MARINE TECHNOLOGY REPORTER

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Hydrograpic Survey

& the Growing Role of Unmanned Surface Vessels

The Abyss

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Salvage

Statistical Analysis of Sinking Ships

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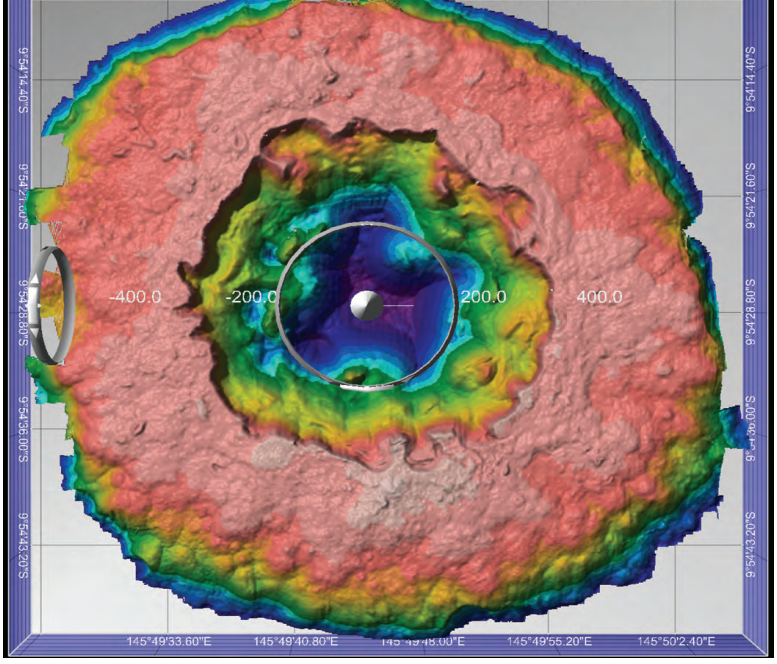

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By MacArtney

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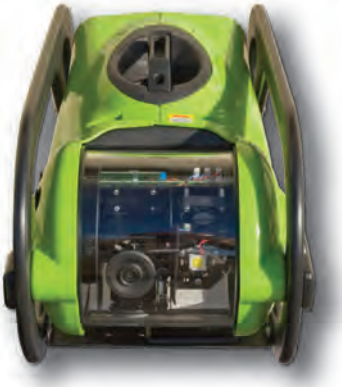

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Little Benthic Vehicles

VIEW:

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Ocean Business, held early last month in Southampton, England, was yet another strong indication that business is blossoming in the subsea sector. For those of you have not yet had the chance to experience Ocean Business, it is a wholly worthy endeavor, an event which seamlessly combines traditional exhibit, high-level conference and on-water technical demonstration. This show, unlike so many others of its kind, seems to serve as a real incubator of business relationships and deals. This is an inexact appraisal comprised by personal feedback from exhibitors in the halls, as well as the preponderance of "grip and grin" photos signifying "deal done," many of which can be found in our post-Ocean Business coverage starting on page 36.

While there was plentiful news from the Ocean Business hallways again this year, perhaps the biggest headline was that the show itself has been sold to Diversified Business Communications U.K. Much of the Ocean Business success to date is attributable to the hands-on, personal touch of the current show management, Intelligent Exhibitions and its staff. Only time will tell if the successful formula continues under the guidance of a more corporate management.

An outstanding feature of this year's Southampton event was the large number of companies selling or using unmanned surface vessels (USV) for the purpose of hydrographic survey, the impetus for this months feature on USVs starting on page 24. USVs come in a wide variety of shapes and sizes, and each has its own unique signature regarding capability and area of operation. In this edition we focus on five specific systems from five separate companies – from well-established industry veterans to newcomeers – each with its own unique set of operatational characteristics and capabilities.

