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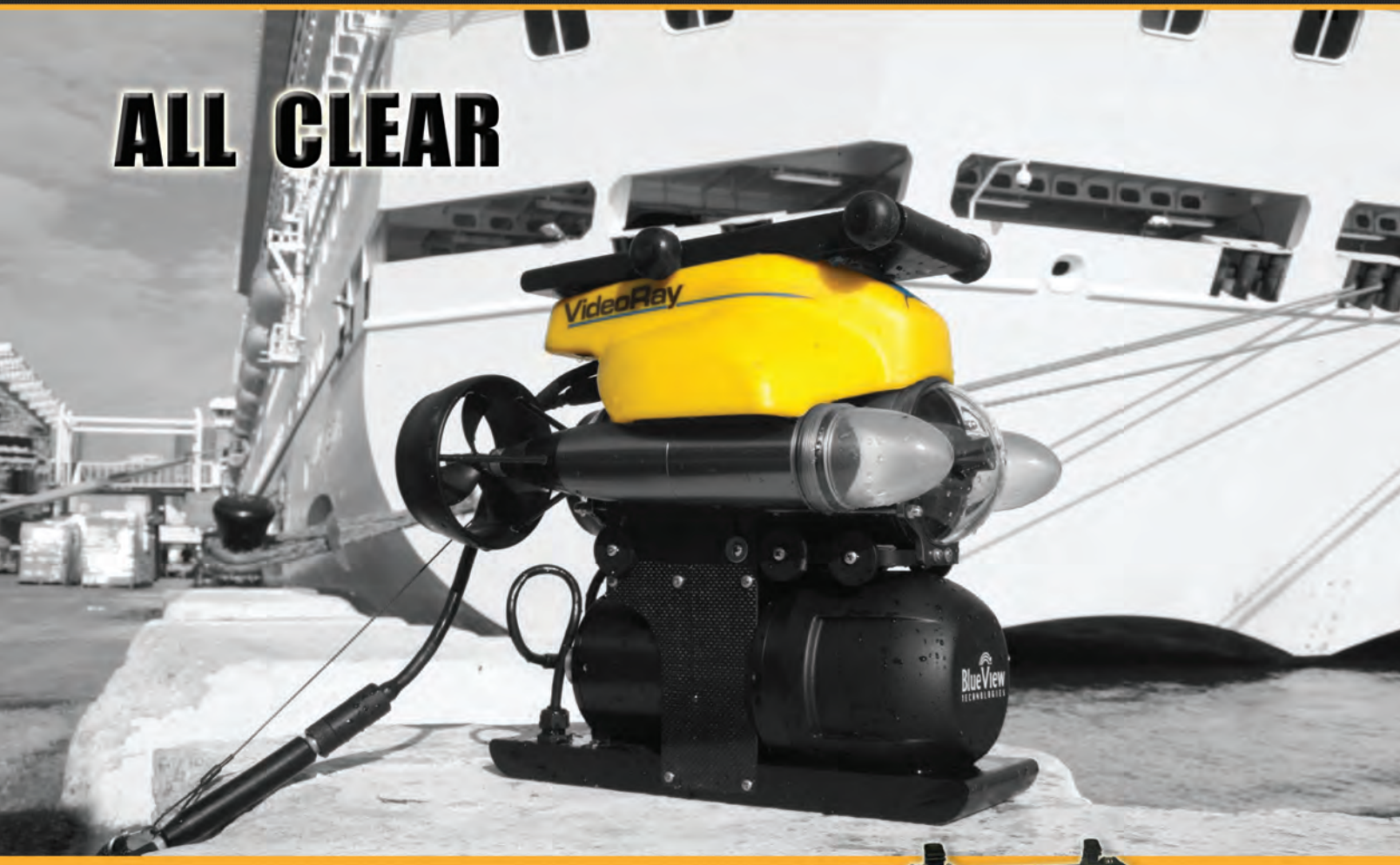

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(Image: NOAA)

On the Cover

While the U.S. lags Europe in the development of Offshore Wind, 2012 could be a turning point in the push for renewable energy. See story page 24.

(Photo courtesy BMT Group www.bmt.org)

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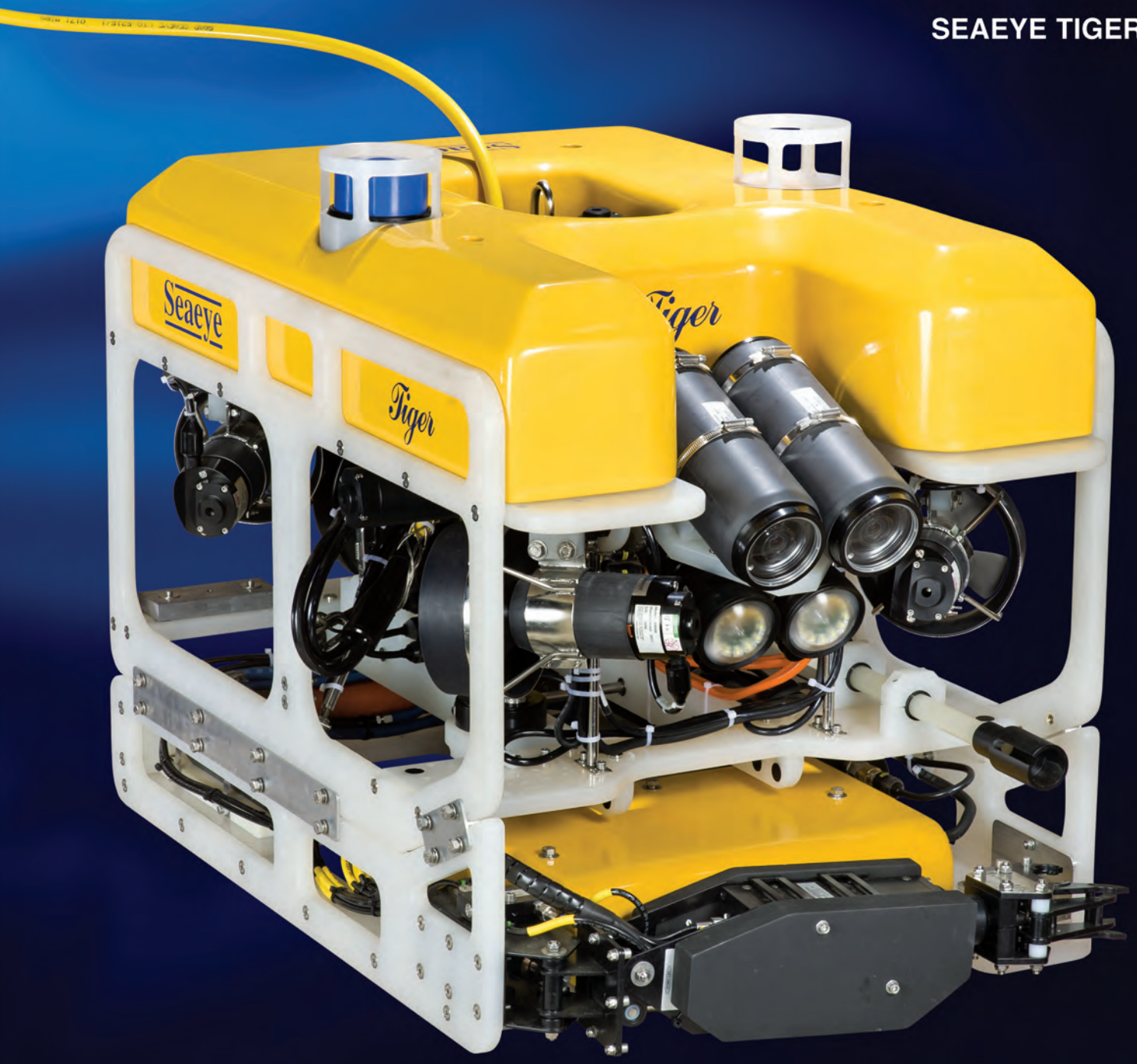

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I just returned from the Offshore Technology Conference in Houston and it never ceases to amaze me the power that Oil & Gas have to unite disparate groups of individuals. With the price of a barrel of oil hovering above $100, vast tracts of new gas field finds opening up onshore and off, and renewed vigor to discover and recover resources above the Arctic Circle, there is a palpable good vibe among the offshore O&G community which is having spillover effects on closely interconnected subsea and maritime markets.

Now more than ever the subsea industry is in the limelight, with the confluence of James Cameron's dramatic dive to the Marianas Trench; the 100th year anniversary of the sinking of the Titanic (and the resultant dispute regarding the recovery and selling of artifacts); and the sudden resurgence of the offshore O&G markets, two years on from the Macondo spill in the Gulf of Mexico.

With the limelight comes scrutiny, and last month, on the second anniversary of the Deepwater Horizon blowout, a national panel of researchers issued a report urging governments to reassess oil spill response (see story page 8).

Perhaps the worst kept secret in the world is the fact that the Europeans are light years ahead of the rest of the planet in the development, testing and implementation of offshore renewable energy, particularly Offshore Wind Farms. The U.S., in particular, has a long and well-documented love affair with fossil fuels, consuming nearly 20% of the world's daily take with less than five percent of its population. But the U.S. is poised to catch up. According to our article *"Marine Renewable Energy: Set to Take Off in 2012,"* (page 24) a trio of attorneys from Blank Rome argue that the political will and technical know-how are well aligned, as the Department of Energy's National Renewable Energy Laboratory estimates there are more than 4,000 gigawatts of potential offshore wind resources in the U.S.: or four times the existing sources of electricity!

But as most of the readers of *MTR* know all too well, sound business reason, political backing and solid science still sometimes fall well short in bringing concept to reality. While there is certainly momentum growing for the development of offshore wind, It appears now an abundance of cheap gas will help to put a damper on realizing the full benefits.

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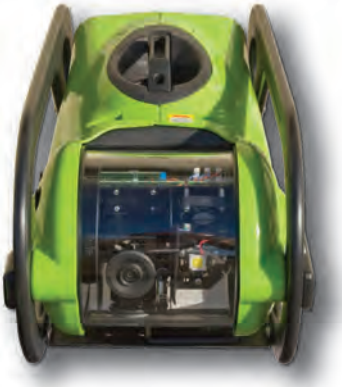

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See Story on page 36

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See Story on page 12

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See Story on page 18

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See Story on page 30

Juan Manuel Casal *is with Mariscope — Argentina;* ***Christian Haag*** *is with Mariscope — Chile.*

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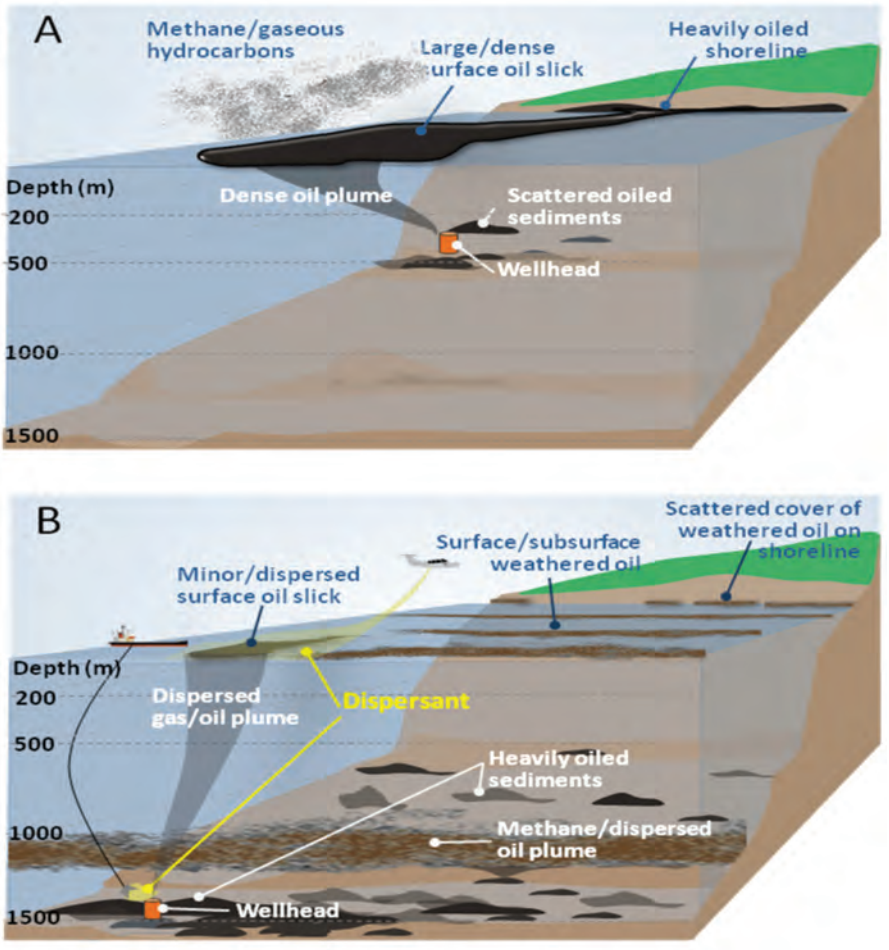
Marine Scientists Urge Governments to Reassess Oil Spill Response

On the second anniversary of the Deepwater Horizon blowout, a national panel of researchers including University of Georgia marine scientist Samantha Joye is urging the federal government to reassess how it would respond to similar oil spills that might occur in the future. The 22 researchers, whose paper was published in the peer-reviewed journal Bioscience, noted that the 2010 Deepwater Horizon oil spill was unlike any other oil spill encountered previously. Although the well blowout occurred at unprecedented depths and released enormous quantities of oil (an estimated 4.9 million barrels or 206 million gallons), the response to cleanup and contain the oil followed a framework that assumed the oil's behavior would mimic previous shallow-water and surface spills.

In addition to creating a new model for understanding how deep water oil spills occur, the authors argue for an increase in immediately accessible research funding following oil spills so that society can be better prepared to respond to future spills, should they occur. They also noted that the requirement of the federal Natural Resource Damage Assessment Process that requires cooperative decision-making between the government and the responsible party and mutual approvals of research studies slows down the process and limits the scope of studies that are conducted.

"So many aspects of this oil spill were unique—that it was an offshore, deep-water blowout; that both methane and oil were released from the wellhead into the pelagic ocean; that dispersants were used at both the sea surface and sea floor," said Joye, the Athletic Association Professor in the UGA Franklin College of Arts and Sciences. "Doing science in response to the spill was an incredible challenge, and what we learned during the response led us all to the new spill response model that is described in our paper."



(Credit: Peterson et. al, BioScience, May 2012).

The figures contrast (a) the traditional model for crude oil fate and effects that prevailed before the DWH blowout and (b) the newly emerging and still developing model of a deepwater blowout like the DWH.

The authors noted that the lack of a model for understanding deep-water spills may have hindered initial work on this disaster and obscured understanding of what actually happened in the key early days. "The problem here is that scientific assessment would be faster and more thorough if this were a familiar type of spill," said the study's lead author, Charles "Pete" Peterson, a professor at University of North Carolina–Chapel Hill, who has been deeply involved in the study of Exxon Valdez environmental effects for more than two decades. "But this was a new type of spill. We now have a sense that the bulk of the

(Continued on page 10)

(Continued from page 8)

impact was probably in the mid-water and deep ocean. Who the heck knows what oil does to the mid-water pelagic and deep-dwelling critters?"

To create their new model, a group of scientists convened under the auspices of the National Center for Ecological Analysis and Synthesis in 2010, while the spill was still active, to synthesize existing knowledge to anticipate the potential ecotoxicological effects of the spill. They highlighted major gaps in scientific understanding that must be addressed for society to successfully confront the modern oil spill in an age in which drilling has moved into deeper water. This new model for how an oil spill unfolds and where the resulting ecological impacts accrue emphasizes that the vast majority of the oil is retained at depth and, among other response actions, calls into question the efficacy of dispersants. In the case of Deepwater Horizon, hot oil and natural gas erupted from the seabed and were rapidly mixed and dispersed due to the physics of the pressurized oil jetting from the tip of the wellbore. "Much of that oil never got to the surface, or ever could have gotten to the surface, calling into question the value of dispersant use at depth" argues co-leader Gary Cherr, director of UC Davis' Bodega Marine Lab. "We have generally hailed the use of [chemical] dispersants as helpful, but really are basing this on the fact we seemed to have kept oil from getting to the surface. The truth is much of this oil probably was staying at a depth independent of the amount of surfactants we dumped into the ocean. And we dumped a lot of dispersants into the ocean, all told approximately one-third the global supply."

Additional authors include: Richard F. Ambrose, UCLA; Shelly Anghera, Anchor QEA, L.P.; Steven Bay, S. California Coastal Water Research Project-Costa Mesa; Michael Blum, Caz M. Taylor, Douglas Meffert, Tulane; Robert Condon, Sean P. Powers, Dauphin Island Sea Lab, Ala.; Monty Graham, Southern Mississippi University; Thomas A. Dean, Coastal Resources Associates, Inc.; Michael Guzy, John Lambrinos, Bruce Mate, Oregon State University-Corvallis; and Stephanie Hampton, NCEAS.

New "Fish Kill" App

A team of scientific and educational organizations led by Woods Hole Group developed a smart phone app to study fish deaths in Buzzards Bay. The "Buzzards Bay Fish Mortality" app utilizes mobile crowdsourcing to collect data from citizens who encounter dead fish on the beaches and waters of Buzzards Bay. The goal is to collect enough data to verify reports of large numbers of fish mortality in the area. It uses "mCrowd" - a crowdsourcing platform developed by the University of Massachusetts Amherst. It is available for free in the iTunes App Store. It will soon be available for Android users.

