Great Lakes Observing System • View from St. John's • Underwater Intervention 2012 Preview

MARINE TECHNOLOGY REPORTER

November/December 2011 www.seadiscovery.com

5-minutes with
Marty Klein
The Godfather of
Side Scan Sonar

Picture Perfect

Winners of *MTR's* First Image Contest

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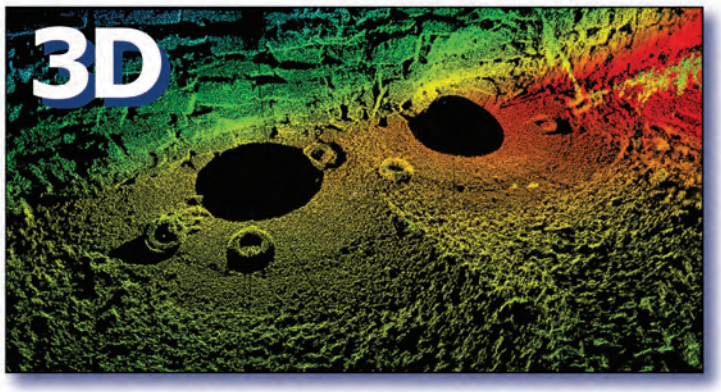

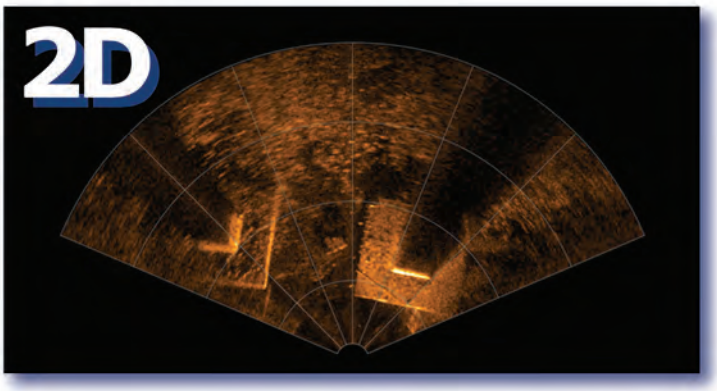

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November/December 2011

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Marine Technology Reporter • Volume 54 • Number 9

Pictured on the Cover

Pictured on this month's cover is "Underwater 'Rivers' in Knight Inlet as revealed by multi-beam sonar technology." The image, submitted by Robert Kung and acquired February 2011 at Knight Inlet, British Columbia, Canada, was voted the top image in MTR's inaugural image contest. **See results starting on page 34.**

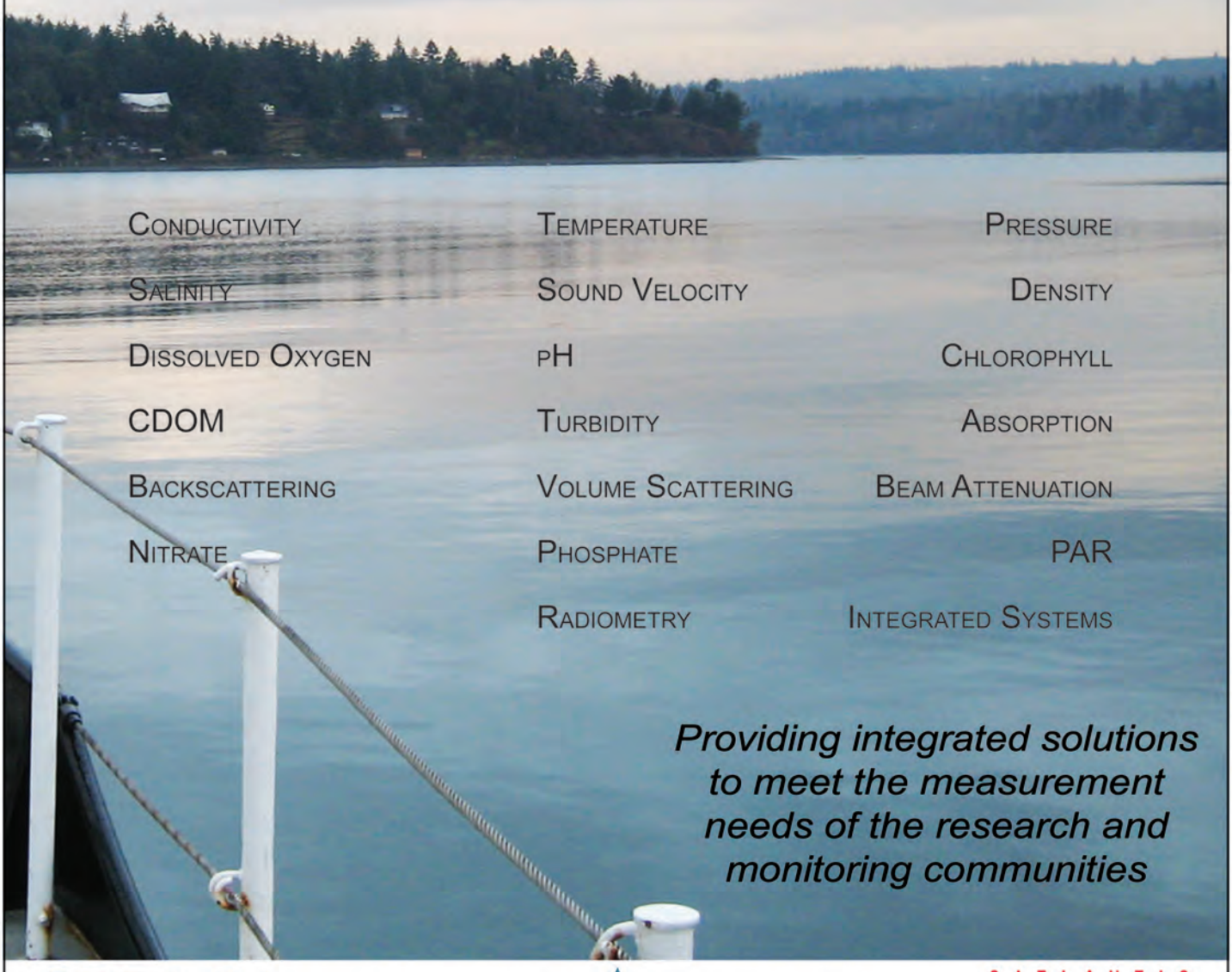
Pictured in the background:

"Acoustic Imagery" finalist in MTR's inaugural photo contest, submitted by Matthew Lawrence, NOAA. PROSAS Surveyor Synthetic Aperture Sonar Image of the Collided Schooners Frank A. Palmer and Louise B. Crary in the Stellwagen Bank National Marine Sanctuary. Image Captured: September 2010

Sea-Bird Ocean Group

Satlantic, WET Labs, and Sea-Bird Electronics: Partners in Instrumentation

Accurate, stable, and reliable aquatic instruments from the smallest streams to the deepest oceans



Conductivity	Temperature	Pressure
Salinity	Sound Velocity	Density
Dissolved Oxygen	pH	Chlorophyll
CDOM	Turbidity	Absorption
Backscattering	Volume Scattering	Beam Attenuation
Nitrate	Phosphate	PAR
	Radiometry	Integrated Systems

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SATLANTIC
www.satlantic.com
sales@satlantic.com
+1 902-492-4780

Authors

Rhonda Moniz *is an ROV Pilot/Engineer, Diving Safety Officer, and Underwater Cinematographer. She has also worked over the past 20 years, as a lead Science Diver and Diving Instructor. Moniz is founder and Director of Operations for Benthic Exploration, a company specializing in marine technology including ROV, AUV, Side scan, and sub-bottom profiling technology. She has been involved in a number of expeditions around the globe including several as ROV Pilot and Engineer for Dr. Robert Ballard.*

She has served as the lead science diver and underwater cinematographer for the University of Massachusetts – Marine Science and Technology Campus, and the University of Rhode Island. She has worked as the underwater Director of Photography for the Virginia Institute of Marine Science, Museum of Natural History in New Mexico and has acted as Science Advisor for the underwater-segment for "Evolution" an eight hour PBS series for NOVA. She has also worked on several Discovery Channel productions. She is currently principle investigator for Rescue 57, a project off the coast of Ireland to locate and raise a WWII Halifax Bomber. A documentary and companion book will be included in this project. She has worked as an Open Water SCUBA Instructor and has attained Master Instructor Rating with the Professional Association of Diving Instructors. As an Instructor Ms. Moniz has taught at a number of Universities including, Suffolk University, Massachusetts Institute of Technology, Tufts University, Boston University, Dean College, and the University of Massachusetts-Marine Science and Technology Campus.

Ms. Moniz is a full member of the American Academy of Underwater Sciences, Divers Alert Network and, the Boston Sea Rovers.

See Rhonda's Blog twice each week on www.SeaDiscovery.com

See Story on page 24

Linda Joy *writes about NOAA's research activities for the NOAA Office of Communications and External Affairs. She has a journalism degree from the University of Maryland and prior to joining NOAA in 2008, she wrote about research at the National Institute of Standards and Technology and the National Institutes of Health.*

See Story on page 42

Image courtesy Robert Kurtz.

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NEW YORK
118 E. 25th St., New York, NY 10010
Tel: (212) 477-6700; Fax: (212) 254-6271

FLORIDA
215 NW 3rd St., Boynton Beach, FL 33435
Tel: (561) 732-4368; Fax: (561) 732-6984

PUBLISHER
John C. O'Malley
jomalley@marinelink.com

Associate Publisher & Editor
Gregory R. Trauthwein
trauthwein@marinelink.com

Contributing Editors
Capt. Edward Lundquist, USN (Ret.) • Rhonda Moniz
Claudio Paschoa • Andrew Safer

Production Manager
Irina Tabakina
tabakina@marinelink.com

Production Intern
Nicole Ventimiglia
nicole@marinelink.com

Sales Administration & Office Manager
Rhoda Morgan
morgan@marinelink.com

Sales & Event Coordinator
Michelle Howard
mhoward@marinelink.com

Manager, Accounting Services
Rhoda Morgan
morgan@marinelink.com

Manager, Public Relations
Mark O'Malley
momalley@marinelink.com

Manager, Marketing
Jocelyn Redfern
jredfern@marinelink.com

Manager, Information Technology Services
Vladimir Bibik
bibik@marinelink.com

CIRCULATION
Kathleen Hickey
mtrcirc@marinelink.com

ADVERTISING

Vice President, Sales and Marketing
Rob Howard
howard@marinelink.com
Tel: (561) 732-4368 • Fax: (561) 732-6984

Advertising Sales Manager
Lucia M. Annunziata
annunziata@marinelink.com
Tel: (212) 477-6700 • Fax: (212) 254-6271

Mike Kozlowski
kozlowski@marinelink.com
Tel: (561) 733-2477 • Fax: (561) 732-9670

Japan
Katsuhiro Ishii • amskatsu@dream.com
Tel: +81 3 5691 3335 • Fax: + 81 3 5691 3336

Having published *Marine Technology Reporter* for more than six years, it is extremely difficult to point to any single edition that clearly stands out as my favorite. However, having just put the ribbon on the November/December 2011 edition, I can honestly say that this is clearly in my Top Two.

Earlier this year we announced plans for our first ever international photo contest, inviting photographers from around the world — inside the subsea technology field and out — to submit to us their most compelling images regarding the diving and undersea technology industry. The results far exceeded expectations in terms of quantity and quality, with participants submitting more than 500 images including acoustic imagery, people, vehicles & structures, and ocean life. Starting with the cover and continuing on page 34, have a look at the images that make up MTR's First Annual Image contest.

This month we welcome **Rhonda Moniz** into the editorial fold. You can read Rhonda's impressive credentials on page 4, and I'm betting you will see a lot more of her in print and online at **www.SeaDiscovery.com**, as she has recently started a twice-weekly blog on this spot, as well as taken on editorial duties in the creation of our daily news and information. This edition marks the first time she has appeared in print, and it is a tremendous debut by my estimation. Last year on cruise with **Dr. Robert Ballard** as an ROV Pilot and Engineer, Rhonda had the opportunity to spend some time with **Marty Klein**, widely regarded (and conferred here!) as the *'Godfather of Side Scan Sonar.'* Last month Rhonda spent some time interviewing Marty in his home, and the result is an insightful and informative article on a true subsea technology pioneer.

Gregory R. Trauthwein • trauthwein@marinelink.com • tel: 212-477-6700

MARINE TECHNOLOGY REPORTER
www.seadiscovery.com
Vol. 54 No. 9
ISSN 1559-7415
USPS# 023-276

118 East 25th Street,
New York, NY 10010
tel: (212) 477-6700;
fax: (212) 254-6271

Marine Technology Reporter ISSN 1559-7415 is published monthly except for February, August, and December by New Wave Media, 118 E. 25th St., New York, NY 10010-2915. Periodicals Postage at New York, NY and additional mailing offices.

POSTMASTER: Send address changes to MARINE TECHNOLOGY REPORTER, 118 E. 25th St., New York, NY 10010-2915. Postmaster send notification (Form 3579) regarding undeliverable magazines to Marine Technology Reporter, 118 East 25th Street, New York, NY 10010.

Publishers are not responsible for the safekeeping or return of editorial material.

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MTR Digital

On page or on-screen at **www.SeaDiscovery.com**, Marine Technology Reporter is designed to keep you informed of breaking industry news 24/7. Here are some bits you might have missed:

11/28/2011

Bibby Invests In North Sea Market

Aberdeen-based subsea installation contractor Bibby Offshore has announced a multi-million pound investment in marine assets for its core North Sea market. From January 2012, the DP3 Diving Support Vessel, Toisa Polaris, will come under the control of Bibby Offshore. The vessel will be taken on a 2-year time charter with options to extend. This also includes a pre-agreed purchase option as part of the deal with Toisa Ltd.

11/23/2011

Norway Launches Offshore Oil Drive

Norway's energy ministry on Tuesday began a formal process to open the central Barents Sea for oil and gas exploration in the wake of this year's treaty with Russia dividing the sea into two economic zones.
"If we succeed with our effort, it will lay the foundation for a new era in the high north," Minister of Petroleum and Energy Ola Borten Moe said as he unveiled a proposal to assess how oil and gas activity would affect an offshore area the size of Denmark.

11/28/2011

Planet Ocean Aids Crossing

Surrey based Planet Ocean is supplying a TRIAXYS directional wave buoy to provide vital data for the new replacement Forth River Crossing.
The 1m diameter buoy, manufactured in British Columbia by AXYS Technologies Inc, will provide wave height and direction information during all phases of the construction and maintenance of this significant infrastructure project.

Correction

The cover photo of the September 2011 edition of *Marine Technology Reporter* was improperly credited. The Photo Credit should have read "Photo: Andrew Larkin, NOAA."

New Monitoring Tech helps Reveal Secret Arctic

A group of Arctic researchers has employed the latest monitoring technology to investigate the effects of climate change, by measuring temperature and salinity in the water column beneath surface ice. The results of the investigation, which used YSI's new Castaway-CTD, could cast new light on our understanding of the ways in which shifting ocean currents impact upon the climate in northern Europe. The Catlin Arctic Survey is a unique collaboration between scientists and explorers, and the Castaway enabled the researchers to work very quickly in extremely hostile conditions because the device is small, portable and can be operated in the field without the aid of a computer.

Previous research looked at ice thickness and ocean acidification, but the latest Catlin Survey work has studied freshwater currents beneath the ice surface to help understand their effect on bottom-up ice melting, which is disrupting global ocean circulation.

It is well established that the Arctic environment has a significant effect upon the global climate. For many years, climate scientists have raised concerns over future shifts in global weather systems and highlighted the role that the Arctic plays in such systems. Changes in the Arctic heavily contribute to the Thermohaline Circulation; a giant aquatic conveyor connecting the planet's oceans, distributing heat, oxygen and nutrients. Changes to the Thermohaline Circulation combined with vast atmospheric, positive feedback loops (that produce large quantities of methane from the melting permafrost) that occur within the Arctic, can have drastic repercussions on the global climate.

In 2011 the Catlin Arctic Survey was commissioned by The Catlin Group to assess the temporary ice base on the Prince Gustav Adolf Sea, on the northern most fringe of Canada's Arctic archipelago, around 800 miles from the North Pole.

Organic Matter

A key measurement parameter for the team was Colored Dissolved Organic Matter (CDOM), because high levels can result in 40% higher light absorption. In the Arctic, much of the CDOM is derived from three of Northern Russia's vast river mouths. Commenting on the significance of CDOM, Dr Victoria Hill, a British-born Oceanographer, said: "Locally CDOM should act to increase thermal stratification, trapping heat near the surface. The water becomes more stable and there is reduced mixing. However, if surface ice melts, it creates an upper layer of fresh, cold water which does not mix. In the long run, the surface water becomes warmer and no longer sinks to form the deep and colder water that draws the Gulf Stream to Northern Europe."

The researchers anticipated that the Arctic Ocean would be highly transparent, because the rivers contributing CDOM were frozen. However, the team determined that this was not the case. In fact, Dr. Hill revealed: "In the Chukchi, between 70 and 80% of solar radiation was being absorbed by CDOM." In another data set, retrieved by Adrian McCullum, from the Scott Polar Research institute, concerning results were obtained from a sample of the water column; at a depth below 200m, the water was 1 Deg C colder than expected. This significant change in normally stable, deep water, suggests that the surface melt water was sinking, driving warmer water into contact with the surface ice. This sparked further interest into the variation of temperature in the Arctic Ocean.

Arctic Ocean Profiling

Highly specialized equipment is necessary for profiling very deep water. However, YSI's Castaway CTD has been developed to provide a simple and accurate method for the rapid determination of conductivity, temperature and depth down to 100m. Incorporating GPS, sensors, data logging and a display into one

compact instrument, the device is literally cast (or lowered) into water and retrieved immediately. The Castaway automatically collects and computes the data and users are able to see the result of their work immediately on a small display. The investigation in to CDOM's effect on ocean temperatures was therefore an ideal application for YSI's Castaway-CTD (conductivity, temperature and depth). A light-weight and easy to use hydrographic profiling instrument, with high-resolution sampling of conductivity, temperature and depth, the Castaway was a vital piece of sampling equipment used by the Catlin Arctic Survey team.

User Feedback

Ann Daniels, of the Catlin Expedition Team was keen to stress the importance of the CTD to the success of the survey, "It was very

The researchers anticipated that the Arctic Ocean would be highly transparent, because the rivers contributing CDOM were frozen. However, the team determined that this was not the case. In fact, Dr. Hill revealed: "In the Chukchi, between 70 and 80% of solar radiation was being absorbed by CDOM."

lightweight, perfect for a long-range scientific expedition. The LCD display was very useful as it allowed the team to view information from the CTD while in the field, and allowed 'live science' to be relayed back to HQ by phone. It meant there was interest generated during the expedition rather than having to wait till the unit was returned to the UK."

