superior vessel energy efficiency and maneuverability. In addition, based on the System 800xA Extended Automation platform, the ABB automation package provided will be based on its System 800xA Extended Automation platform.

# Vard Logs $1.1B Order

## *Deal to build PLSVs for DOF, Technip*

Vard Holdings Limited secured contracts with joint ventures of DOF Subsea and Technip for the design and construction of four Pipe Lay Support Vessels (PLSVs), a contract which is the largest order in VARD's history, with an aggregate order value of approximately $ 1.1b. Two of the vessels, of VARD 3 05 design (151 x 30 m) will be delivered in 2Q 2016 and 3Q 2016 respectively. The hulls of these vessels will be built at Vard Tulcea in Romania and outfitted at Vard Søviknes in Norway. The other two vessels, of VARD 3 16 (139.9 x 28 m) design, will be delivered from Vard Promar in Brazil, in 4Q 2016 and 2Q 2017 respectively. The new designs have been developed in cooperation with DOF and Technip. The Norwegian built vessels will carry pipe lay towers rated at 650 tons, among the largest ever in the industry. At 340 tons, the Brazilian built vessels will be among the most complex vessels ever constructed in Brazil. Topside equipment for all four ships will be delivered by Huisman of the Netherlands.




## Tritech RAMS for BP Quad 204

Tritech won a contract for its real-time riser and mooring line monitoring system RAMS. Tritech was selected by Single Buoy Moorings Inc. (SBM), designer and supplier of Turret Mooring Systems (TMS), to supply the primary safety tool for real-time mooring line failure detection and riser monitoring for the new build Floating Production Storage and Offloading Unit (FPSO), for the BP Quad 204 development. The RAMS technology will provide 24/7 real-time simultaneous monitoring of the presence and precise position of all subsea targets beneath the FPSO. Tritech is to supply a full hardware and software solution to comply with detailed project specification, including DNV high availability and redundancy requirements.

## Odyssey Recovers Silver

The latest recovery from SS Gairsoppa reportedly set the world record for deepest, largest precious metal recovery. Odyssey Marine Exploration said it has recovered more than 61 tons of silver bullion this month from a depth of nearly three miles. This recovery of bullion from the SS Gairsoppa, a 412-foot 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 U.K. 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 U.K. 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.

# General Dynamics Tests U.S. Navy UUVs

General Dynamics Advanced Information Systems 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 completion of this significant milestone is a great achievement for our Knifefish team," said Thomas Kirchmaier, president of General Dynamics Advanced Information Systems. "Knifefish will help meet the constantly-evolving requirements of today's fleet and greatly reduce risk to Navy personnel and ships."

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.

"Overcoming unique size, weight and power challenges are keystones to the successful deployment of the Navy's Knifefish program," said Tom Mason, senior program manager of General Dynamics Advanced Information Systems. "Completing these early discovery programs is critical for meeting the program's schedule and cost requirements."

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. The Knifefish system will include two UUVs, in addition to launch and recovery equipment, a support container, spare parts and support equipment.

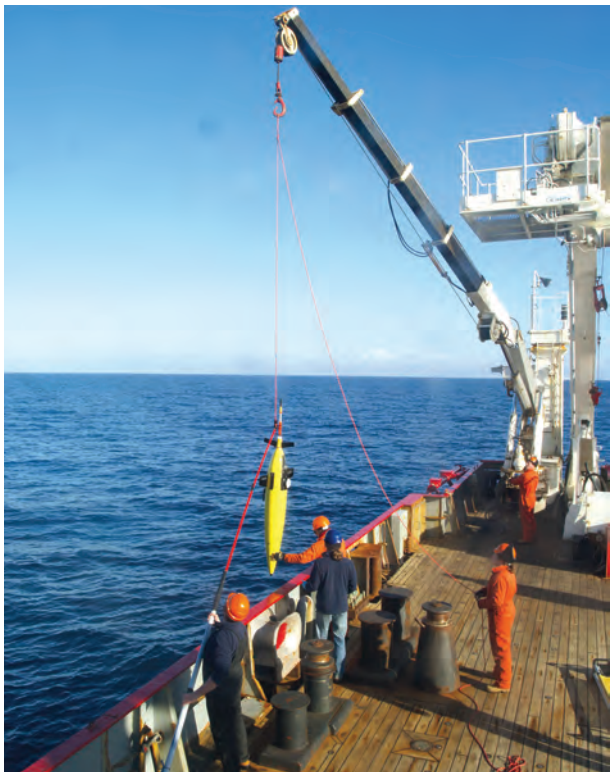
The U.S. Navy's Naval Sea Systems Command (NAVSEA) awarded General Dynamics Advanced Information Systems a contract to design and build Knifefish in September 2011. The General Dynamics Advanced Information Systems team on the Knifefish program includes Bluefin Robotics (Quincy, Mass.), Ultra Electronic Ocean Systems (Braintree, Mass.), Oceaneering International, Inc. (Houston, Texas), Metron (Reston, Va.), Applied Research Laboratory at Penn State University (State College, Pa.), 3 Phoenix (Hanover, Md.), General Dynamics Information Technology (Fairfax, Va.) and ASRC Research Technology Solutions (Greenbelt, Md.).

gd-ais.com
generaldynamics.com

# Kongsberg AUV Seaglider Debuts

Following its acquisition of the Seaglider exclusive commercial license from the University of Washington in May this year, subsea technology developer Kongsberg Maritime launched 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 nine 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. Kongsberg Seaglider joins the Kongsberg Hugin and Remus AUVs, and introduces extreme long-duration operation capabilities into the company's underwater vehicle portfolio. 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. Full production of Kongsberg Seaglider is expected by December 2013 although there is capacity for delivery of special orders before this date.

km.kongsberg.com



Pipeline End Module placed at the end of the pipeline to make it possible to clean (pigg) the pipeline and at the same time connecting it to the export line.

## Statoil Contracts Kongsberg for Subsea Structures

Kongsberg Oil & Gas Technologies AS (KOGT) signed an agreement with Statoil for the delivery of subsea structures, in-line tee's, tie-in and connection systems for the Polarled gas pipeline. The contract was signed with Statoil on behalf of the partners in the joint venture for Polarled: Statoil, Petoro, OMV, Shell, TOTAL, RWE Dea, ConocoPhillips, Edison, Maersk Oil and GDF SUEZ.

## MORPH Robots Tested

In July future underwater robots were tested at the European center of Underwater Technologies, located at Ifremer in France. The tests were carried out by research engineers in the scope of a four-year-research-program named MORPH (Marine Robotic System of Self-Organizing, Logically Linked Physical Nodes). Launched in February 2012, MORPH is funded by the European Commission with a budget of $11.3 million. 32 researchers from five countries and nine member organizations participated in the trials: Atlas Elektronik (Germany), Ifremer (France), Jacobs University Bremen (Germany), Ilmenau University of Technology (Germany), Universitat de Girona – Computer Vision and Robotics Research Institute (Spain), IMAR (Institute of Marine Research Portugal), NATO center for Maritime Research and Experimentation (based in La Spezia, Italy).

# ASV Research Contract

## Deal to Design and Build a Long Endurance Marine USV under the UK Government-backed SBRI

Autonomous Surface Vehicles (ASV) won the second phase of the recent SBRI competition to develop a Long Endurance Marine Unmanned Surface Vehicle (LEMUSV). Run by the Natural Environment Research Council (NERC) and the Defense, Science and Technology Laboratories (Dstl) the competition brief sought to develop an autonomous vehicle to gather data from the ocean over several months.

The team includes Cosworth, who are looking at generator systems, Hyperdrive Ltd., who will investigate motor options and power management systems and Cranfield University who will be considering collision avoidance technologies. ASV will undertake the detailed production design, build, commissioning and sea trials of a fully operational, open ocean going "C-Enduro 4" vessel. This second phase work will build on research and development from the phase one of the LEMUSV project. The robust vehicle design will use state-of-the-art technologies from the consortium and be designed specifically capable of being deployed at sea for periods of up to three months in all weather conditions and sea states. The C-Enduro concept centers on a 'three pillar' energy system providing a flexible and fault tolerant solution to energy supply. Having researched and trialed various energy sources as part of the phase one work the team has selected solar panels, a wind generator and a lightweight diesel generator as energy sources. Detailed calculations and tests show that this selection, combined with efficient power management and command and control systems packaged in a rugged self-righting vehicle, provides the greatest likelihood of meeting the performance requirements of this project. ASV will work with the NERC and Dstl teams to ensure that their requirements and ideas are captured and incorporated in the detail design.

www.asvglobal.com

## U. of Kiel Acquires CORMAC Winch

The MacArtney Group delivered 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 use aboard various research vessels, hereunder the R/V Alkor, which is operated by the GEOMAR Helmholtz Center for Ocean Research Kiel.

(Photo: Geomar)

**CORMAC Winch will be used on multiple GEOMAR vessels.**

## ROMAR Wins Contracts

Aberdeenshire-based oilfield service company ROMAR International has been awarded two contracts with a combined six figure value in Southeast Asia with two major oil and gas operators.

This is the first contract win for the company since recently expanding into the region with local representative, STEP Oiltools. ROMAR has employed a further six personnel in recent weeks to support the two operations. ROMAR said its core business activities evolve around its innovative designs using magnetic separation expertise, experience and technologies to provide value-added solutions. The company has developed a range of products and services tailored to suit various demands and applications across the offshore oil and gas markets worldwide. The first project commenced in July. The scope of work includes use of the ROMAR SS1000 Swarf Handling system and Swarf Flowhead for the abandonment of four wells. Following the initial contract, there is capacity for a contract extension for ROMAR to provide contingency cover for a longer term period.


**Robbie Gray, ROMAR's commercial director**

## Triton to Reveal New Submersibles in Monaco

Triton Submarines will debut five new models at the 2013 Monaco Yacht show September 25-28.

Triton will add to its family of yacht-based submersibles with the addition of four-, six- and eight-passenger models as well as a two-passenger model rated for 5,500 ft. (1,675m) and the Triton 36000/3 Full Ocean Depth (rated for 36,000 ft./11,000m). "Triton broke new ground with the Triton 3300/3. The 3300/3's acrylic sphere is the largest and thickest ever produced for a submersible," said Patrick Lahey, President, Triton. "Triton's newest models will once again set the standard for performance and innovation. We are looking forward to introducing our four-, six- and eight-passenger deep submersibles at the 2013 Monaco Yacht Show."

Triton will also feature submersible support vessel (SSV) designs developed in partnership with Bury Design. SSV designs include the unique Triton Launch and Recovery Catamaran (LARC), a highly efficient SSV capable of speeds up to 20 knots with a range of up to 1,000 nm. The 23-m LARC is capable of launching and recovering any of Triton's two- or three-passenger models in a wide range of sea states making it unique in the world.

### Fugro Chance Tackles Project involving

# Noisy Acoustic Metrology

Fugro Chance Inc. provided 3D acoustic metrology on a large 36-inch diameter spool piece, despite environmental and logistical challenges.

The metrology was performed from a platform in Enlace Litoral Tabasco, Gulf of Mexico at a water depth of 25m.

Active lines from the platform created a noisy auditory environment and the shallow water depth provided additional challenges in the long baseline (LBL) acoustic operations.

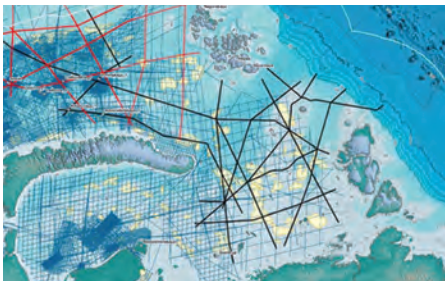
Once measurements were finalized, the spool piece was welded to the existing pipeline and then set back down on the seabed.

With limited tolerance for such a large diameter spool piece to fit into the riser brackets, the delivery of precise measurements was crucial for on-time completion of the project.

This was one of the shallowest 3D acoustic metrology projects Fugro Chance has ever completed and the spool piece was the largest in diameter acoustically measured.

The client had allotted 36 hours for completion but Fugro's fast response time and onsite troubleshooting enabled completion within 23 hours, saving the client time and money.

fugrochance.com



## Survey in Barents, Kara Seas

Petroleum Geo-Services (PGS), within the framework of an international scientific program, has acquired 8,840 line km of 2D data in the Russian Barents Sea and Kara Sea. The 2D survey, conducted in partnership with Geology Without Limits (GWL), began in 2012, using the vessel Akademik Lazarev. This scientific research survey is part of a multi-year, long offset, reflection seismic program. The scope of work included increasing knowledge of the regional geology, tying the sedimentary basins, exploring interesting geological structures and identifying potential well locations in the Barents and Kara Sea area. The scientific research conducted in 2012 showed that the northern part of the Kara Sea usually marked out as the Kara Plate is a promising proliferous region. Even at this early stage of exploration maturity, it is obvious that the area is quite promising relative to other prospects on the Russian Arctic Shelf and there are strong indications of oil dominance in hydrocarbon presence. The Kara Plate has, until recently, remained one of the least explored regions of the Barents-Kara Shelf. Geophysical investigations began during the 1970s and the first offshore drilling started in the early 1980s, in this area which is ice-bound for the majority of the year. The Kara Sea is a complex mosaic of basins and platforms, having undergone intercontinental sedimentation from 240 million years ago to 60 million years ago, after which it bordered the developing Atlantic and Arctic oceans. The first datasets from this scientific research program are now available as of July 2013 and can be obtained by contacting the PGS MultiClient team at:

Email: meinfo@pgs.com

## Offshore Wind Spend

# $20 Billion Per Year

**By Dmitry Dovgan, Douglas-Westwood**

Douglas-Westwood (DW) released the fifth edition of the World Offshore Wind Market publication where it forecast offshore wind installations averaging 3.2 GW per year over the next 10 years. Capital expenditure is expected to hit a peak of $24b in 2016. The market will remain highly concentrated in the Northern European region, particularly in U.K. and German waters. The Chinese market will also grow quickly in the forecast period.

### Energy is Blowing in the (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 including:

- The large, untapped offshore resource allows build at utility-scale with installed capacities of 100s of Megawatts (MWs)
- 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 lifecycle can be split into three main phases, these being the initial phase of capital expenditure (Capex), followed by a lengthy period of expenditure to maintain the offshore wind farm (Opex) and then finally 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 longer, at the end of which the operator may decide to 're-power' or decommission the project.

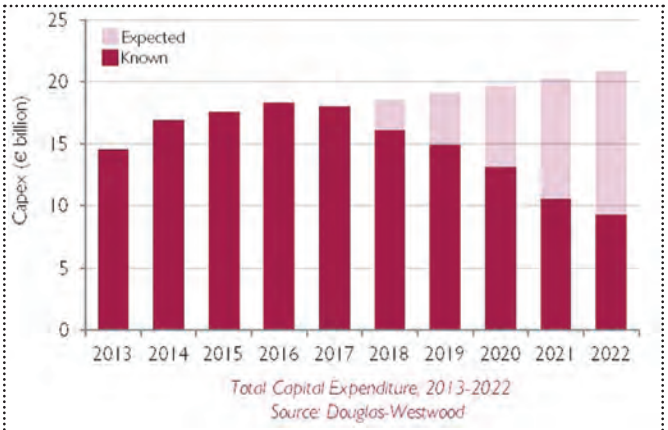
To date, no large-scale offshore wind farms have been decommissioned.

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

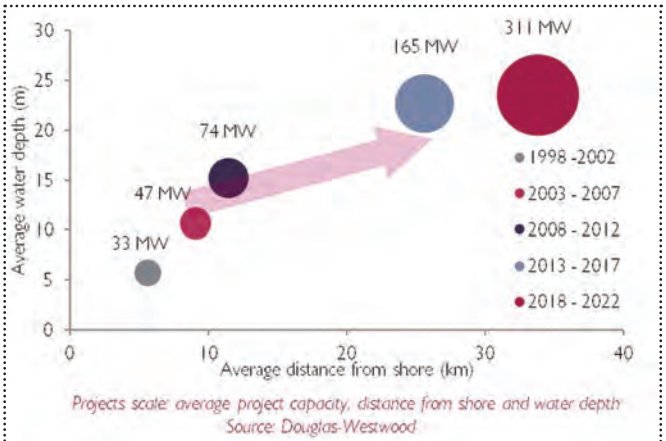
The chart below shows how this trend is set to continue over the next 10 years. For example, the majority of U.K. Round 3 projects are over 30km from the shore and over 1,000 MW in size. In total, the nine designated Round 3 zones represent over 30 Gigawatts (GW) of potential capacity and would require capital expenditure levels of more than $124.8b.

### Offshore Wind Costs

High cost levels are one of the major areas of concern in this emerging industry.




*Total Capital Expenditure, 2013-2022*
*Source: Douglas-Westwood*




*Projects scale: average project capacity, distance from shore and water depth*
*Source: Douglas-Westwood*

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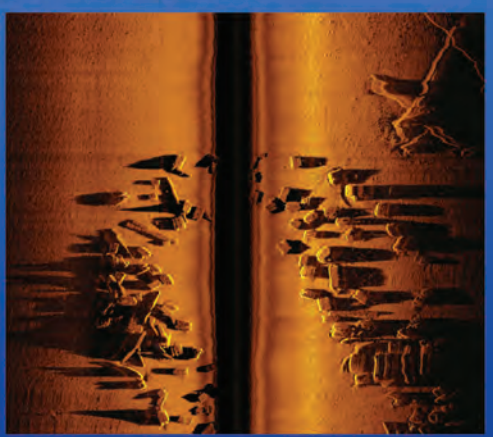

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- Range: up to 10,000 m
- Depth: up to 7,000 m

## PinPoint
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At present, 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 U.K. market due to the ongoing Electricity Market Reform (EMR) process being undertaken by the current government.

Evidence of cost reduction is limited, although an 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 the 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, commercialisation 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 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 90m to more than 150m and the weight of the nacelle (hub unit / generator) will increase from 100 tons to more than 300 tons.

## 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 newbuild 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 7.5MW or more. These vessels include the HGO Innovation and Swire’s sister ships the Pacific Orca and Pacific Osprey. Project developers believe 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 take 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 from those that are already involved in the onshore wind industry to new entrants.

Several highlights from the report are picked out below:

- The market is anticipated to grow steadily from 2013 to 2022, adding on average 3.2 GW each year
- Total cumulative capacity is expected to increase more than five-fold in the next 10 years
- From 2013 to 2022 the U.K., Germany and China will account for 64% of all offshore wind installations
- Assuming that a solution is finalized with regards 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 the database of projects DW forecast that annual Capex levels will exceed $24b by 2016
- 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.

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.

### About the Author

Dmitry 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 & 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 & gas sector. Prior to these Dmitry pursued a management career with a telecom software vendor, leading business analysis and strategy functions. Dmitry studied economics in Russia and Germany, and has an MBA from Aberdeen Business School.



# Eagle Eyes on Mooring

## Welaptega Marine Ltd., Halifax

*From agriculture to aquaculture with a little bit of Mi'kmaq First Nations' folklore thrown in for good measure.*
*It is an intriguing story of a company with innovative ideas adapting technologies and tools to carve out its own niche in a marine sector industry where one million dollars is pocket change.*

**By Tom Peters, Halifax**

# Tony Hall

**Founder & CEO,**
**Welaptega Marine Ltd.**

Welaptega (Mi'kmaq for 'eagle eye') Marine Ltd. headquartered in Halifax, Nova Scotia and with several global operations, has become a world leader in risk-based mooring integrity verification for the offshore oil and gas industry. It develops and commercializes technologies for the inspection of moorings and other underwater assets such as pipelines and wellhead controls.

The agriculture comes in with Tony Hall, the company's founder and CEO. Born in England, he moved to Canada at a young age where his father had a small farm in Nova Scotia. He initially followed that farm path and got an undergraduate degree in agriculture. But he drifted away from the land to the sea and into aquaculture where he earned a Masters degree in Marine Biology from the Memorial University in Newfoundland and Labrador.

In his search to find a career path, he began integrating some of his agriculture background with his work in aquaculture. He started applying agriculture pest management to marine growth on mooring lines and subsea structures with the premise that a lack of regular maintenance on these subsea assets could cause deterioration of the structure by the marine environment which in turn goes to the subject of safety.

In 1991 Hall started Welaptega, "borrowed a few grand" and went to Aberdeen, Scotland, a hot bed of offshore exploration and production, to sell his research.

"I literally went to oil companies pounding on doors," Hall said. On his first trip to Aberdeen, he landed a contract with a British gas company who liked his approach to the issue.

Following his system to measure marine growth on subsea assets, he was asked by companies if he could to measure chains and their integrity when used as mooring lines.