Right Whale Finder App

Mariners along the U.S. east coast can download a new iPad and iPhone application that warns them when they enter areas of high risk of collision with critically endangered North Atlantic right whales. The free Whale Alert app provides one source for information about right whale management measures and the latest data about right whale detections, all overlaid on NOAA digital charts.
A key feature: a display linking near real-time acoustic buoys that listen for right whale calls to an iPad or iPhone on a ship's bridge showing the whale's presence to captains transiting the shipping lanes in and around Stellwagen Bank National Marine Sanctuary.
Whale Alert can be downloaded free of charge from the iTunes App store.

Unique System FZE Receives Award From CodaOctopus

At the recent OI '12 in London, Unique System FZE was awarded CodaOctopus' best worldwide sales representative in recognition of its outstanding performance over the last two years. Unique System has been representing CodaOctopus for many years in the Middle East, successfully promoting all three product groups i.e. 3D sonar, Marine Geophysical and Motion Sensing.

(L to R): Stephen Auld (CodaOctopus), Shaijan Baby, Sahil Gandhi (both Unique System FZE)

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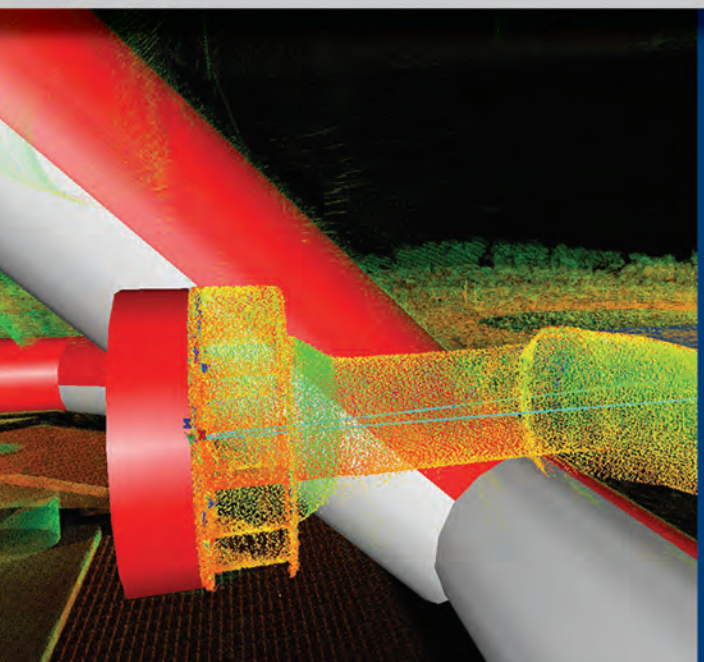

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The Return of NEMED

... the violent, rude, and rushing torrent of the diluvian spring tide and the front breast of the exceedingly rough blue-crested wave came over them and not one of them escaped ... *The Invasion of Nemed, Book of Leinster*

By John Miller, Executive Director, New England MREC

Four thousand years ago, Nemed led his people in battle against a race of titans for control of Ireland, only to have their army destroyed by the power of the sea. Such myths are common in many cultures and speak of our respect, or even fear, of the ocean. Today, of course, we have learned to live with the sea using it for food, transportation and recreation, but we are also aware of its power when we see the destruction wrought by a tsunami. However, with the vast majority of the world's population living near the coast and many of them lacking adequate supplies of electricity, the power in the ocean waves and tides cannot be ignored.

New technologies face many challenges, with survivability at the top of the list for ocean energy devices. For survivability, a disciplined and staged design approach is needed. To advance technologies that could survive in outer space, Technology Readiness Levels (TRLs) were defined, specifying various levels of performance and testing. For the ocean, the US Department of Energy has modified these levels to focus on test requirements and needed infrastructure. One glaring deficiency is the lack of open ocean test sites. With estimates that legal permitting represents up to 70% of the cost of an open ocean site; pre-permitted and monitored sites are critical to advancing this industry. The UK responded with the European Marine Energy Center, located in Orkney,

Free Flow Power's turbine being towed to the Massachusetts Maritime Academy's partial scale test site aboard the barge donated by Verdant Power, New York, NY.

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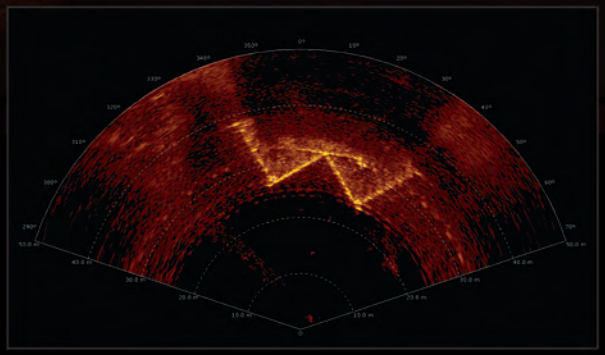

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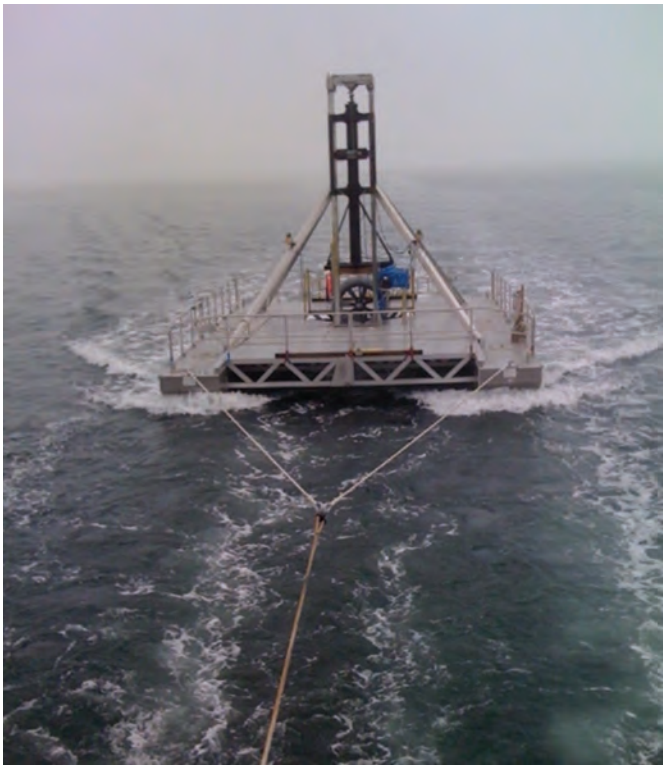
Scotland, and other countries have followed suit.

Around the world great progress has been made harnessing the power of the ocean. The UK, Ireland, and Canada have invested in test infrastructure and financials incentives. Companies such as MCT, OpenHydro, ORPC and Verdant are at or near commercialization for tidal energy conversion, and Aquamarine, Pelamis and OPT are doing the same for wave power. The costs have been huge with a recent CEO panel at the Global Marine Renewable Energy Conference(GMREC) estimating it takes 10 years and $70 million to commercialize an ocean energy device.

The New England Marine Renewable Energy Center (MREC) has a solution that leverages existing resources in a cost effective manner. MREC was founded to support the sustainable development of marine renewable energy in New England. Within 100 km of Boston is arguably the greatest concentration of ocean engineers and scientists in the world. MREC and its university consortium - Universities of Massachusetts Dartmouth (UMD), New Hampshire (UNH) and Rhode Island (URI), as well as MIT and Woods Hole Oceanographic Institution (WHOI) - bring together a significant infrastructure which includes six wave, tow and basin tanks. In the past five years the consortium members have worked with more than 20 companies testing wave or tidal energy conversion technologies. But these traditional test capabilities meet only TRL 1-5 needs. The good news is that MREC is building a system to integrate the full TRL test requirements ... providing a full suite of test facilities for these companies.

The New Marine Energy Development System (NEMEDS) will provide cost effective development support through the full TRL range of requirements. NEMEDS adds six flumes of various sizes at commercial and government labs, to the existing test tanks, and is developing both partial scale and full scale ocean test sites. With limited budgets, a key element of this program is to do everything in the most cost effective manner. Two strategies to meet this goal are leveraging existing facilities and developing synergies with other programs.

Free Flow Power's turbine being tested at USGS Conte Fish Center, Turner Falls, MA



Free Flow Power's turbine aboard Massachusetts Maritime Academy barge being towed to the Muskeget Channel tidal power test site during the summer of 2011.

NEMEDS exploits an existing network of university and commercial facilities. An example is the flume and fish breeding capabilities at Alden Labs. Another facility is the USGS Conte Fish Center at Turner Falls, MA, designed to provide large flumes to study anadromous fish behavior. With the largest flume in the US, Conte has been used by developers such as Free Flow Power to test large turbines.

NEMEDS also provides open-ocean testing. Again, in the spirit of cost-efficiency the UNH Open Ocean Aquaculture Site provides a fully permitted site with 50m of depth, 10 years of wave monitoring and buoy testing, and close access to shore support facilities. In April Neptune Wave Power deployed its wave device at the site and Eddie Mayfield, Neptune's President, noted, "UNH provides me the most cost effective way to do ocean test-

ing, and they provide outstanding technical support." For tidal testing, partial scale test sites are available today at UNH and at the Massachusetts Maritime Academy (MMA).

Developing synergies with other programs can be seen in the NEMEDS tidal test site development. Muskeget Channel, between Martha's Vineyard and Nantucket, has a tidal resource that is being developed by a municipality, Edgartown. With limited resources Edgartown has employed the capabilities of the UMD School of Marine Science and Technology to conduct resource and environmental surveys. In exchange, Edgartown has guaranteed one permanent berth for open-ocean tidal testing, allowing the organizations to share in installation, maintenance and operational costs.

While very cost effective, these facilities are not free and additional funding is being sought. In the meanwhile, MREC and NEMEDS continue to support testing of new technologies. Last summer, a partial scale turbine from Free Flow Power was tested on the MMA barge using an advanced energy storage system from FastCAP Power, an ARPA-E awardee. This summer a second tidal test will be accompanied by a wave device test provided by Resolute Marine Energy. Additionally WHOI researchers will experiment with the use of radar for measuring offshore wind and wave resources. Funding for this work is being provided by the Massachusetts Clean Energy Center with the radar work following on a Bureau of Ocean Energy Management MREC contract to develop a roadmap for assessment technologies, a great example of the synergies of state and federal funding being used in complementary programs.

MREC is supporting a wide range of technology developers with cost effective and responsive test support. A recent Cooperative Research and Development Agreement (CRADA) with the National Renewable Energy Lab (NREL) will ensure the entire system adheres to the developing testing protocols of TC-114 standards organization. NEMEDS has returned to lead the way, with an integrated and compliant system,

Large flume tank at the USGS Conte Fish Center, Turner Falls, MA

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Requirements Ever Increasing for

Hydrographer Skill Set

By Lou Nash, M.S., President of Measutronics Corporation

Anyone who has ever been directly involved in the collection of bathymetric data knows that good hydrographers have an impressive skill set. On a smaller survey vessel, this skill set quite often includes a basic working knowledge across such disciplines as navigation, geodesy, acoustics, computer operating systems, electronics, data telemetry, meteorology, small engine repair, electrical systems and small boat handling. As the capabilities and features of sonars, positioning and motion reference systems continue to increase, so too must the hydrographer's skills increase. Perhaps more importantly, as the capabilities, and hence performance expectations, of these systems are continually stacked higher and higher, the hydrographer's base of knowledge must be ever more broad. While it is possible to achieve such a base of comprehension through extensive field experience, erudition in the disciplines of surveying principles and measurement sciences is a tremendous place to start and forms the most solid base from which to build on the "knowledge pyramid".

As wonderful underwater images obtained by acoustic means become more and more common within trade journals and at manufacturer web sites around the world, more is demanded of the "average hydrographer" by end users of the data sets obtained.

The current surge in equipment capabilities and data demands can be directly correlated to the advancements in computer processing power and, perhaps more specifically, advancing capabilities in the manipulation of three dimensional data sets within advanced software packages.

Sonar system manufacturers have responded to the ability to process extremely large data sets with what seems to be an ever-growing list of system capabilities in the multibeam, scanning and interferometric sonar systems they produce. As the sheer volume of point cloud data collect-

The author training the Tunisian Navy, Bizerta, Tunisia.

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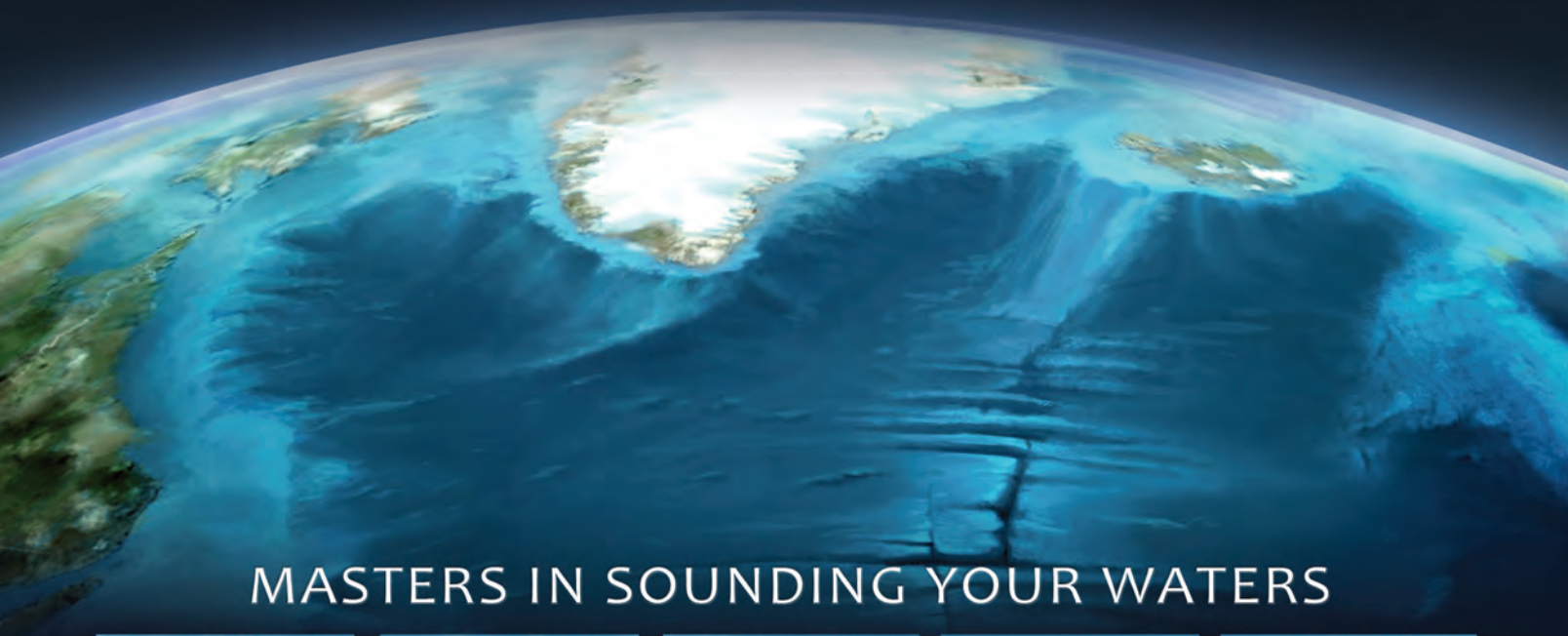

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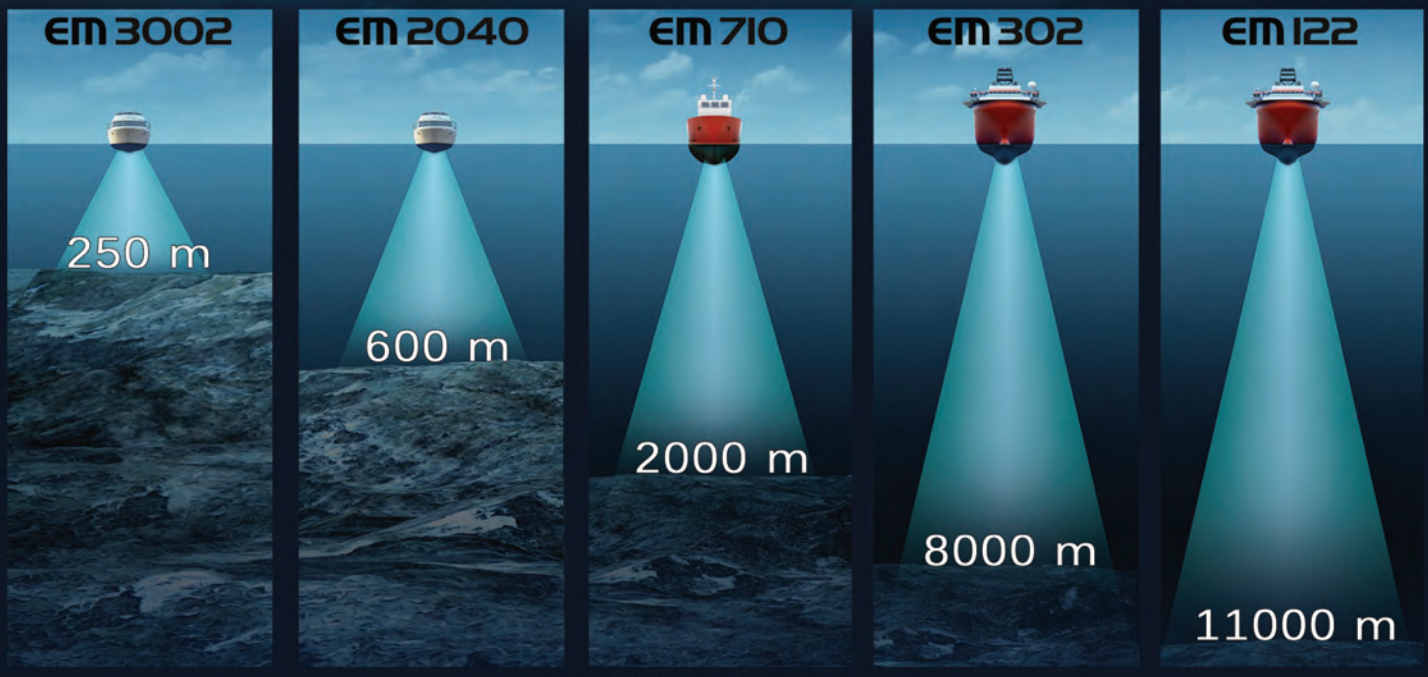

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THE FULL PICTURE

ed continues to increase, so too does metadata such as return intensity, water column and backscatter data.