Easily deployed, the Castaway was cast into bore holes created in the Arctic ice, and allowed to free–fall at depths of up to 100 m, its sensors gathering data, including a temperature system able to respond within 200 milliseconds. The device was especially well designed for surveys in this extreme environment. A rugged, non-corrosive housing, a flow-through design, AA battery power and tool-free operation meant Castaway was perfectly suited for an Arctic survey.

"The Castaway CTD was deployed by the explorer team for the Catlin Arctic Survey 2011 during March to May," said. Dr. Tim Cullingford, Science Program Manager. "The conditions at this time of year in the Arctic are extreme, with temperatures down to -40DegC. Nevertheless, the Castaway was successfully deployed through holes drilled in the ice to an ocean depth of 100 meters. Its compact nature meant that it was easy to handle (e.g. keeping it warm just before deployment was simply done by placing inside the explorer's jacket). The screen allowed an immediate return of temperature and salinity readings, which were successfully relayed back to London HQ on a regular basis. In the round, the Castaway provided an easy and useful back-up to the data returned by our main CTD."

www.ysi.com/castaway

MacArtney Brings Offshore Power Ashore

The SR250 floating turbine from Scottish renewable energy company, Scotrenewables, is a floating tidal device. The 33m, 100 ton SR250 is fixed to a mooring turret which is tethered to the sea floor. The construction of the turret allows the turbine to move with the direction of water movement, positioning itself automatically for optimal energy capture in much the same way that windmills turn to face the oncoming wind. Harnessing the renewable power is just one part of the process – it also needs to be exported to the grid onshore through a medium voltage cable. The Scotrenewables design, that combines a dynamic turbine mounted on a tethered turret, can put significant strains on the riser section of the export cable.

Designing the right cable and connector infrastructure system was important from the outset to ensure that power harnessed by the turbine could be reliably fed to the onshore grid. Scotrenewables chose MacArtney to provide the infrastructure for its 250kW prototype and its design is a result of close cooperation between engineers from both companies.

Where Dynamic Meets Anchored

Infrastructure that connects dynamic systems to static cable anchoring needs to be carefully designed to reliably maintain power and signal contact as the turbine moves horizontally with the tide as well as vertically with wave movement. The SR250 turbine has a turret and a vertical swivel. At the turret, a 6.6kV wet mate connector acts as a stab plate. As the turbine turns about this axis to face the water flow, this swivel turret holds the dynamic unit on the anchoring and the swivel ensures that the signal and power

Earlier this summer, 2011, Orkney based Scotrenewables launched their prototype floating tidal turbine, the SR250, designed to minimize the installation and maintenance costs of tidal energy compared to seabed-mounted tidal turbines. Vital infrastructure for this renewable energy project was designed and supplied by MacArtney Underwater Technology.

connections in the cable remain intact and prevent them from twisting during the 360° movement.

Scotrenewables and MacArtney worked together to custom design the 6.6kV umbilical that can carry the required 250kW. For this prototype, the 3500m cable also has two signal STPs (screened twisted pairs) that transfer data to and from the turbine to shore. Protecting the cable extends its functional life and preventing bending and twisting of the cable at the termination point is vital for preventing cable fatigue and failure. At the point of contact between cable and turbine, a steel stress termination on the high voltage wet mateable connector pair take the strain off the cable. The termination point where the cable exits the stress termination is also vulnerable as vibrations in the cable can weaken it over time. A bend stiffener was designed into the system to dampen the vibrations to help protect the cable from fatigue and extend its working life.

Close Cooperation

Mark Hamilton, CTO at Scotrenewables said, "MacArtney was the ideal subsea engineering partner for us in this our first venture into large-scale offshore deployment. Their vast experience in component supply, and support during the design and installation phases were instrumental in delivering our project on time and on budget."

The system will be tested in the waters off Orkney for two years, exporting power to the grid. Testing the turbine in real sea conditions will provide the company with invaluable advice and experience before producing the full scale 1-2MW version.

Westwood
N.Sea Future is "Bright"

"Despite a long-term decline in oil & gas production in the North Sea, its services and support industry has a bright future," said John Westwood, Chairman of energy business advisors Douglas-Westwood, in Aberdeen recently. Addressing a major event organized by the Norwegian British Chamber of Commerce on opportunities and challenges for the industry in the North Sea area, Westwood noted that the North Sea is a major world-class basin that for the past 40 years has delivered huge economic benefits to Norway and The UK.

"However, oil and gas production is in decline," he said. From its peak a decade ago Norwegian total production is down some 32% and the UK 46%. Despite recent discoveries and development announcements it will not recover to historic highs. "Norway is of course in a better position than the UK due to its slower depletion policy, recent significant finds and also it has the 'High North' – the Arctic promises major opportunities, but at a price. "The continuing challenge for both countries is to greatly slow production decline by focusing on maximizing recovery from existing fields and the multitude of small fields that remain untapped and extensively explore the northern & western frontiers."

John Westwood, pictured addressing delegates at OceanTech Expo.

OFS Boom

"But in the decades ahead it will be the support industry that has developed to serve North Sea oil and gas, that will ultimately deliver greater economic benefit than the oil & gas itself," Westwood continued. Both nations have built major oil & gas services industries and developed world-class technologies and this combination is the legacy that will outlive local reserves. Large volumes of products and services are already exported and both Aberdeen and Stavanger have become world-class industry centers.

"As evidence of this, consider the reason we are all here today – the Offshore Europe Conference & Exhibition. At the peak of North Sea production a decade ago the show attracted some 24,000 people. In 2009 it was 48,565 and this week it may exceed 50,000 people from 110 countries. "So while oil & gas production in the region is slowly declining the international importance of the oilfield service industries that have evolved here in the North Sea is increasing."

People problems

"The most significant problem both nations' industries face is people," said Westwood. "The baby-boomers are retiring, many young people are under-educated or have zero-value qualifications and those that are capable are often reluctant to enter an industry perceived as lacking in green credentials. The oil and gas industry clearly offers our young people a fantastic future, but is anyone in the education system telling them?"

"Pulling together operators & OFS companies to force an education & training culture is essential to assure the future. Undoubtedly the training sector is a great commercial opportunity. "

Enhanced Heave Compensation via ROVINS

Calesurvey works with sister companies Calegeo and Calefleet to provide marine survey and contracting services to the offshore energy and telecom industries. Recently Calesurvey was in the market for a motion sensor to use in conjunction with a variety of instruments, most notably an R2Sonic multibeam echosounder (MBES), onboard the Kommandor Stuart, the company's dedicated DP-2 geophysical survey vessel. Based on upcoming survey work in the seas around Greenland, where challenging, long-period swells are common, Calesurvey was particularly interested in the heave compensation performance of the motion sensor. **iXBlue proposed Calesurvey use one of its ROVINS units to provide the necessary input required by the MBES.** ROVINS is intended for use by the offshore industry in water depths of up to 3000m. ROVINS displays a heave accuracy of 2.5 cm or 2.5% of amplitude, whichever is lower. This performance comes from using the Smart Heave algorithm, which intelligently filters the vertical acceleration data prior to integration and applies a 100-second delay on the datastream, during which short-term motion history is taken into account, ultimately to provide the best possible heave output. iXBlue engineers were on hand to install the ROVINS unit on the Kommandor Stuart and to help iron out one or two minor integration issues in preparation for a trial in the North Sea. One of the key advantages of the unit was the ability to easily mount it on the same pole as the MBES. Most importantly, the survey results from the MBES contained half of the heave artefacts that Calesurvey was accustomed to, with twice the overall heave accuracy. Using SMART HEAVE, the MBES survey was within Calesurvey's target specification and achieved Special Order standard as defined by the International Hydrographic Organization (IHO), and this before any post-processing of the data. The trial was also successful in demonstrating to Calesurvey's clients ROVINS ability to provide the vessel's position in the absence of a GPS input. ROVINS in-built INS will be of considerable benefit when the vessel is operating, as is planned, in higher latitudes with high sun-spot activity, when the likelihood of GPS dropouts rises appreciably.

iXBlue proposed Calesurvey use one of its ROVINS units

Bureau Veritas is Integrating Offshore Safety & Service

There are a lot of lessons yet to be drawn from the Deepwater Horizon incident, but one thing has become very clear already: a more integrated safety system covering the unit and the drilling equipment is required to make offshore drilling safer. Fortunately, that need for more integration to improve safety is going with the tide of business needs. More and more offshore operators are looking for one body to oversee all their compliance needs. This is one area where business needs and increased safety go hand in hand.

Dan Frorup, Vice President in charge of the Offshore Deep Sea Global Business Unit (OGBU), Bureau Veritas, explains, "For some time we have seen demand from major offshore operators to integrate certification and classification services for offshore units. They also want to incorporate risk-based inspection and asset integrity maintenance schemes with their certification, classification, conformity assessment and statutory compliance needs. Ashore, we see growing demand for all sorts of second party verification, supplier qualification and quality control services, training and documentation control services. The operators want all that delivered by the same business, through one point of contact. So business needs were already driving us to create a unified business unit and unified technical approaches to deal with offshore energy in all its aspects. The Deepwater Horizon has now shone a bright light on one aspect of that which also needs to be included, which is the drilling and blow-out equipment. And it shows how, when all information about a whole system is shared and is regulated in one way, safety will be enhanced."

Extending Classification Rules to Meet Demand

Bureau Veritas has extended its classification rules to include the items of drilling equipment which are essential for the safety of offshore drilling operations. These cover well control equipment including Blow-Out Preventers, marine risers, tensioning systems, heave-compensation systems, mud circulating systems, cementing equipment, drilling derrick and supporting structures. For the first time offshore drilling operators can turn to one body to assess the entire drilling unit and equipment under one integrated approach.

Says Frorup, "Bureau Veritas has the technology and well developed services to support the five core families of assets in the deepwater energy field; drill ships of all types, production floaters with hull, topsides and moorings, subsea including SURF (Subsea, Umbilicals, Risers and Flowlines) and SPS (Subsea Production Systems), fixed platforms and offshore wind turbines. Now we also have a single business unit to deliver those services, and that is important for both commercial and safety reasons."

Bureau Veritas: In Practice and In Action

Examples of recent major integrated offshore projects entrusted to Bureau Veritas include the Third Party Independent Verification of the Goliat (pictured) field off Northern Norway on behalf of ENI, covering the FPSO, subsea systems, flow lines and risers, and services to the Shtokman development in the Barents Sea including the basic design review for the Shtokman FPU and Independent Verification Services to provide assurance of design integrity at the FEED stage of disconnectable floating production platforms, the offshore trunk pipeline and subsea production systems.

"We see demand for integration as a global trend," says Frorup. "Perhaps the U.S. area was a little behind the global curve on this, as the U.S. way is to look for the best contract at the time to do the job, and put the whole operation together that way. And U.S. regulation is divided and spread across various bodies. But the impetus of the DWH will push domestic regulators and operators to be more like those in the North Sea and other areas, where integration of certification, validation and classification and a holistic approach to safety is more the norm. That's already happening in Brazil, for example, where Bureau Veritas is very active in offshore work, especially with Petrobras, for whom it is classing the P55, the world's largest semi-submersible."

To be installed in 2012, the P55 production platform will reach a peak production of 180,000 bpd. Bureau Veritas is classing the unit, the production plant and

mooring lines and issuing full statutory certificates on behalf of the Marshall Islands. P-55 will be the thirteenth (13th) floating platform classed by Bureau Veritas with Petrobras, and BV is also responsible for third party certification of several Petrobras pipeline projects.

Additionally, BV has been selected to perform FEED design certification of a new wellhead fixed platform in development by Petrobras R&D Center (CENPES) for the Badejo Field, in Campos Basin. The certification will include subsea riser support structures. BV has also been selected by Petrobras and several EPC contractors to provide technical assistance in complex risk and safety studies, including sophisticated fire and gas as simulations, for all major projects under development by Petrobras, some of them still in the FEED phases, such as the new pre-salt FPSOs.

New Rules for New Technologies

"We have our AIMS system, we have our VeriSTAR tools and we have our well-developed rules of offshore units," says Frorup. "Now, we are adding a new set of Bureau Veritas rules, NI 569, to cover the classification of new generation drillships. Drillships are Mobile Offshore Drilling Units adapted for drilling operations in ultra-deep offshore environments. Units classed under BV's offshore rules can add the optional notation DRILL, published in NI 570. DRILL covers all safety-related drilling equipment. DRILL is applicable to all types of offshore rigs including drillships, semi-submersible, jack-up and Tension Leg Platforms." The new structural Rules in NI569 cover the hull assessment with particular attention to the interface between the hull and structures supporting drilling equipment. Structural assessment is based on specific loading configurations considering typical operations of drillships, including transit, drilling preparation, BOP running, casing running, normal drilling, standby at the intended site and survival. New structural requirements are explicitly defined for moonpool area and moonpool structural details, including hydrodynamic effects. Prescriptive requirements for safety aspects are complemented by risk assessment techniques which are consistent with the requirements of various national regulations.

Both NI569 and NI570 DRILL Rules cover design assessment criteria, construction survey, qualification of novel technology and in-service survey.

The BV Way: Safety + Simplicity = Efficiency

"The big issue with business performance offshore, and with safety, is information not getting shared," asserts Frorup. "When multiple contractors are involved in a project, each using different bodies and different rules to verify compliance, and each subject to different regulatory oversight, it is inevitable that the big picture gets broken into small pieces. There has to be someone looking at the whole picture, with all the information. That way lies safety, and that way lies simplicity, and with safety and simplicity comes efficiency. Integration offshore makes sense."

New Generation RV

Balancing Performance with "Zero Footprint" Objectives

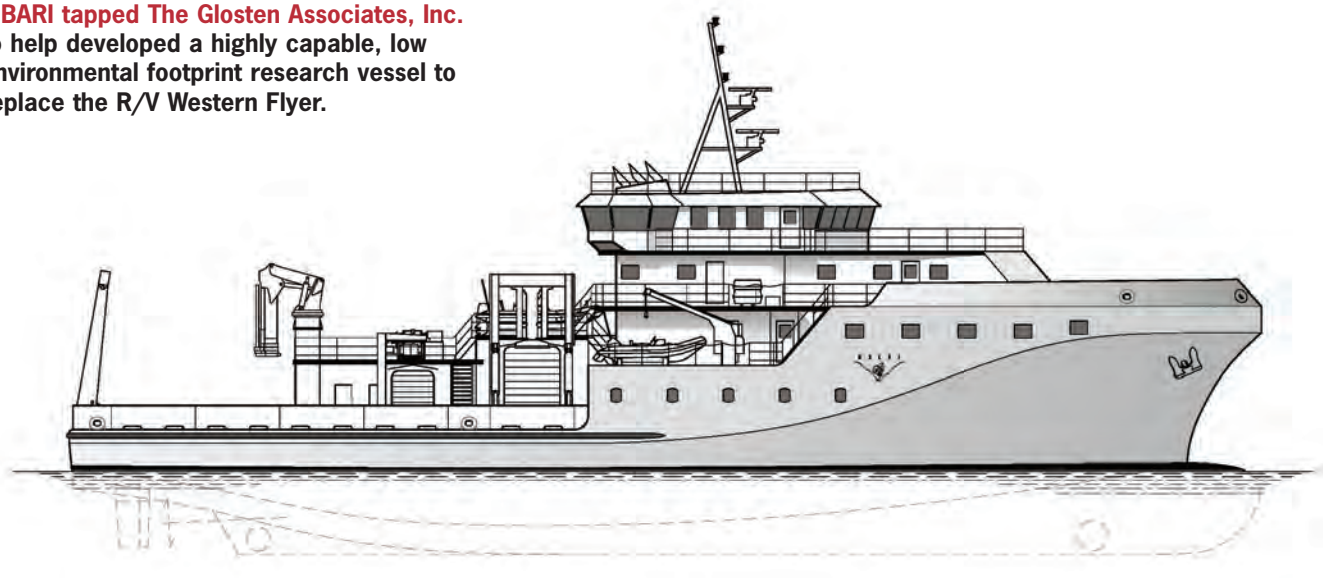
This month's feature vessel highlights a highly capable vessel with zero water emissions and drastically reduced air emissions.

Working for Monterey Bay Aquarium Research Institute (MBARI), The Glosten Associates, Inc. developed a highly capable, low environmental footprint research vessel. The design features options that provide an extensive seakeeping comparison with SWATH and trimaran hull forms. The vessel's very well thought out design also incorporates a life cycle cost benefit analysis, air emissions, and water emissions comparison and recommendations for selection of green systems, such as battery hybrid propulsion, emissions after-treatment, and a new water management system.

In accordance with MBARI requirements, the Glosten design team set about developing a highly capable, low environmental impact research vessel to replace the R/V Western Flyer. In addition to the new vessel's general science operations, it would also need to deploy a remotely operated vehicle (ROV); hence excellent seakeeping performance would be required. For this reason, four designs were developed using three hull types: SWATH (small waterplane area twin hull), trimaran, and monohull. The seakeeping performance of each design was analyzed using a linear, potential theory seakeeping code. The motions were compared and it was found that, due to size limitations dictated by the port facility, the monohull design faired equal to or better than the SWATH and trimaran designs.

To reduce the environmental footprint, "green" options were explored, developed, and compared using a life cycle cost benefit analysis, as well as an air and water emissions comparison. A battery-hybrid propulsion system was developed to maintain the efficient generator load profiles necessary to enable the use of ancillary green systems. A new water manage-

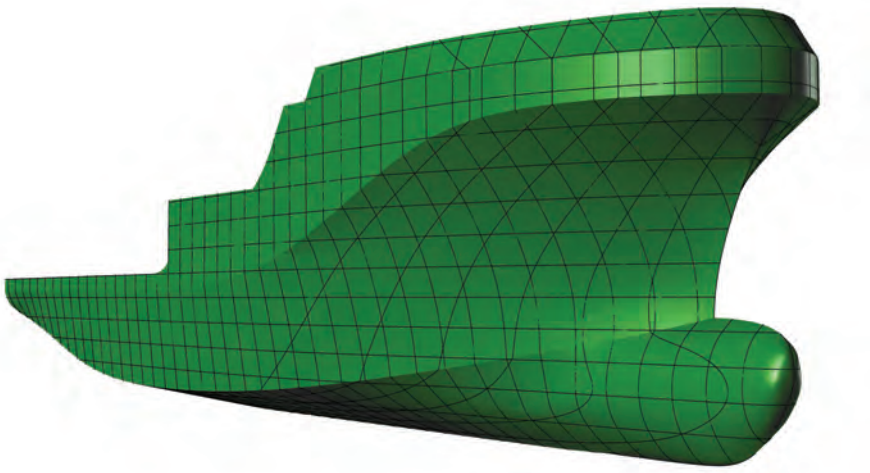
MBARI tapped The Glosten Associates, Inc. to help developed a highly capable, low environmental footprint research vessel to replace the R/V Western Flyer.



ment system was also developed, with a focus on water recycling and zero discharge. As the monohull has a higher deadweight capacity than the other hulls, it permits the greatest flexibility, not only in emissions reductions technologies, but also in science missions. The resulting vessel is an innovative application of proven technologies that reliably meets mission requirements, and practically reduces or eliminates most vessel emissions.