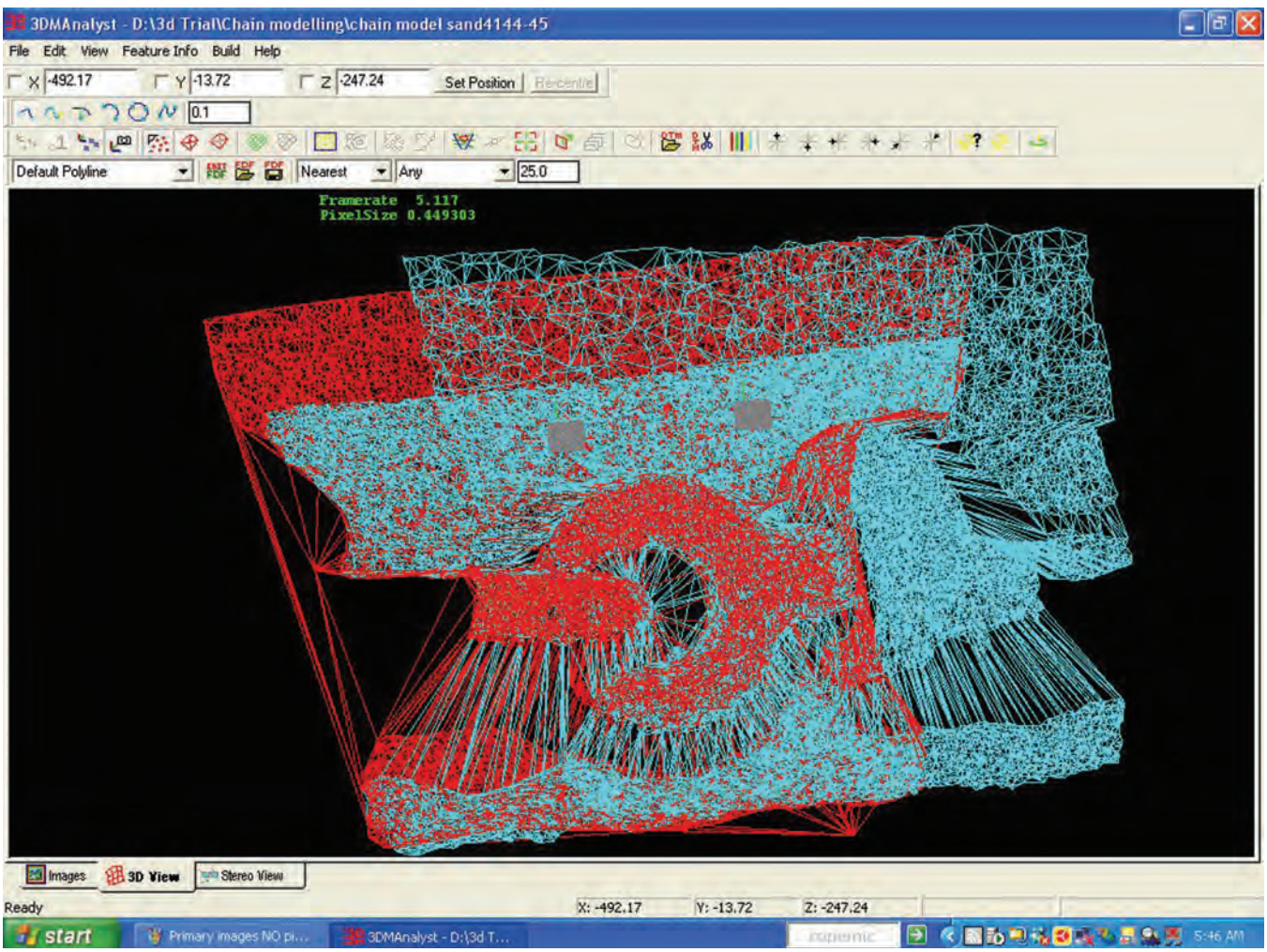
It was a new arena for Welaptega to explore.

In 1996 Hall moved the company to the U.K., to work on new technologies and systems and developed a chain measurement system which could supply data for inspecting moorings on semi-submersibles. That system was followed by the development of yet another for rope moorings involving high resolution cameras to identify potential problems.

Over the years the company has developed a strategy in tackling these inspection projects.

"Our progressive inspection philosophy is a guided examina-

**Wire Frame Chain**



tion of mooring systems that focuses on known problems and failure modes," said Hall. "When anomalies, wear or damage is identified, progressive inspection technologies are used to zero in on the problem and identify its characteristics and operational implications."

Welaptega has developed several innovative schemes to carry out its inspections. It specializes not only in chain and rope measurement systems but underwater asset 3D video and 3D modeling, high definition 3D, risk verification and mooring integrity. Its 3D modeling was significant in the repair and capping of the damaged wellhead at British Petroleum's Deepwater Horizon disaster in the Gulf of Mexico. Welaptega's client list includes such heavyweights as BP, Exxon Mobil, Statoil, Woodside, Transocean, Chevron, Shell, Suncor and Hess.

Over the past several years Welaptega's thorough mooring inspections have saved clients millions of dollars which could have been lost if major drilling installations had to be taken out of service because of maintenace issues. The company has further diversified  to inspections of subsea pipelines and wellhead controls. In a sense, the diversification was out of necessity. Oil and gas production is an up and down business so when commodity prices drop, budgets for mooring inspections often take a hit, said Hall.

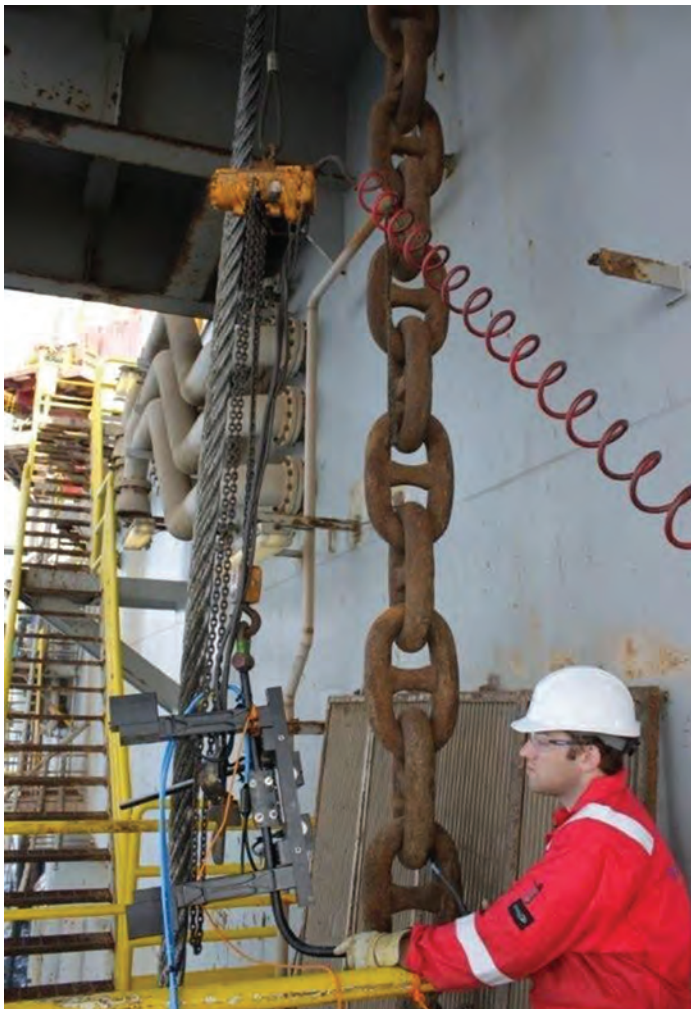
As the technology to inspect moorings has beome more sophisicated, so has the regulatory regime evolved to police mooring maintainance programs, which in turn has demanded more stringent requirements on operators for insurance purposes.

Hall said inspections of moorings, traditionally, have relied on the classification system (Lloyd's for example) which was oringally intended to determine if a vessel was "fit for purpose and what happened was as they moved into ship-shaped floating production, the class system was carried across but not with the same level of scrutiny that tradionally applied to a vessel in drydock," said Hall.

Ships could be drydocked and inspected very closely in detail for sea worthiness but "when it came to mooring systems, they still classed them but the amount of rigor or imperical evidence they had to give it, the class was not the same. They were both considered classed but mooring systems were not being given the same level of look see," Hall said.

In the earlier days of offshore production and exploration,

**Worker with CMS**



**Engineers measure chain.**

these mooring systems weren't old so not really an issue "but now as things get older and losses from things like mooring failures are starting to increase, those losses have accumulated in the insurance industry," said Hall. And, as a response, the insurance industry has moved unilaterally to impose its own standards with a body called the Joint Rig Committee (JRC) comprised mainly of senior offshore engineers and insurance underwriters. This committee gets involved when existing standards aren't sufficient to manage the risk and losses continue to mount.

"They (JRC) stepped in to create a new regime, which has higher expectations of the assured (people insured) to make sure things are in fact fit for purpose and that's what they have now done for moorings," said Hall. This practice has previously been done on other subsea equipment in the offshore industry where losses started to accumulate. In the case of mooring systems, underwriters "generally found any of the class societies were far below what were considered to be best practices for mooring systems because deep water mooring systems are considered to be the highest level of safety critical systems."

The developments within the insurance industry and its efforts to minimize its risk with mooring systems bodes well for Hall and Welaptega.

Hall said for operators to get insured, they will have to show the underwriters that they have a handle on the condition of their systems and "when you have an underwater system the first thing you need to do is go down and inspect it and get the appropriate level of detail."

Welaptega can do that and employs what it calls progressive inspections.

"We go down and have a look around and use high resolution cameras to see if there is anything at first glance that appears not to be right. We also do a risk-based analysis of the actual system and identify which components are most likely to suffer deterioration. There are also detailed inspections to better characterize problems," said Hall

The Welaptega CEO said operators are not forced to carry out these more detailed inspections, but if they don't it will become increasingly difficult to find the "same kind of priced insurance or even find insurance because the underwriters will make it essentially an endorsement on the policy."

To add further sophistication and depth to the data produced for clients through its inspections, Welaptega has formed an alliance with highly respected BPP-TECH of London.

"We are primarily a technology company, and they are more of a naval engineering company," said Hall. Headquartered in London with offices in Aberdeen, Newcastle, Houston and Singapore, BPP-TECH "will take the information we collect from our inspection program and com-

bine it with other engineering data like enviromental stuff, design and design codes and from that comes a series of opinions. We are generating three opinions and basically engineering opionions. That is the expectation of the insurance market and also the operating companies," Hall said.

The opinions will consider the current condition of the mooring system and what can be expected over the next three to five years. With the condition of the mooring system, how does that align with class requirements, whether they are adequate or not and also how does that align with regulatory regimes in the country or region of operation. Finally, how well aligned is an operator with increasing expectations from the insurance industry.

That industry has produced a program called "floating unit mooring assesment (FUMA)," an endorsement that the industry is starting to insert into insurance policies.

"Their expection is as new technologies come along they will be continually added and always continually improving the quality of that fitness for purpose assessement," Hall said.

But even as Welaptega's future looks even more promising with the demand for more stringent inspections and an alliance with BPP-TECH, there will continue to be challenges and access to money will always be one of those challenges.

"It is a tight capital market out there, and it is hard to raise money for small and medium sized enterprizes," said Hall. "And if you are suddenly going through growth then capacity becomes an issue. You need more equipment, you need more people, you need a greater ability to execute more work and that obviously requires financing. Traditionally, technology companies have a problem because they don't really have a lot of hard assets to use as a basis for finance and the money tends to be expensive and hard to come by, so it is always a challenge," Hall concluded.

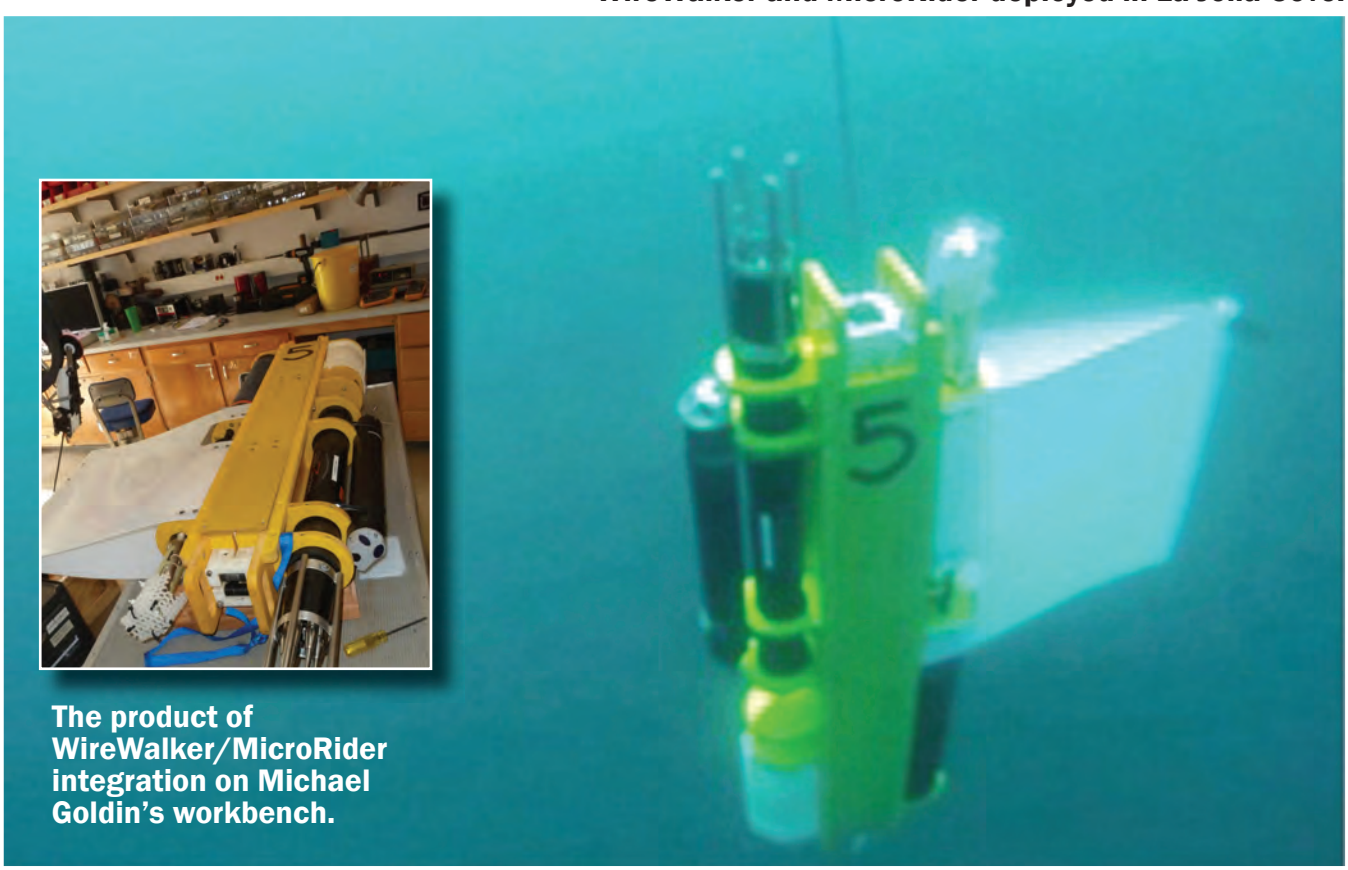
# Turbulence Microstructure Measurements from a Wave Powered Profiler

*By*
*Andrew J. Lucas, Ph.D., Rob Pinkel, Ph.D., Michael Goldin, Rolf G. Lueck, Ph.D. & Jeremy Hancyk*

The Wirewalker (WW) profiling vehicle developed by the Ocean Physics Group at Scripps Institution of Oceanography provides a platform for observing oceanographic phenomena that vary rapidly in depth and time. The smooth, "free rising" mode of operation of the WW makes it a suitable platform for the measurement of small-scale turbulence. A collaborative attempt between SIO and Rockland Scientific Inc. (RSI) to gather estimates of microstructure and the dissipation of turbulent kinetic energy was carried out in the summer of 2012 using a WW and an RSI MicroRider turbulence payload package. The WW platform provided a unique opportunity for RSI to test the performance of the MR over fast and repetitious autonomous profiles in a single location, observing the time evolution of turbulence features in the water column.

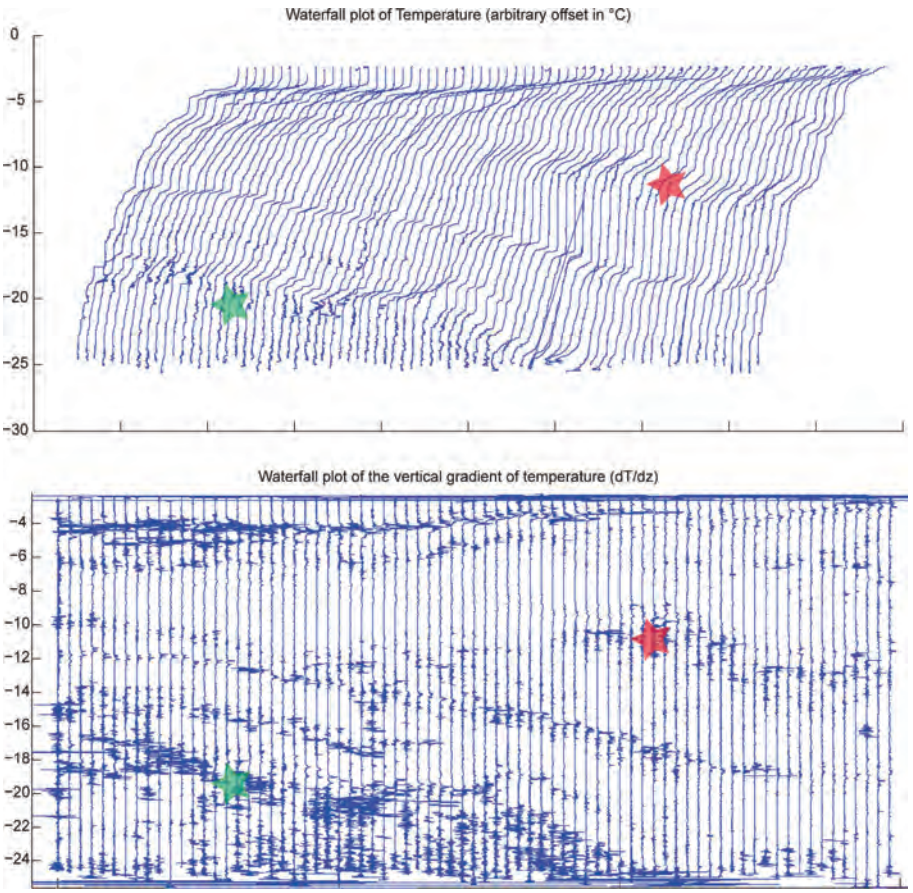
The Wirewalker system consists of positively buoyant vehicle that is driven along a wire by surface waves. The wire is used to suspend a 10kg subsurface weight from a surface float (typically 0.5m diameter). The float-wire-subsurface weight assembly moves vertically with surface waves, while a cam mechanism inside the vehicle rectifies that two-way motion into one direction motion (downwards). Once the bottom stop is encountered, the cam mechanism is mechanically disengaged, and the positively buoyant vehicle rises to the surface, completely decoupled from the wire. In this way, high quality oceanographic data can be collected on each upcast.

**WireWalker and MicroRider deployed in La Jolla Cove.**





**The product of WireWalker/MicroRider integration on Michael Goldin's workbench.**




**Waterfall plots of 75 consecutive temperature microstructure profiles measured by a WW-mounted Rockland Scientific MR turbulence profiler over the course of four hours. Strain (red stars) and shear (green stars) driven turbulence is evident in the elevated variance of the vertical gradient of temperature in the pycnocline and bottom boundary layer, respectively.**

As the WW is a completely mechanical design, it has proven to be a robust, reliable profiler. Compared to buoyancy-controlled floats and gliders, which have limited payload capacity, the WW only requires rough ballasting and can rapidly accommodate large and complex payloads. Equally capable in drifting and moored modes, WWs have been deployed extensively in the Eastern Pacific, Equatorial, Indian and South Atlantic Oceans, carrying CTDs, oxygen sensors, fluorometers and current meters. For example, an array of three WW units array was deployed for 60 days in 50 m depth off the South African coast where the array collected over 100,000 profiles. This is equivalent to over 6,000 km travelled of profile data. Given a low to moderate sea state, a WW will complete a round trip to 50 m in approximately six minutes, with vertical resolution <5 cm, given appropriately fast sampling sensors.

**The MicroRider Instrument**

The MicroRider (MR) instrument is a modular, self-contained turbulence profiler designed to integrate with a variety of instrument platforms. It has been successfully deployment on AUVs, ocean gliders and profiling floats. The MR carries two velocity shear probes, two fast-response thermistors, a pressure sensor, tilt sensor and acceleration sensors. The data from the sensors are internally recorded within the instrument that are then downloaded through a serial connection.

**WireWalker/MicroRider Integration**

The MicroRider and Nortek 2 MHz Aquadopp current meter were mounted on one of the WW rails, with the microstructure sensors roughly 20cm above the WW's leading edge. A Seabird 49 FastCat CTD, Turner Designs Cyclops 7 chlorophyll-a fluorometer, and a data logger were mounted on the opposite rail. A fin was also rail-mounted in order to align the microstructure sensors into the ambient flow. The combination of rail-mounted vane and rail mount location ensured the microstructure sensors were sampling water undisturbed by the WW wake.

The MR draws ~1W of power during operation, which was supplied by the data acquisition system on the WW. MR data were recorded internally; the WW data logger recorded from all other sensors.

**Experimental Methodology**

The MR-WW integrated system was tested over two deployments in 30 m of water in La Jolla Cove, CA. Each deployment was 3.5 days in duration. Round trip of each profile from the surface to 25 m depth was approximately 3.5 minutes, which provided over 1,500 upcast profiles over each deployment (total: 3,102 profiles over seven days).

Each upcast resulted in <5 cm vertical resolution through-


WWW.WHOI.EDU

out the water column of horizontal and vertical currents, density, chlorophyll distribution, and <1 cm vertical resolution in microstructure temperature and turbulence.

**Results**

The MR-WW system proved effective at measuring temperature microstructure and estimating the dissipation of turbulent kinetic energy. The study area is subject to strong internal wave forcing. With the MR-WW pair, we were able to observe regions of enhanced mixing in the bottom boundary layer, at the base of the thermocline where current shear was at a maximum and in regions undergoing internal wave induced strain (Fig. 3). These data demonstrate the utility of the MR-WW pair to observe the evolution of mixing and turbulent features in a temporally and spatial resolved sense.

As we move forward with MR-WW collaboration, we will use the platform to study the dynamics of mixing in systems where dissipative processes are unsteady in space and time, and the detailed distribution of mixing, the dissipation of turbulent kinetic energy and fluxes of momentum and buoyancy are required.

**Acknowledgements**

RSI provided the MicroRider instrument and technical support. A WW platform, Sea-bird CTD, Turner Designs Fluorometer, and Nortek current meter and at-sea operations were provided by the SIO Ocean Physics Group.