As hardware capabilities increase, and as a natural extension of computer processing capabilities, so too do software capabilities. As software capabilities increase, data end users look closer and closer at their data sets and the metadata available. The closer they look, the more they see and the more they want! That in turn fuels manufacturers and software developers in the development of the next feature release or upgrade and thus the cycle continues to gain critical mass, becoming ever larger and larger.

Successful system operation can be defined as obtaining geospatially accurate data on a repeatable basis with a realistic summation and reporting of the quality and analysis of the data and metadata extracted. With the more complex systems, a hydrographer's skill set must be more than just a basic working knowledge as mentioned above. Successfully using higher end sonar and positioning systems requires knowledge of advanced positioning techniques, inertial guidance systems and error propagation, etc. Contrary to the shiny brochures, the equipment components that comprise an advanced sonar imaging or mapping system are not typically "plug-and-play".

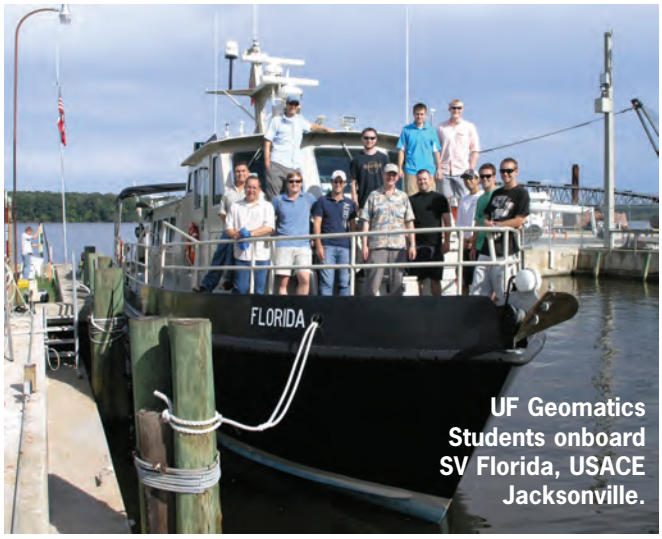
High end sonar systems are comprised of a number of components – the sonar itself, positioning hardware (typically GNSS), an inertial motion reference unit (MRU), an advanced computer with data collection software, etc., each performing a specific task and often capable of operating in a number of modes. Each of these components is available through a number of quality manufacturers resulting in a sometimes overwhelming system components matrix. Obtaining a single technician or field engineer that fully understands the requirements and nuances of all the hardware combinations available in providing a full system is a rare find.

Manufacturers of high end hardware as discussed above typically offer training on the hardware and/or software they provide. However, such training is often "one-dimensional" in that the field engineer, while thorough and highly competent in the training provided on the equipment supplied by the manufacturer he or she represents, does not necessarily have the same level of competence in the other ancillary hardware comprising the complete system. This is not meant to belittle the average manufacturer field engineer. The fiscal reality is, that an engineer employed by Manufacturer X does not typically have the time or resources to stay abreast and efficient in the equipment offerings of Manufacturers Y and Z.

In theory, one could receive manufacturer training for each component within the total system and be fully competent in the system as a whole. However in practice, this is not usually the case for the average hydrographer or field technician receiving typical "operator training" on a piecewise level.

Herein is the sometimes subtle difference between training and education, as defined below (Webster's Unabridged Dictionary):

- **Training** — to make proficient by instruction and practice, as in some art, profession, or work…
- **Education** — the act or process of imparting or acquiring general



UF Geomatics Students onboard SV Florida, USACE Jacksonville.

knowledge, developing the powers of reasoning and judgment.

It is certainly possible that a person without formal education could receive training at the "component level" and, from there, assemble and operate a complete system in a competent fashion. However, personal observation has shown that a person educated in the disciplines of geodesy, positioning and inertial navigation, error propagation, etc. (all subject matter enveloped in the discipline now known as "Geomatics") has the greatest odds of overcoming the "learning curve", in the least amount of time, with high end sonar imaging systems. This expediency is of note when considering the costs of the systems under discussion here lending credence to the dictum, "time is money". Individual equipment components have to be integrated into a system, producing accurate, valid and repeatable results in a minimum of time.

There are a number of universities offering courses of study in the geomatic sciences. The graduates of these programs have mastered the fundamentals of their chosen course of study and as such are able to apply the powers of reasoning and judgment that their education has afforded them. They are able to assemble advanced systems from the component level, incorporate manufacturer training into the proficient operation of the system and, most importantly, analyze the accuracy and adequacy of data collected providing the all-important measure of quality assurance and quality control. With the high costs of high end sonar systems and operating vessels offshore, getting the job done right, the first time, every time is of the utmost importance.

Federal agencies and larger contracting firms have been operating complex integrated sonar imaging and mapping systems for a number of years. Many have long realized the value of hiring personnel with a strong geomatics background and have focused their recruiting efforts at specific university programs. They have reaped the benefits of their targeted hiring programs accordingly.

As with most technologies, the cost of ownership for the systems referred to herein, though still relatively high, are decreasing and becoming affordable to a larger group of end users. As the number of systems within the industry increases, the percentage of qualified operators is decreasing and regardless of what the brochures imply, our world is not all "plug-and-play".

In support of advanced system operation and personnel acquisition efforts, prudent managers embracing these advanced systems for the first time should be contacting geomatics programs to initiate recruiting efforts. Along the same lines, with the world-wide economic down turn we're experiencing now and its effect on new construction (and therefore traditional "terrestrial surveying"), geomatics students should be approaching potential employers in the hydrographic survey world as well. As they begin to get their feet wet offshore, the benefits of their education will pay dividends to both themselves and their employer.

This article should not be construed to infer that the only persons capable of assembling and operating high end sonar systems need be university graduates. Nor is it meant to slight component level training offered by manufacturers. Indeed, the young college graduate has as much to gain from this type of training (as well as industry conferences and seminars, continuing education and hands-on experience) as does the "brought up from the deck plates" field technician and hydrographer. My point is that advanced sonar systems are a major financial investment. The purchase of such a system should be considered only the front end of the investment. Extensive training should also be budgeted for. Spend that money wisely and train the right people. In my experience, the quickest return on this training investment comes from providing manufacturer component level training to those with a broad based, thorough understanding of surveying and mapping principles as offered in a consummate education in geomatics. When those educated persons, trained in the specifics of the equipment they operate become proficient in the use of their advanced system(s), successful system operation is achieved in the quickest fashion and invariably maintained through time.

Marine Renewable Energy *Set to Take Off in 2012*

By Joan M. Bondareff, Nicholas A. Giannasca, and Carlos E. Gutierrez, Blank Rome

The U.S. lags behind Europe in the development of offshore wind (OSW) projects in part due to the lack of a mandatory national renewable energy standard and other tax incentives.

But, the Obama Administration has set its own voluntary goal of producing 80% of the nation's electricity from clean sources by 2035. And, various federal agencies have worked diligently to promote new sources of energy, including OSW and tidal and wave energy.

This year, we anticipate the first new commercial leases for wind off the Atlantic Seaboard (since Cape Wind), and the first commercial project for tidal energy in New York Harbor. This article reviews the current legal and regulatory framework for OSW and tidal energy, and the remaining impediments to further progress and next steps for going forward.

Why OSW?

The most recent estimate of the Department of Energy's (DOE) National Renewable Energy Laboratory (NREL) is that there are over 4,000 gigawatts of potential offshore wind resources in the U.S., or four times the existing sources of electricity. Wind is abundant on the U.S. Outer Continental Shelf (OCS) and relatively "free" once it is tapped. Getting the wind developed and brought to shore is another matter.

Deploying a tidal turbine in the Bay of Fundy

(Photo: Fundy Ocean Research Center for Energy – or FORCE)

Why Tidal Energy?

Two recent DOE reports estimate that wave and tidal energy off the nation's coasts could contribute significantly to the total annual electricity production of the U.S., or up to 15% of its electricity by 2030. Companies like Verdant Power are tapping into this available energy source by developing projects in the East River of New York. On January 23, 2012, the Federal Energy Regulatory Commission (FERC) granted Verdant Power the first commercial license for tidal power in the U.S.

The "Smart from the Start" Initiative

Giving credit where credit is due, one must give credit to Secretary Ken Salazar and his Department of the Interior (DOI) for developing the "Smart from the Start" Initiative. Secretary Salazar announced this initiative on November 23, 2010 to accelerate the responsible development of renewable energy resources on the Atlantic OCS. The main objective is to identify areas on the OCS, so-called Wind Energy Areas (WEAs), which are best suited for wind development. The underlying authority for the development is Section 388 of the Energy Policy Act of 2005.

Federal law enables DOI to lease areas of the OCS for wind development. However, this jurisdiction does not extend to State waters. DOI recognized early on that bringing the wind onshore would require collaboration with the States along the Atlantic. As a result, DOI supported a series of Task Forces, comprised of federal, state, local, and tribal stakeholders, to resolve use conflicts and identify the most suitable WEAs.

While there have been stops and

The most recent estimate of the Department of Energy's (DOE) National Renewable Energy Laboratory (NREL) is that there are over 4,000 gigawatts of potential offshore wind resources in the U.S., or four times the existing sources of electricity.

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starts in the program, the Task Forces were able to resolve most of the critical use conflicts, i.e., between military, shipping, port, and other existing uses of the WEAs. On February 3 and 6, 2012, respectively, DOI issued Calls for Nominations (Calls) for leasing specific WEAs off the coasts of Virginia, Maryland, and Massachusetts. (Areas off New Jersey and Delaware were already the subject of Calls.)

DOI announced the Calls simultaneously with issuing a final Environmental Assessment (EA) on the defined WEAs, concluding that there would be no significant impacts caused by the lease sales. Under a lease, a developer can only conduct certain site surveys and collect meteorological and other data. Further environmental reviews would be deferred until proposed construction of a wind farm.

Interested developers had until March 19, 2012 in the case of VA and MD, and March 22, 2012 in the case of MA, to respond to the new Calls. If there is competitive interest in a particular Call area, DOI, through the Bureau of Ocean Energy Management (BOEM), will conduct an auction to sell the leasehold interests. BOEM will finalize its auction procedures prior to the actual sale beginning. BOEM expects to award leases off the Atlantic Seaboard by the end of the year.

How Will the Power Be Brought Onshore?

Like their onshore counterparts, OSW projects must be "interconnected" to the land-based power grid to deliver the electricity they generate. The construction of new transmission lines, while critical to integrating renewable resources, faces powerful barriers, such as cost recovery uncertainty, siting concerns and technological limitations. In an effort to incentivize investment in transmission, FERC issued rules establishing several broad categories for incentive rate treatments for transmission investments including: incentive rates of return on equity for new investment; use of hypothetical capital structures; and accelerated depreciation.

The Atlantic Wind Connection project (AWC), which promises to build the first offshore "transmission highway," successfully petitioned FERC for incentive rate treatment in 2011. AWC would consist of four 320 kV direct current transmission cables that will run parallel to the Mid-Atlantic coast approximately 20 miles offshore for 250 miles. This project would integrate OSW generation with the land-based transmission system in New Jersey, Delaware, Maryland, and Virginia. While it succeeded in obtaining FERC rate treatment, such approval was conditioned on the transmission project being included in the Regional Transmission Expansion Planning (RTEP) process of PJM.

Therein lies the challenge for AWC. Regional planning processes, like RTEP, generally only consider transmission projects that address a demonstrated reliability need or economic benefits. However, a recent FERC rule will require regional planners to consider "public policy requirements" when conducting planning studies. The new mandate offers renewed hope for offshore transmission projects, such as AWC, that otherwise would not be "economic" or alleviate reliability concerns.

What Role Will the States Play?

Several States with the potential for OSW have commenced initiatives aimed at fostering the development of this growing industry. New Jersey became one of the most prominent when it announced in its 2008 Energy Master Plan its goal of installing 1,000 MWs of OSW. While sev-

eral years behind schedule, the 1,000 MW target remains a State goal.

Last summer, the New Jersey Board of Public Utilities (NJBPU) launched stakeholder proceedings on implementation of the State's Offshore Wind Economic Development Act (OWEDA). One of those hearings explored various methods for funding the state's Offshore Wind Renewable Energy Certificates (ORECs). Despite the NJBPU activity, uncertainty pervades the OREC market.

In Maryland, Governor O'Malley pledged support for the Maryland Offshore Wind Energy Act of 2012 that would establish an OSW "set-aside" within Maryland's Renewable Portfolio Standard. The proposed bill would require regulated utilities to comply by developing or purchasing ORECs by 2017. The OREC model comes after last year's attempt at similar OSW legislation that centered on long-term (25+ years) power purchase obligations. That bill largely failed as a result of cost concerns.

States like Virginia have not pursued the OREC model but are more reliant on investor-owned utilities developing OSW when prices become more competitive.

What are the Remaining Impediments to Offshore Wind?

A number of economic and regulatory barriers need to be surmounted for OSW to achieve its potential to provide an abundant source of clean energy and to mitigate climate change.

Economics

One reason the U.S. has not developed OSW to date is that the economics of OSW are not currently attractive. The installed capital cost of OSW is materially higher than onshore facilities and OSW requires comparatively higher operation and maintenance costs since OSW facilities at sea are more difficult to access and maintain.

The economics of OSW can be materially enhanced by government incentives and the liquidity of markets for commodities the OSW produces (i.e., renewable energy and renewable energy certificates (RECs). The production tax credit (PTC) and the Section 1603 cash

grant have played pivotal roles in the development of wind generation. The PTC confers a dollar-value credit (currently $2.11/kWh) for each kWh of wind electricity generation. Unfortunately, the PTC for wind will expire at the end of 2012 and the cash grant expired at the end of 2011.

OSW must have viable markets for the long-term sale of energy and RECs. Liquid markets with plentiful energy and REC off-takers do not exist. In the absence of markets created by regulation, like portfolio standards, and designated markets for OSW RECs, OSW developers will struggle to find off-takers willing to commit to long-term purchases and financing will be hampered.

Regulatory

OSW represents a relatively new technology in the U.S. and the necessary regulatory infrastructure has not yet developed. For example, there is insufficient coordination between BOEM and states which have to regulate the siting of transmission in their waters. Finally, while BOEM has leasing authority, it lacks one-stop permitting authority over the entire process. At the end of the day, a number of environmental and civil authorities still must approve the lease.

What Does the Future Look Like?

A handful of serious developers are continuing to pursue OSW development. They are primarily looking to states to develop the incentives needed to support development of this available source of renewable energy. If the U.S. is to reduce its dependence on foreign oil, it should promote this form of abundant energy with appropriate policies and tax credits.

Consumers, too, must be willing to pay more, at least initially, for this clean energy until it can become more competitive with existing sources.