The main generator diesel engines will be required to meet Environmental Protection Agency (EPA) Tier 3 standards. An emission after-treatment system is proposed as an option, in addition to the required EPA standards. The after-treatment system includes a combination selective catalytic reduction (SCR) system, diesel oxidizing catalyst (DOC), and diesel particulate filter (DPF). These treatment devices are capable of dramatically reducing nitrous oxides (NOx), hydrocarbons (HC), and particulate matter (PM) emissions from the diesel engines.

EPA Tier 4 engines, which will be required on many vessels by 2016, are expected to utilize a combination SCR, DOC, and DPF system to meet the stringent emission requirements. This design will exceed Tier 4 emissions standards. Numerous SCR systems have been installed on small vessels and are currently operating with positive results.



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Key Vessel Requirements

Length overall max:	170 ft
Beam max:	56 ft
Draft maximum:	12 ft
Range:	4,000 nm
Endurance:	21 days
Calm water speed:	12 kts
Hanger area:	650 sq. ft. required
Aft and side working deck:	1,200 sq. ft.
Wet lab:	500 sq. ft. required
Dry lab:	400 sq. ft. required
ROV/AUV:	100% operability
	Sea State 4, 25 kts wind
Crew accommodations:	11 total,
	maximize singles
Science accommodations:	18 – 20 total;
	minimum 1 single

Photo Courtesy Provincial Aerospace Ltd.

The Sky's the Limit @ PAL

by Andrew Safer

Having seen its staff grow by 38 percent over the last two and a half years—from 650 to 900—Provincial Aerospace Limited (PAL) is preparing to deliver on a $370 million contract with the United Arab Emirates: modifications of two maritime patrol aircraft that will patrol UAE territorial waters, monitor pollution, and support search and rescue activities. PAL will deliver the two customized Bombardier Dash-8 Q300 aircraft in the first quarter of 2012. Seated in his St. John's, Newfoundland office, PAL Vice President Derek Scott said with pride, "These will be the most sophisticated Dash 8's on the planet."

The UAE government purchased the aircraft and, in February 2009, turned it over to PAL who then designed the refit, selected the technologies that would best meet the requirements, stripped the aircraft down to the metal, installed and tested the systems, and trained the UAE government's pilots and sensor operators. Key components have been provided by a global cast of defense suppliers including Thales (France), FLIR (US), Saab Aviatronics, (South Africa), Elettronica (Italy), Rhode and Schwarz (Germany), and Honeywell (UK).

PAL opened its doors in 1972 to offer flight training and charter operations in St. John's, and in 1980, began offering passenger services in Newfoundland which later expanded throughout eastern Canada. Meanwhile, in 1979, the Hibernia oil discovery on the Grand Banks of Newfoundland and Labrador highlighted the threat icebergs posed to the development of this resource. In 1986, PAL met this challenge by

L to R: Derek Scott, Vice President, Airborne Surveillance and Jake Trainor, Vice President, Maintenance and Modifications Division, Provincial Aerospace Ltd.

Photo credit: Andrew Safer

installing an X-band radar on a civilian aircraft and, after demonstrating the ability to detect icebergs, landed their first surveillance contract with the federal government (Department of Fisheries and Oceans). In 1996 the company began modifying aircraft to meet client requirements such as range, speed, and payload, for maritime patrol, and has done so for many governments including the Netherlands, Malaysia, Trinidad, Barbados, Mexico, and the UAE. PAL also provides air reconnaissance flights using their own aircraft for clients such as the Netherlands Antilles Coast Guard and the Government of Canada. They also provide training to the Colombian National Police, Government of Trinidad and most recently, the Government of the UAE.

When modifying an aircraft, PAL installs a variety of equipment including: 360-degree maritime radars, gyro-stabilized forward-looking infrared, nighttime photography, digital communication, airborne data acquisition and management, anti-submarine acoustic, and signals intelligence systems.

Focused on assisting governments in fulfilling their civilian maritime requirements, PAL has had success executing on its business model. "It's not cost-effective to have military assets looking at fishing vessels and ships pumping their bilges," explained Scott.

Newfoundland's harsh marine environment has been the key factor in PAL's rise to global stature. "This location has forced us to be innovative in our technology development," Scott said. "It's our playground for developing capabilities in all of our operations: target detection, ice reconnaissance mapping, and satellite communications." After acing iceberg detection, Scott and his colleagues soon realized they had a capability that could be applied to fisheries surveillance, pollution monitoring (oil spills and the discharge of ships' bilges), search and rescue, and defense.

Photo credit: Andrew Safer

Whereas PAL purchases sensors and other electronics off the shelf, they use their proprietary Asynchronous Data Acquisition and Management System software for in-flight mission management and data collection (which PAL began developing in 1986), real-time mapping, and report generation.

The UAE contract has been the main growth driver over the last three years, but PAL's ice management business had also been increasing. Since the late 1970s, the company has conducted ice reconnaissance missions and ice management operations on the Grand Banks for Hibernia Management and Development Corporation, Petro-Canada/Suncor, ExxonMobil Canada, Husky Energy, Norsk Hydro, and Chevron Canada Ltd. In 2010, PAL expanded its ice management operations to western Greenland, managing icebergs for Cairn Energy's drilling program in the Baffin Basin—the first wells drilled in the Greenland Arctic in the

"It's not cost-effective to have military assets looking at fishing vessels and ships pumping their bilges,"

Derek Scott, VP, PAL

last 10 years. In 2011, PAL continued this service for Cairn's ongoing drilling program as well as the operations of Shell Norway, also off the coast of western Greenland.

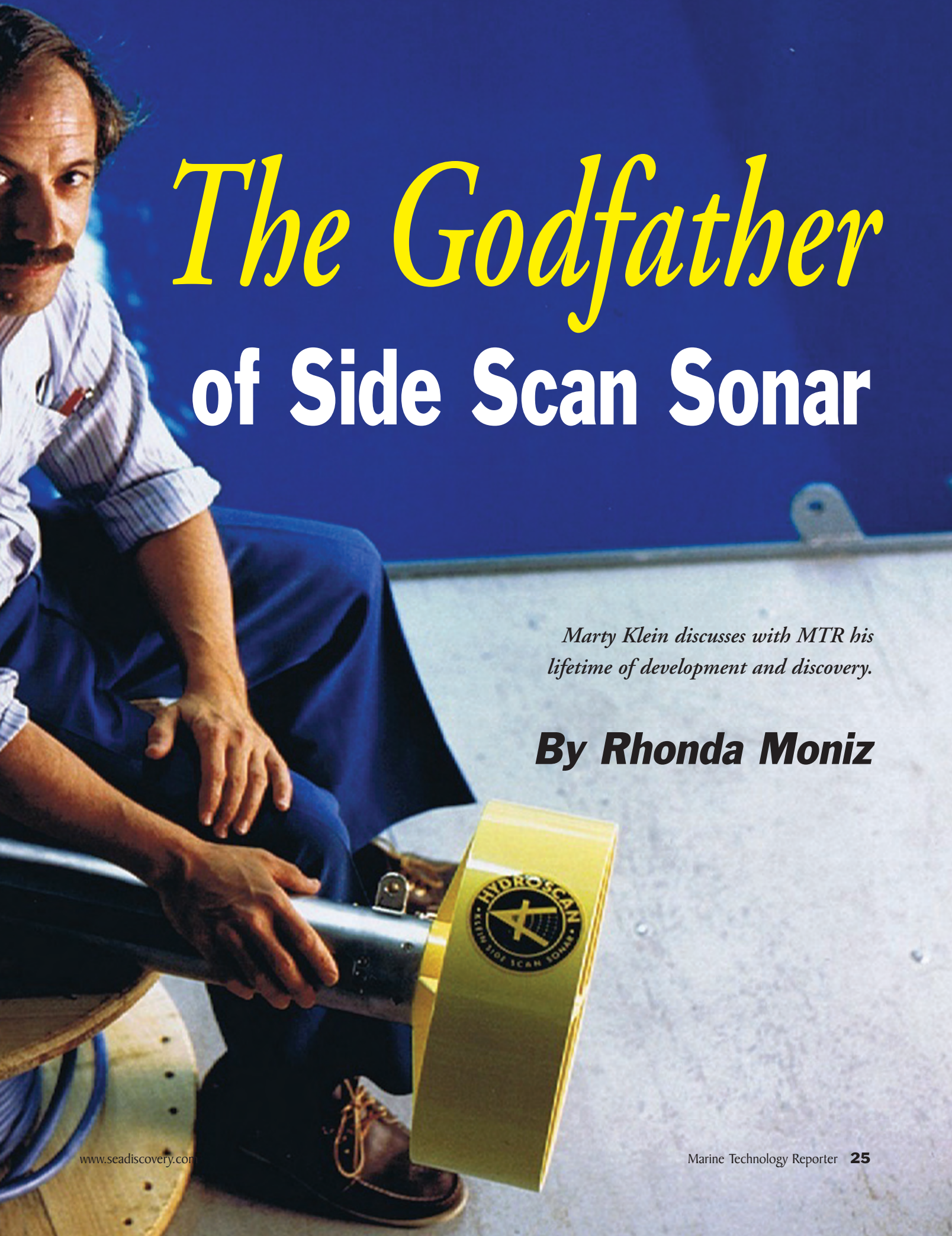
"We have to know where the ice is at all times," said Scott. "These are floating chunks of concrete the size of this room that can do serious damage to a platform offshore if they go undetected."

PAL's ice and weather observers and weather forecaster work together to identify iceberg threats and, when deemed necessary, the berg's trajectory is redirected by means of towing, prop washing, or the use of a water cannon. The company is currently in discussions to provide ice management services for the Shtokman project in the Russian Arctic. "Over the next 20 years, there are many opportunities when we look North," Scott noted.

PAL's third growth center has been in the area of training, having added 20 employees in this new business unit over the last two and a half years. Most are former military personnel who specialized in training in their careers.

In 2006, the company became the first to launch a commercial flight of an unmanned aerial vehicle (UAV) in Canadian airspace. Looking ahead, Scott sees PAL utilizing UAVs to conduct surveillance in the vast reaches of Canada's North. "There is a need to express Canadian sovereignty over that territory," he said. "Canada needs to increase its awareness of who is out there, where they're coming from, if they are a threat to the environment, and if they are breaking the law." For the past four years, the company has been engaged in the RAVEN AUV research and development project in conjunction with Memorial University. "I see all kinds of benefits coming out of that for PAL," Scott observed.

Referring to PAL's $750 million in booked business over the next five years, Scott is looking to maintain the current level of employment in 2012 and is anticipating a further expansion in 2013 and 2014.



The Godfather of Side Scan Sonar

Marty Klein discusses with MTR his lifetime of development and discovery.

By Rhonda Moniz

Does your work require the use of side scan sonar or sub-bottom profiling? Maybe you are dredging a harbor, looking for a site location for a pipeline, or trying to find an ancient shipwreck? If so then you have Marty Klein to thank for making your job easier. Known as the godfather of side scan sonar, he has been a key player in the development of this technology. A technology that has allowed scientists, engineers, and governments from around the world, explore the oceans depths with precision and ease. This year marks the 50th anniversary of Marty Klein's auspicious beginnings as a graduate student at MIT working with the famed scientist, Dr. Harold E. "Doc" Edgerton of EG&G International, Inc. Marine Technology Reporter's Rhonda Moniz recently sat down with Mr. Klein at his home in Andover, Mass., to talk about his industrious career.

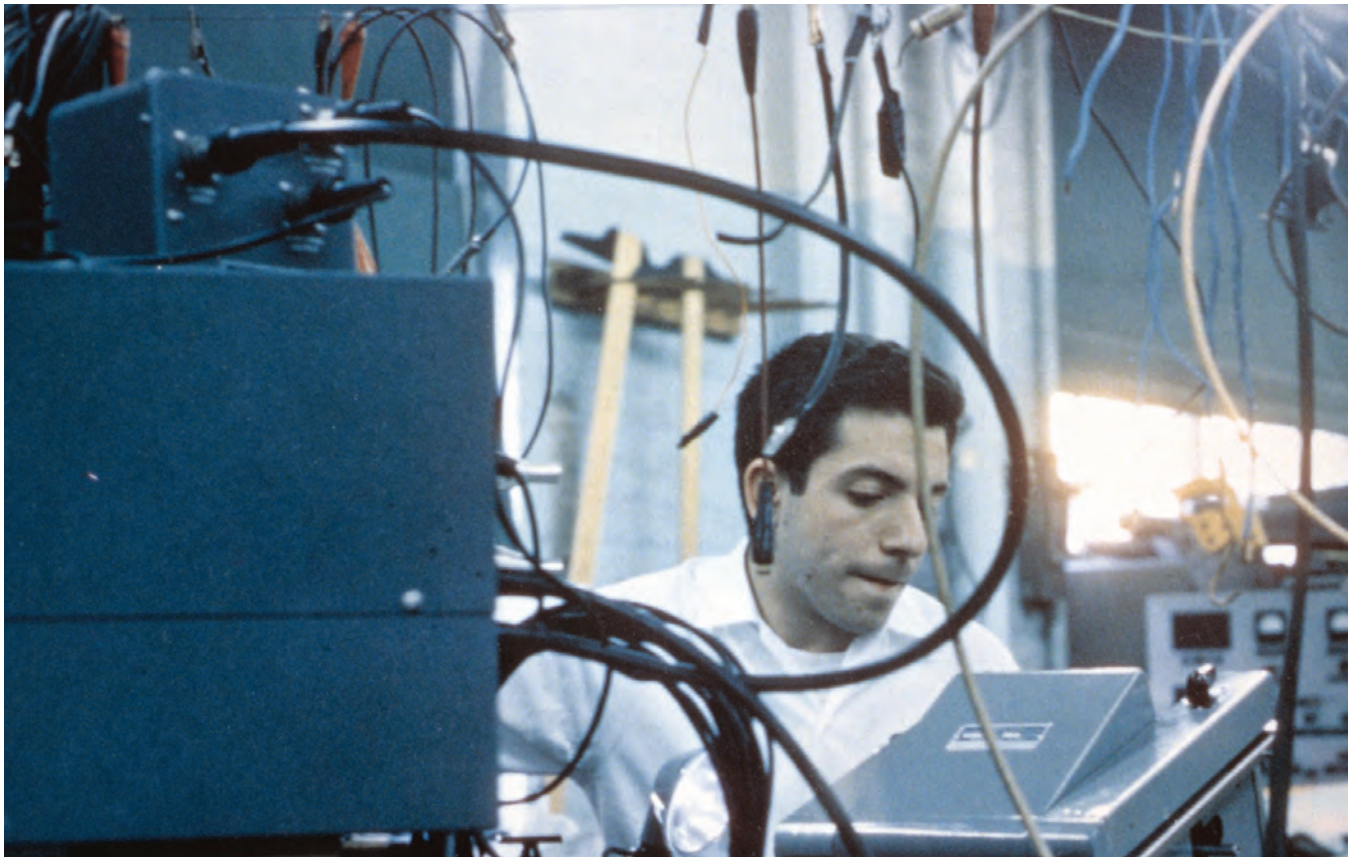
MTR: Take us back to the origins, the early stages of your career. How did you get involved in the development of side scan sonar?

MK: This is a special year for me so this question is timely. It was literally 50 years ago, I was a student at MIT and I had to do a thesis. It was my first introduction to the field. I was about to do a very theoretical thesis with lots of equations and calculations. Oddly enough it was about image processing. I didn't want to do it. I wanted to build something. I like to build things. I always wanted to build things. **I wanted to do something practical, and it turned out by chance I knew of Harold Edgerton at MIT. He was the famous professor that developed the strobe light.** I went into his lab on the fourth floor of a building at MIT and I asked him if he had anything interesting to work on. Little did I know it was to be a major day, my life was never the same after that.

MTR: How was this a pivotal point for you?

MK: Turns out Edgerton's expertise was in cameras and strobe lights. He had been introduced to Jacques Cousteau a few years earlier. National Geographic introduced Cousteau, who wanted to make pictures in the deepest part of the ocean. Edgerton and Cousteau started

Then ... Klein in a sea of wires in his lab at MIT.



a collaboration where Doc Edgerton made special cameras and strobes that could go several miles down in the ocean. They went out on expeditions and took the world's first deep water pictures. It turns out that to locate the camera they used a sonar device. It was a precision timed pinger that would send out pulses that would bounce off the seabed, and also go directly to the surface. They took those sounds and charted them on a special graphic recorder. They could watch the lines on this recorder. The lines would come together as the camera got near the bottom and when it got within 10 or 20 feet, they fired the cameras and took these deep sea pictures.

Doc, the scientist, and very curious person noticed that the pinger he was using was penetrating the bottom of the sea floor. He took an interest in the sonar and began working on a device he called a mud penetrator to penetrate the mud bottom. It just turned out by coincidence that I came onto the scene. I had no background in the ocean.

I was an electrical engineer, but I knew about transistors. As a kid I had been a hobbyist and was fascinated with these new devices called transistors. I would actually build little radios. I grew up in New York City and I would go down to a place called radio row and I would buy parts. I would build my own little radios and amplifiers and intercoms and things like that. I started working on Doc's instruments to tune them for better results. One of the things that Doc did was to give me a key to his lab. Maybe it is common now, but in those days as a young student you did not get a key to a lab. I took that key as my most precious possession. I used to come in to the lab in the middle of the night to work on the instruments and I would fiddle around with the circuits to try to get rid of oscillation. Eventually I got it so that the signals I was getting on the profilers were just perfect. They looked like pencil lines and you could see the sub bottom layers. Doc and I used to go out and look under the tunnels in Boston Harbor including the Sumner and Callahan tunnels. We improved the picture a lot and I was thrust into the world of underwater exploration.

MTR: That is a pretty impressive introduction to the world of marine technology. Where did your career take you from those auspicious beginnings?