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# Development & Deployment of Brazil's First Buoy System

*By Rick Cole, Leonardo Barreira & Edmo Campos*

In sequel to our editorial in the March 2013 edition of MTR on activities related to the Research Moored Array for African-Asian-Australian Monsoon and Prediction Program (RAMA, Indian Ocean), we now update on new research underway in the Atlantic with Brazil's climate monitoring work on the Prediction and Research Moored Array in the Tropical Atlantic (PIRATA, Fig. 1, a cooperative research program between the U.S., Brazil and France) and other ocean sciences being conducted in the South Atlantic Convergence Zone (SACZ) of the western Atlantic Ocean. In collaboration; the Institute of Oceanography, University of Sao Paulo, Brazil (IOUSP), AMBIDADOS, Rio de Janeiro (consultants in oceanographic instrumentation applications and data analysis) and RDSEA International, St. Pete Beach, FL, successfully deploy Brazil's first internally integrated buoy and mooring system; ATLAS-B.

The SACZ is an important component of the ocean-atmosphere interaction over a large portion of South America. For proper monitoring of this region, the southwest quadrant of PIRATA (also known as the PIRATA-Southwest Extension, PIRATA-SWE), four surface buoy locations were chosen with three systems deployed to the north in the tropical region of the SACZ, and the forth, ATLAS-B was deployed recently in April of this year (2013) at 28.5ºS and 44ºW.

In March 2004, the occurrence of an unusually strong extratropical storm over the subtropical South Atlantic, with characteristics of a Saffir-Simpson class-1 hurricane (the Catarina) near 28ºS reinforced the necessity of having a monitoring platform anchored in this region. Catarina made its landfall along the southern coast of Brazil, on the March 28. Maximum sustained winds were estimated between 75-80m/hr, with gusts up to 96m/hr. The storm left at least three people dead and 38 injured. More than 2,000 were rendered homeless. This was the first documented hurricane in the South Atlantic Ocean since the beginning of geostationary satellite recording.

Brazilian climate is significantly influenced by air-sea interactions in the tropics and in the subtropical regions of the South Atlantic. These interactions have been extensively studied and monitored for more than a decade by researchers on the PIRATA Program. The majority of this research has been conducted to the north of the SACZ, a region of high precipitation, which impacts a large portion of terrestrial Brazilian territory. Priority on PIRATA is making in-situ, high resolution time series measurements of surface heat flux, sea surface temperature (SST) and salinity and subsurface temperature and salinity in the upper 500m of the water column. Using a network of "Autonomous Temperature Line Acquisition System" (ATLAS) buoy systems, initially designed by NOAA's Pacific Marine Environmental Laboratory (PMEL, Seattle, WA), in the early 1980s, surface meteorological parameters; wind speed and direction, air temperature, humidity, rainfall and solar radiation are also measured at each location. Current velocity time series have also been added to the PIRATA data set via moored acoustic Doppler current profilers (ADCP, at strategic locations) as well as the many shipboard profiles collected from oceanographic research cruises conducted in the Atlantic region. Each ATLAS buoy system is serviced annually with systems calibration of all sensors completed post cruise and made ready for redeployment.

Data from the array are posted on the Global Telecommunications Network (GTS) by Service Argos (the main source of buoy telemetry) and Brazilian satellite transmissions for real-time distribution to operational centers and modeling communities. Model validation is critical. PIRATA data were instrumental in monitoring the record high SST of the tropical North Atlantic in 2005 which contributed to the unusual hurricane season that year, the most active and destructive on record.

**ATLAS-B**

The ATLAS system continues to evolve today with various upgraded technology and design changes incorporated into the global network. To enhance the PIRATA array in its capability of providing data for weather and climate forecasting, and to better understand the variability of the SACZ region, efforts began in 2009 to develop, build and deploy a new prototype buoy system internally, in Brazil. The first system, ATLAS-B, nicknamed "Guariroba" (an endangered palm tree native to central-western Brazil, birthplace of Prof. Edmo Campos, ATLAS-B project Principal Investigator) was assembled using a retired ATLAS buoy provided by PMEL to the IOUSP, a now standard buoy system in the Global Tropical Moored Buoy Array of TAO, RAMA and PIRATA. The buoy consists of a 2.3m fiberglass/foam core toroid with a three-point aluminum tower and stainless steel bridle. Off-the-shelf electronic components and instruments for ATLAS-B were chosen to closely mirror data already being transmitted from PIRATA.

Surface meteorology on ATLAS-B is measured with a Vaisala WXT520 weather station: air temperature, relative humidity, barometric pressure, precipitation, wind speed and direction mounted on a mast at 4m above sea level. Radiation is measured using an Eppley radiometer and pyranometer for short and long wave sampling at 3.5m. SST and conductivity (salinity) are handled via a bridle mounted Sea-Bird Electronics SBE-37 MicroCat directly connected to the controller. Sub-surface temperature and conductivity are measured at: 20, 40, 60, 80, 100, 120, 140, 180, 300 and 500m. Redundant pressure is included at 300m and 500m. Data acquisition rate varies and is stored in memory. All in-water data are transmitted to the buoy controller by the process of "induction" using Sea-Bird Inductive Modem Modules (IMM, a master SIM board in the buoy controller and one IMM internally integrated into each SBE-37).

**Figure 1 The PIRATA Monitoring Array, Tropical Atlantic Ocean**

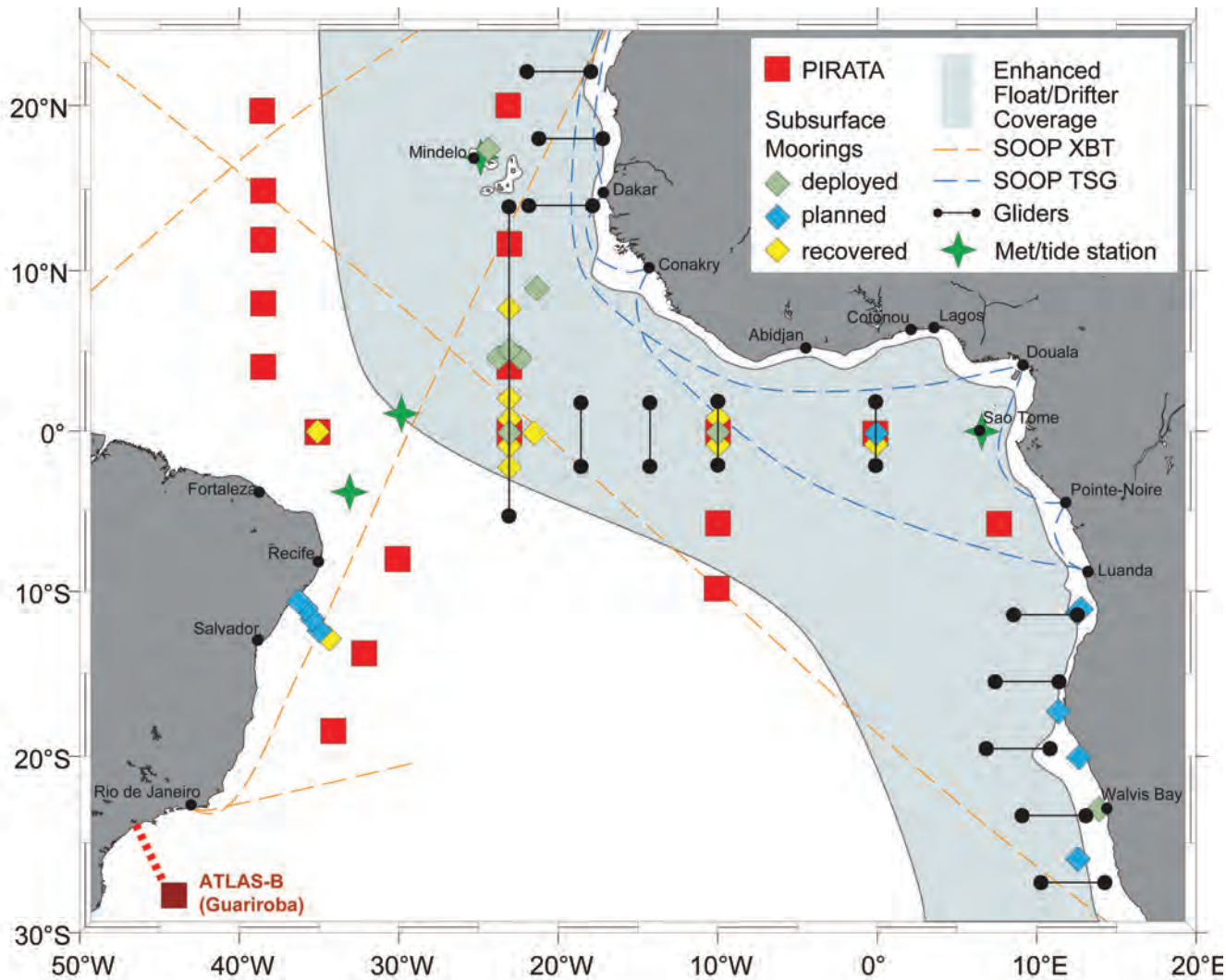
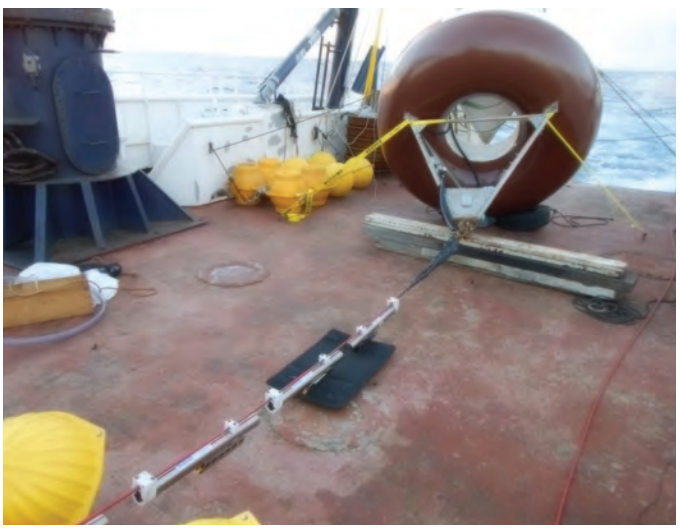
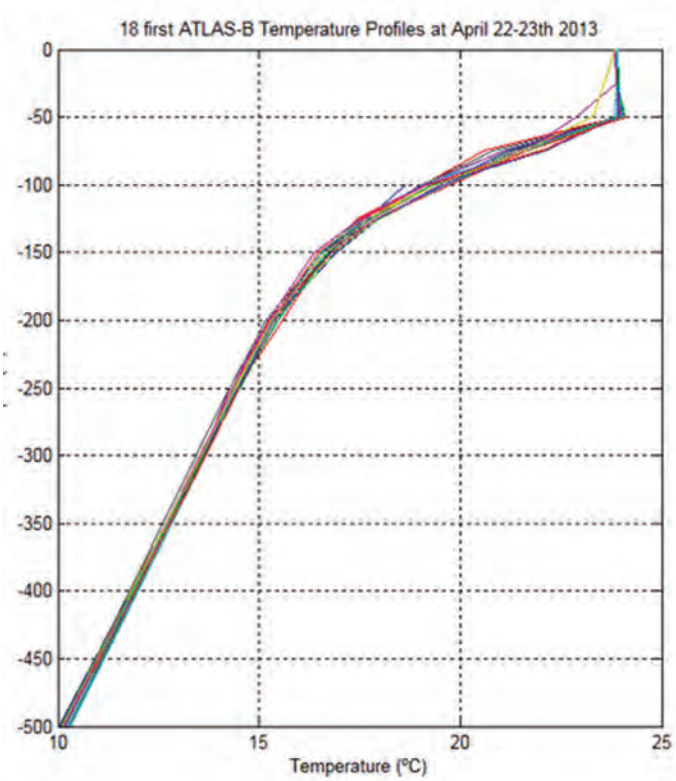


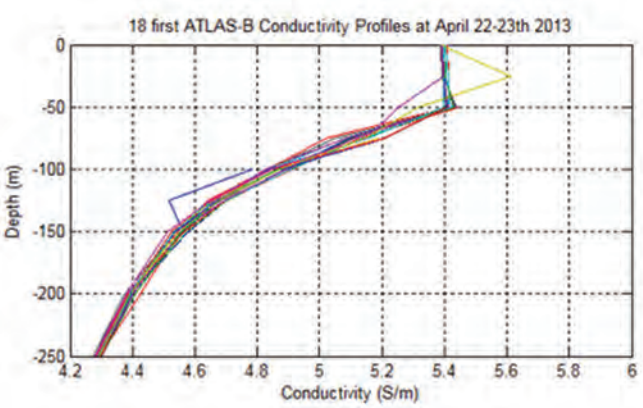
**Figure 2** (left) Systems Integration and IMM Data Check at AMBIDADOS, Rio de Janerio

**Figure 3** ATLAS-B IMM Dry Test, Pre-Deployment On Deck of RV Alpha Crucis with IMM Jumper installed






**Figures 4 and 5** Post Deployment, At Sea Data Check, Temperature and Conductivity



The mooring cable is used as the transmission medium, eliminating the need to cable connect each sensor. The IMM transmits sensor data to the surface by applying a signal to the internal winding of an "inductive cable coupler" (ICC). This induces a signal in the single-turn secondary winding formed by the mooring cable passing through the ICC. The SIM at the surface receives the signal from each sensor using configured system ID numbers (01 -10). The buoy controller and all systems integration were completed by AMBIDADOS in Rio. The data logger is a Campbell Scientific CR1000 with daily data telemetry undertaken by an onboard INMARSAT transmitter, a Skywave IsatData Pro with and integrated GPS system for buoy positioning and watch circle monitoring. A second, positioning device (GlobalStar Tracker) is also installed on the tower shelf for back-up buoy position monitoring should the Skywave system go down. The complete system is powered by an onboard battery pack that supplies the necessary power for a 12-month deployment.

The mooring chosen for the ATLAS-B application is a semi-taut design where the length of the mooring is slightly longer than the site depth (scope of: 1.05). Not quite taut (0.985) and not slack. This approach allows more forgiveness in nylon elongation (stretch) while keeping the in-water sensors at or close to the desired measurement location within the water column. 700m of 3/8" jacketed wire rope (3x19), a standard in ATLAS and other mooring applications and a necessary component for the induction process, is used in the upper mooring. The wire rope also helps protect against shark and fish bite in the surface region of the mooring. At the buoy to mooring bridge (mooring connection point) an "inductive jumper" (J. Kinder, J. Cappellini) is used for the transfer of all sub-surface data to the buoy controller. This allows for the ICC to be buoy mounted on the bridle vs. mounting on the mooring, a more robust option for a long-term deployment. The upper swedge fitting is tapped for the bare end of the jumper cable to be inserted and secured with a series of hex-screws and epoxy then the entire termination is made water proof using rubber, tape and a two-part epoxy coating. The buoy end of the jumper is bolted to the bridle transferring the salt water ground from the mooring to the buoy. From 700m down to the acoustic releases, mounted just above the anchor is 18mm diameter nylon fiber rope married together with shackles and sling links in 500m sections. Glass ball flotation is distributed throughout the mooring to keep tension on the system and is used as backup flotation for system recovery should the buoy break away from the mooring. A shot of 20mm nylon is used between the acoustic releases and railroad wheel anchor along with a short section of chain.

**Deployment**

Once all systems components were built and tested in Rio, ATLAS-B was sent to the small sea-side village of Ubatuba, Sao Paulo, about a four-hour drive south of Rio de Janeiro. IOSUP has a satellite campus here with a small research vessel available to faculty and students for offshore projects. ATLAS-B was moored a short distance from the pier for a "wet-test" prior to the trip offshore to the Atlantic. Research Vessel Alpha Crucis (formerly RV Moana Wave of the Univ. of Hawaii now owned and operated by the IOUSP) arrived at Ubatuba to load the buoy, systems components and the science team. On April 22, after a short few days transit, ATLAS-B was deployed at position 28º 30'S / 44º 00'W at a depth of 3,700m with 100% data transmission. Times series of daily data are being received and processed and are publically available at ftp://ftp.io.usp.br/labmon/ATLAS-B. Quality control and analysis are conducted to transfer the data onto the GTS network. Buoy data are compared to the National Center for Environmental Prediction (NCEP) Reanalysis data set (data that incorporates in-situ measurements with numerical models and is continuously updated representing the Earth's atmosphere). All data compares well with exception of some normal aches and pains of a prototype buoy system design and a first deployment.

**Conclusion**

The development of a Brazilian alternative for the ATLAS buoy and mooring system can be considered a great success. This was the first time a complete design, assembly and deployment of such a deep water monitoring platform was carried out exclusively in Brazil. The present site will be maintained as a pilot project for a few years and once the ATLAS-B design proves itself capable and scientifically valuable it will be transformed into a sustained observing component of the Brazilian climate research program. A second ATLAS-B system is being constructed now, to be built entirely in Brazil, including the buoy. This system will replace the prototype upon recovery in early 2014.

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**Further pictorial and video of the ATLAS-B cruise can be seen at: www.rdsea.com**

### The Ship

### The Work


### The Buoy


## The Team

**Chief Scientist for the ATLAS-B cruise was Carlos Franca along with IOUSP RV Alpha Crucis crew and the AMBIDADOS/RDSEA team: Marcelo Toffoli, Leonardo Kuniyoshi, Marcelo Perantoni, Rick Cole and invited researcher Leonardo Barreira (Co-Author), from the IEAPM.**

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# Sailing for Science

## Survey and research fleet seeks knowledge of world's oceans, but requires recapitalization

**By Edward Lundquist**

A new report by the National Ocean Council, the Federal Oceanographic Fleet Status Report, notes the challenges faced by operators of the United States fleet of survey and research ships.

"These 47 ships are part of our Nation's critical infrastructure, collecting vital information to help protect lives and property from marine hazards; measure and project global climate change and ocean acidification; enhance safety and security and more." Retired Navy Capt. Edward Lundquist talked to several key stakeholders in the Federal Oceanographic Fleet to get a sense of where the fleet is today, and what the future holds. His report summarizes his conversations with the National Science Foundation (NSF); Office of Naval Research (ONR); National Oceanic and Atmospheric Administration (NOAA); and University of California-San Diego's Scripps Institution of Oceanography (SIO).

### NSF: Operating Costs Rise, Budgets Fall

The report is an update of a similar 2007 report that summarizes the status of the federal oceanographic fleet and identifies deficiencies and priorities.

"We're continuing to evaluate the federal oceanographic fleet and the requirements of our ships to support future science needs in the context of budget constraints," said Bob Houtman, section head for the Integrative Programs Section (IPS) in the Division of Ocean Sciences within NSF's Geosciences directorate.

Houtman said the federal agencies are continuing their efforts to modernize the fleet, while at the same time retire older, less capable ships. "As budgets are decreasing, not all ships are being utilized at the same rate. The owners have had to carefully evaluate if it is cost effective to keep every one of those ships in the fleet."

Two of the oldest global ships, ONR-owned Melville and Knorr, are being retired and replaced with new ocean-class ships in CY14-15. The NSF-funded arctic research vessel Sikuliaq will replace the R/V Alpha Helix that was retired at the end of 2006.

The two biggest cost drivers, fuel and manpower, account for two thirds of the operating costs. According to NSF's Rose Dufour, program director for the Ship Operations Program, one third of the cost is for fuel alone, and another third is for crew and shore support. "It's increasing ahead of inflation and exacerbating our level-funding situation."

Newer ships, Houtman said, are technologically more capable and are more efficient. "The cost to get a ship to sea is not going down. Operating costs for the fleet are going up faster than our budgets."

Houtman said an interagency working group continues to look very carefully at how the federal agencies can share the ships that are in the fleet. "If a funded science research cruise is going to be in a geographic location, scientists can put in additional science proposals to take advantage of the fact that ship is already going to be in that location, permitting more science to be accomplished for a relatively small incremental cost."

But ships optimized for survey work are different than ships designed for research. And global class ships can travel to more distant areas and remain at sea longer than the smaller ships, although they have higher operating costs.

"Not all ships are equally capable," Houtman said.

Research ships do a lot of work on station and have a large working deck aft with the ability to launch and recover vehicles and sensors in the water over the side. Survey ships are designed to travel back and forth collecting data over large areas of ocean with installed shipboard equipment while underway.

Sending a small ship a long distance may cost more money in the long run due to the transit costs than using a large ship that might already be in the area.


## The FLIP Side

**55 ft. remain visible after the crew of the Floating Instrument Platform (FLIP) partially flood the ballast tanks causing the vessel to turn stern first into the ocean. The 355-ft. research vessel is owned by the Office of Naval Research and is operated by the Marine Physical Laboratory at Scripps Institution of Oceanography at University of California.**

(U.S. Navy photo by John F. Williams/Released)

Dufour said some ships are specialized for a capability or an operating environment. "Not all ships have the ability to go anywhere," she said.

In some areas, it may be more cost-effective to deploy unmanned vehicles from the shore instead of from a research ship underway. Buoyancy gliders can travel long distances and use very little power, but are slower, so they take a longer time to get where they are going or to cover an area of interest, and they are limited in the sensor payload they can carry Many underwater vehicles are battery powered, and so have limited endurance.

"They don't necessarily have the longevity for long-duration missions, and you have to place them very specifically where you want them working, so it takes a ship."

Dufour said many specialized instruments, like ocean bottom seismographs, need ships for deployment and recovery and cannot be done autonomously. Some deep submergence vehicles, like Alvin, are deployed from a mother ship. If there's a mission for Alvin, you have to use R/V Atlantis," she said. Jason and other ROVs can be operated from many of the ships in the Federal Oceanographic Fleet but require special winches and control vans (or labs).

Houtman said NSF is developing new mooring arrays as part of the Ocean Observatories Initiative that will have satellite links and the ability for Autonomous Underwater Vehicles (AUVs) to dock with the array without surfacing to recharge, exchange data and receive instructions.

There's been a significant investment in new technology, Houtman said, particularly with unmanned, off board systems such as buoyancy gliders, unmanned aerial systems and autonomous underwater vehicles. "With advances in handling equipment, vehicles, sensors and connectivity, new off board systems will enable us to increase the quality and quantity of data collected."