The Hybrid Powered Viking Lady Works Offshore Wind Fields

(Photo courtesy: Eidesvik)

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Enabling Deepwater ROV Activity via

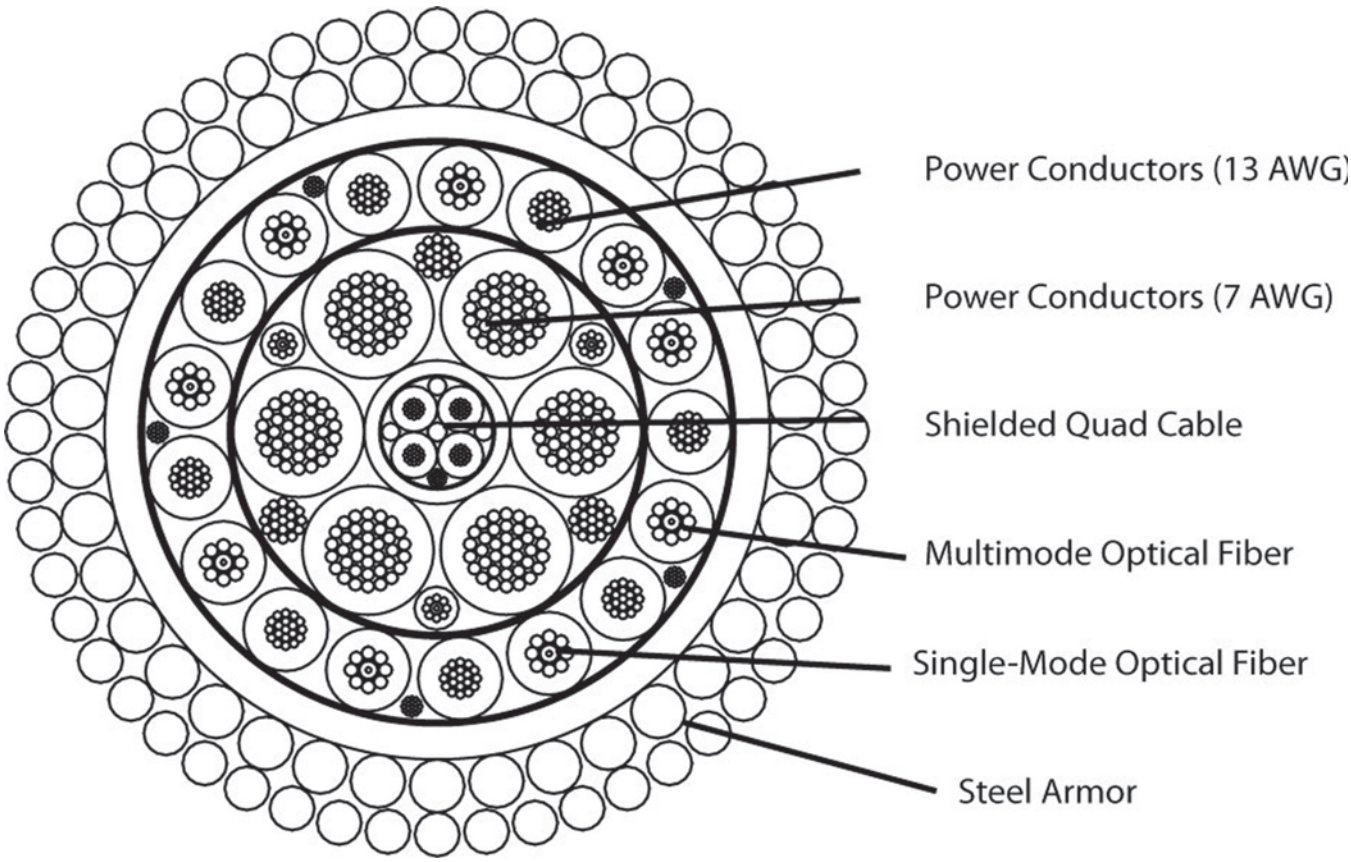
Cabling

By David J. Harris

As offshore activity continues to migrate into deeper waters and more remote locations, every aspect of exploration and development faces increasing challenges and levels of complexity. Most headlines on this subject are dominated by platform and riser technology evolution, the trend to next-generation drill ships, and augmenting production capabilities to include subsea processing. All of these involve incredibly complex solutions and will continue to revolutionize the industry; still, their application use and success will continue to rely on ROV evolution that can keep pace and deploy those technologies into reality.

Consider the basic challenge of physically placing an ROV into the deep water areas necessary to perform its tasks. Where traditional WROV's operate in waters around 2500 meters deep, today's activity is increasingly

Figure 1
A typical umbilical cable is an armored assembly containing signal conductors, power conductors, and optical fibers.



[Source: TE Connectivity]

taking place in depths closer to 4000 and even 5000+ meters. One can readily appreciate the increasing size, weight, and powering capacity of umbilical cable needed to support this activity.

An umbilical cable for ROVs needs to meet a range of mechanical and environmental requirements not commonly experienced in other applications. At deepwater levels, temperatures are typically between 0 and 3°C. Pressures are also a concern. At 2000 meters, the pressure of ocean water exceeds 2900 psi (2000 N/cm2). Add in the long lengths of the cables and the need to withstand twisting and other movements, you can see the tensile loads on the cable are quite challenging.

Packaging the required elements in an umbilical assembly involves protecting them both mechanically and environmentally. At the same time, the design should be no larger or heavier than necessary and should be flexible to accommodate the movement of the ROV. Umbilical cables typically also serve as the main lift cable for ROV. The design challenge is to manage the tradeoffs between achieving a mechanically robust cable and minimizing size and weight.

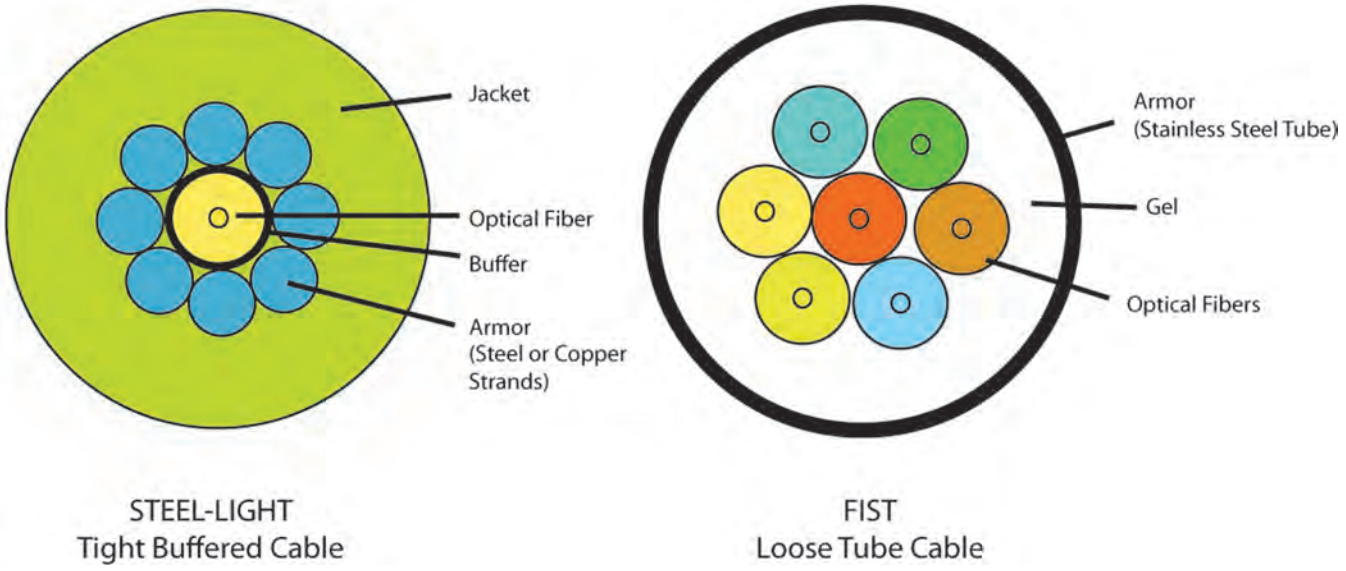
Given the complexity of the design and the mission critical need for reliability, only a handful of companies have earned the trust of the global ROV community to produce such cables.

Smaller, lighter cables simplify shipboard deployment by reducing the space required for winching equipment and cable storage. Since deepwater umbilical cables are several thousand meters long, a 10% reduction in a cable's diameter can significantly reduce the required deck space.

A high-performance umbilical cable typically contains multiple types of elements to handle power, control, video, and telemetry. Thus you will find a mixture of larger conductor power cables, twisted-pair and multiconductor elements, coaxial cable, and fiber-optic cable in various combinations to meet the specific needs of the application.

An umbilical cable is typically constructed in several concentric layers. Figure 1 shows a type of construction designed by TE Connectivity that combines power, multimode and single-mode fiber-optic cables, and a shielded quad cable in a double-armored cable. As you can see this is a complex design and it is important that all elements work together in harmony to provide the required power, data and mechanical criteria. Each layer is defined not by function, but by the diameter of each cable element to maintain concentricity. Some cables, for exam-

Figure 2
Innovative optical packaging makes application of fiber optics easier.



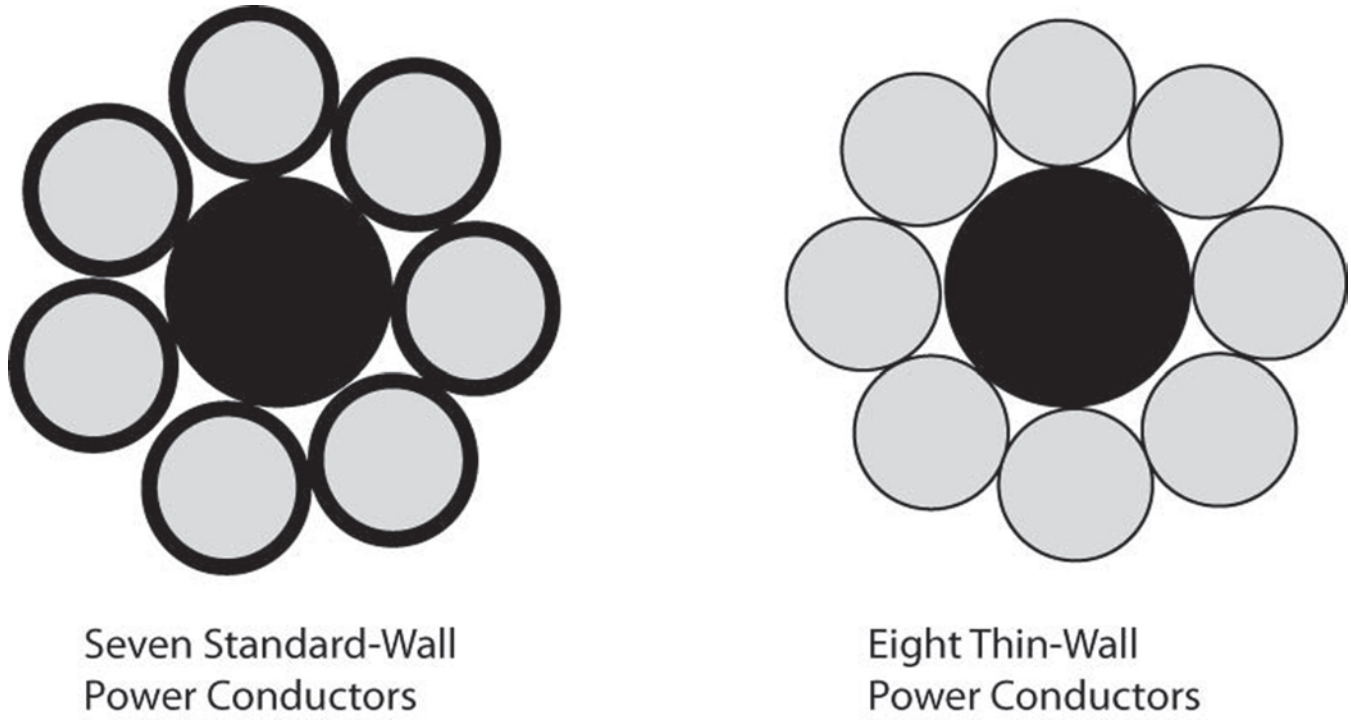
[Source: TE Connectivity]

ple, may have power cables near the core's center, while others have them in outer layers. Maintaining concentricity is important both to clean, efficient winching and to achieving rugged flexibility. Each layer is wrapped with a tape, typically an aluminum/polymer tape, and voids are typically filled with water-blocking materials. Not called out in Figure 1 are drain wires and fillers. These are added as necessary.

The outer armoring serves as both strength members and core protection; it functions to disengage the cable elements from the overall tensile load placed on the cable.

The cable is 1.670 inches (42.42 mm) in diameter. Its weight in water is 2771 pounds per 1000 feet (4123 kg/km). It has a working load 35,000 pounds (156 kN) and a bend radius of 33 inches (84 cm). The bend radius is most important to the diameter of the sheave. Using the

Figure 3
Thin-wall insulation technology allows more power and functionality to be packed into the same space.



[Source: TE Connectivity]

cable at smaller bend radii can increase fatigue resistance and shorten the service life.

Given the challenges of creating robust umbilical cables, designers use advanced simulation tools to analyze the mechanical and electrical performance. It is impractical to build multikilometer prototypes, so expertise in design and simulation are essential.

Current efforts in umbilical innovation are focusing on the cable's core, looking for ways to pack more functionality into the same or smaller space. The Rochester Cable group of TE Connectivity, for example, is working with thin-wall insulation and fiber-optic packaging as key to next-generation cables.

Enabling Optical Communications

Optical fibers are finding increased use in umbilical cables because of the increased bandwidth they offer over long distances. While fibers have high tensile strength to withstand longitudinal pulling, they can be easily broken or damaged if not protected correctly. As a result, fiber-optic cables typically have their own armoring. While aramid yarn—the same strength members common with other fiber-optic cables—are used, more robust designs also use metallic armoring. The high hydrostatic application pressures can increase attenuation in a fiber. TE Connectivity offers three different approaches:

- **Fiber in Steel Tube (FIST)**, which places the fiber in a solid stainless-steel tube to protect against hydrostatic pressures, high temperature effects and corrosive environments. FIST packaging is a loose-tube design, which can accommodate several fibers loosely held within the tube and encapsulated in gel. Because the fibers 'float" within the tube, the length of the fiber is slightly longer than the tube to ensure low strain. FIST technology is the simplest and lowest cost approach. It maintains low strain on the fiber by decoupling stress on the tube from that on the fiber. If the cable stretches during installation or use, the excess fiber can accommodate the stretching without being strained. Loose tube designs also are very forgiving of extreme temperature excursions, but are less suited to the most rugged applications, such as extreme depths and extreme cable lengths.

FIST also offers high density packaging of multiple fiber in the tube and, of the three options, is the easiest to terminate.

- **STEEL-LIGHT armoring**, which uses strands of precisely sized plow steel concentrically arranged around the fiber buffer to protect the fiber from breakage.

- **ELECTRO-LIGHT armoring**, which is similar to STEEL-LIGHT armoring but uses copper in place of steel. The copper can also be used for power to allow composite cables to be designed with a smaller outside diameter.

STEEL-LIGHT and ELECTRO-LIGHT fiber elements are both tight buffered approaches to packaging. Tight buffering, while requiring more careful manufacturing, provides better performance in highly dynamic applications and is the most rugged choice. STEEL-LIGHT armoring is the most rugged, designed to withstand hydrostatic pressures of 10,000 psi.

Both STEEL-LIGHT and ELECTRO-LIGHT fibers have very small diameters, allowing them to be fit into interstices in the cable design. With some of newer small-diameter umbilical cables using thin-wall copper conductors, such spaces may not be available. FIST may be a better choice to minimize cable diameter in such cases.

Picking the correct one of these three options means you will have solved many of your telemetry issues. It is a matter of weighing the tradeoffs required in ruggedness for a given application against cost, convenience, and cable size. Umbilical cable suppliers have the experience to guide you in the best choice for your applications.

More Power in the Core

As the capabilities of the ROV increase, the power needs of the ROV also increase. There are two ways to increase the power-handling capabilities in the core of the umbilical cable. First, you can use conductors of larger cross section. This will, however, increase the diameter of the cable. The second approach is to use thin-wall insulation in place of standard-wall cable. TE Connectivity, for example, uses cross-linked polyethylene (XLPE) as an insulation on power conductors. Thin-wall insulation can achieve cable diameters that are in the range of 30% smaller than comparable standard-wall products.

While conventional wisdom dictates that thicker insulation be used as power handling increases, new materials and new processing methods have overturned such wisdom.

Thin-wall technology is well established in the military and aerospace industry, which offers many of the same demands for rugged performance as deepwater applica-

tions. Thin-wall insulation has excellent abrasion resistance, excellent thermal stability over a wide temperature range, and electrical properties required for power-carrying applications.

With thin-wall-insulated wires, it becomes possible to add additional conductors—and thereby provide more power to the ROV—to the umbilical without increasing its size. Figure 3 shows an example in which eight thin-wall conductors fit into the same space as seven standard-wall conductors.

Umbilical Runs Deep

As the need increases for deepwater ROVs to support research and oil and gas exploration and production, umbilical cables are supporting the needs for robust performance. New technologies in insulation and optical packaging allow umbilical cables to supply more power to the ROV and to support the increasingly sophisticated capabilities. This translates into more capable deepwater devices with a wider range connected by a compact cable delivering more power and more data-handling capabilities.