MK: I continued working in Doc Edgerton's lab. The great thing was he was a famous scientist and he knew people. He knew Cousteau; he knew the heads of Polaroid. The lab there had a constant stream of famous people coming in that you could meet and speak to and

& Now ... Marty Klein stands by original sonar recorder now housed in MIT Museum.

share ideas with. It was really wonderful, so I worked in Docs lab for a while. Doc had a company called Edgerton, Germeshausen, and Grier, Inc (EG&G). Doc had been part of the Manhattan project and had helped take pictures of the atomic bombs. Those pictures of bombs going off, those are actually pictures that Edgerton took.

His company EG&G then had an ocean technology division to make these cameras and pingers so I went to work there. I started working on these devices, and then the year after I graduated in '62 the submarine Thresher sank off the coast of Boston. It was a tragic event, but it was a watershed event. The Thresher sank in deep water, and I got involved in the first deep-water search ever done. So here was this kid, I have just come out of school, and I start working with the bathyscaphe Trieste. The Trieste had made the dive to a depth of seven miles in 1960 with Don Walsh and Jaques Piccard. The Trieste by this time was owned by the U.S. Navy and was called in to search for the Thresher. I was called in, again as a young engineer, to make a side scan sonar and sub-bottom profiler for the bathyscaphe. I got to not only work on this project, but I got to dive in the bathyscaphe. I got to know the pioneers in deep-sea work and it launched me on a career that although I am now retired, still goes on. I still have a fascination for the ocean and for the people who work in the ocean. So I have been very blessed to be close to this field, to make discoveries and to work with a lot of amazing people.

MTR: It must have been quite the experience to work on the Thresher Project during the early years of deep-sea exploration. With the technology in its infancy it had to have been challenging.

MK: Its funny, MIT is a tough place. You work very hard and you really don't realize how much they are preparing you for challenges and here I was thrust into this. Its years later that I really realize the challenges, the things we accomplished. We built whole pieces of equipment in a week or two. We were using what was then the latest technology. There were no computers. There were no integrated circuits or analog circuits, resistor capacitors. So it was a mix of ancient technology and what at the time was very modern technology. There were many challenges. One was that the Trieste went deep. Making things work in deep water is tough. I learned a lot from Edgerton himself. **I also learned a lot from Sam Raymond who went on to found Benthos. Learning how to work in the deep ocean was a challenge.** Doc himself had a pressure vessel at MIT. Sam also had a pressure vessel at Benthos so we could take things to great pressure and test them. We could squeeze them and make them crush. There were also electronic challenges. We were dealing with very low-level signals and you are in a very noisy environment in a submersible. There is a lot of machinery so trying to get very sensitive low level sonar signals and other signals out of the noise was a tremendous challenge.

There are high levels of humidity in a submersible. Its like your in a cloud its damp so the equipment has to take tremendous punishment. It also has to be small. The equipment had to fit through an 18 inch diameter shell to get in. One of the first things we did was take a piece of plywood and cut an 18-inch hole and everything we made had to go through that hole including us. The people on the Trieste liked me because they were all these giant guys and I was a little guy so I could tuck myself in the corner while I worked on the sub.

MTR: For those not familiar with the story of the Thresher could you give us a little backdrop?

MK: The Thresher was a nuclear sub on a test dive. Its funny you asked me the question because I have been involved with a lot of shipwrecks. **You try to detach yourself emotionally, but I still find it hard to this day. I still get chills. People like to talk about shipwrecks and treasures, but 129 brave people were in that thing.** There was some kind of a pipe failure and it began to sink. The hull imploded and it sank in 8400 ft. of water. The Navy was involved in the search. One of the sobering things for me was it wasn't found with my equipment. The sonar's we were making back then could see things but they didn't have clear images. We were turning an echo sounder side ways and the beam was wide and frequency was low. We were getting blobs but we weren't getting pictures. It was after the Thresher search that I became determined to make side scan sonar that could really make pictures of things on the sea floor, so a shipwreck would look like a shipwreck and an airplane would look like an airplane. Something I am very proud of is this little tiny group at EG&G did make equipment that in fact made pictures where ships look like ships and so forth.

MTR: It sounds like you have also been able to meet and work with interesting groups in the field.

MK: Back in those days Doc Edgerton introduced me to a group in Boston called the Boston Sea Rovers. He was a member and scuba diver. They were, and are an amazing group of people. In order to test our equipment we had to go out in Boston Harbor or the Charles River. We worked

with divers, and Doc Edgerton introduced me to a man named Frank Scalli, who was a pioneer in diving instruction. They were a whole bunch of guys who loved the ocean and loved to dive and it has been an honor for me ever since. I have been connected with the Sea Rovers since that tie and so I would meet other pioneers in the field.

MTR: What were some other projects you became involved in?

MK: Well I was working in a variety of roles. We went on all sorts of expeditions along the way, which was wonderful because I could learn about the real world. One of the things I found as an engineer is that most people don't go out with equipment. They sit in a laboratory somewhere

Doc Edgerton introduced me to a group in Boston called the Boston Sea Rovers. They were, and are an amazing group of people. They were a whole bunch of guys who loved the ocean and loved to dive and it has been an honor for me ever since.

Above: **Marty Klein returns to Loch Ness for Side Scan Expedition.**
Below: **Marty Klein (center) poses with fellow explorers during his first expedition to Loch Ness.**

Klein on his invitation last year to work in the field with Dr. Robert Ballard

"I knew Bob (Ballard) back in the day before he was a famous star. We used to meet at Woods Hole. He was a young geologist ... I had the chance to go out with them last year and I was just in heaven for a number of reasons. The people on board are just amazing.

Bob has the uncanny ability to find talent and encourage talent.

So on board we had ROV people, navigators, biologists, educators, geologists, and archeologists. Often in the world of science people don't collaborate.

Bob puts people together and there is a synergy. He gets people working together."

or in a classroom and think about equipment. I had to go out all over the world on boats of every size. Everything from rowboats, canoes, and submarines, to giant Navy vessels. We had to go out and make this stuff work in very difficult conditions. It could be freezing cold and icy or it could be in the middle of a tremendous gale. We had to go places where you didn't have access to anything. You couldn't go to the hardware store. You couldn't go to Home Depot and pick up some stuff. You had to bring all kinds of spare parts and try to anticipate what might go wrong.

The other thing I learned was the equipment was abused. Even though you cautioned people things on the ship would get kicked and bounced and stepped on. The cables would get tied in knots. Just to keep things running was a tremendous challenge and a tremendous responsibility too because when you went on these trips you were responsible if anything happened or if anything went wrong. You are the equipment designer even though somebody threw your thing down the stairs or dunked it in the ocean it still is your fault if it didn't work. A lot of my emphasis in my whole career was making it better, stronger, and easier to use. I was in some ways a pioneer in materials, for instance I always wanted to make the cables we used stronger and more flexible. We were one of the first users of Kevlar. Kevlar was a Dupont fiber and when I would meet with cable manufacturers I would tell them I want it stronger, I want it tougher, I want to be able to tie it in knots and its still got to work. A guy was in my office from Boston Insulated Wire, which was the local cable company. He said there is a new material, it is a boron fiber made by Dupont and its called Fiber B. I said we'll take it. Turns out it was Kevlar and so we were one of the first users of Kevlar. I did a lot of those kinds of things. I was often the first user of a certain kind of electronics, certain component or certain type of material. That was very challenging, but also a lot of fun. So I went off on expeditions, some were with Doc Edgerton who was great to travel with. For example we went and surveyed the English Channel. This was in the early 60's. There had been a plan for a hundred years to put a tunnel between England and France. We had a project to study the sub-bottom geology of the channel. We went between Dover England, and Calais in France. We went on 12 - hour days surveying the bottom of the channel. Years later the tunnel was actually built. My mother used to say, "Martin, you built that tunnel". There were a lot of other expeditions to look for ships, to look at geology or to look for downed aircraft. Some of those surveys were grim, plane crashes etc. We worked on the Mississippi River. The river is still periodically in the news. They are giant concrete mats that hold the river in place. I went down with Doc Edgerton to work with the core of engineers to use side scan sonar to look at the concrete mattresses in the river. We did other things like cable crossing. If a pipeline or cable was going to go across a river or bay we would survey the bottom and see that it was clear of obstacles. We could also see the cable after it was laid, we could see if it was moved or severed.

MTR: You have obviously been involved in many projects with a pretty large range of applications. What are some of the projects that stand out for you?

MK: I worked with the Marine Archaeologist George Bass

in 1967, we found a ship off the coast of Bodrum Turkey, and that was really the first find of an ancient shipwreck using high-tech equipment. Just before that Doc Edgerton used my sonar working with Alex Magee to find the Henry the VIII warship, the Mary Rose.

I was also a member of the hydrographic society. These are individuals who map the ocean floor primarily for navigation. You use this data to clear a harbor for a ship to come in. **For a long time a harbor would be checked sometimes by an echo sounder but they would also drag a chain across the harbor between two boats at a certain depth and if the chain didn't hit anything they would declare it clear. When I first got into this kind of work I found this operation to be clunky and clumsy.** I thought someday we are going to make equipment so they don't have to do that, and in fact they don't have to do that anymore. The Klein multibeam sonar is now used to substitute the wire drag search. We have also been involved with the military for mine hunting operations and of course when planes go down. Even though I am now retired when I hear on the news a plane has gone down, first it takes me back to when I was involved looking for these things, secondly somewhere around the world, I know one of my customers is going to be on their way in the middle of the night to go do a search. A lot of these things have been found and I feel proud that I have had a part in making that happen.

MTR: You eventually started your own company.

MK: Yes, I was with EG&G for about five years. I was a kid and wanted to make better equipment. I didn't start it for financial reasons. I wanted to improve the equipment. The big company went too slowly for me and I went off on my own. I did some consulting at first. I did some consulting for MIT and Benthos among others, but my goal was to make new equipment and so I was living in Lexington, Mass., in a rented home and literally started the company in my basement, Klein Associates. In 1989 it was sold to a Japanese firm and then sometime later was purchased by L3 Communications. It is now called L3 Klein.

MTR: How has your technology fit in for the Offshore Industry?

MK: When I started making these things my goal had been to make a sonar to look like pictures so a wreck

"It was after the Thresher search that I became determined to make side scan sonar that could really make pictures of things on the sea floor, so a shipwreck would look like a shipwreck and an airplane would look like an airplane. "

would look like a wreck, a pipeline would look like a pipeline, but when we first made the equipment the world did not know about side scan sonar. They did not know about high res sonar and in fact I personally would go to trade shows to introduce it to people. The first question everyone would ask was what is your range? How many miles can you see? Because people used to think of sonar for submarine hunting and sub sonar can see many miles, I would say, well its got a range of maybe 1000 ft and they would put their head down and walk away. It took a long time. I had to show pictures, here is a shipwreck this is an oilrig.

We were one of the first people who would go to the off shore conference. It was kind of amusing because the show was a huge show and we were a small company and we had no money. We would load up my Pontiac station wagon and we would drive to Houston. It took a long time for people to take us seriously. But they did and I am proud to say, side scan sonar is very commonly used in the oil industry to site oil rigs, to do cultural resource surveys, to look at pipelines and to look at conditions of pipelines. More recently in the BP blow out a lot of side scan was used to survey the area to see what was going on at the bottom. It is a tool used often in the offshore industry, but it was not when I started out.

MTR: You were in the field with Dr. Robert Ballard last year. What was that like?

MK: Yes, my friends and family kid me because I am supposed to be retired, but I am busy all the time. I was very fortunate last year to be invited on board the E/V Nautilus. I knew Bob back in the day before he was a famous star. We used to meet at Woods Hole. He was a young geologist. We would talk about our dreams and things that would happen in the ocean. He of course went on to find the Titanic, but he has had tremendous success in getting students and a lot of people involved in the ocean. His crew tow side-scan sonar and have Argus and Hercules for ROV operations. I had the chance to go out with them last year and I was just in heaven for a number of reasons. The people on board are just amazing. Bob has the uncanny ability to find talent and encourage talent. So on board we had ROV people, navigators, biologists, educators, geologists, and archeologists. Often in the world of science people don't collaborate. Bob puts people together and there is a synergy. He gets people working together. I loved every minute of it.

MTR: What are your plans to retire?

MK: I don't have any. Every day brings something new. ***Exploration goes on.***

Klein with side scan sonar in Boston Harbor.

MARITIME REPORTER AND ENGINEERING NEWS

NEW WAVE MEDIA

Second Annual
Don Sutherland Memorial

Maritime Photo Contest

See your image on the cover of the world's largest maritime magazine

Your photo could be on the cover or in the pages of the most widely read publication in the global maritime industry. Enter as many photos as you like, in each of the five categories. Entries can be submitted and viewed at:

www.maritimephotographs.com

All images must be entered by May 11, 2012 to be considered. Winners will be published in the June 2012 issue of Maritime Reporter and Engineering News, with the Grand Prize Winner featured on the front cover of the magazine.

This contest was established to honor the memory of the late Donald S. Sutherland, renowned maritime photographer and writer, who passed away unexpectedly in 2010.

Categories:

Ships and Boats
Offshore Structures
People
Maritime Scenes
Weather Systems

Dec. 6, 2011 - May 11, 2012

Photo at right was submitted by: Alan Loynd, Hong Kong

Photo above was submitted by: Ken Elliot, USA

For complete contest rules go to http://www.maritimephotographs.com/rules-and-terms.asp

Picture

MARINE TECHNOLOGY REPORTER

1st Annual Photo Contest

Perfect

VESSELS & STRUCTURES
Submitter: NEPTUNE Canada
Photographed July 2011

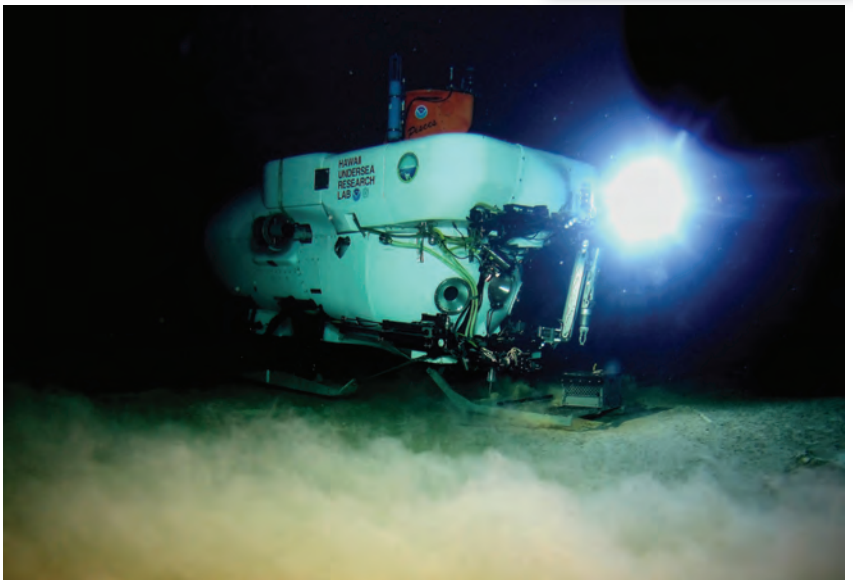
The R/V Thompson is leaving the dock on its NEPTUNE Canada network maintenance voyage, with the Olympic Mountains providing the background.

www.seadiscovery.com

OCEAN LIFE
Paolo Guglielmi
Photographed June 2011

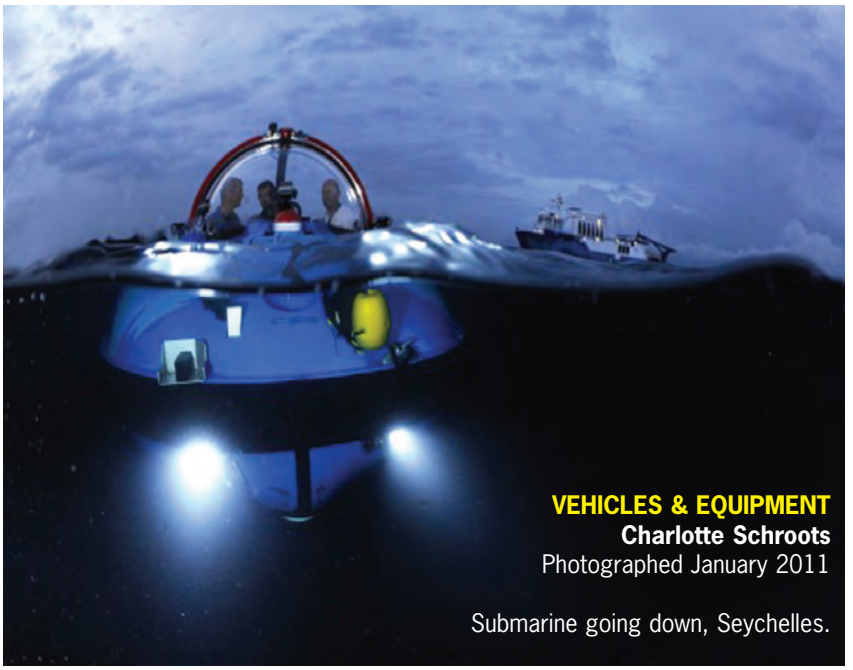
Oxygen, East Mediterranean.