The new generation of research ships will incorporate the latest in dynamic positioning, satellite communications and a "telepresence" capability that allows scientists and students who can't get to sea to participate from ashore.

Telepresence, enabled by vehicles with video and data connections, are still "ship centric."

"We're looking for efficiencies," said Houtman. "We want to line up multiple cruises in a specific geographic area that make sense in terms of cost-effective operations."

"We really feel we have a bright future for the Federal

**The U.S. Coast Guard cutter USCGC Healy (WAGB 20) is designed to support scientific research in the Arctic Ocean.** U.S. Navy photo by Aerographers Mate 1st Class Gene Swope

**"ONR is very much in the business of autonomy, so unmanned autonomous systems are a major focus for us. We see that these systems extend the reach and capability of the ships, not replace them. One augments the other. Not all of these unmanned systems can be launched from land, and need to be taken by a ship to where they will operate. And there's real value in getting scientists together on a ship to collaborate and learn from each other."**

**Frank Herr, Head of the Office of Naval Research (ONR) Ocean Battlespace Sensing Department**

Oceanographic Fleet," Houtman said.

The National Science Foundation's Ocean Sciences Division Integrative Programs Section (IPS) supports the operation and acquisition of major shared-use oceanographic facilities needed to carry out oceanographic-related research programs. This includes funding operations and technical services support for numerous facilities such as the Academic Research Fleet, the National Deep Submergence Facility, the National Ocean Science AMS Facility, the Monterey Accelerated Research System Cable Test-bed Facility and the Aloha Cabled Observatory. IPS also funds the development of new ocean research technology through the Ocean Technology and Interdisciplinary Coordination (OTIC) Program and is responsible for managing the acquisition of new ships such as the R/V Sikuliaq and the new Ocean Observatories Initiative multi-scale ocean observatory system.

### ONR: Many Times, a Ship Works Best

The Office of Naval Research (ONR) operates six oceanographic research ships, primarily for use by the academic community said Frank Herr, head of the Office of Naval Research (ONR) Ocean Battlespace Sensing Department. "These are marine scientific research ships rather than military survey vessels. We're very careful to distinguish between the two categories."

ONR's ships are operated by Scripps , WHOI, University of Washington and the University of Hawaii.

"These ships are worldwide assets," Herr said. "They may be away for two years at a time. The two new ships being

**"We all have a goal of creating a fleet that we can operate under today's budget and the constraints that go with that. When we looked out 10 years into the future, we could see that we need a balanced approach that leverages resources, partnerships and new technologies. We also need to ensure the fleet is properly capitalized to meet the nation's scientific requirements."**

**Rear Adm. Mike Devany is the director of NOAA's Commissioned Officer Corps and the NOAA Office of Marine and Aviation Operations.**

built will replace the two oldest."

The Navy, NSF, NOAA and the academic institutions have created the University-National Oceanographic Laboratory System (UNOLS) consortium, established in 1972, to coordinate scheduling and share best practices.

"We recover the cost of ship operations with a day rate which is adjusted every year. The ship operators work very hard to keep their costs down so they will attract customers. The more efficient they are, the lower the day rate. The ships are very competitive in their operations," said Herr.

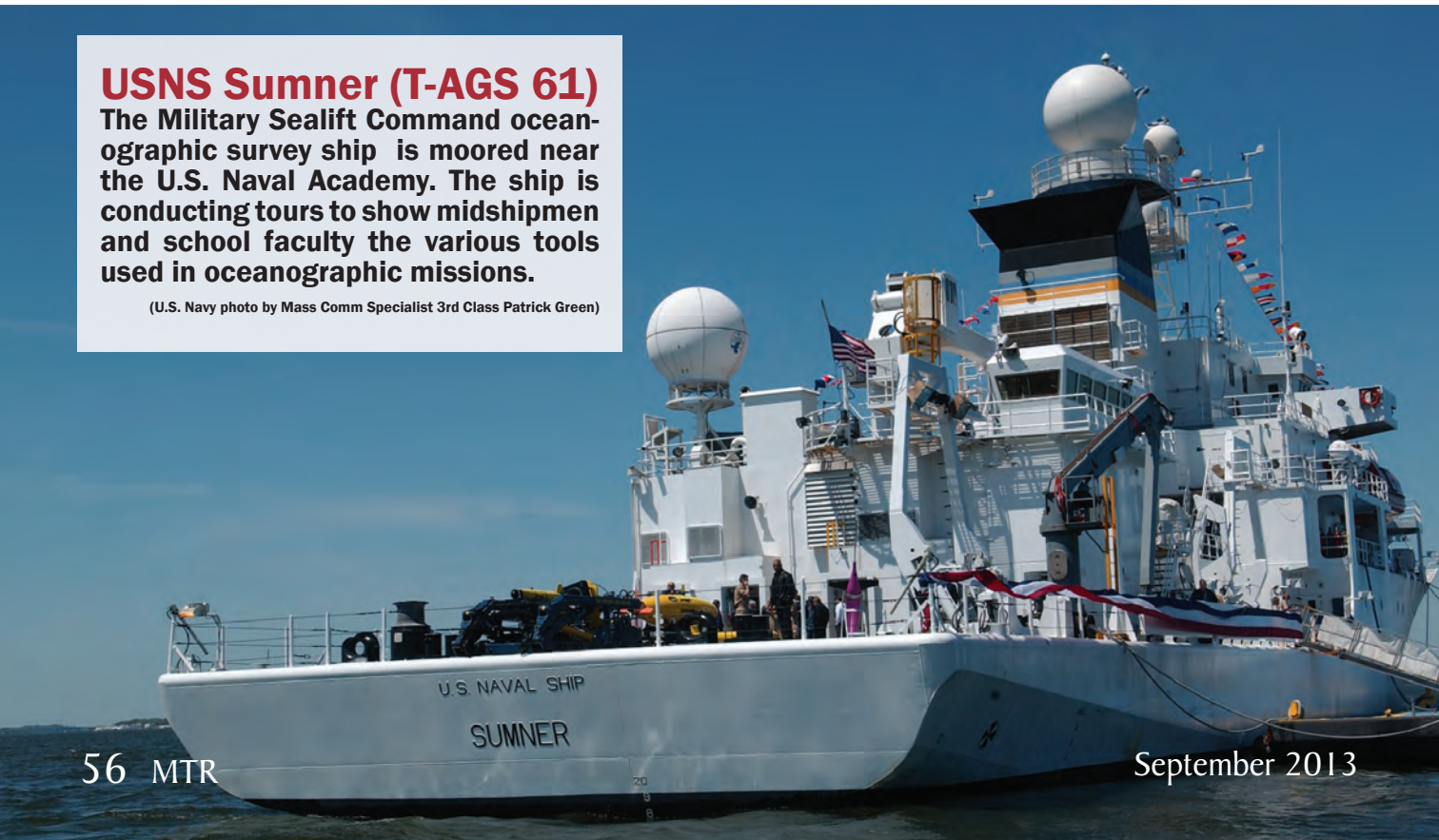
That said, some ships have special capabilities or are optimized for specific areas. "Ships that operate in the Atlantic will probably stay in the Atlantic, and the same with the Pacific. We try to minimize transit costs," Herr said.

ONR's Oceanographic Facilities Program Manager Tim Schnoor said ONR is part of a Federal Interagency Working Group on facilities and infrastructure and includes Navy, NSF, NOAA and agencies that do not have their own ships, such as the U.S. Geological Survey and Bureau of Ocean Energy management. "We work closely together and meet frequently."

"We not only coordinate our activities, but we have had multi-ship projects that have involved ONR, NSF and NOAA vessels at the same time. During the response to the Deepwater Horizon incident in the Gulf of Mexico, we were all involved.

"UNOLS scheduling ensures a balance and optimized employment of the U.S. academic research fleet, arranging research cruises on the various ships based on required ship capabilities and locations in the world to support research objectives," said Schnoor. "It helps minimize non-productive transit days."

Much of the at-sea research is planned well in advance, but some opportunities come up without notice. After the Deepwater Horizon disaster in the Gulf of Mexico, a number of UNOLS research vessels were brought in to study the impact of oil dispersal in the water column. "We saw new sonar technologies being used to learn about gas seeps. We've been able




**USNS Sumner (T-AGS 61)**

**The Military Sealift Command oceanographic survey ship is moored near the U.S. Naval Academy. The ship is conducting tours to show midshipmen and school faculty the various tools used in oceanographic missions.**

(U.S. Navy photo by Mass Comm Specialist 3rd Class Patrick Green)

to study earthquakes off Japan, Haiti and South America, and deploy ocean-bottom seismometers to compare data and understand what the various tectonic plates are doing," said Schnoor.

Some ships are highly specialized, Schnoor adds. "The R/V Marcus Langseth, for example, owned by NSF and operated by the Lamont-Doherty Earth Observatory (LDEO) of Columbia University, is outfitted for seismic research work."

There are also vessels owned by states and institutions. For example, the University of Delaware owns the 146-foot region research ship R/V Hugh R. Sharp; and the University of Miami owns the 96-foot F. G. Walton Smith. Both are part of the UNOLS fleet.

Herr said there are some drawbacks to using large research platforms. "Ships are expensive to operate, and they can't go everywhere. We're in the business of getting information about environment from as many means as possible. Our needs are large, so we rely on a variety of methodologies. Ships are one, along with satellites and remote sensing systems. 30 years ago people thought that remote sensing would replace ships. We've found that for many missions a ship is the best alternative."

Herr said unmanned systems, including unmanned aerial systems, unmanned surface vehicles and unmanned underwater vehicles have been very useful and their numbers are growing. "ONR is very much in the business of autonomy, so unmanned autonomous systems are a major focus for us. We see that these systems extend the reach and capability of the ships, not replace them. One augments the other. Not all of these unmanned systems can be launched from land and need to be taken by a ship to where they will operate. And there's real value in getting scientists together on a ship to collaborate and learn from each other."

In addition to the ships, the research community has the deep submergence Alvin, owned by ONR and operated by WHOI. There are also extremely capable deep diving systems like Jason and Hercules, and completely unmanned, untethered high-endurance sea gliders. "We're using Scan Eagle UAVs off the R/V Knorr as part of the Trident Warrior exercises to study the physics of the marine boundary layer, to develop better environmental forecasts for warfighters. There's only so much you can know about your environment using a weather balloon or dropping an expendable bathythermograph over the side. Our research can help create better operational models to predict sensor and weapon performance," said Herr.

"Some of the more recent research conducted from ships of the federal oceanographic fleet have surprised oceanographers with how little they knew about the

currents and air sea interaction around the Philippines. There are large 'internal waves,' underwater currents and mezoscale eddies being formed in the Luzon Strait. Other research in the Indian Ocean, conducted in collaboration with India and Sri Lanka, has also yielded astonishing results. We're taking ships into the Bay of Bengal and finding out that there is an astonishing amount of fresh water being dumped into the Indian Ocean during monsoons. And as we study typhoons, we're finding that there are three times as many typhoons as hurricanes in the Atlantic, and they're bigger. We can study the effect of typhoons I and their 'storm wake' to see how the storms bring up colder water that extracts heat from the upper ocean. It takes time for the ocean to relax back to the previous current conditions," said Herr.

ONR owns Alvin, and its support ship Atlantis. Both are operated by WHOI.

There is the potential to discover a new life form every time Alvin dives. "If it's investigating hot smokers along the ocean ridges it might discover new microbial life forms. There's always something new to find in deepest part of the oceans," Schnoor said.

"Ships are still an indispensable element of tool kit," said Herr. "I expect that will persist for the foreseeable future. We need to be on the ocean, to put our instruments where the problems and questions are."

Scripps operates the ONR-owned Floating Instrument Platform, or FLIP, which can be towed to a location and anchored or allowed drift. "It's fairly large, but still a smaller footprint than a ship when vertical," said Herr. "It's a very stable, noise-free platform for instruments."

**NOAA: A Balanced Approach**

Rear Adm. Mike Devany is the director of National Oceanic and Atmospheric Administration (NOAA's) Commissioned Officer Corps and the NOAA Office of Marine and Aviation Operations. In his position he co-chairs an interagency working group on facilities and infrastructure. "The National Ocean Policy directed us to get a baseline of where we've been, where we are, and where we need to go with the Federal Oceanographic Fleet. We all face budget issues, so we have to be realistic, but we set out to show what it costs to operate and maintain the vessels. We looked at what it costs to operate, maintain and sustain the fleet—both for the government operated survey ships and the university operated research ships. Fuel is the big cost driver. **Fuel was $0.84 a gallon when I was in command in 2004, and today it's almost $4.00 a gallon—so, a pretty dramatic increase."**

Devany said the other big cost driver is the hiring, training and retaining of qualified crew. "Here at NOAA, we are able to do that and compete successfully, because we have a blended work force of wage mariners—which are the same as CivMar for the Military Sealift Command; civilian technicians such as electronics technicians and survey specialists; and then the NOAA corps which generally does the overall operation and the running of the platforms in the command for them."

"Once we started putting together the report, we noticed that things were changing rapidly because this was the year of sequestration, and last year was the real point where declining budgets started to show up," Devany said. "We could see that it was important to optimize the fleet. In our case, we've taken several ships either offline—either decommissioned them or placed them in a warm layup status—until we could make a decision on what we wanted to do with them down the road."

NSF and the Navy have done the same with the university operated ships, he said. "We all have a goal of creating a fleet that we can operate under today's budget and the constraints that go with that. When we looked out 10 years into the future, we could see that we need a balanced approach that leverages resources, partnerships and new technologies. We also need to ensure the fleet is properly capitalized to meet the nation's scientific requirements."

Devany said the report is divided between survey and research ships. "The UNOLS community operates generally for academic research. In order to keep them at a higher utilization rate, they take on some of the survey responsibilities for other agencies, including NOAA. The ships that I operate for NOAA and the different communities that we support are gathering data for environmental, mapping, weather, oceanographic or fisheries. And we wanted to make sure that we could match the requirements to the fleet. This is a nationwide enterprise. And if you want to leverage your cost, you need some commonality, the ability to share assets or resources and a way to get to a platform that's going to be less expensive to use because it might already be working in the area we're interested in. Transiting eats up fuel and people time."

The Navy also operates survey ships. "There are some exceptions, but generally NOAA is responsible for the survey work in domestic waters, and the DoD ships operated by the Navy work in international waters," Devany said.

According to Devany, the NOAA ships are specialized platforms. "We categorize them into natural resources versus commerce, which would be the hydrographic ships, equipped and crewed to conduct nautical charting or surveys. We also have FSVs (fishery survey vessels) that are configured to be acoustically quiet. They assess fish stocks, monitor marine mammals and do some bathymetric mapping, which is different from charting in terms of being able to go out and survey the bottom and know what's down there so they could do some habitat mapping for fisheries for resources. "

Hydrographic ships have an advanced multi-beam system for ship-mounted charting, as well as two-four launches for working at the bays and inlets. A ship like the Thomas Jefferson, for instance, assisted with post-Sandy recovery in New York Harbor. The ship deployed its launches, to see where all the wreckage was and determine what needed to be cleared,

while the ship went and steamed its track lines with a multibeam to determine what was there In the main part of the channel. So it's a combination of equipment and the specialists on board to collect and process that data, then turn that into the information necessary for the Coast Guard to reopen the port.

Devany said partnerships are important. "We work together through the International Research Ship Operators, IRSO. We have an annual meeting and we come together to talk about best practices, where we're at, what have we learned from ship design. A good example would be the relative merits of modernizing a 20- or 30-year-old hull versus recapitalizing? Are your maintenance costs going to become so high that it makes more sense to get rid of that vessel and either replace it or find another way to do business? The European community has a barter system, where they are able to trade time among platforms. They have the same issues as we do when it comes to the cost of fuel and people. So, if you have, for example, a Dutch ship operating somewhere and there are four buoys that I need to pick up near where they are, and they have five buoys to be picked up near where I am, then we can work out a trade.

That collaboration includes the NATO Center for Maritime Research and Experimentation in La Spezia, Italy, which operated two research vessels. "We've discussed having their Global-class ship, the Alliance, do some work for us in the Atlantic, and perhaps we can support them in some way," Devany said. "We'll share our project plans and see if there is some commonality there. We're talking with NATO about commonalities that we have in mission areas or data sets that we both need. In the end, most of this data is flowing across all the nations; and it's information that everybody needs, especially if you start talking about climate and what's going to happen with either an ice-diminished Arctic, fisheries or transportation."

Devany said operating and maintaining the NOAA fleet is a challenge. "You're always looking at the budget numbers and trying to match the budget with mission. But we've been sustaining very well. We have to manage within what we have. In terms of ship operations, the shoreside is more heavily civilian-dependent. We run our engineering and ship repair with a port engineer, and the work is all contracted out. We don't have our own shipyards and we don't have our own repair guys. Training is very similar. We contract out most of our training. For most of our training for the CivMars, we send them to MITAGS (the Maritime Institute of Technology and Graduate Studies), MEBA (Marine Engineers' Beneficial Association) or we send them to SIU (Seafarers International Union). They all have great schools and provide a standardized set of training.

Devany said the proudest moments for the NOAA fleet have been in the response to natural disasters and events like Deepwater Horizon and Hurricane Irene. "We had to get ships to where they were needed quickly and ready to go to work. During Irene, we had to get the Chesapeake Bay opened back up again. After Superstorm Sandy, we had to get in there and clear that harbor and get it open so that people and commerce, can go back and forth. We flew damage assessments on the King Air. People were able to look at the imagery from that flight up on the website and were instantly able to go in and see if their house was still there, or what damage was done to their neighborhood or a relative's community. I think that's where we've been able to step in and make a difference when the nation needed us."

"I think we're responsive, flexible, and adaptable," Devany said. "That's what I ask my folks to be, and I think they ably step up to the charge."

### Scripps Institution of Oceanography

The White House Federal Oceanographic Fleet Status Report more of a status report than a strategic plan or an analysis with conclusions. It looks at all of the federally funded research vessels, including special mission hydrographic survey or fisheries research ship, such as those operated by NOAA or the Navy. "Scripps operates four ships; more than anyone else in the academic research fleet," said Bruce Appelgate, associate director for ship operations and marine technical support with Scripps Institution of Oceanography at the University of California San Diego. "We are able to share these facilities with institutions and scientists all over the U.S. and the world."

"We're seeing a trend over the past five years, with fewer and fewer days at sea on our ships," said Appelgate. "This isn't because there's decline in demand or need for these facilities. The demand for ship time has remained consistently strong, both in terms of the number of scientists who need to go to sea, and in the number of days they request to conduct their work."

According to Appelgate, the reduction in underway time is driven by costs, which have gone up steadily over the past ten years. Why?

"The reduction in ship usage has been driven by reduced funding, not reduced demand. Global Class research vessels have experienced annual cost increases over the past 10 years of about six percent. For comparable commercial vessels, that number is about seven percent. At the same time our most significant sponsor of oceanographic research, the National Science Foundation, has only been able to fund increases of about three percent per year. When ship time is available, there's tremendous demand – for our own institutionally-supported ship time we recently received four times more requests than we could support. NSF gets more than three times as many requests as they can now support."

In the face of budget constraints, Scripps makes every effort to attract and retain career mariners. "We're very motivated to improve quality of life issues for our mariners. That's why they stay with us. We do fascinating work involving unique skills and ports of call, and our mariners like the kind of work we get to do. The quality of our mariners, and the dedication they have to conducting important scientific research, is of tremendous value to the scientists and funding agencies who

**AGOR**

**An artist's rendering of the Armstrong-class auxiliary general oceanographic research vessel (AGOR). The ships will join the U.S. Academic research fleet.**

**(U.S. Navy Photo)**

**"This funding crisis couldn't come at a worse time …**

## It's not a stretch to say that the fate of humanity depends of the oceans.

**The acidification of the oceans that is occurring now due to the presences of high atmospheric CO2 caused by the burning of fossil fuels, will change the web of life in the oceans. Understanding the processes taking place out there is vitally important to society."**

**Bruce Appelgate, associate director for ship operations and marine technical support, Scripps Institution of Oceanography at the University of California San Diego**

utilize our ships."

"This funding crisis couldn't come at a worse time. It's not a stretch to say that the fate of humanity depends of the oceans," said Appelgate. "Most of the oxygen we breathe comes from the oceans. The acidification of the oceans that is occurring now due to the presences of high atmospheric CO2 caused by the burning of fossil fuels will change the web of life in the oceans. Understanding the processes taking place out there is vitally important to society, because they will affect you even if you live in Kansas."

The population curves continue to rise, and the numbers of people are increasing especially in the coastal areas, where people depend on the oceans for food, resources and habitat. Much of our ability to do the right thing and understand these big global issues depends on how well we understand oceans. The best – often the only – way we can accomplish this understanding is through ship-based research. We need the oceanographic fleet to be as active as scientists require them to be."

"When people think about oceanography, they think about the water, fish, and marine mammals. But seagoing research cuts across every scientific discipline. Geoscientist use ships to study deep earth structure, earthquakes and volcanoes. Seafloor seismicity is related to tsunami risks to our coastlines. Climate and weather are influenced by deep ocean circulation and surface currents. Atmospheric chemistry is influenced by interactions at the air/sea interface. Marine plants and animals provide oxygen, food, and perhaps contain important compounds that will yield important new antibiotics and other drugs. To study these, you need ships."

Appelgate said the academic research fleet is a remarkable asset for the nation and science. "I've worked on lots of different vessels. The organizations that maintain these ships and the mariners that sail them take remarkable care of these vessels. As an example, the two oldest ships in the fleet, the R/V Melville and R/V Knorr, are both over 40 years old—43 and 42 respectively—yet both are well maintained and have modern equipment. "But," Appelgate admits, "They are getting old. Both are in great shape. But with ships this age, whenever you get them into dry dock and dig into them you find things that need to be replaced."