About the Authors

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For more information on umbilical cables and other deepwater solutions, visit **www.te.com/offshore** or **www.rochestercables.com**

Dr. Michael Incze

Naval Oceanographer
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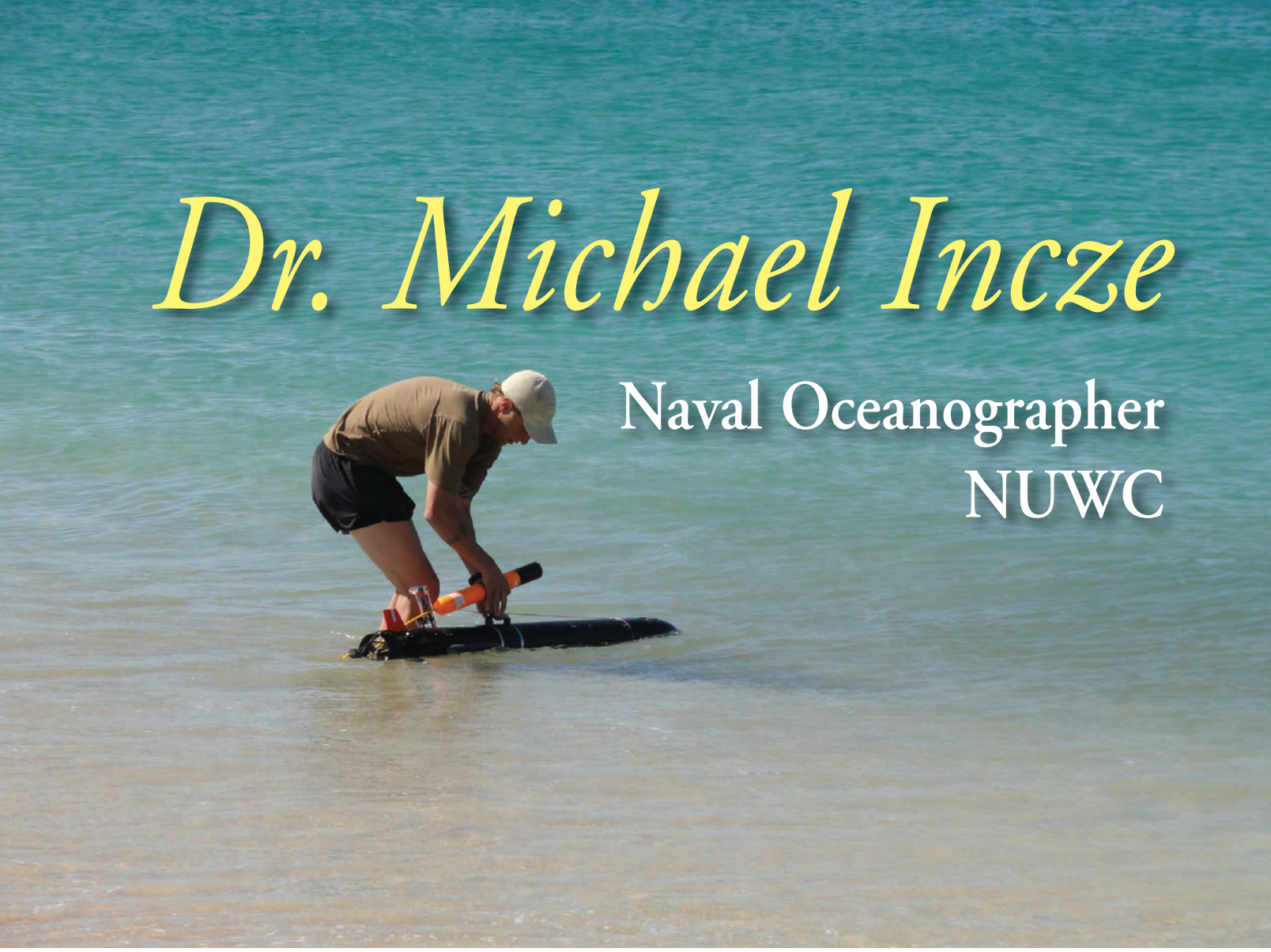


Navy Special Warfare variant being launched from shipboard and shore for concurrent survey operations off the coast.

Recently Marine Technology Reporter's ***Rhonda Moniz*** *sat down with* ***Dr. Michael Incze,*** *one of the leading naval oceanographers at the Naval Undersea Warfare Center in Newport, RI.*

Can you tell us a bit about your position here?
MI: Sure, I have worked as an oceanographer for the Naval Undersea Warfare Center for 20 years.

What got you interested in working in your field?
MI: We really are an ocean-oriented family. My father came over to this country from a small village, which is now Romania in the Transylvanian section. He came over in 1950 having never seen the ocean and ended up -- after a year of bouncing around up in Maine fell into some good fortune. For one dollar he bought a camp on a small island off the coast of Maine.

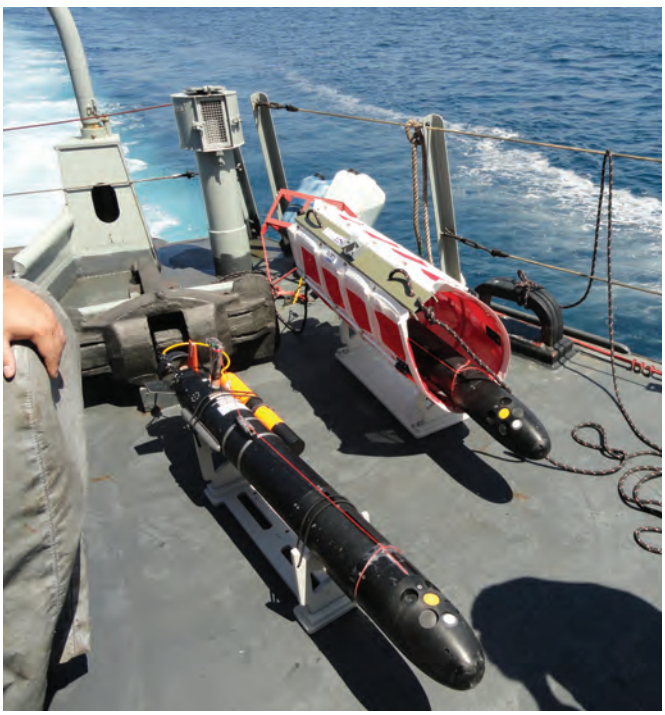
Wow, only a dollar? Things sure have changed!
MI: Yes it sure has and that purchase essentially set the destiny for our family. I have four brothers and every one of us turned out to be ocean-oriented in our careers. Of the four, three of us have been naval officers, and two of us have been oceanographers. Two of us work for the naval undersea warfare center and two of us have our master's license in the merchant marine. So from a father emigrating from Romania never having seen the ocean, to spending our youth on a little island off the coast of Maine, I feel pretty lucky.

That does sound like a nice place to spend your childhood. Now where did you go to school?
MI: I went to Cornell, as did my other brother who is also an oceanographer. I did my undergraduate work there and received my graduate degree at the Rosenthal School at the University of Miami in biological oceanography. After some time I went back to the same school to get my doctorate in marine geophysics.

Sounds like you have a multidisciplinary background.
MI: I do, which worked out well for my job here, where I am covering a whole spectrum of subjects over the past 20 years.

What were some of your initial projects?
MI: I was hired as a physical scientist. That is actually my position now. In fact, all the oceanographers at the Naval Undersea Warfare Center (NUWC), and there are not that many, have the job title as physical scientist. My first job was in the combat systems department, which has been my department from the get go. I started working on the environmental tasks for the submarine combat systems that were being developed.

"With AUV's this is a really exciting time because there is a strong direction for the navy to go to unmanned vehicles for safety, cost reduction, manning reduction and new environments that are being explored. So there is a big drive for all military forces actually to explore what part of the job can be done with unmanned vehicles. So for the first time there is a huge buy-in."



What did that entail?

MI: The submarines while en route are dependent on oceanography for their tactical advantage, deployment of their sensors, and avoidance in terms of non-detection both acoustically and visually. There are quite a few nuances to that, so that my job really was as a liaison between the naval oceanographic command, the meteorological oceanographic centers, and all the other environmental organizations. I came in from the combat systems side and from the hardware side.

Sounds like you've worked on some great projects.

MI: The most interesting projects for me are just happening now. Of course I probably say that every year. Whatever I am working on at the moment tends to be the most interesting!

Sounds like you find all of your projects interesting. That's not a bad thing.

MI: That's right, in the past I worked with the busy two-system, which is a submarine combat system. Then when the Virginia class hit the water, I started to focus on deployed arrays.

Could you explain the Virginia class system?

MI: Sure, they are a class of nuclear-powered fast attack submarines designed for a broad spectrum of open-ocean and littoral missions. These deployed arrays are not part of any particular platform. They collect both acoustic and environmental data to help characterize the ocean and to help determine how to take the best tactical advantage, in terms of maneuvering, avoidance and detection. We have looked at many off-board and on-board systems. Taking into consideration how the system puts together the environmental data with climatological data to come up with the best real-time data that can be provided to the fleet.

So that was some of your initial work?

MI: Yes, that's how I started out, which was really fun because you get to work with a lot of platforms and operators. We analyzed many exercises and real world events to determine, if we lost tactical control, to determine how.

AUVs swim through the surf zone for beach recovery.

We examine replays to determine how we would measure the environment better. We looked at interpreting remote imagery from on board sensors or from deployed sensors to avoid losing tactical control in the future.

Sounds like challenging work.

MI: It can be. I also worked as the test director for the Office of Naval Research's Littoral Advanced Development Program.

Could you explain that?

MI: Yes, We would bring technologies out to sea. For us this is an important part of making sure that while we were evaluating these technologies we weren't harming critters or anything else in the ocean. As test director I had to organize all the assets to make sure the technologies were being evaluated not only in a way that gave good feedback to the program developers, but also kept us in the green in terms of all the environmental monitoring. That particular aspect of it was quite interesting because I was working with the National Marine Fisheries, NOAA, and marine lawyers that were all involved in the broader spectrum, not just the tactical perspective, of oceanography. We have environmental people at the lab that worked with marine mammal mitigation on everything from herring eggs to beaked whales.

Its good to know that there are regulations to assure marine life is not detrimentally effected.

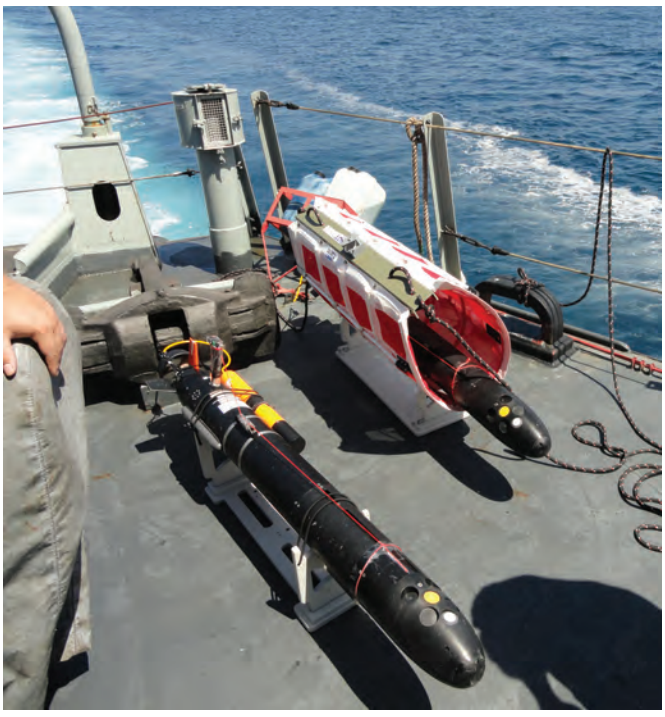
MI: There are very strict practices and oversight. You must test the technologies while doing the right thing environmentally. So it is a well-controlled process and sometimes it took 6 to 12 months to ensure everything is lined up in terms of permitting, controls, sensors, and procedures that allow you to start-up and shut-down in a smart way. ONR put together quite a large program dedicated to the legal aspects of that, but for me as an oceanographer I was interested in the legal terms as well. That was an interesting project that lasted several years. We supported allot of fleet exercises all over the globe.

Like they say, join the Navy and see the world.

MI: Yes, but as you know from your work in the field it can get tiring. Sometimes there is 50% travel and a lot of that is hectic because when you are on sea tests, and as you know that means not a lot of sleep. I have been on submarines, cruisers, basically every platform in the navy.

Being in the military puts you at the forefront in cut-

"As test director I had to organize all the assets to make sure the technologies were being evaluated not only in a way that gave good feedback to the program developers, but also kept us in the green in terms of all the environmental monitoring."



ting edge technology development. Tell us what you see in terms of advancing technology.

MI: Well with AUV technology for example, this is a really exciting time because there is a strong direction for the navy to go to unmanned vehicles for safety, cost reduction, manning reduction and new environments that are being explored. There is a big drive for all military forces to explore what can be done with unmanned vehicles, and for the first time there is a huge buy-in. We are in a transition. This may be a little optimistic, but I think we are in the same transition that computers made in the 60s and now the advances with PCs and tablets you see today. Instead of small, specialized groups with high priced vehicles, we are starting to see vendors coming in saying, you know I can build something that doesn't meet everyone's demands, but meets allot of demands both on the commercial and military side. I can do it without a million dollar vehicle or a $500,000 vehicle or a $200,000 vehicle but I can do this really cheap if all you need to do is this X number of tasks. Even more exciting is the fact that vendors are buying into this concept. If you look at the past the only option was the million-dollar vehicle, because a special sonar needed to be built to fit requiring a high level of initial investment.

How has that changed today?

MI: If you look at the vehicles today, such as the Iver from OceanServer and others, behind them now are L3 Klein, Imagenex, and Edgetech that are saying, hey there is a market out there for miniature sonar's and we want to be in it. So we have this huge groundswell of vendors including the sensor makers such as YSI. People that are building the Doppler velocity logs, like Suntech, are all getting onboard with this cooperative spirit. It's been a great partnership with those vendors in delivering a rapid cycle things like these miniaturized side scan sonar. Klein is a great example with the 3500. The fidelity is amazing; you can see people's footprints where they walked in the mud on the bottom checking out a wreck. For a small vehicle that is unbelievable. The second thing that has happened

Concurrent AUV operations from a shallow water launch point in a tidal cut with strong reversing currents.

is for the first time these guys are kind of exposing the front seat driver. They are saying we don't care if you guys add capability to our vehicles we are not going to keep everything in a black box. No more if you want this to turn right instead of left when this happens you need to come back to us. We will put you under contract to develop it we throw it back and forth over the fence until you say it is good enough and then if you want something else you go through the whole process again. So for the first time ever they are saying here is the API's for the front driver, here is a back seat computer have at it. This is really what our department is doing now. We are saying here is the 50 things we would like this vehicle to do and we don't have to go under contract to do it. We don't have to worry about classification, and because the vehicles are small and cheap we are building new behaviors, and putting them in very rapidly. It's not just the ease of doing this but there is this whole cooperative nature now with vendors pitching in. These back seat driver libraries are being put together.

So putting more control in the end users hands.

MI: Yes. One of the architectures for putting these together is known as MOOS. This is architecture that is a Mission Oriented Operating Suite. Well it turns out that if you subscribe to this architecture you have available to you all these building blocks and all these components for behaviors. So for example when you say I see this particular threshold exceeded on this particular sensor and when it does that I want the vehicle to turn to starboard 80 degrees you don't have to write that whole behavior and plug it into the back seat, which by its self would be fantastic. You can enter behaviors into a commercial AUV. You go to the library and say OK here is the turn to starboard module, here is the sensor module, and here is my threshold. So all these components are already there and when you build a new behavior you are just wiring together some building blocks and then adding in a unique piece here and there. These then get thrown into the library for the next guy.

So it's very much like plug and play.

MI: Well it is not quite there yet but it is headed in that direction. To me when I gave the analogy of the computers origins to the advances made now it is the same with these AUV's. I can put a bunch of them in the back of my truck, drive down to the dock throw them in the water and in one day I can get forty hours of testing in. A year ago with a million dollar vehicle in order to get 40 hours

"To me when I gave the analogy of the computers origins to the advances made now it is the same with these AUV's. I can put a bunch of them in the back of my truck, drive down to the dock throw them in the water and in one day I can get forty hours of testing in. A year ago with a million dollar vehicle in order to get 40 hours of testing in, first of all it costs you a hundred thousand dollars because you need to get the boat, the personnel to run things."

of testing in, first of all it costs you a hundred thousand dollars because you need to get the boat, the personnel to run things.

You need the platform and trained personnel.

MI: Yes you need everything associated with that vehicle and so you end up testing 40 hours a year maybe. Because you only test 40 hours a year 30 of that is redundancy. You end up checking the system so there are many vehicles that don't see the water as much as we do in a week. For us this whole development, this partnership with the vendors the whole thing, open API's, the library, the component vendors getting on board is a great environment for this mushrooming of capabilities with AUV's.

This has been coming up with most of the individuals I have talked to in the industry. There has been talk about the vendors finally getting on board and allowing the end users the ability to build in what they need. It is moving many projects forward. On average how many projects are you working on?

MI: It's the Navy way to give you about 30% more than you can actually do. My desk is overflowing with projects and my brain is overflowing with ideas. There is not enough time, people or money to do all the good things that need to be done. All the people in my department have multiple projects. It is very rare that you are working on a single project, which is very different from 20 years ago. Business was different then. There would be this big program and they would hire 300 people and the project would have a 5-year time frame and there was allot of money. Now the projects are much smaller projects with much faster time lines and they are not coordinated so one might be in the big push while another is in
the investigative stage. You are doing all you can to keep the plates spinning, which is interesting and challenging in its own right. One of the things the Navy has done is to skim the administrative support layers so that most people are not only taking care of technology work but also taking care of allot of administration. We do have some help and they are terrific, but we do allot of monitoring of funds and taking care of personnel.

I recently spoke with someone at one of WHOI's labs and it is interesting that much of what the scientists are studying are being dictated by the military. In other words if the military is studying in the Arctic then scientists jump on those coat tails to get their work done.

A lot of research is funded in ways by the military.

MI: Yes I think that is true in some senses, especially with the AUV's. Traditionally it has been the Office of Naval Research, and behind it all is a military machine. I have to confess that although I am a scientist I am closer to the operational side than I am to the science. I am a naval reserve officer and I have a pretty good feel for what has to happen in the military and I still have allot of ties to those guys that are making the decisions about war fighting capabilities including AUV's. That keeps me pretty close to the operations, as a matter of fact allot of what we have done with the Iver2 has been through a direct interface with the Naval Warfare Group that are looking for this new paradigm. A paradigm where they have an organic asset with them in the fleet so that when they have a search and survey mission on the site they don't get on the horn and say hey can you get out here in a month with your AUV platoon or with their containers and highly trained guys. Then they do the job and leave and two weeks later they need them again. What they are looking for is something they can have on site and use it when they need to. They can support the seal teams and so forth. That has been a great thing for us because it fits our paradigm that is moving AUV's forward. We have a capable vehicle that a guy can run by himself, it doesn't need a special, and by the way he wants it to do something different every week. Turns out it works well and we don't have to go back to the vendor. OceanServer has been the most reactive contract I have ever worked with, they are fantastic, but their expertise is not in military applications so we have people back here that can do that in fact. We build these behaviors and put it in the back seat and have it out in the fleet in two weeks.