MARINE TECHNOLOGY REPORTER
1st Annual Photo Contest



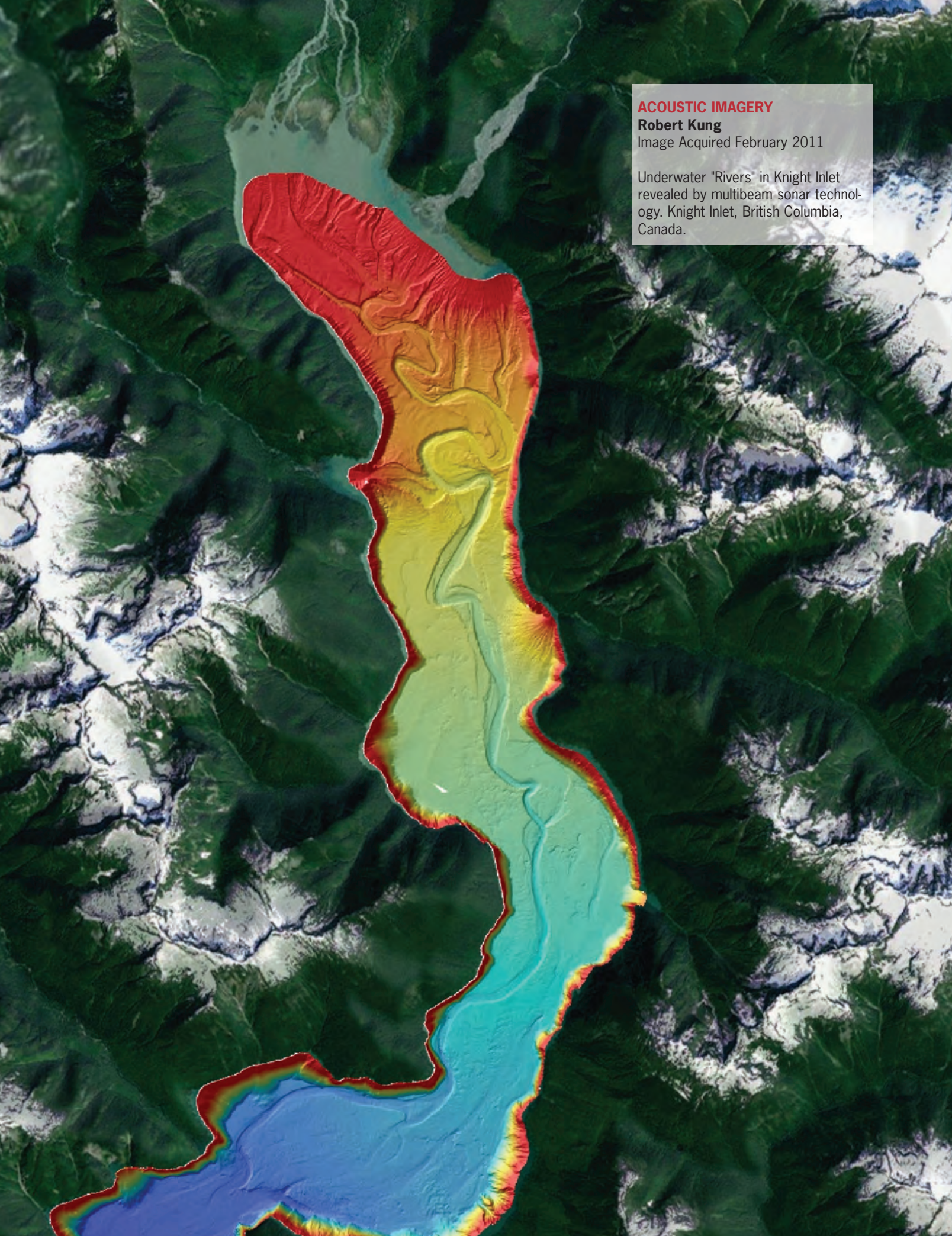
VEHICLES & EQUIPMENT
Amy Brown
Photographed October 2010

Hawaii Underwater Research Laboratory's (HURL) manned research sub Pisces IV, equipped with BIRNS custom man-rated penetrators, oil filled connectors and cable assemblies, during a 950m Test and Trial dive. Oahu.



VEHICLES & EQUIPMENT
Charlotte Schroots
Photographed January 2011

Submarine going down, Seychelles.



ACOUSTIC IMAGERY
Robert Kung
Image Acquired February 2011

Underwater "Rivers" in Knight Inlet revealed by multibeam sonar technology. Knight Inlet, British Columbia, Canada.

MARINE TECHNOLOGY REPORTER

1st Annual Photo Contest

VEHICLES & STRUCTURES
Howard Phoenix
Photographed July 2011

Safe end … now. Albania

OCEAN LIFE
Robert Patzner
Photographed March 2009

In 5 m depth, Maldives.

PEOPLE
Frank Immel
Photographed November 2011

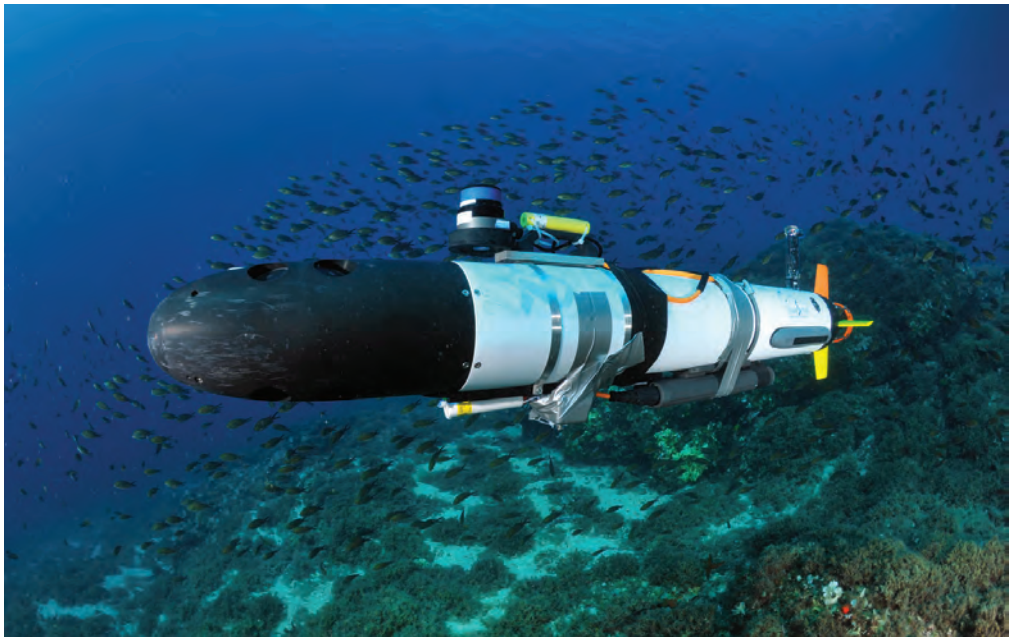
Diver Working in the Snow,

PEOPLE
Michael Lombardi
Photographed May 2011

Scientific diver examines an undercut ledge along a vertical reef face associated with fallen sea levels during the Pleistocene ice age. Depth is 100 meters+. Exumas, Bahamas.

MARINE TECHNOLOGY REPORTER

1st Annual Photo Contest



VEHICLES & EQUIPMENT
Marino Brzac
Photographed September 2010

High technology beneath the surface between marine life. Kornati

VESSELS & EQUIPMENT
Fernando Lopez Melian
Photographed March 2011

Oceanographics Buoys in San Pedro del Pinatar, Alicante, Spain.

VEHICLES & STRUCTURES
Keren Levy
Photographed September 2011

Under the sea. Eilat, Israel.

Great Lakes Observing System

Gathering Gigs of Data

for Millions of People

By Linda Joy, NOAA

Turn on the kitchen faucet on a hot August afternoon, and the last thing you want is a glass full of foul-smelling, discolored water.

If you run a manufacturing plant, you'd be loath to lose business because a ship carrying the raw materials you need is grounded in shallow water.

And if you're an angler, you expect that your state's natural resources department has all the information it needs to manage your favorite species so it's around for years to come.

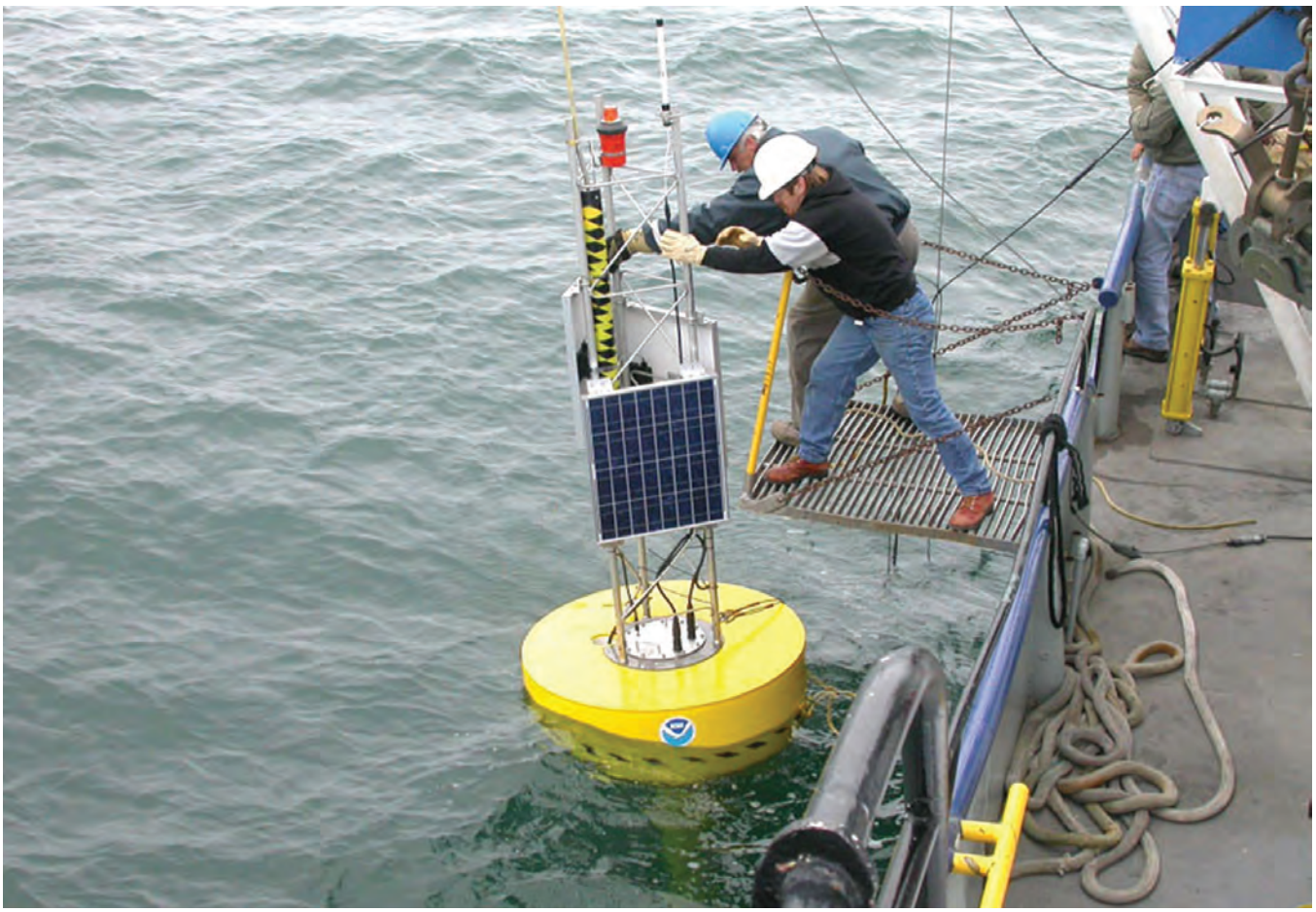
To meet these expectations, water commissions, shipping navigation managers, and natural resource managers rely on high-speed communications technology more than ever before. Using the Internet to stream data from satellites, buoys, and other instruments, NOAA and other federal agencies now provide some information instantly. Towns, counties, and states use this data to make decisions that affect millions of people and dollars — soon more data will be available instantly.

In the densely populated Great Lakes region, home to more than 30 million U.S. and Canadian residents, NOAA's Great Lakes Environmental Research Laboratory (GLERL) and its partners are designing a new comprehensive system to integrate and stream data collected by the Great Lakes Observing System (GLOS).

"Those who use Great Lakes water resources — manufacturers, power producers, transportation providers, the commercial fishing industry, and recreational fishers and boaters among others – want easy access to the wealth of information available to resource managers and Great Lakes researchers," explains GLERL researcher Steven Ruberg. "The technology exists to make this happen."

For example, the same digital infrastructure that enables a smart phone app to locate an empty parking space or an open dinner table can also immediately alert a water company to changes in lake water that could alter water quality for customers. Changes in lake pH (a measure of how acidic or basic the water is), temperature, and oxygen concentrations can disrupt water treatment operations and result in discolored and bad-smelling drinking water.

GLERL has charged a team of scientists and engineers



(Photo Credit: NOAA Great Lakes Environmental Research Laboratory)

NOAA Real-time Coastal Observation Network (ReCON) buoy deployment.

with the architectural design of a communications infrastructure to collect and stream data from many different sources to those who rely on the Great Lakes to provide food, water, energy, and transportation. GLERL works with the Great Lakes Observing System, the Environmental Protection Agency's Great Lakes National Program Office, and the U.S. Geological Survey on this project. LimnoTech, a water sciences and environmental engineering consulting firm, is the contractor doing the design work. When completed, the system will include an array of data collection instruments, a way to transmit data to a central management point, a data management and communications system, and a variety of "data products" that extract the desired data and deliver it instantly to the users in handy formats.

The system will draw data from instruments on satellites, aircraft, stationary platforms, buoys, drifters and floats, automated underwater vehicles, towed sensor arrays, and ships. Ultimately, the data products it streams will cater to the needs of the users. They may include maps generated by computer models of water and nearshore conditions, as well as streams of data on physical, chemical, and biological parameters. In addition to feeding critical information to those who use the lakes on an on-going, daily basis, the system will help guide decisions in remediation, restoration, and conservation efforts in the long term.

Researchers and potential end-users of the system have examples of how Great Lakes region residents will benefit.

The Macomb County, Mich., Health Department expressed its support in a letter last fall. "The MCHD, with financial support from Federal, State and Local partners, has established a real-time automated source water monitoring system in the Huron-Erie Corridor. Enhancements provided through the GLOS program will provide a greater degree of public health protection through modeling of flows and predictability of contaminant concentrations at public drinking water intakes," wrote Interim Deputy Health Officer Gary White.

GLERL researcher Steve Ruberg recalls an incident that instant streaming of tailored data products might help prevent in the future. In August 2006, three of four

Cleveland Water Department treatment plants took in Lake Erie water with low oxygen concentrations. This caused a cascade of problems in treating the water and resulted in discolored water and numerous customer complaints. The utility provides drinking water to 1.5 million people in northeast Ohio. Now, real-time observations from a NOAA Coastal Observation Network buoy in Lake Erie are already going hourly to the Cleveland Water Department. The information should allow extra time to switch to alternate water processing methods if necessary due to sudden changes in lake water quality.

Ruberg also points to benefits expected for fisheries managers from a NOAA buoy to be deployed in the Thunder Bay National Marine Sanctuary in Lake Huron. The buoy will provide data on waves, currents, temperatures, and weather conditions. It will also feed underwater images to the Thunder Bay National Marine Sanctuary visitor center in Alpena, Mich., as well as to all the other National Marine Sanctuary visitor centers around the country.

Scientists from the Michigan Department of Natural Resources, the Thunder Bay sanctuary, and GLERL hope to better understand how changes in water temperature affect the lifecycle and reproduction of lake trout and other species.

NOAA Administrator Jane Lubchenco inspects a Real-time Coastal Observation Network (ReCON) buoy during a visit to the NOAA Great Lakes Environmental Research Laboratory in Ann Arbor, Mich. NOAA Deputy Undersecretary for Operations Mary Glackin is on the left. The buoy provides real-time observations of physical, chemical, and biological variables in coastal areas. This buoy will be deployed in Lake Huron near Alpena, Mich.

They are planning to use real-time temperature data in deciding when to sample fish from Thunder Bay. The scientists will then be able to correlate trends during the fishes' first year of life with data sets on spawning in order to better understand the local ecosystem, Ruberg explains. This could in turn enable fisheries managers to more accurately predict fish population trends.

GLERL expects to implement the first phase of the improved GLOS data streaming system by 2012. The Great Lakes Observing System is part of the NOAA-led Integrated Ocean Observing System.

Great Lakes freighter.

(Photo Credit: NOAA)

(Photo Credit: NOAA)

UI 2012

Underwater Intervention set for New Orleans

Strike up the band! It's not just the saints that are marching back to the Big Easy! It's time, once again, for the annual Underwater Intervention International Conference 2012. There's no better place for you to be than New Orleans for this year's great event. The UI Committee is ecstatic to be able to return to the Morial Convention Center, a huge favorite of our Presenters and Exhibitors, judging from their enthusiastic responses.

This year's show dates are January 24th through January 26th, with Exhibitors move-in beginning on Sunday afternoon, January 23rd.

The Morial Convention Center has continued to be an excellent conference venue. The Exhibition space and features lend themselves well to all that our Exhibitors and Presenters have to offer. With the continued growth and redevelopment of the French Quarter hotels and businesses, this area continues to welcome visitors in the grand old style of New Orleans. The hotels exude all the usual New Orleans charm and flair of times old and modern. Many more of your best-loved restaurants, gathering places and superb new venues are eager to serve you. New Orleans is opening wide its doors to welcome you to the most gracious, lively and historic cities of the South.

Now in its 21st year of partnership, the Association of Diving Contractors International and the Marine Technology Society's ROV Committee are doing what they do best; bringing together the very best in the Underwater Operations community. Underwater Intervention continues to be the frontrunner in uniting the top industry leaders in Commercial Diving, ROV's, AUV's, Oil and Gas, Marine Construction, Shipwreck Exploration and Salvage, Submersibles, Communications, Bridges and Dams, Nuclear and Hydro Energy, Ocean Mining, Oceanography and Marine Technology.

Our Technical Program is a powerhouse of information, with presentations covering cutting-edge advancements in technology and new equipment. As you have come to enjoy, look forward to and expect, we are offering many innovative presentations and exhibits designed with your needs in mind. Highlights of the program include:

- Advanced Electronic Technologies for Divers
- AEP Contact Training Program
- ANALOX Hypergas MKII Training Taster
- Case Study of Remote Sensing in Construction
- Generating 3D Models from Underwater Video
- LI-ION Battery System for MUVs
- Bathymetry and Biotope Surveys in the Red Sea
- Marine Debris and Underwater tech
- Navy Hull Inspections
- ROV Competition

- Work Class ROV Repair in less than 60 Minutes
- Integrating Equipment to Work Class ROVs
- Fiber Optic Connectivity

Our Special Events for UI 2012 begin with the traditional Early Bird Reception on Monday night on the Show Floor. It's a favorite event that features great food, superb music, and the always important networking opportunities.

The UI Committee will host the UI Awards Dinner on Tuesday night at the Marriott Convention Center Hotel Ballroom. The Awards Dinner highlights the annual awards and scholarships for the MTS ROV Committee and the Association of Diving Contractors. ADCI will present its Commercial Diving Hall of Fame Inductees Class of 2012. A special and sumptuous dinner for our group, with wine at table, will be prepared by the Marriott Chef for $85.00 per person. Business attire is requested.

The Exhibit Floor will be replete with the latest and greatest the industry offers. At press time, there were only a few booth spaces left on the floor. So, if you still haven't secured a space, don't delay – time is running out! Just come on down and join us for the best UI International Conference yet!