In fact, the entire fleet is aging. However, efforts now underway will revitalize segments of the research fleet. Scripps and Woods Hole Oceanographic Institution (WHOI) have been selected by the Navy to operate the two newest ships in the research fleet, the Ocean-class Sally Ride and Neil Armstrong. The NSF recently launched Sikuliaq to be operated by University of Alaska in the Arctic and around Alaska. And plans are now being considered for midlife refits to the three largest research vessels in the fleet (Thomas Thompson, Roger Revelle, and Atlantis) that could extend the useful service lives of these vessels 15 years beyond their current design at significant overall savings. "Our three Global Class research vessels are uniquely capable in the fleet, with seakeeping and scientific capabilities that enable scientific missions impossible on smaller vessels. With no existing plans to construct new Globals, and a cost of at least $250 million per ship in today's dollars, it's vitally important to the community that we invest now to extend the useful lives of these ships."

Scripps provides the technical support for the ice breaking research ship USCGC Healy in the Arctic on a five-year contract. "The Arctic provides a tremendous research opportunity," Appelgate said. "I expect a growing demand across a lot of marine sectors in the Arctic. With more open water during the year, more ships can get up there where they couldn't operate before, and this includes research vessels that will be able to work in ice-free parts of the Arctic Ocean. "

Appelgate said the U.S. research fleet is manned by highly competent career scientific mariners.

Appelgate said the University of California funds research opportunities for its students, through the innovative UC Ship Funds Program. "We fund it. The students dream up novel scientific research at sea and submit proposals that are competitively judged. If selected, the students execute the research, under the mentorship of experienced seagoing scientists. Each program is different, and all have been outstanding. We're seeing a crossroads between old school technology—ships—and ongoing innovation used by early career scientists to create ways of studying the ocean and broadcasting the results to a wide audience, which greatly amplifies what we are able to learn and say about our oceans and planet."

# UNOLS Research Vessel Fleet

The University-National Oceanographic Laboratory System (UNOLS) is a group of academic institutions and National Laboratories organized in the United States to coordinate research vessel use for federally funded ocean research.

| OPERATING INSTITUTION | SHIP | OWNER | LENGTH (ft) |
|---|---|---|---|
| **GLOBAL** | | | |
| Scripps Institution of Oceanography | MELVILLE | Navy | 279 |
| Woods Hole Oceanographic Institution | KNORR | Navy | 279 |
| University of Washington | THOMAS G. THOMPSON | Navy | 274 |
| Scripps Institution of Oceanography | ROGER REVELLE | Navy | 274 |
| Woods Hole Oceanographic Institution | ATLANTIS | Navy | 274 |
| Lamont-Doherty Earth Observatory | MARCUS LANGSETH | NSF | 235 |
| **OCEAN/INTERMEDIATE** | | | |
| University of Hawaii | KILO MOANA | Navy | 186 |
| Oregon State University | OCEANUS | NSF | 177 |
| University of Rhode Island | ENDEAVOR | NSF | 185 |
| Scripps Institution of Oceanography | NEW HORIZON | SIO | 170 |
| Bermuda Institute for Ocean Sciences | ATLANTIC EXPLORER | BBSR | 168 |
| **REGIONAL** | | | |
| University of Delaware | HUGH R. SHARP | UD | 146 |
| Moss Landing Marine Laboratories | POINT SUR | NSF | 135 |
| **COASTAL/LOCAL** | | | |
| Scripps Institution of Oceanography | ROBERT GORDON SPROUL | SIO | 125 |
| Louisiana Universities Marine Consortium | PELICAN | LUMCON | 116 |
| University of Miami | F.G WALTON SMITH | UM | 96 |
| University System of Georgia | SAVANNAH | UG | 92 |
| University of Minnesota - Duluth | BLUE HERON | UMD | 86 |
| University of Washington | CLIFFORD A. BARNES | NSF | 66 |
| **NOAA GLOBAL CLASS VESSEL** | | | |
| NOAA* | RONALD H. BROWN* | NOAA | 274 |
| **USCG ICEBREAKERS** | | | |
| USCG | USCGC HEALY | USCG | 420 |
| USCG | USCGC POLAR STAR | USCG | 399 |
| USCG | USCGC POLAR SEA | USCG | 399 |

*The Research Vessel Ronald H. Brown is operated by NOAA, but is scheduled in cooperation with UNOLS.

# SMD Improves 2013 Work Class ROV Range

**By Mark Collins, ROV Business Stream Manager**

SMD has been a leading manufacturer of subsea robotic systems since the 1980s. In 2003 SMD started manufacturing Work Class ROVs, a business that has grown steadily.

SMD's ROV division operates from a modern facility named "i19" in Newcastle Upon Tyne, UK. ROV sales, project managers, engineers and technicians are all located within the facility and the company has the ability to manufacture up to 48 Work Class ROV systems per year. SMD also has offices in Houston, Singapore and Macau. SMD introduced the original Q-Series range of Work Class ROVs in 2005. The range consisted of three vehicles - Quantum construction class, Quasar general purpose class and Quasar Compact lightweight work class. Through market trends and customer feedback, SMD undertook its first range refresh in 2009. The refresh retained three vehicle models - to give customers choice and flexibility when building fleets - and updates focused on key attributes SMD felt were of absolute importance to clients;

- Dependability – Robust construction, stable control system and careful selection of sub components.
- Performance – The ability to operate in high currents while remaining composed and offering precise control.
- Flexibility – The ability to configure for any operation. Defined free spaces within the vehicles for tool fitment, powerful tooling hydraulics, broad choice of customer interfaces.
- Ease of use – Intuitive control software. Inclusion of automatic pilot aids. Good access for maintenance.
- Value – Use of off shelf components, low through life costs

By 2012 SMD had delivered more than 94 Work Class ROV systems. Four years had passed since the last refresh so SMD deemed it time to revisit the product range again and the decision was made to develop the next generation Quantum, Quasar and Atom (Quasar Compact replacement) for 2013 release.

## New for 2013

SMD's new 2013 range of Work Class vehicles builds on the original key attributes. All aspects of each system were reviewed and updated **with one of the main changes being the introduction of the DVECSII/S control system.** First deployed on the i-Tech only SMD manufactured QX Ultra ROV, the SCADA/PLC based DVECSII system offers advancements in configurability, diagnostics and graphical user feedback. Proven industrial PLC technology is employed to maximize reliability.

Pilot aids through dynamic position technology were available on previous generation SMD WROV systems but were limited to relative positioning through seafloor lock technology. The new ROVs have the option of a more advanced dynamic positioning system - relative and absolute - co-developed by SMD and Seebyte.

Advanced flight modes such as auto-position, navigation map trail, cruise-control, advanced waypoint tracking, chart overlay, auto fly follow and survey are all included with the latest DVECSII/S system. Seafloor lock, mid water positioning and sonar lock and auto follow are available when relevant transducers are fitted to the vehicle. DVECSII/S also sees the introduction of the multiplatform CORE pod which forms the control hub on the new Quantum, Quasar and Atom vehicles. SMD's distributed control architecture remains ,but the field maintainable and compact CORE pod offers increased instrument connectivity permitting operators to fit and control the latest HDTV cameras, and high bandwidth sonars, for example

Improvements have also been made to the mechanical and hydraulic aspects of the new vehicles. Vehicle construction of previous incarnations employed aluminum alloy section bolted in triangulated configurations to aid stiffness. SMD wanted to lighten, stiffen and free up more space for tooling and access to components on the new range.

The 2013 ROV models employ space frame construction that moves away from internal bolted sections. This has resulted in robust, stiff yet light vehicle frames that still retain bolted extremities for damaged section replacement. For the customer, this translates to better collision resilience, improved stability for manipulator work and more space within the frame.

SMD design and manufacture all its Work Class hydraulic componentry under the well-known brand name Curvetech. Many of the Curvetech components fitted to this latest vehicle range have been updated and improved. Quantum is now fitted with a new Curvetech HTE 430mm thruster.

The thruster uses a unique mono strut design to minimize water flow disruption. Lighter and more compact hydraulic power units (HPU) have been developed for the Quasar and Atom and a new range of smaller, lighter and feature-packed Intelligent Hydraulic Control Units (iHCU), are available for customers to configure their ideal system. Atom is available in 60hp and 100hp guise, Quasar 125hp and 150hp and Quantum 200hp and 250hp. The first new Atoms, Quasars and Quantums entered service at the beginning of 2013.

The 2013 range share a new topside control console design. Using client feedback and adhering to the latest IMCA and NORSOK standards the layout offers an ergonomic environment with space for a surveyor and observers. SMD offers a choice of screen and control desk configuration. The standard control setup can be either 20ft cabin or vessel room installed.

# Future ROV Designers

## to be found at the Center 2013 International Underwater ROV Competition

### By Kathleen Gleaves

"Away" calls out the deck crew feeding the tether line as the ROV slips silently below the surface. The pilot grips a joystick and deftly maneuvers the craft downward toward its target, intently following its progress on a pair of eight-inch monitors. The copilot, in charge of the working appendages begins the delicate task of opening an underwater hatch. As an observer, it's hard to comprehend that the UR2 ROV crew you are watching is made up of sixth-graders, the youngest team at this year's International Underwater ROV Competition. Their teamwork and intensity belies their tender years.

This is the 12th year the Marine Advanced Technology Education (MATE) Center at Monterey Peninsula College has held the competition. Their goal in doing so is to increase awareness of marine technical fields and careers. Their efforts connect students and educators with employers and working professionals. The ROV competition is a big event, but it is not all they do. Their workshops provide educators with resources and training to bring the world of marine technology, research, exploration and industry to their classrooms. MATE is funded by the National Science Foundation.

For the students, it's all about the ROV Competition. Fifty-five teams

(Photo: Kathleen Gleaves)

**Deck crew for the Jesuit High School Robotics Team from Carmichael, California, launching "Leviathan," eventually taking first place in the competition.**

from around the world designed and built their vessels, raised the money, surmounted international travel hurdles and made their way to the Weyerhaeuser King County Aquatics Center in Federal Way, Washington, a suburb south of Seattle and the site of this year's culminating event hosted by the University of Washington.

Each year the MATE Center staff designs a mission, or theme, for the competition. The missions and the resulting task lists are carefully chosen to replicate real life challenges in the ROV world and many times are based on actual events. In 2011, thanks to the Deep Water Horizon disaster, the mission revolved around the skills needed to respond to an oil spill. This year the mission focused on building an ROV capable of repairing and maintaining ocean observing stations along the Washington Coast.

Vessels had to submerge, pick up an instrument, bring it to the surface and install a replacement. Other tasks included unlocking latches, opening a hatch door, placing a large object into a barely larger space, then closing and relocking the hatch. Extra points were gained for removing simulated sea life fouling the exterior of the station. Teams were allotted 15 minutes to accomplish their five tasks with points given for each completed task. Further complicating their efforts and to simulate real-world conditions, the pilots do not have direct line-of-sight to their vessels, they must observe the operation on monitors with the vessel's own onboard cameras providing the feed.

A cadre of scuba divers stood by to retrieve wayward vessels – there were a few. The Ranger Class vessels deployed in the shallow end of the Olympic-size pool, while the more experienced competitors in the Explorer Class faced the added challenge of navigating in the deep water of the diving pool.

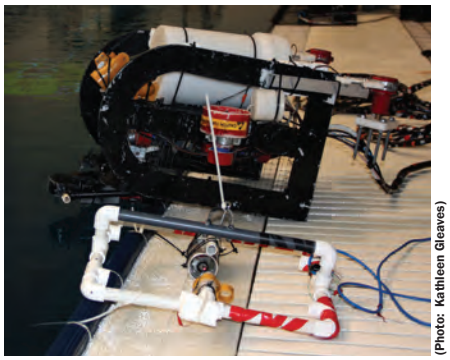
Competing at the International event is the culmination of many months of proving their vessels in regional com-

petitions before qualifying for the International event. This year the 50-plus teams ranged in age from the sixth-graders of Thunder Bay, Michigan, to undergraduate students from Purdue University. Competitors arrived from Taiwan, Saudi Arabia, Russia, Singapore, Egypt, U.K., Macao, Venezuela, China and Hong Kong with plenty of U.S. and Canadian teams as well. Representing home schools, colleges, universities, public and private schools, even 4-H clubs.

The SeaTech Robotics 4-H club from Mount Vernon, Washington has attended the MATE competition every year since 2007. Club leadership includes three engineers and one orthopedic surgeon with a background in biomechanics. Club organizer Lee McNeil, an engineer with Boeing who personally spends 30-40 hours a month helping the students, said "All of us have a desire to introduce these kids to opportunities that will greatly improve their futures. These experiences give them a glimpse into what they could do if they are willing to finish school and work really hard." Local businesses donate services to the team for water-jetting, machining and manufacturing, but all the work is done using CAD models created by the students themselves.

McNeil said, "Students can put in between 200-500 hours." One of his teams logged over 100 hours of pool time just practicing for the mission. It paid off. The SeaTech Explorer team earned the highest Mission score in this year's event and placed third overall.

Frugal teams with little or no sponsorship proudly reuse components from prior years' vessels spending as little as a few hundred dollars. Large, established teams with big sponsors may invest over $10,000, although much of that is in donated services. Most teams' financial investment ranged somewhere in the $700-$800 price range according to MATE staff. The staff bestowed this year's "Bang for the Buck" award to the Explorer Team from Linn-Benton Community College and the Ranger Team from Columbia Virtual Academy. The award is given to the team who spent



(Photo: Kathleen Gleaves)

**Damage sustained at a security checkpoint hampered the performance of the Egyptian team. Red electrical tape held parts of their ROV together long enough to complete their mission assignment.**

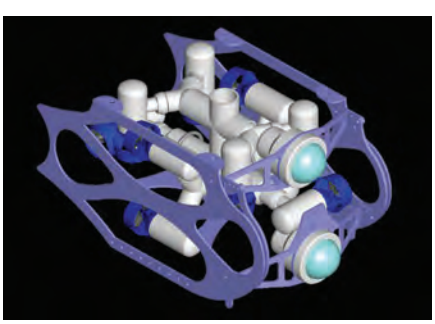
the least amount of money on a vessel that performed well. Each team finances their project through fundraising events, corporate sponsorships, grants or parents' checkbooks.

The Long Beach Community College team wasn't satisfied with their 125 Mission points on day one. They opted to try again on day two in hopes of bettering their score. Their sleek, impressive machine named "The Dude" sat confidently at the pool's edge, lights blinking a standby message. But despite repeated attempts their software refused to boot-up and The Dude remained deckside. The team was pragmatic about the glitch, said copilot Michael Marin, "It happens in real life, and it happens here."

For Marin and teammate Tara Willis, the event is about more than competing for glory and a ribbon; it's about finding a job in the work they love. Based on her contacts at the 2012 event, Willis scored an internship aboard the E/V Nautilus, Robert Ballard's exploration ship, last summer. Her knowledge, enthusiasm and willingness to work hard earned her a return trip to the Nautilus, this time with a paying job "playing with real ROVs," she said with a huge grin.

Finding and nurturing the interests, skills and knowledge of future mariners is why Oceaneering, a premier ROV company, is a prime sponsor of the event. The company realized several years ago that the industry was rapidly outgrowing the available trained workforce. MATE offered the perfect connection between the industry, the educational system and future ROV pilots, not to mention maintenance techs, designers and builders. Oceaneering and several other maritime companies staff booths at the event and actively recruit talented students into their ranks. Students connect with companies offering internships and future jobs in all facets of the industry. The sponsor list reads like the phone book of marine technology companies.

As MATE's spokesperson, Caroline Brown explained, an ROV pilot's lifestyle isn't something adults generally come to in the middle of their careers. Shipboard life entails many weeks at sea away from home and family. If you start your career embracing the lifestyle, it's much easier to build a life and family around the schedule than the other way around. Capturing kids' imagination, giving them the chance to play with "toys" they'd only dreamed of and then showing them how they can make a career of playing with those toys is one way the industry is able to fill their staffing needs. Not everyone interested in ROVs longs for a career at sea; fortunately the industry needs shoreside specialists as well as the seagoing staff.



**SeaTech 4-H students designed their ROV in CAD with the help of their Boeing engineer mentors. Students invest hundreds of hours perfecting designs and operating techniques.**

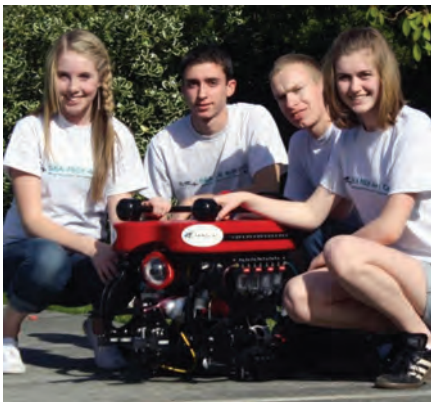


Photo courtesy of SeaTech 4-H

**SeaTech 4-H club members proudly display their finished vehicle. Students must design, build and operate their ROV themselves and prove to judges they understand the process through a series of presentations and interviews.**

To meet that need, and to encourage a holistic view of the ROV world, MATE expanded its program to include more than just piloting underwater robots. In addition, teams must also develop a business structure complete with a CEO, engineering staff, finance and marketing divisions. A few years ago the MATE staff decided that having the teams develop a business enterprise around their vessel would draw in students from outside the normal science and engineering tracks. The teams now include students with an interest in math for their finance officers, those with an entrepreneurial spirit for business development, even graphic designers to develop marketing materials.

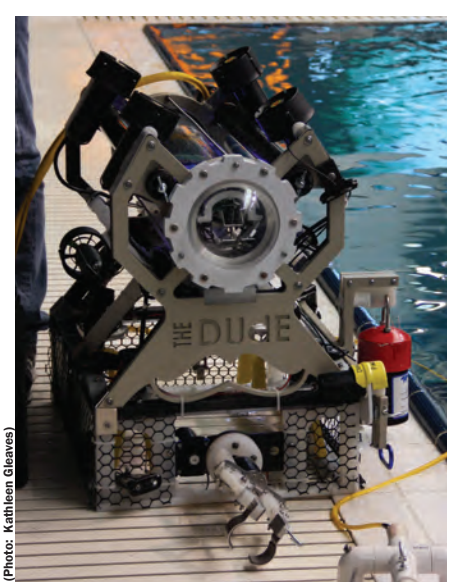
There is no limit to the number of club members; however, the poolside operating team is limited to six students on deck. That didn't keep the 30-plus cheering supporters in matching t-shirts from Jesuit High School in Carmichael, CA, from making their enthusiastic support known from the viewing stands. The Jesuit HS team took home top honors in the Explorer Class as well as the coveted Safety Award.

The Arab Academy for Science and Technology and Maritime Transport

(AASTMT) sent two teams of Egyptian college students, one from Cairo and one from Alexandria. Both teams were stopped by security staff at the airport in Scotland. Their ROVs, dubbed suspicious devices, were inspected, disassembled and ultimately broken during their four-hour delay before being returned to the students with a "sorry for the inconvenience" note. The teams continued on to Federal Way, where they worked through the night in their hotel room to repair the damage in time for the morning competition. Adding to their woes, three members of the Cairo team were unable to obtain Visas and had to remain at home. The chief engineer had to quickly learn to pilot the crippled vessel. In spite of the difficulties, both teams remained upbeat and positive about the experience. MATE staff bestowed their "Guts and Glory" award on the Cairo team for persevering through adversity.

Safety checks are a key part of the competition. Safety judge Scott Fraser, an educator from Long Beach College and a long-time supporter of MATE, explained the process. "First we look

**"The Dude" is an intimating vehicle designed and built by the Long Beach Community College team. A computer glitch on day two denied them the opportunity to better their day one score.**
**Photo: Kathleen Gleaves**




(Photo: Kathleen Gleaves)

for obvious things like sharp edges, exposed wires, loose connections." Next they take a more technical view looking at wiring harnesses, pressure canisters, fuses and more. Teams are docked 10 points if they receive a safety violation and they are given a chance to correct the problem. That doesn't mean problems don't develop during the competition, and the staff is vigilant.

The team from Mansoura University in Egypt, whose vessel escaped the rough treatment of security authorities, nonetheless suffered some shipping damage and failed their initial safety check. They forfeited their first run on day one to resolve the problems. When they returned to the pool on day two for their last chance, a bright spark and an unpleasant arcing sound, followed quickly by a puff of smoke, brought safety officials running to the station. The team was disqualified before their vessel saw water. Disqualifying a team is the hardest part of the job according to safety judge Leah Hebert. "You have to do it for everybody's safety," especially with the trifecta of danger signs; sparks, smoke and that unmistakable "ffttzzz."

Hebert understands the dangers better than most. As the first female ROV pilot in the world, she brings the highest level of professional field experience to the competition and serves as an admired role model to the young women interested in the marine technology field. Her employer, Oceaneering, supports Hebert's involvement with the MATE center. Next year the finals will be held in Thunder Bay, Michigan, hometown of that team of sixth graders. Dozens of teams and hundreds of future mariners around the world are eagerly awaiting MATE's November mission announcement so they can start inventing the next generation of ROV's.

For more information on the MATE center and the ROV competition, check out their website.