This is unheard of. Last Monday the guys from the operational test and evaluation force called us and said we are pulling a mind field down in Florida and we would like to see if you guys can survey these things without spending $750,000, which is what it takes to survey a mine field today in a traditional sense with a tow fish and boat on site and so forth. If you called a year or two ago there would have been a long process that would have had to happen, but two days later we had the missions planned for this thing.

We had the vehicle in the mail and I leave on Monday to go down and throw these things in the water. I think we will have the maps of these things and all the bathymetry associated with it and our total cost is a fraction of what it would take with traditional means.

Keeping costs down and having the ability to create more efficient mission plans is always a good outcome.

MI: Yes and one of the things I think is great about these vehicles is that you can have one on every ship. If you have to enter a port that you have never been before you don't need to wait for a white ship you can just throw these things over the side and say OK here we are good to go or here there are three obstructions up the channel that we need to take care of before we go in.

Again I am hearing a lot of this with the low cost of some systems and the ease of use. It really seems these vehicles are opening up many doors for multiple applications.

MI: They sure are because Universities in Croatia, Singapore and all over the US are taking these things on board and pushing the envelope with new adaptations and behaviors. So we are learning as this huge group without all the costs and not to mention the glacial pace that happens if it has to go through a program review with some Navy funded program. In the Navy the wheels turn slow and rightly so since there are tens of millions of dollars associated with a program. For a university that has bought an AUV for $100,000 and has 20 graduate students working on it, it is terrific because although you don't have the formal documentation that goes with it you are exploring all these ideas and doing great things to review if things are working or not. You now have 200 users out there getting all this data and working with the systems.

Dr. Incze (left):

Not all operating days are tough ones. Here we wait as the AUVs are deployed and performing missions off the beach in Queensland, AUS.

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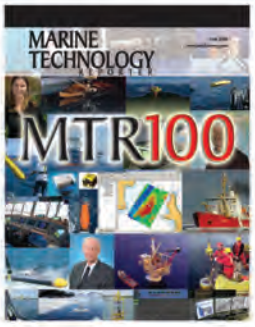

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Mike

Dozens of Leaders Trained for SeaPerch

Sea Cadets in Command

By Marlene Stevens

"If you had asked us 3 months ago what SeaPerch means, we wouldn't have known how to answer that question," said Henry J. Nyland, CAPT, US Navy (Ret.), and Deputy Director of the U.S. Naval Sea Cadet Corps Headquarters in Arlington, Virginia.

Yet, on a cold, clear morning in November 2011, 73 Sea Cadet Command Officers received SeaPerch training at the Naval Undersea Warfare Center (NUWC) Newport Division in Rhode Island. This was the second in a series of SeaPerch Sea Cadet Command Officer training sessions with a goal of ultimately training 10,000 Sea Cadets to build their own underwater robot.

SeaPerch

The training was facilitated by the SeaPerch Program Technical Director, Chris Hansen. "SeaPerch is our way of conning kids into liking engineering," said Hansen. "SeaPerch isn't a vehicle, it's not a person; it's the Program and it's the community. It's that community and that group of people and all the different individual programs that make SeaPerch a success. And that's what we are working on growing. We are not sending 50 gazillion kits out to 100 gazillion kids. It's the community of people that do it, and the community of the kids that do it, that make the program successful." He went on to say, "We are not looking for the kid born with the pocket protector. We've already got them. We are looking for the kid who maybe says 'I want to be a fashion designer. But, robots are cool…'"

The real success behind the SeaPerch Program is its mentors. In addition to ONR, SeaPerch is managed by the Association for Unmanned Vehicle Systems International (AUVSI) Foundation, and is also supported by the National Defense Education Program (NDEP), Naval Sea Systems Command (NAVSEA), the Naval Engineering Education Center (NEEC), the National Guard, Micron, Raytheon, Maritime Reporter and Marine News magazines, Lockheed Martin, Northrop Grumman, the American Society of Naval Engineers (ASNE), the Society of Naval Architects and Marine Engineers (SNAME), the Center for Innovation in Ship Design (CISD), BAE Systems, Northern Virginia Community College, to name a few. More than 20,000 students built the SeaPerch in 2011. The participation of the Sea Cadets ensures that we will surpass that number in 2012. The SeaPerch program is making a definite and positive difference in the math and science scores of American youth, as more of them become acquainted with engineering concepts.

"Years ago there was the race to the moon, the cold war, and we were graduating the scientists and engineers. And now, the number of graduates is going way down. Now, hopefully, this will spark an interest again in math and science," said Lloyd Burkett, Commanding Officer of the Sea Cadets, George Washington Division, New Rochelle, NY.

"What we love about it, beyond the physical numbers is that we are using these wonderful mentors, some of these folks who were in the Navy and who are very committed to this project, working with Sea Cadets. What better mentors to take the SeaPerch program forward than these Officers, because they are going to be the best ambassadors I could imagine for the SeaPerch Program," said Susan Nelson. Susan Nelson is largely responsible for taking the SeaPerch Program to the national level. Like so many visionaries, she is also hesitant when it comes to taking credit for it. I asked her how she came up with the concept. "Well, I just saw this vehicle, and envisioned what it could be. MIT had done a wonderful job designing a teacher training program. And they took the SeaPerch concept from the book by Vickie Jensen and Harry Boehm [Build Your Own Underwater Robot], and

turned it into a teacher training program. They provided the education of the teachers and a list of parts for the teachers to then go out and take to their classrooms. I saw a couple of teachers speak at a meeting I attended. They were just so passionate about SeaPerch and for some reason, I guess as a marketing person, and with the full support of ONR, I just was able to take it to the next step."

Susan explained that she was ardent after hearing the teachers speak about SeaPerch being a great equalizer. They had students who weren't the most popular kids, but, when they got the pliers and soldering irons in their hands, they were stars of the show.

After the meeting, Susan approached Kelly Cooper, the Program Officer at ONR responsible for funding the SeaPerch Program. Susan introduced herself and told Kelly that she would like to build this idea and curriculum into a program that she believed would go national in five years. Upon Kelly's approval, Susan created a small manufacturing operation, complete with inventory, staffed by her and other committed volunteers, and assembled all the materials needed into kits for distribution. Today the assembly of kits is outsourced to a contractor due to the rapid expansion of the program.

"I didn't have to create the wheel. The concept already existed and I give all the credit in the world to MIT for developing the curriculum and to, of course, Vickie and Harry for creating the vehicle."

A New Partnership

The idea of training 10,000 Sea Cadets in how to build an underwater robot came about sometime during the summer of 2011. Randy Hollstein, National Chairman, US Naval Sea Cadet Corps Headquarters, Arlington, Virginia, realized that the Sea Cadets needed to tap into ONR's STEM programs. This resulted in a visit from ONR's Dr. Michael Kassner, Director, Office of Research (Discovery & Invention) and Carolyn Van Damme. It was during that visit that the subject of SeaPerch came up, as well as other ONR STEM opportunities for youth.

"One of the most critical things was making sure that whatever they do, they also endeared the youth towards the Navy. These kids are already wearing Navy uniforms and they are already in them for practical purposes. We know their grandpas, aunts and uncles are already waving the flag. So we felt as though we'd be a perfect fit," said Captain Nyland. "After a couple of phones calls, I found out that Susan Nelson was in charge of the SeaPerch Program as Executive Director. So we started working with Susan."

"We are honored to have the opportunity to partner with the Navy League and the Sea Cadets," said Nelson. "We're on the verge of signing a national partnership

agreement with the Navy League and we will eventually train 10,000 Sea Cadets to build SeaPerches. And beyond the physical numbers, what better mentors to take the SeaPerch program forward than these wonderful mentors, some who were in the Navy, and who are all very committed to this project."

Sea Cadets

Since 1958, it has been the mission of the Naval Sea Cadet Corps (NSCC) "...through organization and cooperation with the Department of the Navy, to encourage and aid American youth to develop, train them in seagoing skills, and to teach them patriotism, courage, self-reliance and kindred virtues." The U.S. Naval Sea Cadet Corps (NSCC) and the Navy League Cadet Corps (NLCC) are youth programs for American males and females, ages 10 through 18.

The Navy League of the United States (NLUS), also called the Navy League, is a national association with nearly 50,000 members and 250 councils around the world, who advocate for a strong, credible United States Navy, United States Marine Corps, United States Coast Guard and U.S. Merchant Marine. It was founded in 1902 at the encouragement of President Theodore Roosevelt. Its on-going mission is to "enhance the morale of active duty personnel and their families; to inform Congress and the American public on the importance of strong sea services; and to support youth through programs such as the Naval Sea Cadet Corps, Junior ROTC and Young Marines that expose young people to the values of our sea services."

All prospective Sea Cadets must be unmarried, free of felony convictions, enrolled in school and maintain at least a C average. They must also have parental consent, possess good moral character, be interested in the program and prepared to attend drills regularly. Cadets meet or "drill" at their local unit weekly or monthly throughout the year. A unit is structured along military lines and is headed by a Commanding Officer. Units may drill on military bases, at reserve centers, local schools, or community centers. They are taught team work, camaraderie and an understanding of the military command structure among cadets. Cadets are instructed by both Sea Cadet Officers and senior Sea Cadets through classroom and applied instruction in subjects such as basic seamanship, military drill, and leadership.

Applicants must successfully pass a basic physical examination, very similar to that required of a regular Navy enlistee. Newly enrolled Sea Cadets are required to attend 10-14 days of summer recruit training at Navy and Coast Guard "boot camps" throughout the country. After completing recruit training and other required courses of instruction, many Sea Cadets participate in two-week advanced training aboard Navy and Coast Guard vessels ranging from small patrol craft to large nuclear powered aircraft carriers for a day cruise. Sea Cadets do not participate on extended tours.

Sea Cadets study a broad range of subjects. Some are designed to help them to become responsible adults; others teach them the importance of strong maritime forces. They also study naval history, customs and traditions, seamanship, navigation and similar subjects that will help their chances for promotion should they decide to join one of the sea services.

Sea Cadets are authorized by the Secretary of the Navy to wear Navy enlisted uniforms appropriately marked with NSCC/NLCC insignia.

"We have a little over 25 Cadets in our Division," says Diane Ellswick, Administrative Officer for the Navy Construction Battalion Center (NCBC) Division of Sea Cadets, at Quonset Point, RI. "We have 10 year olds up to 17. It actually starts at 10; you can have a waiver for 10 year olds. From 10 – 13 are League Cadets and when they get older, 13 and up, they are eligible to become a Sea Cadet. Trainings get more intense as you get older and more responsible."

Ellswick went on to say, "One of the great parts of the Sea Cadet Program is that we show them and help train them to be an adult in society. We expose them to many different types of jobs and show them bits and pieces of what is out there. There are different trainings that they can attend. We have speakers from various different job fields to come in and speak to the Cadets and give them a taste of what is out there. This opens their eyes and prepares them to be a little more knowledgeable before going to college, and what is out there for them to have as careers in life."

Sea Cadets are under no obligation to go into the military. However, for those who do decide to enlist in the Navy or Coast Guard, prior Sea Cadet training may permit entry at an advanced pay grade. I asked Stephen K. Bunting, 1SG, USA (Ret.), Assistant Training Director, US Naval Sea Cadet Corps Headquarters, Arlington, VA how many Sea Cadets actually join the military.

For more information

www.seacadets.org
www.seaperch.org

Determining the growth Rate of Poti Malal Gypsum Karst, Malargüe, Mendoza, Argentina

Cave Diving in Argentina

By Juan Manuel Casal, Mariscope, Argentina & Christian Haag, Mariscope, Chile

The San Augustin Cavern is located in the area of Poti Malal, the southern sector of the Mendoza province in Argentina, at the south west of the city of Malargue. The cavern is carved in marine chalk from the Jurassic period of high potential, in which a hydro-geologic system of unknown magnitude and dynamics has been found.

The objective of this research is to quantify the growth rate of the Karstic system through the determination of the velocity of dissolution of chalk in a submerged part. In October 2011 a systematic study started, taking water samples and making measurements on dissolution, which will be repeated over the time in order to get representative data that include geomorphologic variables as well as geochemical and climatic ones, among others.

The installation of samples, the collection of water samples and the measurements of dissolution plates and bags, are being carried out by the scientists themselves, using cave diving techniques. These specialists have the correspondent certifications and equipment that are requested by the international standards for these kinds of operations.

It is extremely difficult to reach the diving area and at least two hours of equipment carriage inside the cave are necessary in order to get to the point of diving. Before you can reach the area, a good piece of off-road experience is necessary to get in the neighborhood of the cave. In order to be able to carry all the equipment to this extreme event, we used several Land Rover Defenders. Once in the area, we changed our Landys by horses and mules, than even our special 4x4 weren't as good as our four legged friends in the heavy terrain. So, we had our first experiences in 'Mule Diving.'

Once there, the complete gear had to be lowered to the main vault by ropes and pulleys. The cave diving was performed under TDI and IANTD standards. For the first incursion, every diver had two side mounted tanks, instead of the twins on the back. We decided this way of diving, since the transport of a twin down to the diving area would have been much more difficult. For the second incursion, Nitrox Rebreathers of the Dräger Dolphin type were used. The advantage is that at the end of the day you only have to take a small 5l tank out of the cave and fill it up with Nitrox. From now on, we call it 'Mule Blending.'

Since the diving was performed at 1700 m (4,500 ft) of altitude, we decided to limit the diving depth to 18 m, giving an equivalent depth of 23 m. The dive time with Nitrox was 60 minutes without decompression (40 minutes with air).

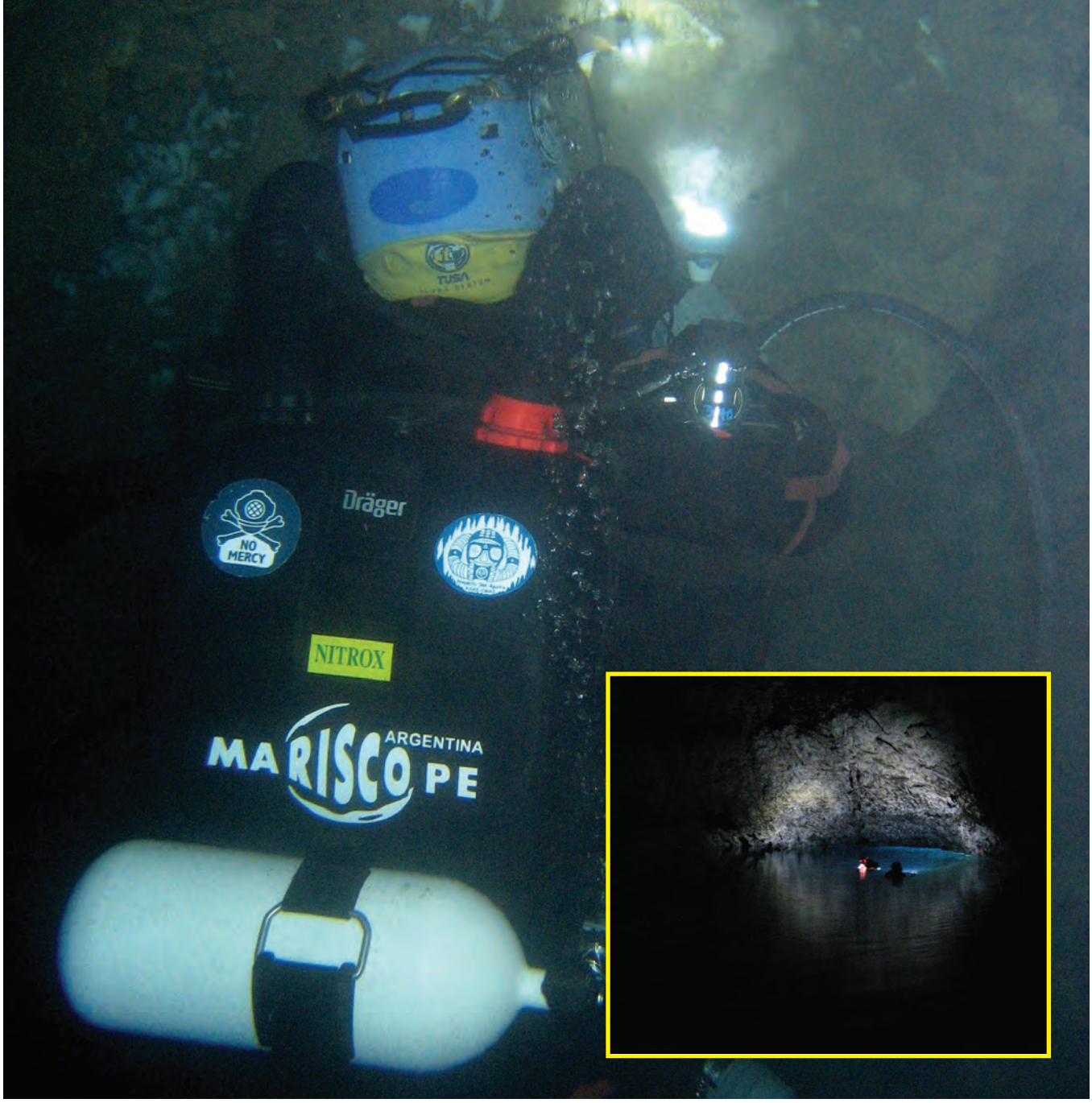
For safety, the internationally accepted rule of 1/3 was applied: 1/3 of the amount of gas was used for penetration, 1/3 for the exit and 1/3 as backup. Obviously every diver had also an emergency tank with air, in case the rebreather flooded. Even though exact time calculations for bottom time and exit time have been carried out, everybody carried a dive computer. Additionally every life supporting system was redundant, following the international rules for cave diving.