Online Registration and complete details for Underwater Intervention International Conference 2012 are available through our website **www.underwaterintervention.com**. *Traditional forms are still a Registration option.*

Underwater Intervention 2012 Exhibitor List

Company Name	Booth Number
ABTEL	736
AC Plus Marine	235
Airdyne	737
Airgas Gas and Equipment	227
AK Industries	819, 918
Allspeeds, LTD (trading as Webtool)	229
Alpha Rentals, LLC	400
American Diving Supply	101
American Inshore Diving Company	108
Amron International	110
Aqua-Air	305
AquaShell LLC	208
Aqueos	625
Arc Controls, Inc.	325
Balmoral Group	937
Balmoral Offshore Engineering	935
Bauer Compressors	422
Bay-Tech Rentals	609
Birns, Inc.	809
Blue View	717
Broco	901
CalDive	210, 210
Cavidyne	511
CDL, Inc.	424
Chet Morrison Contractors	129, 131
Clinton Instrument Company	109
Commercial Diving Supply	128, 130
CompAir - Gardner Denver	536
Corrosion Control	213
Cygnus Inst.	730
DeepSea Power and Light	735
Deltawave	312
Denso NA	817
Divers Alert Network	337
Divers Supply	801
Divex	221, 223
Diving Unlimited International	438
DYNACON	601
ECA Robotics	135
Edge Tech	804
Epic Diving and Marine	418
Falmat	301
Fisk Marine Insurance International, LLC	119
Five Star Marine	211
Flange Skillets	627
Forum Technologies	401
Fox Industries, Inc.	328
Fugro Chance	637
G and M Rentals	231
Geospace Offshore	200
Global Diving and Salvage	811
Global Dynamix. Inc.	725
Gulf Engine	729
HYDROLINX Diving Communication, Inc.	829
Hydroweld USA, LLC	124
Hy-Lok USA	121
Imagenex Technology Corp.	218
Innerspace	436
International Special Risks	909
Inuktun	111
J W Fishers	629
Jack Vilas Associates	922
John W Fisk	437
KMDSI	100
Kongsberg	501
Linden Photonics, Inc.	226, 226, 226, 226
LinkQuest	907
Lubrication Technology, Inc.	224
Marine Magnetics Corp.	931
Marine Sonic Technology	234
Marine Technology Society	320
Mariscope	911
MATE Center	322
Moog/Focal Technologies	310
Morgan City Rentals	311
Northern Diver (International) Ltd.	921, 923
Nuvair	217
Ocean News and Technology	639
Ocean Reef	318
Ocean Technology Systems	506
Oceaneering International	306
Oceanwide	339
ORE	806
Outland Technology	805
PAC Stainless	329
Patriot 3	929
Pegasus Thruster	910
PMI Industries, Inc.	134
Polymer Corporation	113
Praxair	835
Prime Technology	728
Professional Marine Explorers Society	323
Proserv	426
Quikrete	903
Ranger Offshore	928, 930
Redfish Rentals	537
Remote Ocean Systems	701
Rotech Subsea	336
ROVSCO, Inc.	724
Royal Purple	330
Seabotix	107
SeaCon Brantner	705
Seamar Divers International	319
Seamor	116, 118
Seatronics	117
SeeByte	927
Shark Marine	917
SI TECH	830
Sidus Solutions	407
Sound Metric	711
South Bay Cable	723
Southwest Research Institute	831
Stanley Hydraulics	810
Steffen	800
Stranco-Linus	925
SubConn	321
Subsalve	823, 825
Subsea Technologies	411
SURFACESUPPLIED, INC.	822, 824
Teledyne Benthos, Inc.	828
Tetis Group	220, 222
The Cortland Companies	802
Trelleborg Offshore	816
ULO/Aqua Form	539, 541
Umbilicals International	428
Underwatertools.net	638
Unique System, LLC	120, 122
Unitec	207
Videoray	201
Wach`s Subsea	228
White`s Manufacturing	619

McFarlane Receives Lifetime Award

Dr. James R. McFarlane, founder and president of International Submarine Engineering Ltd. received the Diver Certification Board of Canada's Lifetime Achievement Award for 2011 for his significant contributions to the underwater industry. The award was presented to Dr. McFarlane by Jonathan Chapple, DCBC's incoming Chairman and Senior Manager, Military and Professional with Aqua-Lung Canada Ltd. at the Canadian Underwater Conference Awards Banquet on October 24, 2011. Dr. McFarlane was also a keynote speaker at the conference. "Jim's underwater-oriented technical contributions to Canada and the world are almost beyond compare." says David Parkes, CEO, DCBC. "In just one field of underwater work, Jim has been part of engineering teams that have designed and built over 400 robotic manipulators and over 200 vehicles."

Dr. McFarlane started ISE in 1974 and has been involved with the design, construction, and operation of manned, tethered and untethered Remotely Operated Vehicles as well as subsystems of these vehicles including manipulators and computer control systems. In 2009, ISE was inducted into the Offshore Energy Center Hall of Fame and was also named as one of Canada's top 40 defense companies. Dr. McFarlane is the author of many papers on submarines, manned submersibles, remotely operated vehicles (ROVs) and autonomous underwater vehicles (AUVs), including the world's first automobile refueling system for Shell.

He has also made keynote presentations in Europe, India, Japan, China, Korea, USA and Canada. Two notable presentations include the inauguration of the India Chapter of IEEE, Oceanic Engineering Society at the National Institute of Ocean Technology (NIOT) in 2008, and most recently at the Institute of Industrial Science, at The University of Tokyo in 2010. Dr. McFarlane has served on many committees for international meetings and has been honored as guest speaker at many conferences around the globe. He has also received numerous awards including the Officer of the Order of Canada, BC Science Council Award for Industrial innovation, the BC Science and Engineering Gold Medal, and the IEEE Vancouver Centennial Award this past August.

Sound Metrics Wins Japanese Order

Sound Metrics received an order from Japan Maritime Self-Defense Force (JMSDF) for 17 DIDSON Diver-Held Systems. In their search for victims following the earthquake and tsunami that hit Japan, JMSDF, state and local agencies routinely deployed equipment loaned to them by Sound Metrics. While JMSDF had access to many new technologies for their search and recovery operations, it was the DIDSON's ease of use and near video-like imagery that led JMSDF to order 17 units that will be placed with agencies at ports around the country. Sound Metrics designed and manufactures the DIDSON brand of acoustic imaging sonars that has exceptional image clarity. **www.soundmetrics.com**

N-Sea to Aquire Subcom

The N-Sea Group BV and Subcom BV signed a Letter of Intent in relation to the acquisition of Subcom BV by the N-Sea Group BV. As of January 2012 Subcom BV will be integrated into the organization of N-Shore Diving BV. The founder and CEO of Subcom BV – Rodger Weitzel – will become the general manager of N-Shore Diving BV on January 1 when Subcom BV will no longer operate under the Subcom BV name. N-Sea Group BV Managing Director Gerard Keser said; "N-Shore Diving BV already has a strong market position in the South-West Netherlands, yet, by strengthening our base, we will be able to respond stronger to the market and take the next step. Subcom BV is a company that has proven itself in the market in which we operate and will become of great value to our organization."

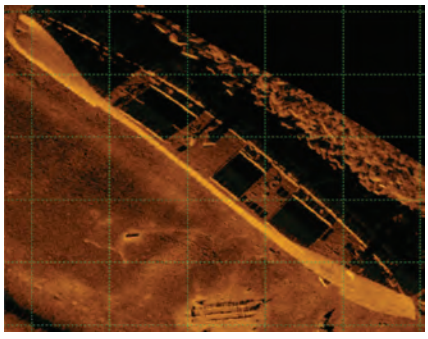
Teledyne RDI, VideoRay Announce Success

VideoRay and Teledyne RD Instruments announced the collaborative effort to integrate Teledyne RDI's Doppler Velocity Log (DVL) on board VideoRay's Pro 4 have proven successful. Through extensive system integration and software development provided by several leading software and integration companies, the Teledyne RDI Explorer was demonstrated in October at VIPS 2011, VideoRay's annual user conference. This ROV conference, with over 150 delegates from several organizations from over 16 countries, is the annual meeting of users, developers, dealers, and accessory vendors for Inspection Class ROVs. Working on the Teledyne RDI DVL project, in addition to VideoRay and Teledyne RDI, were Seavision Undewater Solutions of Little Compton, RI, SeeByte Ltd. of Edinburgh, Scotland, and Studio Ing. Banfi SAS of Rome, Italy.

High Resolution Capability for SonarWiz 5

Chesapeake Technology, Inc. announced a new High Resolution capability for SonarWiz 5 that doubles the resolution of the earlier version. The result for sidescan sonar data is crisper, sharper mosaics, waterfalls, and sonar contact images. "The new High Resolution feature makes it possible to see things on the mosaic that wouldn't be visible otherwise," said Christian Mueller, Humminbird's SAR Side Scan Operator. "On a recent search I had almost 70 targets in the survey area. Using High Resolution, I immediately was able to narrow it down to 5, and the first one was a hit. Without SonarWiz 5, this would not have been possible."

Surveyors in all types of industries can use High Resolution to resolve smaller features and see finer detail to improve productivity, security, and safety. For example, Navy Route Surveys will better detect and classify mine like objects (MLOs).



Teledyne RDI Hosts 8th Users Conference

Teledyne RD Instruments (RDI) hosted its 8th ADCPs in Action (AiA) Users' Conference in San Diego, California on October 2-5, 2011. Nearly 200 Teledyne RDI Acoustic Doppler Current Profiler (ADCP) and Doppler Velocity Log (DVL) users and partners from around the globe converged on Mission Bay to share information and learn from each other during this 3-day industry event. Harry Maxfield, Teledyne RDI's V.P. Sales/Marketing reports "The feedback from attendees was that this was our best AiA to date. Although we continue to change up the event and speakers to keep it fresh, this year's conference just had a great vibe about it. I believe this due in part to the attendance of so many new scientists and engineers this year. There was great mix of fresh ideas from new users and hard won experience from our long standing customers. It was a great blend of the old and the new."

It was split into four concurrent tracks, covering: acoustic Doppler flow and discharge measurements in rivers and streams; acoustic Doppler current profiling and wave measurements in the ocean environment; and underwater Doppler navigation and diving tools.

Record Contract to Rapp Hydema

Rapp Hydema and Triplex were awarded a record-sized deck machinery contract for Australia's Commonwealth Scientific and Research Organization (CSIRO). CSIRO selected Teekay Holdings Australia and Sembawang Shipyard Pte Ltd. to carry out the design, build and commissioning of the vessel. Sembawang and Teekay appointed RALion (a joint-venture between Alion Science and Robert Allan LTD) to carry out the vessel basic design. The new vessel, named the Investigator, is scheduled for mid-2013 delivery. The consolidated deck and handling machinery package is due for delivery in 3Q 2012.

Project management at Rapp Hydema reported that the contract apparently comprises "the most comprehensive and largest-scale research system ever delivered." Ultimately, Rapp staff executed comprehensive analysis of dynamic loads in order to identify related drag forces and available payloads. Given the mission of working at extreme water depths (wire and cable-holding capacities range from 6000-8800m), this proved no small task.

Symbolic of the scale of the deck machinery package, the new vessel will include no less than three winch rooms—and yet even with such accommodations, space issues have posed a great challenge. Approximately 180 tons of deck and handling machinery, with an installed-power footprint of approximately 1800 kW, has posed special challenges in design. Among newer technologies aboard, there will be an Active Heave Compensation (AHC) package and Rapp's own patented liquid-cooled motor, recipient of an Offshore Technology Conference innovative technology award last year. Also, electrically-driven, electronically-synchronized level-winding for the winches will also be utilized.

Rapp is also providing its latest mission-specific upgrades of its long-running PTS Pentagon winch control technology, in the Research C-Bus version (for the scientific winch package management) and Fisheries C-Bus (for the fishery winches suite). Triplex equipment includes a 30-ton telescopic corer boom, a Multi-Corer Pipe Handler, Corer Pipe Davits, a 20-ton Aft A-Frame with 170-stroke and a 6-ton CTD Overhead Crane. Two 180kW power units and Towing Booms (fore and aft) are also to be provided.

Datawell Chooses CoastalObs TechServices

Datawell, the manufacturer of precision wave buoys celebrating its 50th anniversary this year, has teamed with CoastalObsTechServices LLC for sales and service support in the continental US, Hawaii, Alaska, Guam, Puerto Rico, and the US Virgin Islands. Datawell wave buoys use accelerometers or GPS data to track buoy motion, which is then translated into wave statistics. The buoys are offered with a variety of data transmission capabilities, and options such as solar panels and corrosion resistant hulls are available. Datawell also supplies mooring components, local radio data receivers, and test equipment to support deployments. OEM motion sensor packages are also available for alternative installations.

CoastalObsTechServices provides support for a wide variety of met/ocean data acquisition activities. These services include identification of required observations, selection of sensors and supporting components, data acquisition design, systems integration, deployment, maintenance, recovery, data analysis, and QA/QC.

Saipem Wins $1.5B E&C Offshore Contracts

In Iraq, Saipem has been awarded by South Oil Company the EPIC contract for the Iraq Crude Oil Export Expansion Project – Phase 2, within the framework of the expansion of the Basra Oil Terminal, off the Al Faw Peninsula in the Arabian Gulf, approximately 550 km southeast of Baghdad. The contract encompasses the engineering, procurement, fabrication and installation of a Central Metering and Manifold Platform (CMMP), to be installed in a water depth of 28m, along with associated facilities. Fabrication of the CMMP topsides will be carried out at

Saipem's yard in Karimun (Indonesia), while the jacket and piles will be fabricated at the Saipem Taqa Al-Rushid (STAR) yard in Dammam (Saudi Arabia). Offshore activities will be performed in the third and fourth quarter of 2013.

In Nigeria, Saipem has been awarded the OFON2 - D030 contract by Total E&P Nigeria Limited, for new offshore facilities in the Ofon field, about 50 km off the southern coast of Nigeria.

Saipem will carry out the engineering, procurement, fabrication and installation of the OFP2 Jacket (comprising the 1,970 ton jacket structures and the 4,500 ton piles), as well as the transportation and installation of the complete new OFQ living quarter offshore platform. The fabrication of the jacket will take place in the Saipem Rumuolumeni Yard in Port Harcourt, Nigeria. Offshore activities will be performed mainly by Saipem 3000 vessel, in different phases during 2013.

Schilling Receives New Navy Order

Schilling Robotics, LLC, received an order for two 150hp, 3,000m rated HD ROV systems from GMB USA, Inc. for delivery to the Republic of Korea (ROK) Navy. One system will be delivered for their Amphibious Submarine Rescue vessel and the second for their Auxiliary Towing Salvage vessel. This order adds to the first HD purchased this year by the ROK Navy, reflecting the expansion of their salvage and rescue operations. The exceptional performance and configurability of the HD results in an ideal solution for their needs. "We are very pleased that the ROK Navy has recognized that Schilling's HD vehicle is the most technically advanced in the world, and has selected us to continue their expansion program," said Tyler Schilling, chief executive officer for Schilling.

Global Diving & Salvage Promotes Daily

Daily

Global Diving & Salvage, Inc. promoted Deirdre Daily to General Manager of the Alaska Region. Throughout her time with Global as the Alaska Region Office Manager she has been involved in all aspects of the daily operations including assisting with estimating and project management. She has built strong relationships with clients, participating in industry associations and exhibiting at various tradeshows, and has fostered overall business development in the region.

WASSP Appoints McDonald

McDonald

WASSP announced the expansion of the company's senior management with the appointment of Ian McDonald as General Manager. The role is a newly created position and will see McDonald overseeing WASSP's international sales & marketing strategy for their multibeam sonar products. Originally from Glasgow, Scotland, McDonald has vast experience in the marine and offshore sector and has worked with over 300 technology and life science companies and research institutions in the UK and around the world. He also holds a BSc in Technology & Business Studies from University of Strathclyde, Glasgow.

Birns Promotes Kreis

Kreis

Birns Inc. appointed Catalin Kreis as its new Marketing Communications Executive. In her new position Kreis will be responsible for spearheading the BIRNS social media program, providing creative direction and overseeing operations for trade shows, and coordinating with the sales department as a customer liaison. Kreis will focus on developing ongoing strategic marketing strategies and initiatives for BIRNS in all its target markets.

First Offshore Marine Academy Trainees Earn Jobs

The first group of trainees to complete the inaugural 12-month training program with the UK's only dedicated academy for the offshore wind industry have all successfully started work in new roles within the industry. In testament to the Offshore Marine Academy's aim to take people with a familiarity with the marine and coastal environment and prepare them for a new career in the expanding offshore wind industry, each of the four trainees have been snapped up by employers. Now working with developers Centrica, offshore cable installation contractors Visser & Smit Marine Contracting and marine solutions specialists Offshore Marine Management (OMM), the graduates all lived in England's South West and came from a variety of backgrounds when they entered the first course in September last year.

The Offshore Marine Academy launched its Offshore Trainee Program in response to the recognized skills gap in the offshore wind industry, which has meant there is a lack of qualified and able workers available for the wide range of careers. The Academy's aim is to enable trainees to receive the right mix of training and experience to start their career in this growing arena.

James Grant, 22, had completed an electrical apprenticeship prior to the program and is now a trainee cable engine driver on the 89m cable laying vessel Team Oman. While Daniel Fraser-Pickard, 26, renovated buildings before the program and is now a permits coordinator, supporting the Lincs project team under supervision for Centrica. Daniel said the Academy helped him make a really smooth transition from working in the construction industry to employment in the offshore industry. The program includes offshore survival and induction; field trips, site visits and operational activities such as lifting and rigging practice; sessions on seamanship and navigation, sub survey, hydraulics and working at heights; an understanding of financial management, and safety training.Two more trainees, Mike Giles, 26 (pictured above), a plumber, and Cyrus Mills, 24, an environmental biology graduate are now employed in different departments within OMM. Mike has taken a role as site coordinator supporting the development of a new cable storage facility at Gravesend. Cyrus who is following a career in hydrography said that if the objectives of the Academy are to show a window into the offshore industry while providing guidance to enable the individual to further specialize, it has fulfilled its role 100 percent.

Teledyne Gavia Delivers Offshore Surveyor AUV to GAS Srl

Teledyne Gavia delivered the company's Offshore Surveyor class Autonomous Underwater Vehicle (AUV) to Geological Assistance and Services (GAS) of Bologna, Italy. The AUV, as configured by GAS, incorporates a 500 kHz GeoSwath module and a Teledyne Benthos Sub-bottom Profiler (SBP) module as the primary survey sensors.