**www.marinetech.org/rov-competition-2**

**Tasks to complete at the MATE ROV competition included unlocking latches, opening a hatch door, placing a large object into a barely larger space, then closing and relocking the hatch. Extra points were gained for removing simulated sea life fouling the exterior of the station. Teams were allotted 15 minutes to accomplish their five tasks and to simulate real-world conditions, the pilots observed operations on monitors with the vessel's own onboard cameras providing the feed.**

**Step One: Open the hatch**

Photo: Kathleen Gleaves

**Step Two: Pick up the payload**

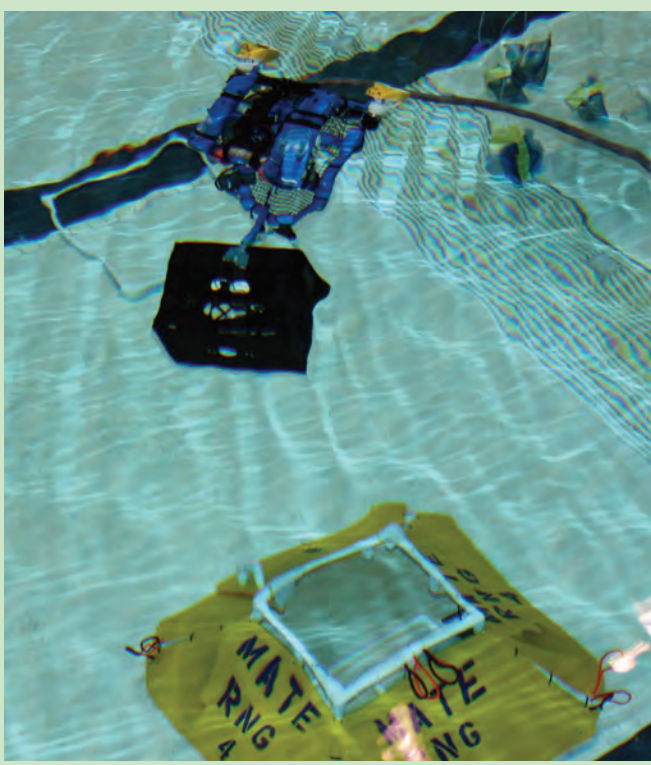


Photo: Kathleen Gleaves

## About the MATE Center

The Marine Advanced Technology Education (MATE) Center is a national partnership of organizations working to improve marine technical education and in this way help to prepare America's future workforce for ocean occupations. Headquartered at Monterey Peninsula College (MPC) in Monterey, California, the MATE Center has been funded asa National Science Foundation (NSF) Advanced Technological Education (ATE) Center of Excellence since 1997.

**www.marinetech.org**

# Easy as 1, 2, 3!

**Step Three:** **Deliver the payload**

# Demand for ROV Pilot Technicians Grows

Maritime Training and Competence Solutions (MTCS Ltd.) claims the whole subsea industry is getting busier all the time, with companies investing and expanding. One area in which this has been particularly noticeable is in remotely operated vehicles (ROVs). As the demand for ROVs increases, so does the need for qualified ROV Pilot technicians. Fueled by the search for oil in ever deeper waters and utilizing numerous strands of technology, the world of ROVs is breaking new ground to develop ever more sophisticated vehicles, meaning an increased need for pilot technicians. The global demand for ROVs was recently highlighted in a report from analysts, Douglas-Westwood, which revealed that **expenditure on work class ROV operations had more than doubled since 2002. The energy analysts predict that by 2012, $1.458B will have been spent in this sector.**


MTCS, an ROV training company, based in Windermere, U.K., is familiar with the demand for ROV training, as it prepares to launch a new, 10-day ROV 'Fast Track' Technician Course on Monday, October 28 to Friday, November 8 (weekend is free time), which will offer a range of ROV technical systems. MTCS will be working with DPS Offshore, part of the Forum Energy Technologies (U.K.) Ltd, a specialized Offshore engineering company, to deliver this training program. Daron Larcombe, ROV Rentals & Business Development Manager for DPS Offshore said: "It is important our personnel take this opportunity to gain additional training on ROV technical systems in addition to their ongoing competency programs.

The skills they learn in these courses will allow us to continue to offer our customers quality personnel with a proven background of ongoing training required in today's high-tech subsea environment."

MTCS is a fully accredited assessment and training center. It can provide a spectrum of operational, technical and supervisory training to the offshore industry, both in the U.K. and abroad. With a new facility now open in Singapore, MTCS will also be delivering courses in Loyang from November 11-22, with further courses planned for 2014. Courses also run from their Aberdeen facility.

The majority of their courses focus on ROVs as used in the oil & gas, nuclear and renewables industry, with the fast-track course being open to candidates with a Pilot Technician Grade II, who are looking to gain Pilot Technician Grade I certification. The 'Fast Track' Technician Course will focus on: ROV Control systems; Fiber Optic testing and repair; ROV electrical power and distribution; Long line fault finding; Umbilical testing and repair; Hydraulic systems; Interfacing sensors and tooling, and Assessment & Action plan. Richard Warburton, Managing Director for MTCS said, "ROV pilots are in huge demand in the oil and gas industry and this is set to continue over the coming years.

In recent months we've seen companies such as Canyon Offshore, CTC Marine, Subsea 7, Saipem and DOF Subsea all recruiting, plus agencies such as Advance Global Recruitment and EuroSearch have been putting out calls for ROV Pilot Technicians for their clients. In addition to these advertised posts, here at MTCS, we have been inundated with requests for student CVs – almost four times as many as we had for the same period last year. Estimates are that by the end of 2013 there will be almost 6,000 subsea wells in operation, with vacancies in the Scottish sector of the North Sea, plus opportunities to work abroad in Norway, the Middle East, Asia, South America, Africa, Australasia and China."

**Email: enquiries@mtcs.info**
**www.mtcs.info**

## ROV Support Vessel

Harkand Harmony, the newest ROV support vessel to service Asia Pacific's oil and gas industry has been launched in Singapore. The vessel, built by ASL Marine Holdings at Batam near Singapore, will be fitted with one Comanche WROV and a complete survey spread. Harmony's addition to the Harkand fleet, along with two new Triton XLX ROV's which will be delivered in August, is a step forward in the company's development plan.

## Calesurvey ROV Services

With Calecore's fleet busy, spot market vessel MV Imor completed the Lithuanian section of a Baltic Sea Cable route survey. The multi-vessel project commenced in 2012 and used the Kommandor Stuart and the Kommandor Calum in a UXO and geophysical routing survey. Dual gradiometer and the use of ROV's were deployed from all vessels for target identification and safe cable routing.

## SeeByte Software for ROV

SeeByte and Seatronics announced that the Predator ROV will now be fully integrated with SeeByte's SeeTrack CoPilot software.

## VideoRay ROV to Help Test Spill Ops in Arctic

The U.S. Coast Guard Research and Development Center (RDC) will test and evaluate oil spill detection and recovery technologies in the Arctic Ocean as part of Operation Arctic Shield 2013. A multi-agency team aboard USCG Cutter Healy will test and evaluate various unmanned aerial systems (UAS), an unmanned underwater vehicle (UUV) and a remotely operated vehicle (ROV) to search for simulated oil spills. RDC has assembled a team to include NOAA personnel operating a Puma UAS; University of Alaska, Fairbanks researchers operating Puma systems funded by The Center for Island, Maritime, and Extreme Environment Security; representatives from the Department of Homeland Security Science and Technology Center of Excellence and personnel from the U.S. Air Force Special Operations Command. Tests will also include operation of a SeaBED UUV by Woods Hole Oceanographic Institute (WHOI) researchers. NOAA personnel will also employ the Environmental Response Management Application online mapping tool that integrates both static and real-time data for use during the exercise. The Coast Guard is providing one of its brushed skimmer systems to simulate recovery operations at the ice edge and a Video Ray PRO 4 ROV to provide a vantage point from below to observe and document skimming operations.

www.seadiscovery.com

## From tiny electrical impulses grows a $2.6B giant

# MOOG

**By Tom Peters**

In 1951 William (Bill) Moog developed the electro-hydraulic servovalve that translates tiny electrical impulses into precise and powerful movement. Moog, an inventor, entrepreneur and visionary, likely knew then that valve would open the flood gates that would transform a small workshop in East Aurora, New York into the corporate giant Moog Inc. is today.

Bill Moog, along with his brother Arthur and Lou Geyer, formed the Moog Valve Company, and their first four servovalves were sold to Bendix Aviation. That order was followed by larger orders from Boeing and Convair. Moog had made a significant move into the aerospace industry and has never looked back.

Today, Moog Inc. employees 8,000 people around the world and has revenues of $2.6B. The Moog vision has been to diversify and although the main focus of the company has been the aerospace industry serving the commercial aircraft industry, military and defense and even supplying highly sophisticated components for the U.S. Space program, Moog also supplies and manufactures components for a variety of industrial, medical, marine and energy applications. And through initiative and innovation, Moog staff have created new products for these various industries that have been both customer specific and for a broader based customer use.

**An employee works on the production of a large electrical slip ring at Moog Focal's Nova Scotia facility.**

The diversification has led to Moog's acquisition around the world of leading companies producing top quality products that would complement and expand the various Moog product lines. Such was the case with Focal Technologies of Halifax, a marine product company, which in 2005 became part of the Moog Components Group and now the base of its marine operations. "This facility is almost 100% marine. Nearly everything we do here is marine and energy solutions," said Moog Focal's Managing Director Michael Glister, who explained how Focal became a good fit for Moog.

Focal actually started as part of the Nova Scotia Research Foundation, said Glister. With a private owner, the company grew and settled in Burnside, an industrial park across the harbor from Halifax. In 1999 Focal was sold to the U.S.-based Kaydon Corp.

"They were looking for slip ring manufacturers," said Glister. "They didn't really understand that although we made slip rings we are very much a marine company. Being a slip ring manufacturer was not our main objective."

In 2005 Kaydon sold Focal to Moog.

"They were looking for diversification, adding technologies that they thought were adjacent to their own and synergistic with their own. So we are part of Moog but still keep the Focal brand name because it has a very strong brand identity within the marine business. So we are Moog Focal and a business segment of the Moog Components Group," said Glister.

When Focal came out of the Nova Scotia Research Foundation, its concentration was in a couple of areas, said Glister. One of those areas was the use of fiber optics for marine and subsea applications and its first application was a towed array for the Canadian submarines. The other area was developing an electrical slip ring for marine use. They would typically be deployed in the winch of some type of marine system.

Glister offered this example.

"If a ship was to deploy something underwater, it would tail out from a winch. It would have a situation where the cable coming into the winch would be static but having to convert to the rotary side of that cable winch as it deploys the cable into the ocean. Our devices initially were mainly to convert any type of power or signal from the stationary world to the

rotational world and that's what most of our products do today but to that we have added many more fiber optic capabilities," he said.

Glister, a native of England (and a citizen of Canada) and a design engineer by profession, said fiber optics send signals through photons of light and can carry much more data and transfer it further than electricity.

"So we make many parts for fiber optic systems that are used underwater. A very typical one is you have an underwater robot (ROV) that is doing maintenance. It may be a wellhead on the ocean floor or a sunken wreck they want to have a look at. There may be other types of inspection like on a pipeline checking for cracks, ocean bed debris covering the pipe, etc. They send down these robots with cameras, sonar and other sensors. They use and produce a lot of data, therefore, we supply fiber optic systems for ROVs plus electrical power systems. Those are two main products - fiber optics and electrical power - and they are all made here. Other products made here include very large electrical power swivels for floating oil platforms and we do what is called a fluid rotary union, the fluid equivalent of a slip ring. So we have basically four major disciplines in the (Burnside) building making advanced technology products for the underwater business," said Glister.

Creating advanced technology for marine applications is an ongoing process at Moog Focal's Nova Scotia facility. Research and development are part of the company's engrained culture.

"Out of approximately 190 people in this building we have about 45 in engineering and about another 15 in what we call production engineering," said Glister. "So we have about 60 engineers and technologists doing a lot of development. At anytime there is at least 20 new product developments going on in the building. It could be for one customer or a product we are trying to sell across the total marine market," he said.

Some of Moog Focal's developments include a fiber optic rotary joint for use

**"We also make a lot of the very clever electronics and optical systems which convert from the optical into the electrical world and back. "**

**Michael Glister, MD at Moog Focal's production facility in Nova Scotia**

**"We try to grow in synergistic steps and the next area that we see substantial growth is in the supply of our equipment to subsea wellheads and drilling systems."**

**Greg Boyer, Moog VP of Sales & Marketing, Blacksburg, VA**

with a ship's winch, "which basically you can put a stationary fiber on one end, a rotating fiber on the other end and it converts the signal without any degradation. We are pretty well the world leader that in that product," said Glister.

"Another product we make is the media converter. Once you have the fiber optic system in place, eventually that fiber optic signal has to become electrical again so it can go into a camera, computer or something of that nature. We also make a lot of the very clever electronics and optical systems which convert from the optical into the electrical world and back. You might have 10 or 20 electrical signals and that doesn't add up to that much data. But it is collected together and sent down one fiber. The system then reassembles them into individual signals and converts them back to electrical. These are called multiplexers and we are possibly the world's leading supplier of underwater multiplexer systems," said Glister. They are used in the exploration and production of oil and gas, scientific research and many other subsea applications.

In 2012 Moog added to its marine portfolio with the acquisition of Tritech International Ltd. of Scotland.

"Tritech is part of the marine products operation of Moog Components Group," said Glister. "We (Focal) are doing all the work that provides the communication and the power products while Tritech adds something adjacent and that is sonar and sensing. They have a number of products for people trying to navigate or guide themselves in underwater situations. You can't use radar or GPS, none of those work underwater, so the main types of sensors used are acoustic instruments, like sonar, altimeters and other instruments that use acoustic wave lengths. They also make some cameras and lights and a few other sensors as well," Glister said. "So we are adding the Tritech sonar and other sensors and also they do all the software that interprets these signals and turns them into images. So this expands our marine section. Focal and Tritech are in the same market but with slightly different technology," he added.

Moog's marine division is an approximate $80 million a year business and is growing.

"When I came here in 2001 the company was around $10 million. This year alone in this building we will grow substantially," said Glister.

Greg Boyer, Moog's Vice President of Sales and Marketing in Blacksburg, Virginia, said the marine market represents about 15% of the Moog Components Group's business.

Surprisingly, very little of Moog's marine products stay in Canada.

"With the marine business and predominately with oil and gas, it has always been a very international business so we retain less than 1% of our output in Canada. The rest is all exported to other countries. Either into the U.S. and mainly for Gulf of Mexico, the North Sea area of Europe, offshore Brazil, the West Coast of Africa, Northern Australia and some areas of Asia," said Glister.

However, there is some potential for Moog Focal close to home. British Petroleum and Shell are ramping up for ma-

jor offshore oil and gas exploration off Nova Scotia and Moog Focal could quite likely have product involved in all facades of that work from seismic to drilling to production.

Boyer added that, "We try to grow in synergistic steps and the next area that we see substantial growth is in the supply of our equipment to subsea wellheads and drilling systems."

But like any other company constantly striving for excellence, there are challenges and being a world leader makes the task greater.

"If you are going to perform underwater, you can't have a product that is going to fail in any shape or form," said Glister, because that failure could cost the user of the product hundreds of thousands of dollars. And, of course, the manufacturer's reputation.

"So there is the absolute need to perform and that is the competitive side of the business," he said. "We are also becoming a little bit dollar conscious because costs are going up like crazy in oil and gas production markets so we are watching our pennies. But mainly we spend money to make our products high performance with a focus on excellence," he said.

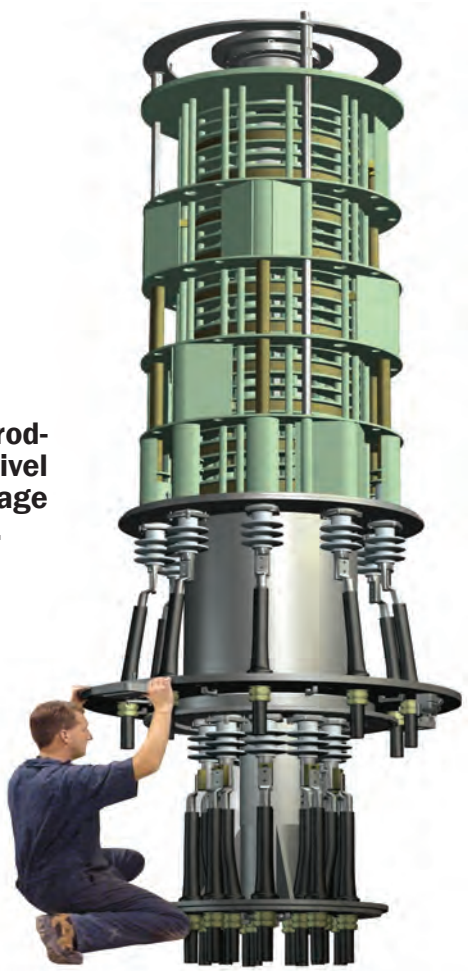
Glister said the company is constantly on the lookout for top notch talent to work in the Moog environment that has a reputation of treating its employees with trust and respect.

Boyer sees finding well-trained technologists and engineering graduates suitable for the marine industry a most pressing issue.

"In the long term, it will be adapting to the change in oil sources from standard oil and gas wells to shale, coal bed methane and similar non-conventional sources," he said.

Overall, Glister sees a bright future for Moog's marine division.

"As far as I can see, the underwater technology sector will grow, and I think we have a future in growing with it here in Halifax. We certainly see a good future in what we do and we are focused on adding to that. It's a fun thing to be in," he added.



**One of Moog Focal's many products is a large electrical swivel for a floating production storage and offloading (FPSO) vessel.**

## Making the Connection

# SEA CON

**By Chris Batten**

For those that know SEA CON best it will be no surprise to learn that their desire to continue its growth and to find new ways to better serve its expanding market is at the forefront of its mind. A prime example of this commitment is SEA CON's new Encapsulating and Molding facility in the West Houston area, opening to develop even greater levels of support both to the Gulf Coast region and internationally.

"There is clear evidence that the market is growing," said SEA CON's Marketing Manager Melanie Harrison. "The demand on suppliers to increase manufacturing, design, support and customer service also grows in line with this upturn. This new facility is just one of a number of steps we will be taking to achieve our mission."

**WET-CON Connectors**

Concurrent to this growth in demand is the need for suppliers to exhibit great flexibility and the ability to react quickly to customers needs both planned and unforeseen, while still maintaining high levels of quality and innovation. Part of this solution is seen by SEA CON to include holding increased stock of most popular connectors to help fill an increasing need for short order custom assemblies.

The SEA CON team believes that this ability to be flexible and meet demand while maintaining quality is equally important as the continued acquisition of good quality intelligence on the needs and solutions required by the marketplace. This intelligence gathering ensures that SEA CON can continue to deliver a clear message and demonstrate not only its expertise, but its understanding of the needs of its clients. With the new facility, SEA CON will be able to deliver on needs to the marketplace in general at a local and international level.

**New Facility, Greater Flexibility**

This new encapsulation, molding and central stocking facility has been designed to be geared towards the customers of SEA CON, many of whom have a "need it yesterday" approach when things don't quite work out to plan. SEA CON currently has five main production facilities geared to the delivery of a mass production of subsea connectors. At times this can make it difficult to provide customers with short order custom assemblies. The new work shop will specialize in these short order needs of SEA CON clients, current and future.

The workshop will allow SEA CON to carry more stock of their most popular connectors to benefit its existing customers who don't necessarily need a molded assembly. Some of the product lines they will carry will be the Rubber Molded, WET-CON, ALL-WET and 55/66 series assemblies. Stocks of these are already held, but this new facility will see these stock levels increase. Of course there is a wider picture to consider and the addition of this new facility will give SEA CON's other production facilities yet another asset to help satisfy customer needs, for example short order jobs.

The facility will be an extension of SEA CON's office located in El Cajon, CA. According to SEA CON it will become ISO 9001, following the same high quality plan as the main production facility so they can assure the quality is to the same high standard as the rest of the organization.

Adding this new facility is another step forward in the development of SEA CON in general and the Gulf Coast area in particular. Once the facility is operating to its fullest potential ROV manufacturers, survey and rental companies along with the drilling and geophysical companies who are so vital to the continued Oil & Gas production globally will have a valuable new resource.

SEA CON prides itself on seamlessly

melding marketing, sales, production and service in a manner that is proactive and customer focused. This can also be witnessed in the strong inter department communications and in particular the vital sales, marketing and production teams. Mal Hughes who heads up projects for SEA CON Europe said, "It is always a balancing act due to the amount of work undertaken in production, but we are constantly involving key people in production in the sales and marketing process to ensure expectations can always be met."

Craig Newell, Vice President of Sales & Corporate Business Development said, "Consistency throughout the business is paramount to our success and the launch of a new Encapsulation and Molding Workshop is just another example of our commitment to over deliver on the promise and work with an overt focus on the changing needs of our clients."

Chris Batten is a freelance writer and author, ex British Army and former CEO of a US 'Under the Hook' rigging company. Chris has been involved in heavy lift in oil and gas in the United States, Europe and the Middle East as well as many other business sectors, including technology and marketing.


**"Consistency throughout the business is paramount to our success and the launch of a new Encapsulation and Molding Workshop is just another example of our commitment"**

**Craig Newell, VP of Sales & Corporate Business Development**

# Oceans 2013 Set for San Diego

The international Oceans conference is a major forum for scientists, engineers and those with an interest in the oceans to gather and exchange their knowledge and ideas regarding the future of the world's oceans. Jointly sponsored by the IEEE Oceanic Engineering Society (IEEE/OES) and the Marine Technology Society (MTS), Oceans 2013 is scheduled for September 21-26, marking the show's seventh return to San Diego, where participants from more than 45 countries are expected to attend this year's event at the Town and Country Resort hotel and conference center.

Addressing this year's theme, "An Ocean in Common," Industry leaders will share their perspectives on past, present and future ocean initiatives. Key speakers include UCSD Chancellor Dr. Pradeep Khosla, Oceans Advocate Dr. Sylvia Earle, and Dr. Greg Kusinski, DeepStar Director, Chevron Energy Technology Company.

The technical program, which runs Tuesday-Thursday, comprises of 23 sessions, including ships-to-reefs, ultra-deep exploration, international business, San Diego maritime history and technology transfer.

The show's exhibition will include a diverse selection of more than 200 booths representing many areas of industry, academia, nonprofit and government agencies. Exhibitors range from electronics and technology companies to equipment manufacturers and environmental activists. A list exhibitors are featured on the facing page.

Numerous special events compliment more than 450 technical and scientific presentations, papers and posters. The conference will kick off with the Oceans '13 San Diego Underwater Film Festival, presented by the San Diego Underwater Photographic Society Sunday (9/22) and Monday (9/23) nights at 7 p.m. in the Town and Country Convention Center. Both nights will feature approximately 16 different films, each less than five minutes in length, covering topics such sharks, ocean pollution and Antarctica.

Other conference activities provide opportunities for attendees to connect with peers. On the conference schedule are a golf tournament, award luncheon, ROV competition and banquet aboard the USS Midway aircraft carrier docked in San Diego Bay.