Surface supplied diving as imposed by international commercial diving standards is nearly impossible in the exploratory phase of cave diving, since mobility is extremely important.

For the illumination, modern LED lamps have been chosen, due to the enhanced autonomy and ruggedness, coupled to separate battery canisters, attached to one side of the rebreather.

The tasks to be carried out underwater were exploration of the system, which is still no completed, life line installation and the selection of the points, were the samples would be installed. After all this, the scientific part started.

In order to determine the magnitude of the dissolution, two methods are used: dissolution plates and dissolution



bags.

The dissolution plates are basically plane pills, manufactured with original chalk taken from the system and fixed on a surface that has been placed in several locations of the underwater system. Knowing the initial volume and weight of these plates, it is possible to calculate the volume and mass loss after a certain period of time.

The dissolution bags are samples that have been measured and weighted, placed in permeable bags. With this procedure, each side of the sample is in contact with water, giving an idea of the velocity of dissolution, although it is a little bit distorted and accelerated.

In order to establish a base line, during the first incursion in the cave system, water samples have been taken in order to obtain values of PH, temperature, conductivity, turbidity, minerals and dissolved oxygen.

Due to the extreme conditions, which are responsible for a human and economic weakening during each incursion to the cave system, initially only once every 6 months these dives will be carried out, following the marked hydric and climatic seasonality, evidenced at the beginning of the austral spring and autumn.

In the future, part of these investigations will be carried out by ROVs specially adapted for these purposes. Vehicles of the FO II type from Mariscope will be adapted with special camera and lighting systems, oceanographic sensors and other instruments, in order to be able to carry out the measurements without putting at risk the divers.

There are obviously tasks that only can be carried out by divers, i.e. exploration and fixing of samples, but others can perfectly be run with ROVs.

The challenge will be to reach the area with all the ROV equipment, power supply, generators, cables and so on. Probably several additional four legged friends will have to help us out. At the moment, we wonder how 'Mule ROVing' would look like, but preparations are already running.

The Argentinean branch of Mariscope Meerestechnik was founded 2011 and is dedicated to applied oceanography and marine geology, ROV services and professional diving. Similar to Mariscope in Chile, founded in 2001 as first office in South America from the German ROV manufacturer, the company in Argentina will provide a vast variety of services in the above mentioned areas, as well as 'Mule Diving'.

Geologic Background

Through the disaggregation of Gondwana, basins of marine origin were generated which had a connection at the occidental border.

The ongoing tectonic processes created a large number of intracratonic basins, which have been filled up with sediments originated from the continents during the mid-Triassic period till to the upper-Triassic period. To the end of the Triassic the first marine ingression occurs in the basin. Simultaneously the rifting process continues, coupled with the deepening of the basin caused by alternated sea level rises and falls.

At the beginning of the Jurassic period, a new marine ingression takes place, which deposits limestone and calcareous shales. By the end of the upper Jurassic period, a fall in the sea level is responsible for a deposit of large amounts of chalk, which constituted the Auquilco formation. The Auquilco (Upper Oxfordian – Kimmeridgian) formation was deposited in a flat marine ambient, highly restricted and with very high salinity, surrounded by a very warm environment, which resulted in the deposit of white colored laminated chalk and which has calcareous levels in between. This Auquilco formation is precisely the focus of our research.

Over this formation marine and continental sediments follow up in an alternate pattern, until the Andes were formed during the Miocene. During this geologic formation period, the sediments are displaced and the deposits hereunder are folded. This elevation of the Andes Mountains gave the actual shape of the environment. All along the area, rifts and folds enabled the formation of cavities.

During the ongoing research, the dissolution of chalk in the Auquilco formation will be investigated. It is known, that the solubility of chalk is big and the dissolution is fast and simple, in comparison to limestone.

A big challenge is simply reaching the area with all the ROV equipment, power supply, generators, cables and so on. Probably several additional four legged friends will have to help us out. At the moment, we wonder how 'Mule ROVing' would look like, but preparations are already running.

The chalk, which is in contact with water, is dissolved fast, saturating the layer of water near the wall, meanwhile the concentration of chalk in the rest of the flow is much lower. This layer of water saturated with chalk is called diffusion layer and herein the chalk moves slowly from the wall to the rest of the flow.

The diffusion layer is the one that controls the velocity of dissolution of the chalk, mainly depending on the layer's thickness.

The flow velocity has a marked effect on the velocity of dissolution, since before the cracks are widened through the water flow (Karstification), the permeability of the chalk is low.

The thickness of this layer is large, due to the electric charge of the chalk molecules. The solubility of chalk in pure water of 20 °C is 2,53 gr/l, between 10 and 30 times more than the solubility of Calcium Carbonate in the presence of Carbonic Anhydride(CO_2)

The dissolution of the cave depends more on the flow velocity than on the percentage of saturation. In the galleries the loss of material is higher than in small passages. Therefore large galleries are growing permanently faster than the rest. When the flow velocity is low, the dissolution depends on the amount of water available. Therefore these chalk caves have small passages and big galleries, with normally quite uniform walls.

Dratler Joins Liquid Robotics

Liquid Robotics said that Howard M. Dratler, formerly CEO of Panzura, Inc., and veteran, high technology sales executive, has joined the company to lead the global sales and business development organization. Dratler will report directly to Bill Vass, CEO of Liquid Robotics. His position is effective immediately.

Optech: Teledyne Majority Ownership

Optech Incorporated said that Teledyne DALSA, Inc., a subsidiary of Teledyne Technologies, has acquired a majority interest in the parent company of Optech Inc. "Optech's lidar systems, which produce detailed three-dimensional images, add a new level of capability to Teledyne's portfolio of visible, infrared, X-ray and ultraviolet sensors, cameras and software," said Robert Mehrabian, chairman, president and chief executive officer of Teledyne. "In addition, Optech's bathymetric lidar systems used for coastal zone mapping and shallow water profiling are highly complementary with our marine survey sensors and systems."

Velocious Subsea Synergy

Velocious Australia has signed an exclusive agency agreement with leading UK subsea engineering company Viper Subsea, enabling both to expand their offerings to overseas markets and collaborate on product development.

Tritech Announces Appointments

Tritech announced the appointments of Scott McLay (left) as Sales Director and David Bradley (right) as Supply Chain Director.

McLay has more than 20 years' experience in the subsea industry having held several senior management and executive level positions with privately held Oil and Gas sector companies.

His most recent role was Subsea Operations Director with Forum Energy Technologies in Singapore. Bradley has considerable supply chain experience, most recently working for Jabil Circuit as Senior Director of Engineering Services, Telecoms and Networking, following senior supply-chain roles based in Singapore and Hong Kong.

He is responsible for all sourcing, production and fulfilment of customer orders and brought strong direction to Tritech's supply chain. Both Scott and David complete Tritech's Board of Directors, headed by Simon Beswick, Managing Director.

Provide Cerberus DDS to South Korea

Atlas Elektronik UK won a contract for the supply of Cerberus Mod 2 Diver Detection System (DDS) sonars for installation in strategic harbours in South Korea. The contract was awarded by LIG Nex1, the South Korean Aerospace and Defence Company which is a subsidiary of the LG Corporation, the second largest South Korean conglomerate.

www.uk.atlas-elektronik.com
sam.west@uk.atlas-elektronik.com

Aker Solutions: Australian Umbilical Deal

Aker Solutions signed a contract with Woodside Energy Limited for the manufacture and supply of electro-hydraulic steel tube umbilicals (EHU) for the Greater Western Flank (GWF) Phase 1 project on the northwest coast of Australia.

The scope of work includes project management, design, engineering, manufacturing and verification testing of two steel tube umbilicals at a total length of 17 km.

The contract also covers all associated ancillary equipment required for transportation to Australia and interface with the existing development.

SIDUS Solutions Opens Houston Area Office

SIDUS Solutions, LLC opened its new Houston Area office as part of her 2012 expansion plans. Local sales and operations activities will be headed by Chris Howerter.

The new office is located at: 2500 E TC Jester, Suite 150C, Houston, TX 77008, Tel: +1 (713) 360-6310

Coastline Completes Hanson Campaign

Coastline Surveys completed two large Geotechnical Vibrocore campaigns for Hanson Aggregates Marine Ltd (HAML). The first work scope comprised 58 core locations offshore Norfolk. Specialist Geotechnical Survey Vessel, MV Flatholm (above), was mobilized and work scope completed with Coastline's 'High Powered Vibrocore, 'C-Core-HP', in 5m configuration, average recovery overall was 4m.

The second work scope comprised of 70 core locations, spread over four licence areas, offshore of Lincolnshire and North Norfolk, the furthest area being 27 miles off the North Norfolk coast. Overall, the work was completed port to port, Lowestoft, in less than 4 days with an average recovery of 4m completed by the experienced team onboard.

SMD, SeeByte Deliver on Partnership Agreement

SeeByte and Soil Machine Dynamics Limited (SMD) announced their latest plans as part of their on-going technology partnership. SeeByte and SMD plan to integrate a smart software tool for dynamic positioning and real-time monitoring of ROVs, based on integrating SeeByte's CoPilot technology into SMD's DVECSII control platform. This will be available on SMD's latest generation ROV systems, the first of which is the Atom. SeeTrack CoPilot offers the industry's most extensive range of operation modes such as station-keeping, cruise-control, survey-control, multibeam imaging, sonar track and midwater DP. SMD's ROVs, equipped with SeeTrack CoPilot, will boast the industry's most advanced ROV control for survey purposes and unparalleled control performance for construction duties.

MMT Wins Survey Deal

Statnett SF and National Grid International Ltd have awarded MMT (Sweden) the marine survey contract for the NSN Seabed survey, a power transmission link between Norway and UK. Statnett and National Grid are jointly developing a project to construct a High Voltage Direct Current (HVDC) electrical interconnector between Norway and Great Britain. MMT will be performing the route survey for this project between Hylen, Norway and Blyth, UK. The survey will be performed April – August 2012.

The length of the cable route is approximately 711 km and the assignment includes geophysical, geotechnical, benthic, archaeological and ROV operations.

For the offshore part, MMT will provide geophysical and benthic surveys from MV Franklin. The offshore survey vessel Stril Explorer is assigned for the ROV and geotechnical investigations. MMT's vibrocorer and CPT will be launched from Stril Explorer for seabed sampling.

Bibby Offshore Charter Agreement

Bibby Offshore signed a three-year bareboat charter agreement with Solstad Offshore Asia Pacific Ltd for the NOR Spring, a DP2 (Dynamic Positioning) Anchor Handling Support Vessel (AHSV). The 2008-built NOR Spring comes with a proven track record in the Middle East and Asia-Pacific. The vessel has 600 sq. m. of free deck space as well as an ROV mezzanine deck and multi-

ple DP reference systems including fanbeam and taut-wire. The ship is equipped with a subsea 20m ton @ 15m Active Heave Compensated (AHC) knuckle-boom crane suitable for man-riding and can be fitted with an existing 40 ton Safe Working Load (SWL) A-frame if required.

NOR Spring has accommodation for 60 personnel and a built-in hospital making it ideal for ROV and diving operations which involve large project and client teams.

For the first contract starting in May, Bibby Offshore will be mobilizing the NOR Spring in Singapore with a survey spread and two newly-purchased TMS inspection class Seaeye Lynx ROVs.

featured products

REMUS 600-S AUV

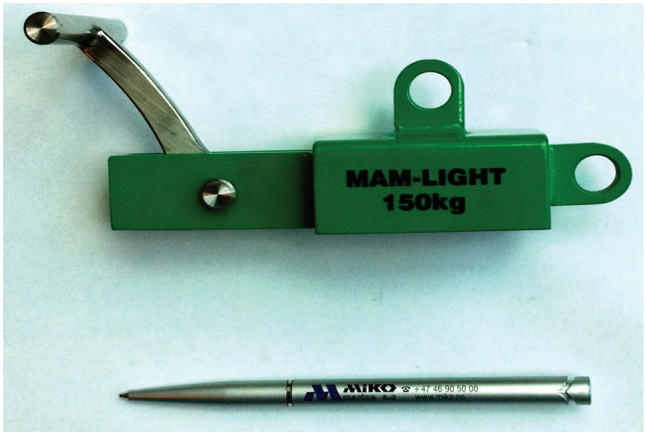
Hydroid Launches REMUS 600-S AUV

Hydroid debuted its newest AUV, the REMUS 600 Survey (REMUS 600-S) at the XVIII International Hydrographic Conference (IHC) in Monaco. The REMUS 600-S is a high performance version of the REMUS 600 and features advanced technology that has only previously been available in Kongsberg's accomplished HUGIN vehicles, making it ideal for such applications as International Hydrographic Organization (IHO) quality surveys. Specifically, the REMUS 600-S incorporates a Kongsberg EM 3002 Multibeam Echosounder (MBES) operating at 300 kHz. The MBES has previously been shown to exceed the feature-detection requirements of the IHO standard S-44 for Order 1a surveys. The vehicle also features Kongsberg's Navigation Processing Suite (NavP), which improves timing accuracy to 1 ms or better and provides complete time synchronization of all onboard sensors, and the Navigation Laboratory (NavLab) software, which enhances the NavP by increasing navigational integrity.

"By integrating Kongsberg technology, this next-generation AUV can collect high-resolution, IHO-quality data with unmatched accuracy," said Christopher von Alt, President and co-founder of Hydroid. "By incorporating long-endurance capabilities and increased-payload capacities, the REMUS 600-S brings a new level of excellence to applications such as under-ice surveys, pipeline inspection and channel monitoring."

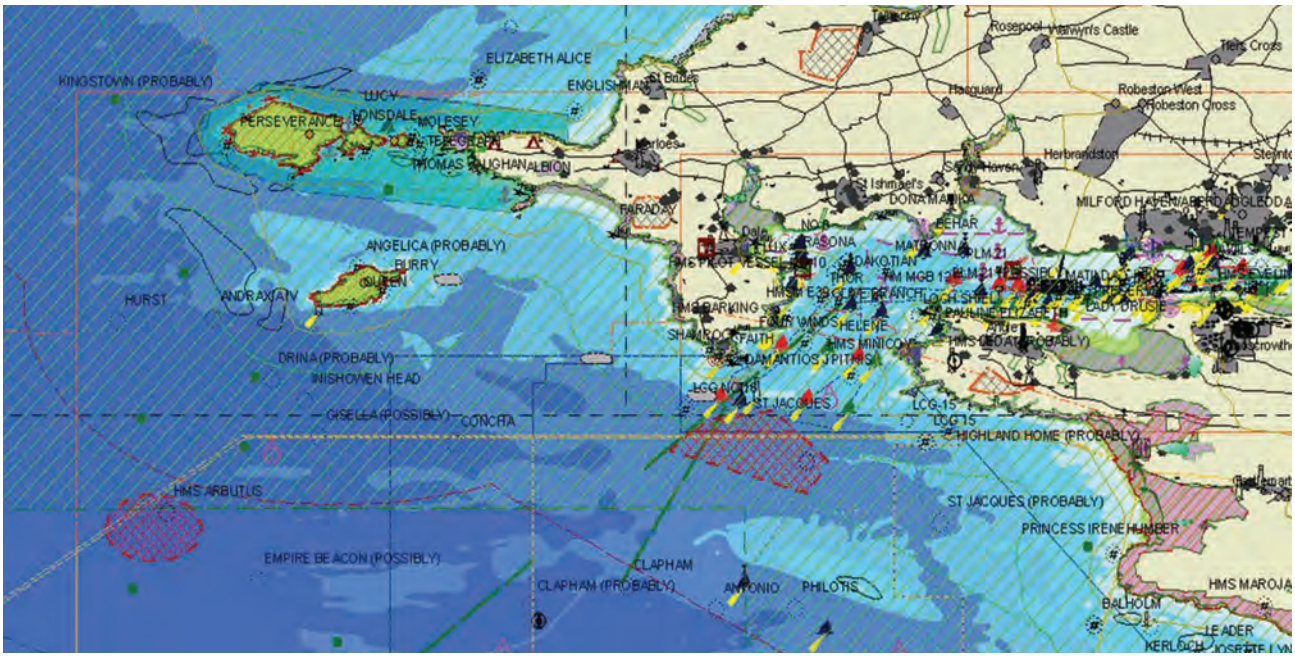
www.hydroid.com

Miko Debuts Permanent Magnet for Temporary Anchor Points



Miko Marine offers a new lightweight and compact addition to its range of permanent magnets. The MAM Light is designed to possess exceptional magnetic strength relative to its size and this enables it to bring new benefits to divers, boat crews, ROV and salvage operators. The MAM-Light is a powerful permanent magnet that weighs just 1.5 kg yet has a holding force of up to 150 kg. This means that it is easily handled manually or by ROV manipulator and can provide an instant anchorage against any steel structure such as a ship's hull, a wind turbine tower, drilling template or platform jacket. The magnet's eye creates a secure fastening for a wide range of functions such as providing a temporary mooring alongside a ship for boarding parties or excursion boats, a fixing point for instrumentation, oil containment booms or guide and anchor lines for divers. When it is no longer required a simple lever mechanism is used to break the powerful connection after which the MAM-Light magnet is stored in a double skinned steel box. This neutralizes the magnetic field that it generates and prevents it interfering with magnetically sensitive items and makes it suitable for air freight.

www.miko.no



SeaZone HydroSpatial 2

With the launch of HydroSpatial Base, the foundation data layer for its new HydroSpatial product range. SeaZone introduces SeaZone HydroSpatial 2, a new era for marine mapping for GIS.