Airmar Unveils Broadband Transducers

Airmar Technology introduced its new broadband transducers that enable CHIRP technology. The acoustic performance of Airmar's broadband piezoceramic transducers include extremely low-ringing and excellent sensitivity across the -3dB bandwidth.

www.airmar.com

FSI Appoints VP of Sales & Marketing

Falmouth Scientific, Inc. (FSI), a Cataumet, MA based designer and manufacturer of precision oceanographic instrumentation and systems, has announced the appointment of Carl Mancuso to the position of Vice President of Sales and Marketing.

www.falmouth.com

OMM Completes Cable Work at Greater Gabbard

Offshore Marine Management (OMM) has completed a contract with Fluor for the installation of 36 inter-array cables at the Greater Gabbard wind farm. Originally contracted to install 29 cables, the remit of OMM's work was expanded during the course of the project to encompass provision of a full range of installation services for 36 inter-array cables, including front end pre-engineering support, installation and the delivery of a final report using in-house survey capabilities. Work was completed using the 122m vessel Deep Cygnus.

Saipem Acquires Site in Brazil

Saipem has agreed the acquisition of 100% of TPG (Terminal Portuário de Guarujá S.A.), a company which fully owns, as a perpetual concession, an area of 35 hectares in Guarujá, within the industrial hub of Santos, the largest port of South America, in the state of São Paulo. The area is strategically located, approximately 350 km from Santos Basin, the offshore Brazilian region where ultra-deep water pre salt fields are being discovered, and approximately 650 kilometers from Campos Basin, the other most important Brazilian offshore basin.

Flexlife Signs MOU With Petrobras

Flexlife, an oil & gas industry specialist in subsea project and integrity management, signed a Memorandum of Understanding with Petrobras to develop and provide a new integrity management system and specialized engineering services for its international oil and gas projects offshore. The agreement – Flexlife's first work in South America - was reached during the recent OTC Brasil exhibition in Rio de Janeiro. It includes the provision of Flexlife's ground-breaking subsea products and services to maintain and extend asset life and is the company's biggest deal to date.

EdgeTech Expands

EdgeTech and affiliate ORE Offshore have recently added another 7,500 sq. ft. of manufacturing and office space to their Massachusetts facility. The manufacturer of side scan sonars, sub-bottom profilers, bathymetry systems, acoustic releases, USBL systems and other specialized underwater acoustic solutions, continues to grow in size and product offerings.

www.edgetech.com

New CEO at Eiva

Jeppe Nielsen, 44, took over the position as CEO as of October 24, 2011 at Eiva. Nielsen has a masters degree in computer science from Aalborg University and has until recently held a position as Senior Vice President at Systematic, where he has held various positions during the last 19 years and gained experience within sales, business development and strategy.

Lindley Group Promotes Buoy Range

Almarin, based in Barcelona, Spain, and Ahlers Lindley, based in Estoril, Portugal, have joint forces to launch a new range of marine buoys and towers under the name Balizamar. The primary application of the Balizamar line of products is Aids to Navigation (AtoN), flotation and mooring buoys.

HATLAPA Acquires Triplex AS, Extends Portfolio

Hamburg-based manufacturer HATLAPA Marine Equipment has purchased a majority shareholding in the Norwegian deck machinery company Triplex AS. In doing so HATLAPA's traditional product portfolio of compressors, steering gear and winches has now been significantly expanded to include all components of a typical deck machinery package for supply vessels and AHTs.

Cal Dive Employs Panther for Extreme Conditions

To tackle the strong currents in Australia's offshore oil & gas fields, Cal Dive International (Australia) Pty Limited, selected Saab Seaeye's Panther XT Plus ROV (Zone Rated and configured for operations in hazardous areas). Although intended primarily for inspection work on oil & gas platforms, sub-sea completions and associated pipelines, Cal Dive says, "It has the muscle to do whatever needs to be done."

Cal Dive points to the fact the Panther XT Plus has 10 powerful thrusters, has 50% more power and swims 30% faster than any other electric work ROV of its class. The Panther's configuration chosen by Cal Dive includes a Seaeye wide-angle low-light black & white camera and a Kongsberg compact color zoom camera. Also a Tritech Super SeaKing sonar with dual frequency sonar head, and a Tritech altimeter with auto altitude option. Fitted to the ROV are two Schilling Orion manipulators: starboard side, a seven function position feedback manipulator with 3.8-in. gripper, and port side, a four function rate manipulator with 7.8-in. gripper. For debris clearance, the Panther comes with a rotary disc cutter and a 38mm anvil cutter. There is also a water jetting system, a cleaning brush assembly and manipulator-held cleaning brush tool.

A Cygnus ultrasonic thickness gauge comes with the ROV, together with a CP proximity probe to check anode protection. In the case of an emergency the ROV is fitted with a battery operated emergency locator strobe.

The ROV system includes a stainless steel framed tether management cage with 150m of tether cable, and its own Seaeye mini camera. Also supplied through Saab Seaeye's West Australian distributor, Oceanvision, is a control container and a self-erecting launch and recovery A-frame with 1100m umbilical cable capacity, a certified bullet assembly and lock latch assembly with snubber rotator. Reassuringly for Cal Dive the new Panther XT Plus has evolved from the proven Panther concept into a more powerful vehicle with an increased payload and re-designed frame that allows more space for additional equipment and a greater range of tools and sensors.

RJE Debuts "Seeker"

RJE International introduced a solution to marking and relocating equipment or sites in deep-water environments where only subsea vehicles operate. Working with Falmouth Scientific Inc, RJE developed a full line of acoustic directional receivers that can be fitted on ROVs, AUVs, and submersibles. Called the Seeker, these small compact directional receivers can track and locate common underwater acoustic beacons that operate from 25 to 40Khz. In addition, the Seeker receivers can also become an interrogator to accurately locate underwater transponders. Designed to operate in depths of up to 6000m, the Seeker acoustic receivers interface with the vehicle through a RS232 data interface and software is provided with the unit. Applications include aircraft "Black Box Recovery" using a ROV, AUV emergency homing system, and support of a submersible navigation system.

www.rjeint.com

Valeport's New Altimeter

Valeport announced its latest innovation, the VA500 Altimeter. The VA500 is dubbed as new technology for underwater positioning in offshore applications, using a state-of-the-art signal processing system with a 500kHz broadband transducer to provide stable, repeatable readings to a resolution of 1mm over a range of 0.2m-100m. With a range of power supply options and both analogue and digital outputs, the VA500 offers great flexibility for the needs of the ROV, AUV and hydrographic community. Digital RS232 and RS485 interfaces, as well as analogue 0-5V and 0-10V outputs are fitted as standard. The VA500 will interface to the Valeport Bathypack and those of other manufacturers. As an option, the VA500 may be fitted with a high accuracy (0.01%) pressure sensor, as used in Valeport's MiniIPS (Intelligent Pressure Sensor.

www.valeport.co.uk

Atlas Elektonik Enhances SeaFox System

Atlas Elektonik has teamed with ECS Special Projects Ltd. to exclusively provide the EOD tool COBRA for the ATLAS SeaFox System. The COBRA (Clip-On BX-90 Re-loadable Assembly) can be fitted to the reusable SeaFox vehicle offering Explosive Ordnance Disposal (EOD) capability from surface to 300m.

Combined with the Rigid-hull Inflatable Boat (RHIB) based SeaFox VSW version COBRA provides a hard-kill disposal capability which can be delivered by remote means by MCM Expeditionary Forces. With COBRA ATLAS is also able to satisfy the market demand for a cost effective historical ordnance disposal capability and offer multiple target prosecution/multiple target initiation by remote means which makes the whole SeaFox System unique.

CARIS: Free Trial of New Software

With the latest release of Spatial Fusion Enterprise v5.6 CARIS offers a free trial of its web mapping software allowing you to experience firsthand its capabilities. Along with several new and improved features, Spatial Fusion Enterprise has implemented the latest View and Feature Download Services in line with the Infrastructure for Spatial Information in Europe (INSPIRE) directive. The objective of this release is to provide hydrographic charting agencies with the software tools needed to share their data interoperably. To request your free trial of Spatial Fusion Enterprise visit

www.caris.com/products/sfe/free.cfm
or Email free@caris.com

Enhanced OPTIMOOR

BMT ARGOSS announced a partnership with Tension Technology International (TTI) to develop improved functionality of the OPTIMOOR mooring analysis computer program. OPTIMOOR is designed as an easy-to-use tool for use by vessel and terminal personnel, as well as port designers and naval architects. It uses the OCIMF recommendations and procedures and includes OCIMF wind and current coefficients for tanker moorings. The new module will draw on BMT ARGOSS's high quality specialist engineering consultancy and operational and web-based services in the fields of Ships, Ports, MetOcean data and the dynamic response of vessels. It will allow OPTIMOOR to make accurate predictions in locations exposed to high wave energy and make OPTIMOOR even better suited to simulation of ship-to-ship transfers.

Nano Seacam

DeepSea Power & Light introduced the Nano SeaCamunderwater video camera, a high resolution camera in a tiny package that goes deep. With a diameter of only 25mm (0.985") and a length of 88.2mm (3.47"), including the connector, the Nano SeaCam comes in a truly tiny package. The standard 6013-T8 aluminum housing is rated to 6km depth and an optional 6Al-4V titanium housing of the same size is rated to 12km for deeper or long term immersion applications. The camera comes with its own standard mounting bracket but can also be mounted simply by using a small hose clamp or zip tie if desired. The Nano SeaCam's power requirements are minimal and versatile, requiring only 1W max with an input voltage range of 7-32 Vdc.

Camera resolution is rated at 620TVL making it suitable for nearly any inspection requirement and the camera is available with its output in either NTSC or PAL composite video format. The Nano SeaCam operates with minimum illumination in the range of 0.04 lux and automatically switches from color to black and white output in low light conditions for best resolution and contrast, producing optimum picture quality under a variety of lighting conditions. Using a proprietary fixed-focus lens, the Nano SeaCam has a 70 degree diagonal angle of view in water and provides a sharp, crystal clear high resolution image as close in as 25.4mm (1"). **www.deepsea.com**

EIVA Releases Accurate Time Tagging Unit

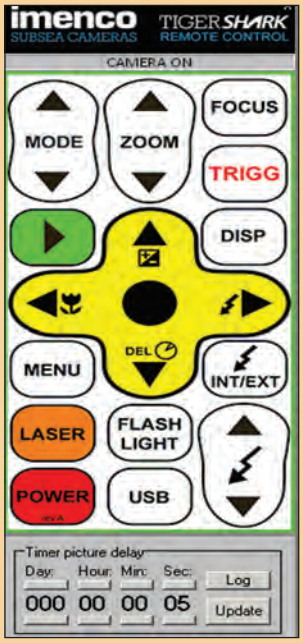
EIVA released a new Accurate Time Tagging Unit (ATTU), the successor of the EIVA TimeBox. The EIVA ATTU is a time synchronized interface unit providing the ultimate solution for precise time tagging of serial communication data from any sensor used in marine surveys. The ATTU thus facilitates time tagging of sensor data with accuracy better than 50µsec. This accuracy is obtained through interface with GPS PPS signal information and sophisticated application of Kalman filtering techniques to stabilize the internal clock of the ATTU. As the ATTU is synchronized through use of GPS the performance and accuracy is dependent on the availability and quality of the GPS PPS signal. The ATTU features either 8, 16 or 24 ports serial RS232 communications utilizing RJ45 connections. Optionally the ATTU furthermore provides for selection of each individual port from serial RS232, RS422 or RS485 communications, if required.

www.eiva.dk

The New Imenco TigerShark Digital Still

The new Imenco TigerShark Digital Still Camera is for ROV and AUV use for precise observations, research, scaling with red dot laser option, monitoring in determined time limits, easy to use Ethernet control and download capabilities. It also can be supplied with timer function, battery packaged and red dot laser for reference scaling. Estimated picture capacity with 128GB memory card option for 14 Mpixel setting – 2.85MB avg. file size – 44,900 pictures; and for 9 Mpixel setting – 1.8MB avg. file size – 71,000 pictures. User can choose Titanium Housing for 4000m depth rating and above, or the standard housing Duplex Steel for 3000m depth rating.

Email: al.cohen@imenco.com
Web: www.imenco.com



Kongsberg Unveils New Software for 3D Sonar

Kongsberg Mesotech unveiled the latest release of MS 1000 software for MS 1071 and MS 1171 Digital Scanning Sonar. This version is designed to provide high-resolution underwater records when combined with Kongsberg MS 1171 Profiling Sonar and precision rotators. These added capabilities extend the usefulness of MS 1071 and MS 1171 Profiling Sonar and will be of particular interest to service companies engaged in Underwater Version 4.6 is also fully compatible with Microsoft Windows 7 Pro Edition, Microsoft Windows 7 Ultimate Edition, and earlier Microsoft Windows versions, notably Microsoft Windows XP Pro.

www.kongsberg-mesotech.com

New S320 GNSS Survey Solution

Hemisphere GPS announced the new S320 GNSS survey receiver, XF1 data collector and survey software. S320 combines the advanced GNSS receiver performance of Hemisphere GPS' Eclipse II technology, precise geodetic antenna, wireless communication and batteries all in a portable, rugged unit with matching data collector.

Designed to be compatible with a variety of existing surveying equipment, S320 is the ideal multi-GNSS positioning system for applications in GIS, construction, mapping, land and marine surveying.

S320 is available as a basic low cost SBAS L1 GPS receiver, with the option to enable full GNSS support and L Band corrections. With transmit and receive capabilities, the S320's UHF 400 MHz or Spread Spectrum 900 MHz internal radio eliminates the need for cables on both base and rover installations. An internal GSM/GPRS modem makes S320 an ideal rover for network RTK, eliminating the hassle of external modems and cables. The XF1 data collector connects via Bluetooth to the S320.

TSR-300 Ice Tracker

Think Sensor Research Inc introduced the TSR-300 Ice Tracker buoy designed to be deployed in the arctic for remote tracking of sea ice and environmental monitoring. Using lithium primary cells for power and optional solar power for backup the TSR-300 Ice Tracker is designed for long reliable operation in extreme environments. Satellite Iridium communication is used to communicate with the TSR-300 Ice Tracker. The onboard sensors are GPS for position, temperature, relative humidity, pressure, and an accelerometer for measuring heave. External temperature sensor strings are also available to measure ice pack temperature at different depths.

Email: info@thinksensor.com
Phone: 778-895-2201

Sonars & Underwater Cameras Aid Aquaculture

The worldwide demand for seafood products is expected to more than double in the next 10 to 15 years. However, the amount of seafood being harvested from our oceans is expected to decline over that period due to overfishing. One solution to the problem is aquaculture; the farming of aquatic species such as fish, crustaceans, and mollusks. Brian O'Hanlon, founder of Open Blue Sea Farms, is one of the pioneers in the field of open ocean fish farming. The key concept behind this method is the moving of holding pens into deep water. Having the submerged cages offshore increases the flow of sea water to the fish creating a cleaner and healthier environment. With a background in marine biology and two generations of New York's Fulton Street fishmongers, O'Hanlon thinks he's found a better way to harvest fish in a more sustainable and environmentally friendly way. He pioneered the use of advanced submersible cage designs for deep water, and was the first to stock mutton snapper and cobia in open ocean cages. His nets are anchored to the ocean floor eight miles off the coast of Panama in the Caribbean Sea.

With open ocean cages, the need for regular inspections is crucial. If the netting is torn, or the cage breaks loose from its moorings, fish and gear could be lost. With some of the holding pens extending more than 150 feet deep into the ocean, it is not practical to use divers because of their limited bottom time at these depths. One technology being employed to aid the modern day aquafarmer is side scan sonar. High frequency sonar has the ability to produce detailed images of the cages, the mooring lines and anchors. The company chose a solution from JW Fishers.

Major considerations were; quality of the images, the durability and reliability of the system, and a quick delivery time. Once it was established that Fishers could meet all of their needs, Open Blue decided on the dual frequency SSS-100K/600K which would provide both long range scan capability as well as short range, high resolution pictures. Shortly after the sonar arrived on site Nicolson reported, "We've been very busy here with the side scan. It works great. We're getting excellent images of the cages and all the support structures."

Top Inset: OBSF founder Brian O'Hanlon in fish cage.
Main photo: Nicolson with side scan sonar.
Bottom inset: Deploying the fish cage.

Another piece of technology being employed in the aquaculture industry is the underwater video system. Several fish farms in Norway are using inexpensive drop cameras like Fishers MC-1 mini camera to view the condition of nets and health of the fish. In Canada, the Dept. of Fisheries and Aquaculture (DFA) which is responsible for monitoring the industry, is using Fishers SeaOtter ROV, a remote controlled vehicle, to inspect the country's aquafarms. DFA's Travis Mahoney reports, "We send the ROV down under the nets to determine the amount of waste present, and to check for dead or dying fish. It's really a very useful tool. It can go deeper than our divers and stay there as long as we need it to."

www.jwfishers.com

Leaner Cougar for Wind Turbines

Four specially designed leaner versions of the Saab Seaeye Cougar XT ROV have been ordered by Pommec, a leading Netherlands-based technology provider to the diving industry. Custom designed to be both low profile and powerful enough to handle the strong currents found in the shallow waters off the Belgium coast, the slim-line Saab Seaeye Cougar XT Compact will be used by Pommec's customer, D.E.C.O. (Diving Engineering & Consultancy Office), out of Bruges Belgium, during the construction of 48 turbines. D.E.C.O. needed an ROV system that could function in strong currents and poor visibility, and also work alongside uninterruptable high-cost pile-driving operations, 24 hours a day, with zero down time. After several meetings with D.E.C.O, Pommec and Saab Seaeye, Pommec's solution was a completely duplicated system-spread with two identical Cougar XT Compacts in each system – making it easy to switch instantly between ROVs, and between systems. The two 20 foot containers, internally split between control and maintenance sections, can each store their twin Cougars and tether winches. The launch and recovery systems will allow the Cougars to be deployed and operated in the harshest of sea conditions. To create a compact version and minimize the effect of current, Saab Seaeye engineers set about reducing the frame size, buoyancy and weight. A thinner 17mm tether is also used to minimize drag.

Control & maintenance container, stainless steel launch and recovery system, and Cougar XT Compact ROV.

Each D.E.C.O./Pommec Cougar is fitted with a low light color camera, rear-facing B&W camera and Kongsberg high definition low light CDD camera. A Tritech Super SeaKing sonar is also fitted along with a free-issue Linquest tracking system. A bare tooling skid is supplied and a Gauntlet Plus four function manipulator.