Full registration includes access to exhibits, technical sessions and all social functions. There are three ways to register for the Oceans conference: as corresponding author; as attendee (including non-corresponding authors) and as exhibitor.

The plenary session and exhibit halls are free, but registration is required. Tutorials can be attended without registering for the full conference. Those who want to attend a tutorial, but not registering for the full conference, or have already registered but want to add a tutorial, must proceed through the online registration process, selecting the tutorial only, but not an attendee registration category. For additional information or questions regarding registration, Email oceansreg@ieee.org, or visit:

**www.oceans13mtsieeesandiego.org**

# Oceans 2013 Exhibitors

Advanced Fiber Products ..... 608
Airmar Technology ..... 418
AK Industries ..... 817, 818
American Meteorological Society .. 426
AML Oceanographic Ltd. ..... 324
Aquatic Sensor Network Technology ..... 831
ASL Environmental Sciences ..... 128
AUVSI San Diego ..... 821
AXYS Technologies, Inc. ..... 519
BioSonics, Inc. ..... 836
Biospherical Instruments Inc. ..... 236
BIRNS, Inc. ..... 101
Bluefin Robotics Corp. ..... 525
Bokam Engineering Inc. ..... 801
Bowtech Products Ltd. ..... 235
Bureau of Ocean Energy Management (BOEM) ..... 843
California Ships to Reefs, Inc. ..... 810
Campbell Scientific ..... 529
CARIS ..... 401
Channel Technologies Group ..... 327
Chukar Water Jet, Inc. ..... 704
CICESE ..... 844
CLS America, Inc. ..... 615
CODAR Ocean Sensors ..... 109
Compusult Ltd ..... 502
Consortium for Ocean Leadership .814
Datawell BV ..... 526, 528
Deep Sea Submersible Pilots Assoc ..... 808
Deep Trekker Inc. ..... 518
DeepSea Power & Light ..... 318
Diving Unlimited International ..... 335
DOE Inc. ..... 517
DOER Marine ..... 319
Edgetech ..... 606
EMO Marine Technologies ..... 505
Energy Sales ..... 424
Engineered Syntactic System ..... 627
Environmental Systems Research Institute (ESRI) ..... 827
Exelis Acoustic Systems ..... 417
Exocetus Development LLC ..... 219
Falmat Cable ..... 315, 317
Falmouth Scientific, Inc. ..... 435
Florida Atlantic University ..... 853
Furuno USA, Inc. ..... 729
Genesis Group Inc. ..... 700
Geometrics ..... 515
Global Dynamix, Inc ..... 730
Greensea Systems, Inc. ..... 830
GRI Simulations Inc. ..... 500
Hawboldt Industries ..... 405
Hydracon Company ..... 628
Hydro Group plc ..... 820
Hydro International ..... 434
IEEE Oceanic Engineering Society (OES) ..... L6
Imagenex Technology Corp. ..... 625
International Ocean Systems ..... 735
InterOcean Systems, Inc. ..... 227
Inuktun US, LLC ..... 727
IXBlue, Inc. ..... 316
Japan Agency for Marine-Earth Science & Technology ..... 719
JFE Advantech Co., Ltd. ..... 718
JouBeh Technologies ..... 504
Knudsen Engineering Limited ..... 407
Kongsberg Underwater Technology, Inc. ..... 614, 616, 618
L-3 Communications Klein Associates, Inc. ..... 707
L-3 PHOTONICS ..... 823
LinkQuest, Inc. ..... 216, 218
Liquid Robotics ..... 834, 835
Lockheed Martin ..... 536, 634
Loggerhead Instruments ..... 706
MacArtney Inc. ..... 406
Marine Magnetics ..... 209
Marine Sonic Technology, Ltd. ..... 636
Marine Technology Reporter ..... 111
Maritime Museum of San Diego ... 804
MATE Center ..... L7
Measurement Technology NW ..... 425
MetOcean ..... 605
MetOcean Data Systems ..... 709
Moog ..... 728
Mooring Systems, Inc. ..... 725
MTS ..... L8
MTS-50 Years ..... 207
Multi-Electronique (MTE) Inc. ..... 534
Myriax Echoview ..... 626
New England Marine Renewable Energy Center ..... 842
NiGK Corporation ..... 714
NIUST National Institute of Undersea Science & Technology ..... 326, 328
NOAA-Southwest Fisheries Science Center ..... 806
NORBIT US Ltd. ..... 819
NortekUSA ..... 624
Ocean Aero ..... 839
Ocean Innovations ..... 314, 415
Ocean Networks Canada ..... 617
Ocean Sonics ..... 404
Oceanic Consulting Corp. ..... 602
Oceanic Imaging Consultants ..... 428
Oceanology International 2014 ..... 829
OCEANS 14 Taipei/IEEE/OES Taipei Chapter ..... L5
OCEANS 15 Washington, DC ..... L4
OCEANS'14 St. Johns ..... 604
Oceanscience ..... 214
OceanServer Technology, Inc. ..... 629
Oceanworks International ..... 619
OneOcean ..... 826
Open Seas Instrumentation, Inc. .. 301
PanGeo Subsea ..... 501
Penn State Applied Research Lab . 840
Phoenix International ..... 535
PNI Sensor Corporation ..... 816
Polymer Corporation ..... 329
Port & Airport Research Institute, Japan ..... 717
Precision Measurement Engineering, Inc. ..... 635
Prevco Subsea LLC ..... 306
Prime Technology ..... 126
QI Incorporated ..... 716
RBR ..... 416
Remote Ocean Systems ..... 118
ROMOR Ocean Solutions ..... 302
Rowe Technologies ..... 527
Saab Seaeye ..... 334
San Diego State Univerity Coastal & Marine Institute Laboratory ..... 846
Scripps Institution of Oceanography ..... 841
Sea-Bird Scientific ..... 514, 516
SeaBotix, Inc. ..... 507
Seacon ..... 124, 225
Seamor Marine Ltd. ..... 701
Seatechrim ..... 427
Seismic Asia Pacific ..... 705
SGK SystemGiken Co.,Ltd. ..... 720
SIDUS Solutions, LLC ..... 215, 217
SMART Scholarship for Service Program ..... 825
Society of Naval Architects & Marine Engineers ..... 807
Sonardyne ..... 105, 107
Sonic Corporation ..... 710
Sonotronics ..... 837
Sound Metrics ..... 108
Sound Ocean Systems, Inc. ..... 429
South Bay Cable Corp. ..... 419
Southwest Electronic Energy Corp 734
SubC Imaging ..... 402
Subchem Systems, Inc ..... 106
Subsea Technologies, Inc. ..... 724
Sutron Corporation ..... 116
Techno-Ocean Network & Kobe CVB ..... 722
Tecnadyne ..... 229
Teledyne Marine ..... 204
Teledyne Marine Interconnect Systems ..... 104
Teledyne Reson ..... 607
The International SeaKeepers Society ..... 822
The Sexton Corporation ..... 838
The Tsurumi-Seiki Co., Ltd. ..... 712
Tritech International Ltd ..... 726
Triton Imaging, Inc. ..... 802
Turner Designs, Inc. ..... 414
Ultra Electronics ..... 400
Underwater Technology Research Center ..... 715
United States Navy League San Diego ..... 832
University of New Hampshire ..... 845
VideoRay LLC ..... 708
Workshops for Warriors ..... 833
Xeos Technologies Inc. ..... 304
Xylem ..... 224, 226, 228

**Macpherson**

**Christensen**

**Ross**

## Macpherson Named CEO of Reef Subsea

Reef Subsea announced a strategic group-wide restructure. **Duncan Macpherson**, who previously held the role of Managing Director of Reef Subsea Norway, has been promoted as the CEO of Reef Subsea. The reorganization will create the need to recruit a number of senior positions in the group, including a Chief Operating Officer and a Chief Commercial Officer. As part of the new strategy, Reef Subsea also announced that it will no longer take delivery of the newbuild MT 6022 MkII design vessel from Olympic Shipping, originally planned for delivery Q3 2013. Reef Subsea will now look to place a commitment on a similar capability vessel for delivery during 2014.

## Christensen Joins NorSea Group

NorSea Group, a supplier of base services and integrated logistics systems to the oil and gas industry in Norway, appointed **Kim Christensen** as its first U.K. General Manager to lead the group's future developments in Scotland.

Christensen will head up NorSea Group (U.K.) Ltd, a new company within the Group, which has been established to reinforce the Group's commitment to enhance its business activity in the U.K. To support this, NorSea Group will open its first U.K. office in Aberdeen. The move follows NorSea Group's recent announcements that it had signed an agreement with the Scrabster Harbor Trust in Caithness and formed a strategic working partnership with local logistics firm Hugh Simpson (Contractors) Ltd to develop Scotland's most northerly mainland port as a one-stop supply base servicing the oil and gas industry. Christensen, a Dane who has lived in the U.K. for 21 years, has more than 20 years of shorebase and logistics experience.

## Calecore Appoints Southall GM

Calecore announced the appointment of **Mike Southall** who commenced employment with the company in June 2013 as General Manager, Calegeo. Southall is a chartered engineer and geologist with nearly 30 years experience as a practicing geotechnical engineer and was previously General Manager for SEtech Ltd. He will be responsible for the leadership and day-to-day management of geotechnical operations, including the DP2 Highland Spirit and Calegeo's range of seabed geotechnical equipment.

## Jee Appoints Ross

Jee Ltd., an independent multi-discipline subsea engineering and training company, appointed **Nigel Ross** as Business Development Director.

Based in the company's Aberdeen office, Ross will be responsible for ensuring the business continues to meets its ongoing strategy for growth by further developing relationships with key customers and seeking new business opportunities to support long-term growth plans. Ross has more than 20 years of experience in business development and sales management within the oil and gas industry. Prior to joining Jee, he worked as a business development director for Xodus, where he was responsible for implementing strategic international growth plans and securing new business for all operating divisions.

He has also held senior positions at Shell, Wood Group and Petrotechnics, and has worked in a number of international locations including West Africa, Russia, Caspian, North Africa and the Middle East.

## Captain Van Gurley Retires

**Capt. John Van Gurley** retired from the U.S. Navy on July 12 in a traditional Navy ceremony at Stennis Space Center after 26 years of active duty service. A native of Orlando, Fla., and Mississippi Coast resident for nearly the past decade, Gurley most recently commanded the Naval Oceanography Operations Command (NOOC) at Stennis Space Center until a change of command im-

**Captain Van Gurley (left)**

mediately prior to his retirement ceremony. During the change of command, Rear Adm. Brian Brown, Commander, Naval Meteorology and Oceanography Command, (pictured above right) hailed Gurley's command of the NOOC, saying his "strategic vision and operational expertise" propelled the organization to "new levels of excellence."

## Ashtead Appoints Sheehan

Ashtead Technology has added to its management team with the appointment of **Tim Sheehan** as commercial director. The appointment, which is a new position, comes as part of the company's strategy to expand its global service offering which includes rental equipment, calibration, repair and maintenance, offshore personnel and bespoke engineered solutions.

## RADM Lockwood Joins OceanGate Board

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.

## PMI Hires Burger

**Tyler Burger** is the latest member of the PMI Industries mechanical engineering team. In this position, Burger will be responsible for developing, testing and design of the company's subsea cable management hardware and services. Burger is a recent graduate of Case Western Reserve University (CWRU) with a Bachelor of Science in Mechanical Engineering.

## Murowinski Joins Rockland Scientific

Rockland Scientific Inc. (RSI) continues its growth with the hire of **Emma Murowinski** as Oceanographer. RSI welcomes Murowinski as she completes a recent Masters of Science Degree in Physical Oceanography from the School of Earth and Ocean Sciences at University of Victoria, with specializations in theoretical parameterization and numerical modeling.

## Costain Finishes EPC Offshore Acquisition

Aberdeen-based EPC Offshore has been acquired by Costain, a U.K. Tier One engineering solutions providers. The deal marks the launch of Costain Upstream, a new divisional operation combining EPC Offshore's capabilities with ClerkMaxwell, the oil and gas engineering and support services provider which was acquired by Costain in 2011.

## Tiburon Subsea Services

The company remains Research Vessel Tiburon, Inc. but is now doing business as Tiburon Subsea Services. The change in name is a more accurate representation of the company's new direction and underwater operations. RV Tiburon started out as a vessel charter and dive support company and in the last 18 years has supported numerous expeditions and projects with noted clients.

## Tritex NDT Opens U.S. Office

Tritex NDT Ltd. opened an office in the U.S. as part of an ongoing strategy of expansion. Tritex manufactures multiple echo ultrasonic thickness gauges that measure metal thickness whil ignoring coating. The company reported steady growth and an increasing global demand for their product range, leading the opening of the new office in Newark, NJ, which Tritex said will better serve its customers in North and Central America, including Canada. Tritex NDT have taken this initiative to offer their multiple echo ultrasonic thickness gauges into these regions while providing better customer service. The new office will provide local product support as well as sales and marketing operations.

## Severn Glocon Acquires Calidus

Control valve engineering specialist, Severn Glocon Group strengthened its presence in the subsea oil and gas market with the acquisition of HPHT downhole tools company Calidus Engineering. Renamed Severn Subsea Technologies Ltd, the company will provide research, development and test facilities to enhance Severn Glocon's subsea valves capability.

A former subsidiary of Badger Explorer (Norway), Calidus is a multi-discipline engineering firm developing innovative subsea and downhole technologies for harsh HPHT environments. Severn Glocon Group is taking this strategic move in a bid to align its operations to better meet future technical challenges in subsea oil and gas production. Calidus' downhole products already developed will provide major sales opportunities with worldwide oil and gas corporations.

**Critchley, CEO**

## First Subsea Wins Heidelberg Spar Mooring Connector Contract

First Subsea Ltd has been awarded a contract by Technip Inc. to supply the subsea mooring connectors for a 23,000-ton truss spar platform moored in 5,310 ft. (1,620 m) of water in Anadarko Petroleum Corp.'s Heidelberg field development in Green Canyon Blocks 859, 860,903, 904 and 948 in the Gulf of Mexico. The Heidelberg spar will be moored by nine Series III Ballgrab ball and taper mooring connectors attached to polyester mooring lines. The connector's male mandrels are manufactured in compliance with American Bureau of Shipping (ABS) 2009 Approval for specialist subsea mooring connectors.

The Heidelberg field is close to Anadarko's 100%-owned Constitution spar, also moored using First Subsea mooring connectors in 2005. Since then over 370 Ballgrab connectors have been successfully deployed in deepwater moorings worldwide. The Heidelberg spar will have a capacity of more than 80,000 barrels of oil and 2.3 million cubic meters of natural gas per day.

## Bibby Charter: Bigger North Sea DSV Fleet

Sat control room onboard a Bibby OSV.

Bibby Offshore expanded its fleet of North Sea class diving support vessels by signing a contract to charter the DPII DSV Mermaid Endurer from Subtech Ltd. on behalf of Mermaid Offshore Services. The charter will run from April, 2014 for 200 days with extension options and a similar optional period has been agreed from April 1, 2015. The vessel will join Bibby Offshore's DSV fleet which includes the Bibby Sapphire, Bibby Polaris and Bibby Topaz, providing additional capacity for clients.

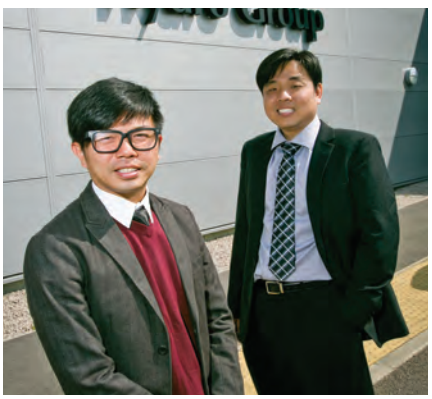
## Two Missing Aircraft Located Off Venezuela

C&C Technologies, Inc. in cooperation with SEA Corporation, the Italian and Venezuelan Authorities and Luca Missoni, confirm that two aircraft lost off the archipelago of Los Roques, Venezuela have been located and positively identified. As of 3:50 p.m. local time on June 19, 2013 the missing LET L-410 aircraft (registration number YV-2081), was located by the crew of C & C's Research Vessel SEA SCOUT. The LET L-410 was lost south of the island on January 4, 2008 carrying 14 passengers and crew from Caracas, Venezuela to Los Roques.

The missing BN2 Islander aircraft (registration number YV-2615), was located on June 27, 2013 at 8:25 p.m. local time. The BN-2 Islander was lost north of the island on January 4, 2013 carrying six passengers and crew, including fashion design CEO Vittoio Missoni and his wife Maurizia Castiglioni.

Search operations were conducted by the, R/V SEA SCOUT, C & C's purpose designed 134-ft. aluminum hulled oceanographic catamaran vessel equipped with an Autonomous Underwater Vehicle (AUV). The AUV's sensor suite includes a Dual Frequency Chirp Side Scan Sonar, Chirp Subbottom Profiler, Multibeam Bathymetry and Imagery System, and a Camera Mosaicking System.

## Hydro Targets Growth in Southeast Asia



Gabriel Tan and Steve Ang

Hydro Group announced plans for further investment in Southeast Asia and the appointment of a technical support supervisor to aid growth in the region.

Earlier this year Hydro Group opened a new Singapore office to support the company's increasing presence in Southeast Asia, and offer its range of subsea optical cables, electrical cables and connectors to the wider energy and defense markets in the region.

Doug Whyte, Hydro Group managing director, said, "Hydro Group has invested close to £300,000 in developing the Southeast Asia operation. We are already moving onto the next phase of development ahead of schedule, appointing two new members of staff to the Singapore office, with the key appointment of Gabriel Tan as technical support supervisor."

## Huisman: 10 Pipelay Equipment Orders

Huisman secured new contracts for 10 pipelay systems with various major offshore pipelay contractors. The new contracts include three 550mt Tiltable Lay Systems (TLS) and one 325mt Vertical Lay System (VLS) for Subsea 7, two 650mt TLS and two 340mt VLS for Technip-DOF, one 275mt VLS and one 570mt Multi-lay System for Ceona. The equipment will be built at the various Huisman production facilities in The Netherlands, Czech Republic, China and Brazil. Delivery of these pipelay systems is scheduled between the end of this year and early 2017.

The orders for the three 550mt TLS for Subsea 7 and the two 650 and two 340mt TLS for Technip-DOF are all part of their contract with Petrobas. The three Subsea 7 TLS will all be equipped with a Huisman squeeze system to accurately control squeeze loads. Moreover, all tensioners will be retractable, which allows for safe and efficient installation of large subsea infrastructure components such as umbilicals, risers and flowlines. The vessels for Subsea 7 will be built by IHC, The Netherlands. Technip-DOF's order for two TLS includes baskets and two 50mt SMST knuckle boom cranes, which allow for deck handling and deep water operation. The vessels for the two 650mt will be built by VARD in Norway and the vessels for the two 340mt will be built by VARD in Brazil. Delivery of the final pipelay system for these orders is scheduled for early 2017.

## ROS Adds New Camera Features

Remote Ocean Systems (ROS) 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 4000m.

See the new products at Oceans 2013, Booth #118

## Sound Metrics

Sound Metrics Corporation manufactures high-definition imaging sonars that seek to set a new standard for what can be imaged with sonar. Sound Metrics engineered a proprietary acoustic lens technology to provide shaped, focused, narrow beam patterns that yield qualiy image resolution, clarity and detail. ARIS is the new line of dual-frequency sonars offered by Sound Metrics and takes over where DIDSON left off.