Benefits include an enhanced data model, allowing for intuitive feature filtering; geo-processing and spatial analysis to create customized data outputs and map views using both real world and abstract feature types. Mapping is delivered in themed tiers with improved symbology, and licensed as a complete package, delivering in both desktop and web GIS. SeaZone HydroSpatial Base provides users with a definitive worldwide marine reference map incorporating large-scale, authoritatively sourced, marine geographic datasets. The content is processed to form a continuous vector layer dataset, with a well structured and defined feature and attribute model, providing the best possible marine mapping experience. SeaZone HydroSpatial Base is ideal for use as a marine spatial planning aid and as a primary decision support tool. It has a global reach and is available for regions where content is captured to scales greater than or equal to 1:1,500,000. The feature attribution for SeaZone HydroSpatial Base is comprehensive and serves a wide range use scenarios. For the high end technical user, HydroSpatial Base performs well when interrogated by vigorous and complex geo-processing or spatial analysis in GIS. For less demanding requirements, HydroSpatial Base represents an excellent high-resolution selectable back-drop with flexible filtering and styling.

Email: s.james@seazone.com

Data Structure:
- New and intuitive Feature and Attribute Data Model;
- Mapping delivered in Themed Tiers;
- Licensed as a complete package

Build Frequency
- Quarterly

Supply Extents:
- Delivered in tiles of ½ degree x ½ degree, referenced to Geodetic WGS84 [urn:ogc:def:crs:EPSG::4326]

Standard Supply Formats:
(non-standard available on request)
- MapInfo TAB;
- ESRI Shapefile;
- ESRI Personal Geodatabase (v9.2);
- ESRI File Geodatabase (v9.2)

Mariscope's New ROV

Mariscope introduced an ROV designed for measuring a series of parameters in the ocean that normally are not integrated on ROVs. With the increasing demand to measure parameters like Oil in Water, CO2 and Methane, for example, ROVs nowadays face a variety of new skills. Not only the offshore industry, but also the aquaculture industry, ports and the scientific community has a need to increase the amount of parameters they measure. The advantage of ROVs carrying these types of instruments is that the measurement takes places exactly where the operator needs it. For example, in order to detect Methane production due to heavy concentration of anaerobic sediments under fish harvesting cages, the only way to get there is using an ROV.

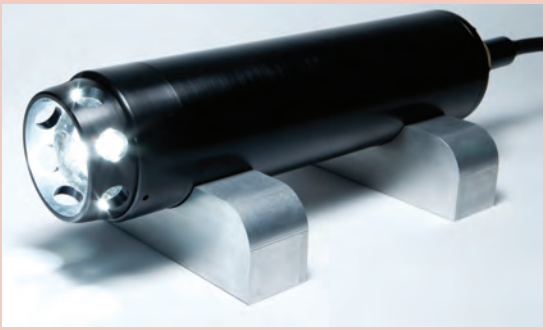
IOOS: New Asset Map to Track Gliders

The U.S. Integrated Ocean Observing System (IOOS) launched a new asset map that displays where partner gliders are currently patrolling and where they've been. That means users can get one-stop access to a current snapshot of where gliders are at sea. Once returned from a mission, users can scroll over visualizations of collected data. Additionally, users can retrieve an historical collection of data from previous missions, reaching back to 2005. "Eventually, this site will provide access to glider data for all IOOS regions and their partners, which will allow scientists easier retrieval of data to inform models and forecasting tools," said Zdenka Willis, U.S. IOOS Program Director.

Check out the Glider Asset Map at http://www.ioos.gov/observing/observing_assets/glider_asset_map.html

BIRNS Aurora

Birns launched the Birns Aurora, a high intensity Light Emitting Plasma (LEP) deep submergence light designed to provide dazzling, electronically dimmable, 14,000 lumen brilliance to usher in the next generation of extreme depth subsea lighting systems. LEP light sources use a solid-state device to generate Radio Frequency (RF) energy to power a plasma light source. This LEP light has a 30,000 hour lamp life, and produces a continuous spectrum, and delivers an exceptionally high lumen density—in fact, the single bulb (approximately 2 mm long) produces 14,000 lumens of brilliant white light at 5,300K, at a Color Rendering Index (CRI) of 94. Also new for 2012 is the seamless electronic dimming software (operable on any PC) which permits easy and continuous (ie, step-free) slide-bar dimming down to 20% —with no reduction in color temperature or color rendering index (CRI) performance. The Birns Aurora has an overall length of 15-in., and with a mounting diameter of 4-in., it can be tailored to fit large or small vehicles, and runs on 28Vdc with a 9.3A power draw, with a weight of 12 lbs in air and 7.5 lbs in sea water.

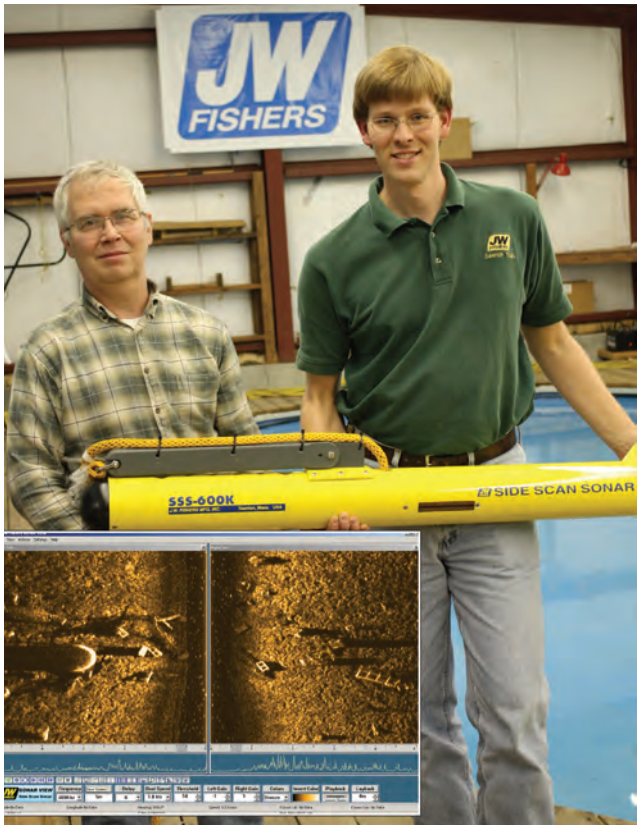


Underwater Search ... Government Style

Los Angeles Harbor Department, UAE Environmental Agency, North Carolina's Department of Transportation, Tafton Fire Company in Pennsylvania, and the Oklahoma Highway Patrol are a few of the diverse group of government agencies engaged in underwater search and survey operations. They are using a variety of equipment including underwater metal detectors, video cameras, and side scan sonar.

The Port of Los Angeles is the number one container port, by volume, in the United States. The value of cargo passing through the port annually is approximately $250b. To protect this, the port has is its own police force, assigned to the City of Los Angeles Harbor Department to patrol the waterfront by boat, bicycle, vehicle, and helicopter to ensure security of the port and the safety of all passenger and cargo vessels passing through it. This includes guarding both topside and underwater areas against possible terrorist threats, monitoring discharge pollution, and checking ship's hulls for compartments carrying drugs or other contraband. To assist in these efforts the department has acquired JW Fishers SeaOtter-2 ROV. This highly maneuverable underwater vehicle is equipped with four powerful thrusters and has high resolution color cameras in front and rear. Compact size and light weight, the vehicle is manipulated with a hand-held controller connected to a rugged topside console. The operator views video from the underwater cameras on a built-in, ultra bright flat screen monitor.

Nestled between Saudi Arabia, the Arabian Gulf, and the Gulf of Oman is the United Arab Emirates (UAE). It's one of the smallest, but wealthiest countries in the Middle East. The UAE is a signatory to the Convention on Biodiversity and the Convention on International Trade of Endangered Species. These two conventions require participating countries to establish protected areas, and to promote the conservation of ecosystems and habitats. At the end of 2008 the UAE had more than 5,000 sq. km. of protected marine area, which represents about 5% of the Emirate. The country's Environment Agency is one of the groups charged with the responsibility of managing this resource. To assist in the work, the agency is using Fishers TOV-1 towed underwater video system. Ashraf Al Cibahy, a manager



Tafton Fire Company's Jon Tandy (L) and JW Fishers technician Brian Awalt with side scan sonar, Inset photo – side scan image of bridge debris.

with the agency's Department of Biodiversity and Conservation reports, "Our coral reef team is employing the TOV-1 to establish a methodology for transect and analysis of video data. Upon completion of the initial survey we will have a baseline to compare future results." Tafton Fire Company and North Carolina Department of Transportation are both using side scan sonar in their operations, but for completely different tasks. Side scan produces high resolution images of the bottom of a river, lake, or ocean, and any objects lying there. The DOT is using their sonar to check support structures of bridges that cross over water. In addition to viewing the condition of the support's base and the bottom around it, the DOT's side scan towfish is equipped with adjustable transducers that allows the sonar to view vertical structures as well. This lets the inspector examine the entire submerged part of the bridge support.

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2012 Marine Technology Reporter Editorial Calendar

January / February — **Ad Closing: Jan 13**

Offshore Inspection, Repair & Maintenance

Market: Salvage & Recovery
Product: Scientific Deck Machinery
Directory: Umbilicals, Cables, Connectors & Power Supply

Bonus Distribution
AUVSI
Feb 7-9 Washington, DC
Underwater Intervention
Jan 24-26 New Orleans, LA

March — **Ad Closing: Feb 23**

Subsea Vehicle Report – Unmanned Underwater Systems

Product : Sonar Systems & Seafloor Mapping
Regional Report: Atlantic Canada
Preview: Oceanology International 2012 Technology Guide

Bonus Distribution
Subsea Tieback
Mar 6-8 Galveston, TX
Oceanology International
Mar 13-15 London, UK

April — **Ad Closing: Mar 22**

Global Offshore Deepwater Report

Market: Seismic Vessels & Systems
Product : Deepwater Positioning, Mooring & Anchoring
Special Report: Environmental Monitoring, Remote Sensing & Pollution Control

Bonus Distribution
Offshore Technology Conf.
Apr 30 - May 3 Houston, TX

May — **Ad Closing: Apr 19**

Hydrographic Survey

Market: Renewable Energy –Wind, Wave & Tidal Power Report
Product : Instrumentation: Measurement, Processing & Analysis
Preview: OceanTech Expo Preview & Show Guide

Bonus Distribution
OceanTechExpo
May 21-24 Newport, RI
UDT Europe
May 29-31 IFA, Spain

June — **Ad Closing: May 24**

AUV Arctic Operations

Market: Communications, Telemetry & Data Processing
Product : Deck Machinery, Winches, Cranes and Ropes
Special Report: Seafloor Engineering & Remote Operations

Bonus Distribution
EnergyOcean
Jun 19-21 Boston, MA

July / August — **Ad Closing: Jun 21**

MTR 100

The MTR 100 serves as an invaluable guide for companies, government agencies, municipalities, research institutions and universities seeking product and service providers throughout the year

September — **Ad Closing: Aug 23**

Subsea Defense: Protecting Port & Subsea

Market: ROV Technology: Workclass to Micro Vehicles
Products : Underwater Imaging: Lights, Cameras, Sonar
Special Report: Training & Education Institutions & Facilities

October — **Ad Closing: Sep 20**

Ocean Observation: Gliders, buoys & sub surface monitoring networks

Market: Marine & Subsea Engineering & Construction
Product : Offshore Inspection, Repair & Maintenance
Regional Report New England

Bonus Distribution
Oceans MTS/IEEE
Oct 14-16 Virginia Beach
SNAME
Oct 22-24 Providence, RI
MAST Americas
Nov 14-16 Washington, DC

November / December — **Ad Closing: Nov 22**

Fresh Water Monitoring & Sensors

Market: 2012 Market Planner
Product : Naval Underwater Warfare Technology
Special Edition: 2nd Annual Underwater Imaging Contest

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Knowledge Skills: Ability to supervise others and manage one or more multiple jobs. Ability to oversee, schedule and assign tasks for one or more jobs. Applies high level skills of specialty trades functions and tools. Ability to interface with external customers and communicate verbally and in writing. Ability to use of basic hand tools, portable power tools, and tools of specialty. Ability to perform multiple tasking and meet critical deadlines.

Basic Qualifications: HS education or Trade School + 10 years of related experience. Prefer technical/professional certifications.

Preferred Qualifications: Must be able to lift, carry and transport heavy equipment and boxes. The exact weight requirements will be determined by the specific job, but no less than 30 lbs. Able to work on and climb ladders, work in extreme temperature environments, aboard ships, in shipyards, under industrial conditions and in confined spaces. Able to perform other duties as required which may involve high heat, humidity, noise and dirty conditions, working aloft or over the sides of vessels. May ride ships at sea for extended periods. May require wearing a respirator. Travel may be required within and outside of the continental United States.

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6	Seacon	www.seaconworldwide.com	011 44 149 365 2733
27	Specialty Devices, Inc.	www.specialtydevices.com	(972) 429-7240
15	Subconn	www.subconn.com	(781) 829-4440
17	Subsea Photo Contest	http://photos.seadiscovery.com/rules-and-terms.asp	Please visit us online
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31	Teledyne TSS	www.teledyne-tss.com	44 (0) 1923 216020
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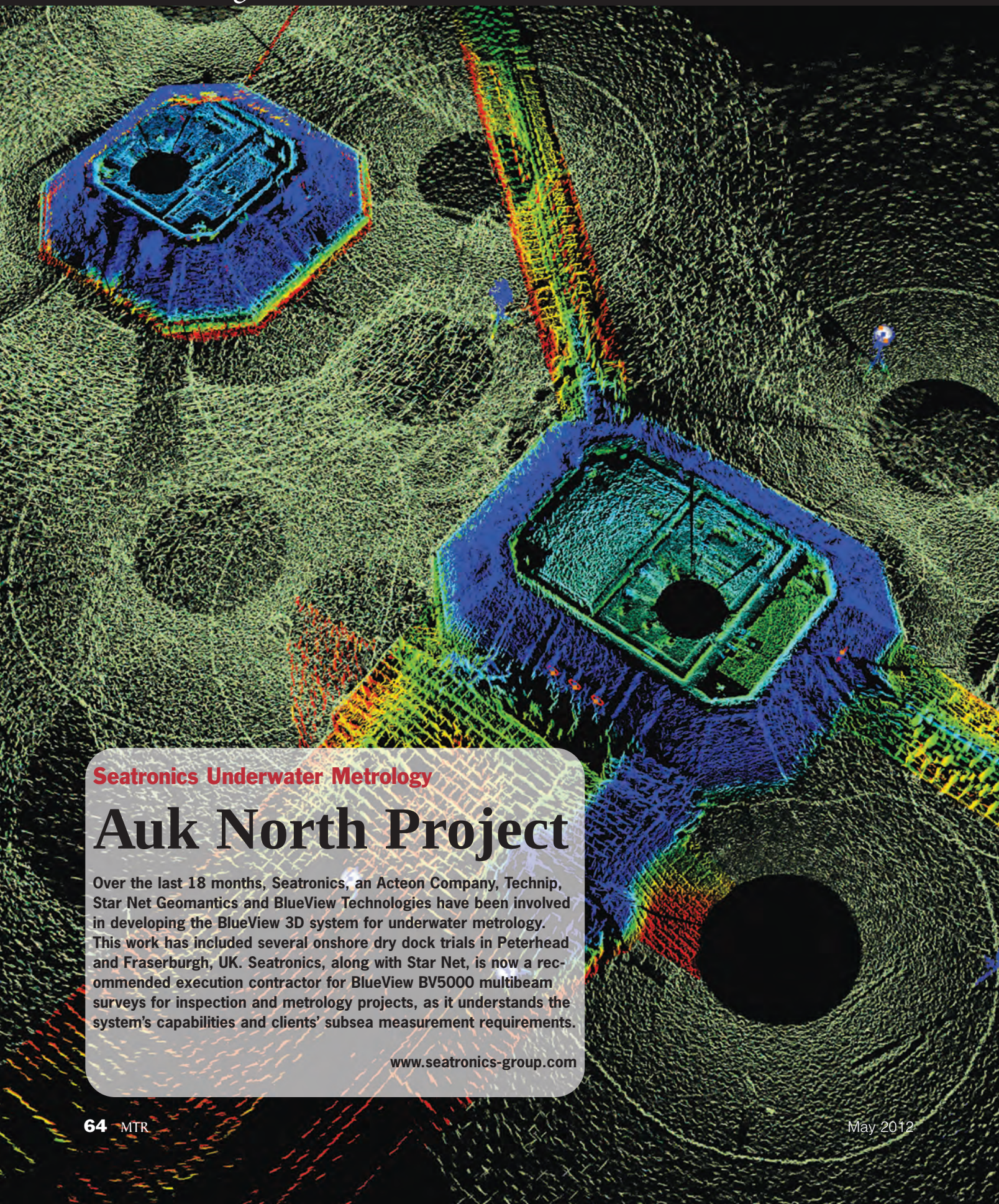

Seatronics Underwater Metrology

Auk North Project

Over the last 18 months, Seatronics, an Acteon Company, Technip, Star Net Geomantics and BlueView Technologies have been involved in developing the BlueView 3D system for underwater metrology. This work has included several onshore dry dock trials in Peterhead and Fraserburgh, UK. Seatronics, along with Star Net, is now a recommended execution contractor for BlueView BV5000 multibeam surveys for inspection and metrology projects, as it understands the system's capabilities and clients' subsea measurement requirements.

www.seatronics-group.com

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