New Ultimate Series Connector

Fischer Connectors announces new interconnect solutions Fischer UltiMate Original Series specially designed for a broad range of harsh environment applications. The new Original Series offers rugged, compact, lightweight, sealed connectors and cable assembly solutions ideally suited to withstand a variety of severe environmental, industrial and chemical conditions. Major features of the new Fischer UltiMate Original Series include rugged, miniature and ultralight design, extremely robust keying, high shock and vibration resistance, excellent shielding, and ultimate sealing level IP68/69K even unmated with Fischer's new facilitated cable assembly solutions. The push-pull connector is available in a wide range of body styles, sizes and configurations including multipole contacts from 2 to 42 poles.

www.fischerconnectors.com

IMEX-100 Camera Series

Imenco`s IMEX-100 series cameras with 36X optical zoom are specially designed for hazardous areas, designed to take high quality video images over Ethernet IP-streams or traditional analogue video connections. The housing is made in high quality grade stainless steel to withstand the toughest environmental challenges. Latest generation camera technology with Extended Dynamic Range and 36x optical zoom ensures high quality images. By employing the best latest in MPEG video encoding technology, the IMEX-100 camera series is designed to simplify video archiving, and improves flexibility in system integration.

Email: al.cohen@imenco.com
www.imenco.com

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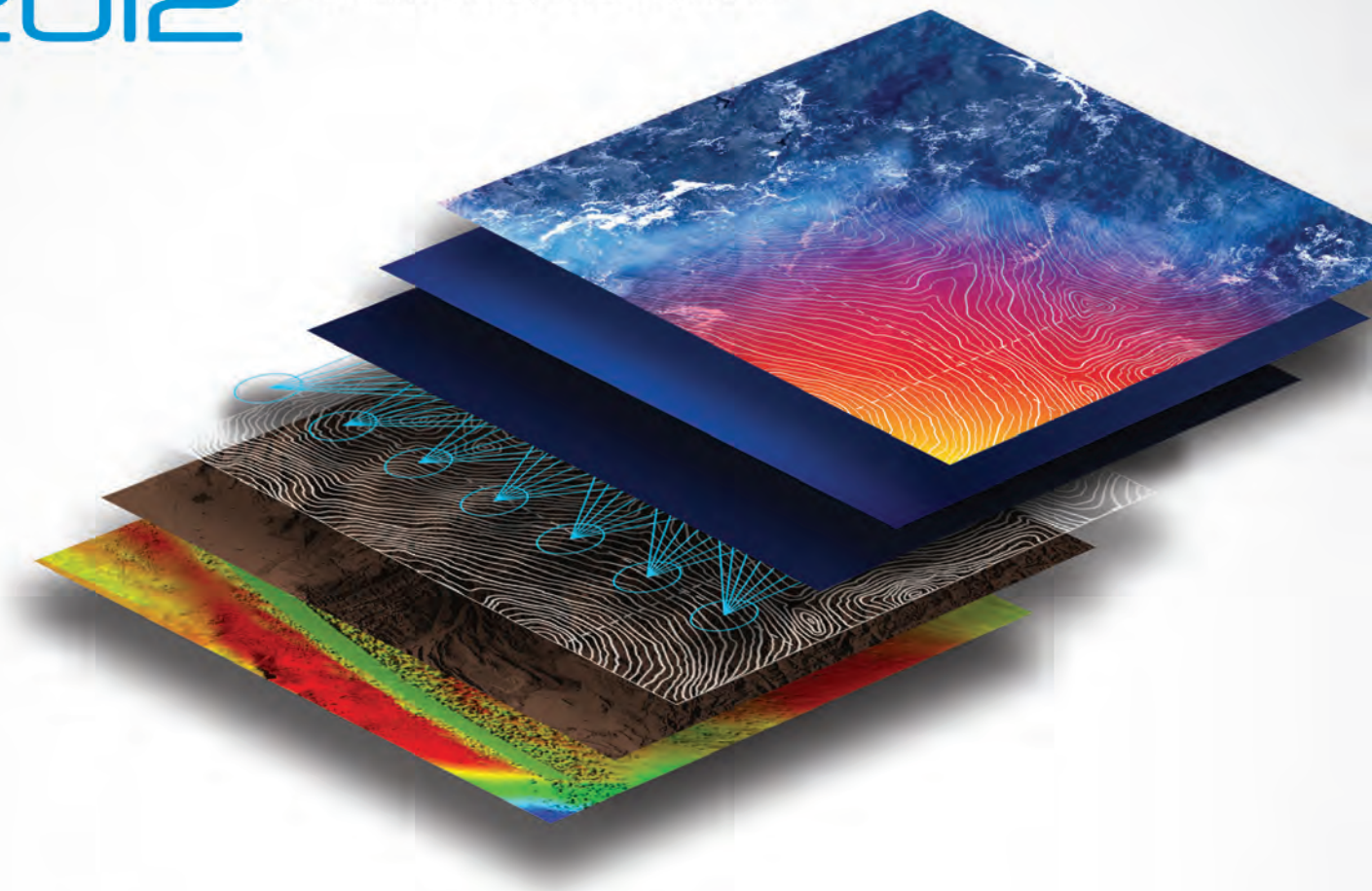

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ENVIRONMENTAL LABORATORY TECHNICIANS / VOLUNTEER

Job Location: USA, SC Myrtle Beach

Coastal Carolina University is accepting applications for two environmental laboratory technicians. Positions are full-time annual appointment with benefits. These positions will work with the University's Environmental Quality Laboratory which serves the coastal and inland waters of northeastern South Carolina. Both positions will be involved with field and lab work listed below. The second position will additionally have a primary responsibility to serve as scientific support of several volunteer water quality monitoring programs. (See http://www.coastal.edu/wwa/vm)

Duties will include but are not limited to: field sampling, sample processing and analysis, quality control procedures, instrument calibration and data management. The following parameters are routinely measured: bacteria, chlorophyll, nutrients, BOD5, organic carbon, turbidity, pH and alkalinity. Field measurements are made with in-situ meters. Applicants should be able to participate in research cruises, train others in sampling and analytical techniques, and interact effectively with students and volunteer monitors.

Requirements: Bachelor's degree in science and one (1) year related job experience. Applicant will possess strong field, laboratory and computer skills. Must also maintain a valid SC driver's license and be a strong swimmer.
To read more about the Burroughs and Chapin Center for Marine and Wetland Studies and its Environmental Quality Lab, see http://www.coastal.edu/wwa . Information on Coastal Carolina University's benefits is available at: http://www.coastal.edu/hreo/employment/benefits.html.
Application Process: Interested candidates should apply online at http://jobs.coastal.edu. Review of applications will begin immediately and continue until December 2, 2011.
Coastal Carolina University is an EO/AA employer.
J. Michael Trapp
Coastal Carolina University
P.O.Box 261954
Conway, SC 29528
USA
Phone: (843) 349-2237
Email: jtrapp@coastal.edu
WEB: http://jobs.coastal.edu

SALES MANAGER

Job Location: USA, MA Falmouth

Teledyne Benthos is seeking a candidate interested in career growth in Technical Sales based out of our North Falmouth, Massachusetts facility.

This position will be the primary outside sales leadership for the company's diverse ocean technology products ranging from acoustic modems to remotely operated vehicles. Once in the sales position, there will be extensive travel throughout the marine technology marketplace. The position will focus on increasing sales through existing customers as well as new business development.

Requirements:
- Bachelor's Degree in Business or Marketing, or in a Technical Field focused on Mechanical, Electrical or Ocean Engineering or Oceanography
- Excellent communicator, both verbal and written, with strong interpersonal skills
- Ability to learn and understand complex technical requirements
- Computer skills and knowledge of Microsoft office products
- Must be able to travel approximately 50% of the time
- U.S. Citizenship or Green Card holder

Preferred:
- Prior experience in the ocean science & technology community
- 5 plus years of experience selling technical products
- Experience managing contacts and projects in a CRM database

Send Resume outlining education, experience and salary history to:
Human Resources
Teledyne Benthos, Inc.
49 Edgerton Drive
N. Falmouth, MA 02556
508-563-1000
e-mail: benthosrecruiting@teledyne.com
AA/EOE/V/D/F/M

Human Resources
Teledyne Benthos
49 Edgerton Drive
North Falmouth, MA 02556
USA
Phone: +1 508-563-1000
Fax: +1 508-563-6444
Email: benthosrecruiting@teledyne.com
WEB: http://www.benthos.com

UNITED STATES POSTAL SERVICE

Statement of Ownership, Management, and Circulation (Requester Publications Only)

1. Publication Title	2. Publication Number	3. Filing Date
Marine Technology Reporter	0 2 3 - 2 7 6	September 29, 2011
4. Issue Frequency	5. Number of Issues Published Annually	6. Annual Subscription Price (if any)
Nine Issues per Year	9	None

7. Complete Mailing Address of Known Office of Publication (Not printer) (Street, city, county, state, and ZIP+4®)
New Wave Media
118 East 25th. St. 2nd. Fl.
New York, NY 10010
Contact Person: Dale Barnett
Telephone (Include area code): 212-477-6700

8. Complete Mailing Address of Headquarters or General Business Office of Publisher (Not printer)
New Wave Media
118 East 25th. St. 2nd. Fl.
New York, NY 10010

9. Full Names and Complete Mailing Addresses of Publisher, Editor, and Managing Editor (Do not leave blank)
Publisher (Name and complete mailing address)
John C. O'Malley
New Wave Media
118 East 25th. St. 2nd. Fl.
New York, NY 10010
Editor (Name and complete mailing address)
Greg Trauthwein
New Wave Media
118 East 25th. St. 2nd. Fl.
New York, NY 10010
Managing Editor (Name and complete mailing address)

10. Owner (Do not leave blank. If the publication is owned by a corporation, give the name and address of the corporation immediately followed by the names and addresses of all stockholders owning or holding 1 percent or more of the total amount of stock. If not owned by a corporation, give the names and addresses of the individual owners. If owned by a partnership or other unincorporated firm, give its name and address as well as those of each individual owner. If the publication is published by a nonprofit organization, give its name and address.)

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John C. O'Malley	New Wave Media 118 East 25th. St. 2nd. Fl. New York, NY 10010

11. Known Bondholders, Mortgagees, and Other Security Holders Owning or Holding 1 Percent or More of Total Amount of Bonds, Mortgages, or Other Securities. If none, check box → ☒ None

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12. Tax Status (For completion by nonprofit organizations authorized to mail at nonprofit rates) (Check one)
The purpose, function, and nonprofit status of this organization and the exempt status for federal income tax purposes:
☒ Has Not Changed During Preceding 12 Months
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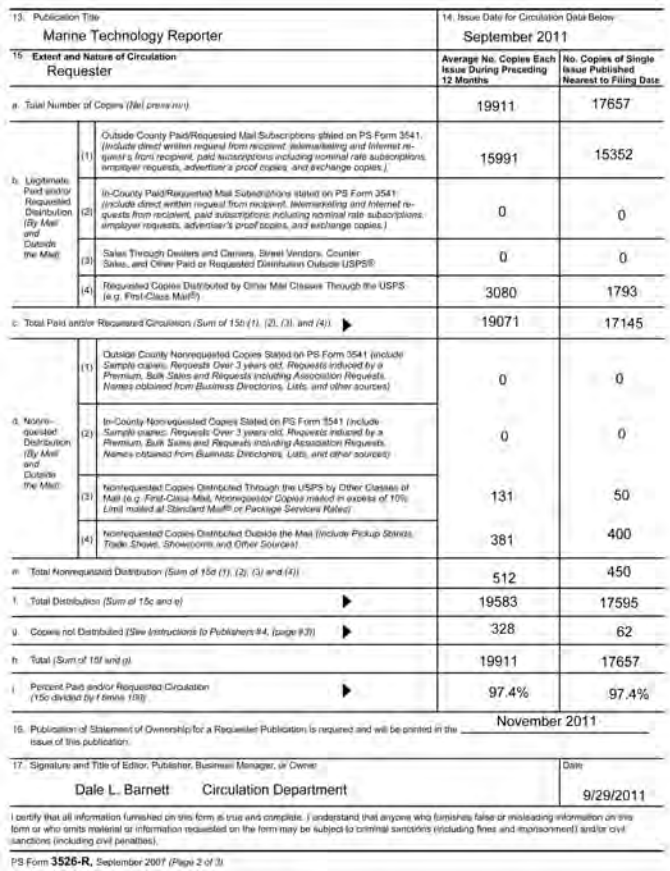
PS Form **3526-R**, September 2007 (Page 1 of 3 (Instructions Page 3)) PSN: 7530-09-000-9855 **PRIVACY NOTICE:** See our privacy policy on www.usps.com



13. Publication Title: Marine Technology Reporter	14. Issue Date for Circulation Data Below: September 2011	
15. Extent and Nature of Circulation: Requester	Average No. Copies Each Issue During Preceding 12 Months	No. Copies of Single Issue Published Nearest to Filing Date
a. Total Number of Copies (Net press run)	19911	17657
b. Legitimate Paid and/or Requested Distribution (By Mail and Outside the Mail) (1) Outside County Paid/Requested Mail Subscriptions stated on PS Form 3541. (Include direct written request from recipient, telemarketing and Internet requests from recipient, paid subscriptions including nominal rate subscriptions, employer requests, advertiser's proof copies, and exchange copies.)	15991	15352
(2) In-County Paid/Requested Mail Subscriptions stated on PS Form 3541. (Include direct written request from recipient, telemarketing and Internet requests from recipient, paid subscriptions including nominal rate subscriptions, employer requests, advertiser's proof copies, and exchange copies.)	0	0
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(4) Requested Copies Distributed by Other Mail Classes Through the USPS (e.g. First-Class Mail®)	3080	1793
c. Total Paid and/or Requested Circulation (Sum of 15b (1), (2), (3), and (4)) ▶	19071	17145
d. Nonrequested Distribution (By Mail and Outside the Mail) (1) Outside County Nonrequested Copies Stated on PS Form 3541 (include Sample copies, Requests Over 3 years old, Requests induced by a Premium, Bulk Sales and Requests including Association Requests, Names obtained from Business Directories, Lists, and other sources)	0	0
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17. Signature and Title of Editor, Publisher, Business Manager, or Owner: Dale L. Barnett Circulation Department — Date: 9/29/2011

I certify that all information furnished on this form is true and complete. I understand that anyone who furnishes false or misleading information on this form or who omits material or information requested on the form may be subject to criminal sanctions (including fines and imprisonment) and/or civil sanctions (including civil penalties).

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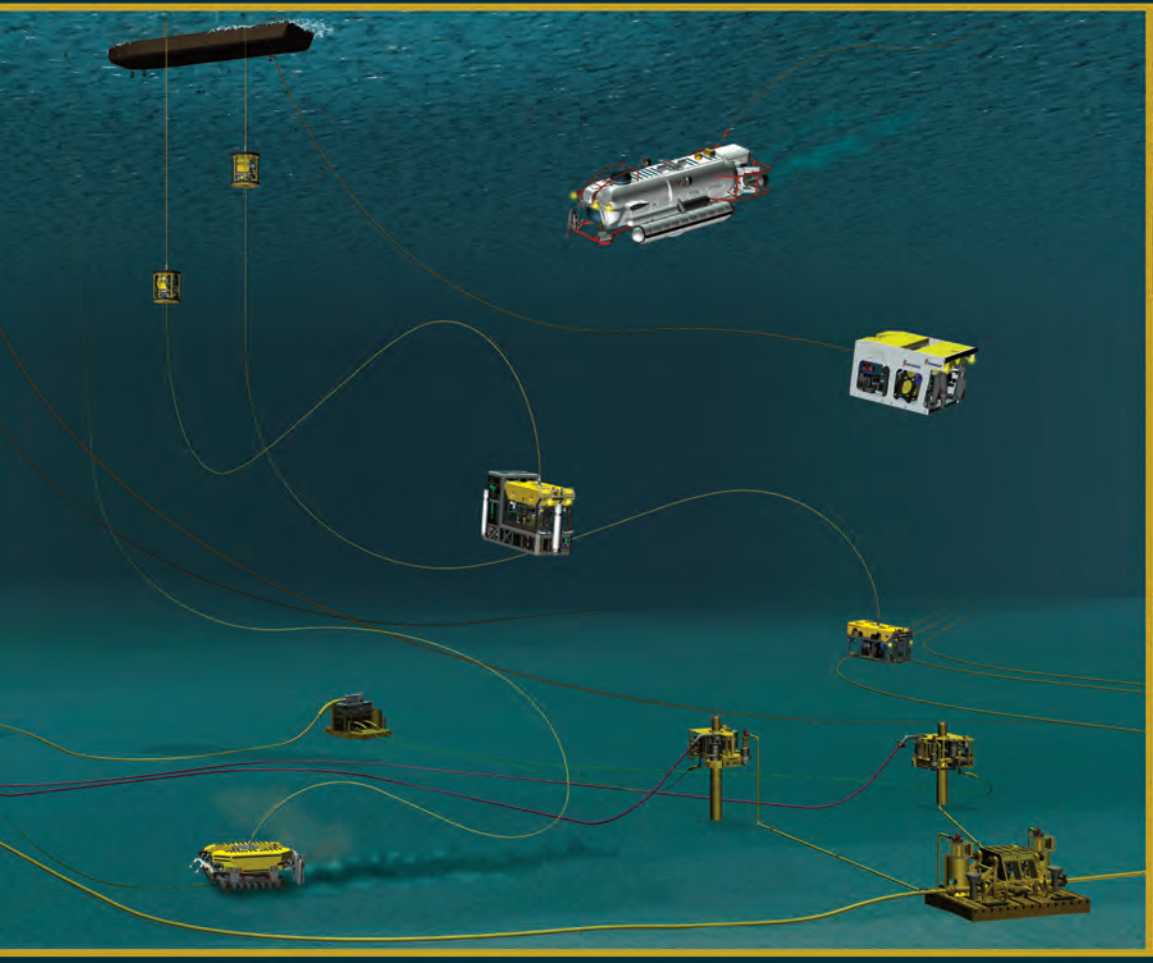

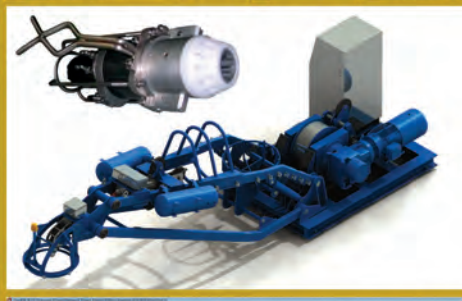

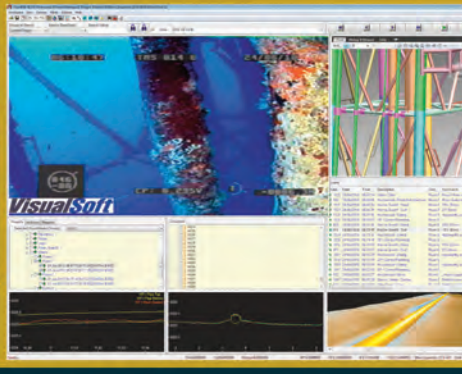

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