Sound Metrics sonars are used by a range of industries including military, oil & gas, underwater construction, dam maintenance, search & rescue, law enforcement and fisheries management. Demonstrations available. Sample videos at:

www.soundmetrics.com


## Kongsberg Maritime Ltd. Camera Division

Kongsberg Maritime Ltd. Camera Division will be at Oceans 2013 where the latest in its product range of moving head cameras, the OE14 522 HD PATZ (Pan and Tilt Zoom) Camera, will be one of the cameras on show. Other recent product introductions are the OE14 370 SD Wide Angle Color Zoom Camera which boasts an 83 degrees diagonal angle of view, 36:1 zoom, a horizontal resolution of 550 TV lines per picture height and a superior faceplate sensitivity of 0.02 Lux. The OE14 504 HD Wide Angle Zoom Camera with a diagonal angle of view of 82 degrees has also been introduced to complement the well established OE14 502 HD Color Zoom Camera.

www.km.kongsberg.com/cameras

See the new products at Oceans 2013, Booth #616

## MacArtney: Compact Low Light Camera

MacArtney introduced the new LUXUS Compact Low Light Camera. Like the original MacArtney Low Light Camera, the lighter compact version is designed 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 LUXUS Compact Camera, the new LUXUS Compact Low Light Camera is designed to function in combination with remaining LUXUS series including LUXUS compact LED, LUXUS compact media controller, LUXUS pistol grip, diver helmet dove tail and universal mounting brackets. According to the manufacturer, the LUXUS Compact Low Light Camera is robustly designed and rigorously tested to perform 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 4000m. Finally, the camera consumes just 2 W and can handle DC power units from 12 to 24 VDC.

www.macartney.com

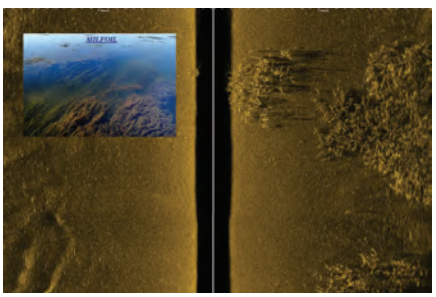
## See More with the Super Wide-i SeaCam

DeepSea Power & Light enhanced its Wide-i SeaCam. The newly designed version, the Super Wide-i SeaCam, has a smaller housing, proprietary lens and a dome port which eliminates vignetting and minimizes image distortion. The camera is 104.9mm (4.13 in) long,

weighs 0.23 Kg (0.51 lbs.) and provides 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.

www.deepsea.com

## EdgeTech: Shallow Water SSS

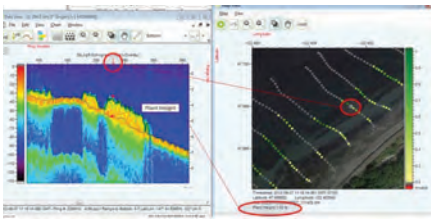


EdgeTech continues to see a growing number of interesting uses for its shallow water sides scan sonars. Most recently, an EdgeTech 4125 Side Scan Sonar system was used to map the invasive milfoil grass in Lake Winnepesauke, NH. Since its accidental introduction to US waterways in the 1940s, Eurasian Milfoil has spread across North America to more than 45 states. Side scan sonar has become a tool that allows biologists to map the milfoil distribution and to monitor the spread of the milfoil using change detection techniques over time.

www.edgetech.com

## BioSonics: Major Software Release

Visual Habitat DT-X, a new version of a software program first released in May 2012 along with the MX echosounder as part of a new data collection, processing and visualization system for aquatic habitat assessment. BioSonics has provided its DT-X series of fisheries echosounders since 2002, with hundreds of current DT-X users worldwide. Until now, Visual Habitat was compatible only with MX echosounder data. Driven largely by client requests, BioSonics has now developed a specialized version of Visual Habitat software that will accept hydroacoustic data collected with DT-X echosounders. This will enable the many DT-X users around the globe to utilize the unique features offered through Visual Habitat software. Visual Habitat DT-X software is available now for download on the BioSonics website, complete with a demonstration mode and sample data files: biosonicsinc.com/product-software-visual-habitat.asp.



www.biosonics.com

## Frog Spit Keeps Divers' View Clear

A new anti-fog formula which needs no rising or buffing is now available for keeping divers' helmets clear while they work. The new formula, Frog Spit, is available through Analox Sensor Technology, a designer and manufacturer of gas analysis equipment for the commercial diving industry.

www.frogspit.net
www.analox.net


## EMO Marine Technologies

EMO Marine Technologies Ltd. is the latest addition to the technical pool of Nova Scotia marine companies. Specializing in small form-factor, rugged, sub-sea fiber optic video and data multiplexer systems, suitable for ROV (new builds and upgrades), and ocean observation/moorings requiring serial data, Gigabit Ethernet and/or HD Video.

sales@emomarine.com
www.emomarine.com

## Kraken DataPod


Kraken Sonar Systems announced DataPod, a removable data storage module for subsea marine applications. According to the manufacturer, the 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. AUVs today are intelligence, surveillance and reconnaissance platforms that gather enormous amounts of streaming data from an array of sensors. In underwater environments, acoustic communications for telemetry have limited bandwidth, so the desire to capture and store large amounts of data for post-mission analysis exists. As a result, most solutions require easily removable and transportable storage devices. This ensures data can be readily delivered to the operator for post-mission review, enables users to reload and relaunch the AUV platform with new storage capacity quickly and avoids the lengthy downtime associated with downloading many terabytes of data from an AUV.

www.krakensonar.com

## MacArtney: LUXUS Brackets, Accessories

The MacArtney Group released a range of brackets and accessories now available for use with MacArtney LUXUS underwater Cameras and Lights. For use with diver helmets, MacArtney holds a wide range of LUXUS brackets in stock. This includes bracket types that are fully compatible with professional diver helmet brands, including industry standard Kirby Morgan models. The range of MacArtney LUXUS diver helmet brackets includes a special click-on dovetail configuration, which is very easy mount and demount. What is more, this dove tail bracket can also be used to swiftly install LUXUS equipment on small ROVs. For the larger and more powerful LUXUS Camera and Light variants, MacArtney holds a range of lightweight, yet robust and practical brackets in stock. These brackets come in three sizes and aids users to obtain perfect alignment of cameras and lights, when mounted on subsea vehicles and equipment. In terms of accessories, an important addition to the LUXUS family is marked by the LUXUS Pistol Grip, which is widely used for diver inspection work.


## Automatic Profiling Buoy APB5

On-Board Web Server with Real-Time Data on Internet

The APB5 is designed for monitoring water quality in coastal waters, fjords, lakes and fish farms. The buoy contains a control, an Embedded Web Server, a GSM/GPRS/EDGE or satellite (Inmarsat / Iridium) router, a winch, a short range radio for communication with sensor unit, solar cells and battery pack. Unique features include: No Bio fouling on sensors; No cable/connectors; Real-Time Data on Webpage, accessible on Internet (HTTP); Two-Way Communication; two-year Data Storage and much more. An expert system using data from APB5 for fish welfare in aquaculture has been developed by The Institute of Marine Research (IMR) in Bergen, Norway. Link to IMR Welfaremeter:

www.imr.no/welfaremeter/

www.saivas.net


# Underwater Metal Detectors

The University of California at Santa Barbara is employing underwater metal detectors in its research programs. Hunter Lenihan is a professor of applied marine ecology at UCSB's Bren School of Environmental Science and Management. He studies the effects of restoration, ecotoxicology and ocean resource management on marine communities. An area of interest is in the impact of ecological and oceanographic processes on coral populations. This led him to become involved a long term coral reef research project in Moorea, French Polynesia with the goal of developing new techniques for reef management and restoration. As part of this work Lenihan and his team are isolating and cultivating disease resistant abalone in an effort to increase their numbers. To gather the needed data researchers must examine the health of many individual abalones over an extended period of time. To aid in locating and tracking the shellfish, researchers have affixed small metal tags to them. Using JW Fishers Pulse 8X underwater metal detector, divers doing the field work can quickly relocate the specimens they need to examine. Another scientist using an underwater metal detector is Dr. Tasman Crowe with the Australian Center for Intl. Agricultural Research. Crowe and his team are working on the Trochus Reseeding Project. Trochus is a conical shaped marine gastropod (snail) that inhabits shallow tropical reefs. Its shell is used to make buttons and jewelry. Global demand for this product is greater than 7,000 tons annually, valued at more than $60m. To determine if the reseeding effort is successful, field workers study the snail's movements through the habitat and periodically recapture individuals for examination. Crowe discusses the difficulty of attempting to track and locate these animals in a complex marine environment. "Trochus often move into and under live coral or coral ruble and cannot be found by visual searches. To solve the problem we affixed small aluminum tags to the trochus and use a Pulse 8X to local them. The methodology proved very effective as we were able to consistently recapture over 85% of a known number of juveniles."

www.jwfishers.com

## September 24-26

### EdgeTech Announces 2013 Sonar Training Seminar

EdgeTech will hold its annual sonar training seminar in New Bedford, Mass.

**edgetech.com**

## September 25-26

### OWET Conference Program

Oregon Wave Energy Trust (OWET) announced the program for the eighth annual Ocean Renewable Energy Conference presented by the Northwest National Marine Renewable Energy Center (NNMREC). **"Community and Industry: Collaboration, Innovation and Opportunity"** is the theme of the event that takes place at the Liberty Theater in Astoria, Oregon. Session highlights will include an update from NNMREC regarding research projects and development of the Pacific Marine Energy Center, industry and community perspectives on technology innovation, how we can protect the ocean with good business practices, impacts and opportunities for coastal communities, utility benefits, and creative financing with community involvement.

Sponsors include Northwest National Marine Renewable Energy Center, Portland General Electric, SAIC, Vigor Industrial and Stoel Rives.

**oregonwave.org**

## Sept 29-Oct 2

### Teledyne RD Instruments ADCPs in Action Users' Conference in San Diego

Teledyne RD Instruments said that more than 30 speakers will be presenting its Acoustic Doppler Current Profiler (ADCP) and Doppler Velocity Log (DVL) research and field work at the company's biennial ADCPs in Action (AiA) Users' Conference, scheduled to take place in San Diego, CA. This year, AiA falls on the tail end of Oceans 2013, allowing many of our customers to combine their travel to attend both events. This popular users' conference is designed to bring the marine community together to share their ADCP, CTD and DVL experiences. This three-day event boasts 4 concurrent tracks comprised of over 30 presentations given by experts from around the globe, as well as 18 product/software training sessions, and a wide array of Teledyne RDI and co-sponsor dockside and on-water demonstrations. Other event highlights include one-on-one meetings with our field service team, data analysis clinics, Lightning Rounds filled with field-proven tips, customer forums, a growing list of poster papers, and 22 event co-sponsors displaying their latest products, software, and technology designed to assist our users. This event also includes numerous social events designed to encourage networking and a free flowing exchange of ideas and information.

The event schedule can be viewed at:

**http://www.rdinstruments.com/pdfs/AiA13_schedule.pdf.**

For detailed information and online registration, please visit:

**http://www.rdinstruments.com/aia2013.aspx**

or contact:

Margo Newcombe T: +1-508-539-6960

**margo.newcombe@teledyne.com**

## Feb 19-21, 2014

### AOG and Subsea Australia Conferences Merge

Papers and presentations are sought for the Subsea Australasia Conference and the Australasian Oil & Gas Conference (AOG), which will merge for the first time at AOG 2014. The merging of conferences will enhance the delegate experience by offering more content and a greater range of sessions with subsea streams incorporated into the Australasian Oil and Gas Conference (AOG).

Event Director, Bill Hare said the Subsea Australia Conference, a joint initiative between Subsea Energy Australia, Subsea U.K. and the Society for Underwater Technology will cease to exist in name only. The deadline for conference paper submissions is September 16, 2013.

**www.aogexpo.com.au**

**Featured Event**

## September 20-21

# Nortek Technical Symposium 2013

Register is now open for the 2013 Nortek Technical Symposium in San Diego, California on September 20-21, Nortek announced.

This year's event features keynote speakers from Ocean Observatories Initiative, Scripps Institution of Oceanography and Woods Hole Oceanographic Institution.

Attendees and presenters also include a host of other scientific researchers, engineers, system integrators and operational clients. The Nortek Technical Symposium is an opportunity for sharing industry professionals' experiences, collaborating for future projects, recruiting of premiere candidates in the industry, hands-on technical training, gaining feedback on data collection and analysis approaches, industry-academic partnerships, product development suggestions and a relaxed and enjoyable time with peers.

**Signature Keynote Presentations:**

- **Tim Cowles** - OOI VP & Director of Ocean Observing: Overview of the Ocean Observatories Initiative (OOI)
- **Rob Pinkel** - Associate Director Marine Physics Laboratory, Scripps: A Brief History of Doppler Sonar Development at SIO: 1974 - Present.
- **Glen Gawarkiewicz** - Senior Scientist, WHOI: Shelf & Slope Processes - Challenges and Opportunities with the OOI Pioneer Array.

**User Contributed Presentations:**

Nortek is currently seeking presenters for various topics. A full schedule of events, technical program and registration information can be viewed online at

**nortekusa.com/2013symposium**

## Falmouth Scientific, Inc.

1400 Route 28A, PO Box 315 Cataumet, Mass. 02534
Tel: (508) 564-7640
E-mail: fsi@falmouth.com / Website: www.falmouth.com

CEO/President: John Baker
Vice President: Fred Hegg (Engineering)
Employees: 15

**The Case:** Falmouth Scientific, Inc. (FSI) has proven itself throughout the years to be a leading manufacturer of precision instrumentation and systems for global oceanographic applications.

**The Company:** Founded in 1989, FSI's experience includes the design, manufacture, and integration of stand-alone and turnkey systems to collect and relay oceanographic data in real time. Personnel include engineering, technical, production and quality assurance staff that are skilled in the manufacturing and testing of precision sensors and systems. Core competencies include system and design engineering; on-site volume production, rapid prototyping, encapsulation, and assembly; and electrical, acoustic, and system testing. FSI specializes in precision marine sensors, specialty transducers and integrated oceanographic systems. Our products and systems are used in environments ranging from estuarine to full ocean depths. Besides offering a suite of standard products the FSI team has engineered many custom solutions. FSI operates from a state-of-the-art manufacturing facility located in the marine technology corridor on Cape Cod, MA. FSI serves many different customers and markets throughout the world including oceanographic research institutions, academic communities, government agencies, fisheries, engineering firms and several segments of the oil and gas industry.

**The Tech:** **Sensors:** The FSI ACM-PLUS is the next generation of single-point Acoustic Current Meter (ACM) technology, offering new features, functionality, and benefits designed to enhance the ability to measure current speed and direction. Key advantages are the ability to make accurate measurements in very clear and/or very shallow water, as well as right at the surface and sea-floor boundary areas. Data can be acquired in real-time or captured and logged in internal memory. FSI offers shallow (200m) and deep (7,000m) versions as well as options to add an integrated CTD and one or two external sensors. FSI also offers instruments to measure waves, tides, and other environmental parameters such as structural vibration and stress.

**Systems:** The HMS-620 Bubble Gun low-frequency, ultra-portable seismic system makes it possible to capture survey data from a small boat without the need for support equipment, deployment infrastructure or heavy machinery. FSI also offers sidescan sonar systems, hull mount arrays and other specialized transducer systems.

**Service:** FSI's service areas include custom design, development, integration, and production of marine systems and acoustic transducers; and manufacturing services such as prototyping, product assembly, encapsulation (potting), calibration, and pressure testing. FSI excels in rapid prototype fabrication of acoustic transducers and subsystems.

## MTR 100 Correction

Last month Falmouth Scientific, Inc. (FSI) was included in Marine Technology Reporter's Annual "MTR 100", our annual reporting on 100 leading and innovative companies in the global subsea space. Unfortunately, some of the information presented in the Falmouth Scientific's July/August 2013 MTR100 listing was incorrect. The correct version is presented to the left.

# MARINE TECHNOLOGY REPORTER

# 2014 Editorial Calendar

| ISSUE | EDITORIAL | BONUS DISTRIBUTION | AD CLOSE |
|---|---|---|---|
| **JANUARY/ FEBRUARY** | **Subsea Vehicles: UUVs**<br>**Market:** Harsh Environment Systems: Arctic Ops<br>**Tech:** Scientific Deck Machinery<br>**Product:** Training Resources | **Arctic Technology Conference**<br>Feb. 10-12, Houston<br>**Subsea Tieback**<br>March 4-6, San Antonio | January 21 |
| **MARCH** | **Instrumentation: Measurement, Process & Analysis**<br>**Market:** Oceanology Intl '14 Technology Spotlight<br>**Tech:** Umbilicals, Cables, Connectors & Power Supply<br>**Product:** Sonar Systems & Seafloor Mapping | **Oceanology International**<br>March 11-13, London | February 18 |
| **APRIL** | **Offshore Energy**<br>**Market:** Seismic Vessels & Systems<br>**Tech:** Deepwater Positioning, Mooring & Anchoring<br>**Product:** Subsea Pipeline Survey & Inspection | **Offshore Technology Conference**<br>May 5-8, Houston<br>**AUVSI 2014**<br>May 12-15, Orlando | March 27 |
| **MAY** | **AUV Operations**<br>**Market:** Offshore Renewable Energy: Wind, Wave & Tide<br>**Tech:** Salvage & Recovery<br>**Product:** Remote Sensing & Environmental Monitoring | **Energy Ocean International**<br>June 3-5, Atlantic City | April 24 |
| **JUNE** | **Hydrographic Survey**<br>**Market:** Comms, Telemetry & Data Processing<br>**Tech:** GPS, Gyro Compasses & MEMS Motion Tracking<br>**Product:** Underwater Imaging: Lights, Cameras, Sonar | | May 27 |
| **JULY/ AUGUST** | **MTR100**<br>Annual Listing of 100 Leading Subsea Companies<br>**Special Report:** Oceans 2014 Preview<br>**Region Focus:** Newfoundland and Labrador, Canada |  | July 21 |
| **SEPTEMBER** | **Ocean Observation: Gliders, Buoys & Sub-Surface Networks**<br>**Market:** Research Vessels<br>**Tech:** ROV Tech: Workclass to Micro Systems<br>**Product:** Geospacial Software Systems for Hydrography | **Oceans 2014**<br>Sept. 14-19, St. John's, Newfoundland and Labrador, Canada | August 21 |
| **OCTOBER** | **Subsea Defense**<br>**Market:** Oil Spill Monitoring & Tracking<br>**Tech:** Seafloor Engineering & Remote Operations<br>**Product:** Fiber Optic and Electrical Connectors | **Clean Gulf**<br>Dec. 2-4, San Antonio | September 25 |
| **NOVEMBER/ DECEMBER** | **Fresh Water Monitoring & Senors**<br>**Market:** Subea Engineering & Construction<br>**Tech:** Offshore Inspection, Maintenance & Repair (IMR)<br>**Product:** Commercial Diving: Lights, Cameras, Helmets | **Underwater Intervention 2015**<br>New Orleans | November 26 |

March 15- November 8, 2013

# Coming this spring!

For the third year in a row Marine Technology Reporter sponsors the Subsea Photo Contest, showcasing the best underwater images- from vessels and equipment to people and ocean life. Winning photos will be published in a special section of the Nov / Dec issue of MTR, featuring the Grand Prize Winner *on the front cover of the magazine.*

## 3rd Annual

# Subsea Photo Contest

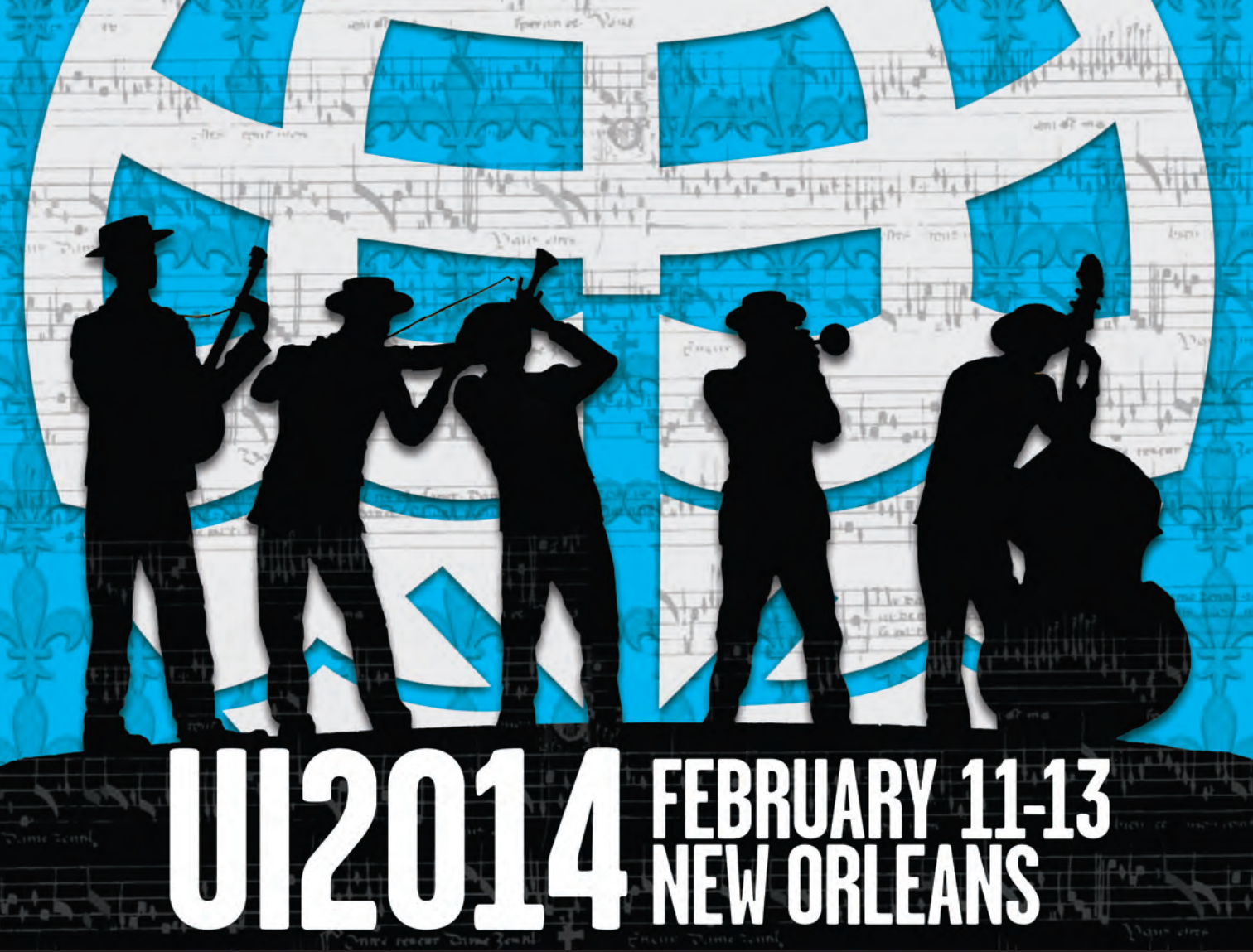
MARINE TECHNOLOGY REPORTER

and

SeaDiscovery.com

underwater technology and ocean science news

To see submissions from last year, go to:
http://photos.seadiscovery.com




Underwater Intervention's sponsoring organizations are non-profit, membership supported professional organizations. The world's premier event for Commercial Diving Contractors, Remotely Operated Vehicles, Manned Submersibles, and all other aspects of the Underwater Operations Industry. Please join us at the Morial Convention Center in New Orleans, LA.

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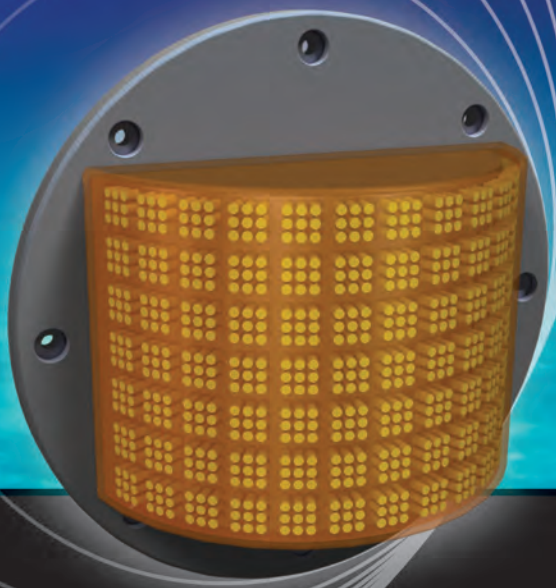

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