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Subsea Hardware Spend to

Double to $124 Billion

Douglas-Westwood (DW) forecast subsea hardware spend is set to double to $124 billion during 2013-2017 compared to the preceding five-year period. The new third edition of Douglas-Westwood's Subsea Hardware Market Forecast analyzes the market through to 2017, examining the key activity trends to provide detailed insight for major players and new entrants alike. "The prospects for the subsea hardware sector look good, however, players will face significant challenges over the forecast period," said Angela MacCormack, an example is Brazil which accounts for 14% of our forecast subsea Capex. Project execution is a major issue for Petrobras with 70% local content requirements and engineer shortages placing pressure on the supply chain, inflating costs and delaying delivery of production systems (predominantly FPSOs). Such delays could impact the timing of subsea hardware installations and spend profiles. "Our outlook takes a conservative view of stated future prospects, with some 60% additional slated projects that we have removed from our forecast. Given capacity constraints evident in the industry, we believe that this approach provides a realistic appraisal of future prospects."

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% of DW forecast subsea Capex eminating from Brazil

"Consensus is that oil prices will not grow at the same rate as the last cycle or will, in fact, fall slightly from current levels," said DW director Steve Robertson. "While we believe that oil supply constraints will support the price in the long term, it should be recognized that the free cash flow of E&P operators will be steady or trending downward, given that most are also seeing flat or declining production levels. The E&P companies will, therefore, not be positioned to absorb cost increases and indications from our oil company clients suggest that they are already putting pressure on the supply chain to control costs and increase efficiency. However, most of our forecast subsea field developments are viable at $60 to $80 oil prices and we believe that fundamentals strongly support long-term oil prices significantly above these levels.

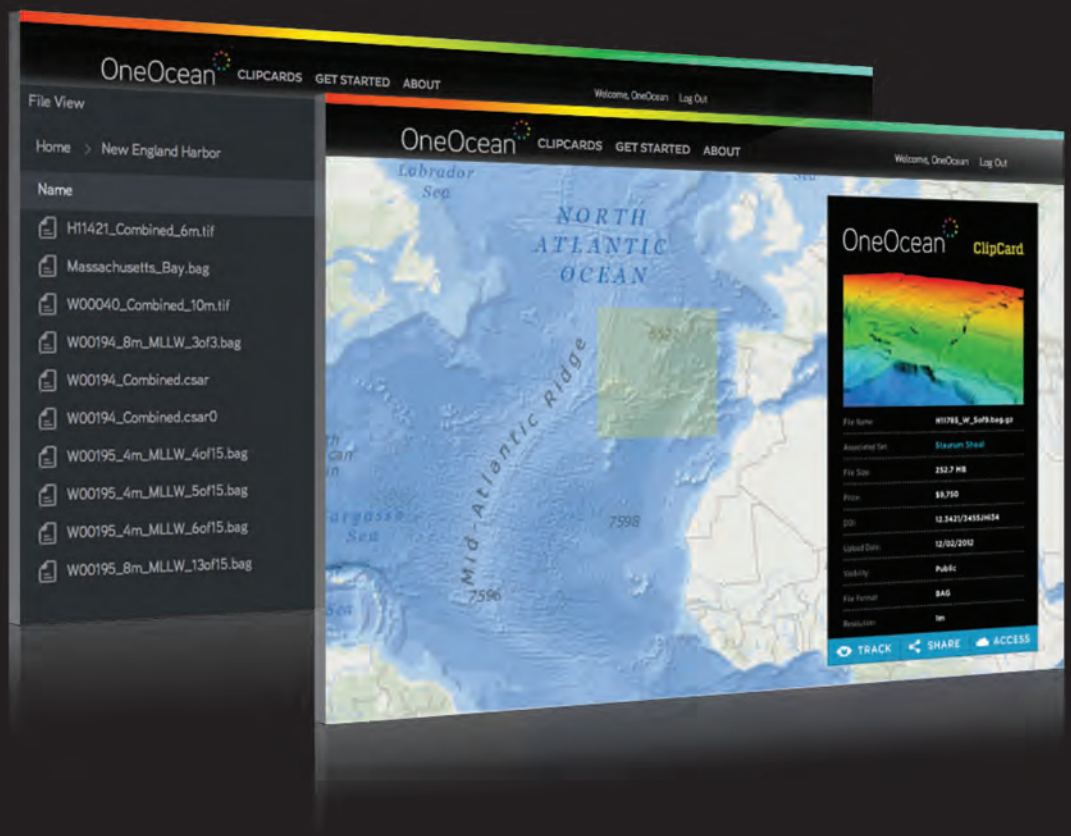
The report notes that reducing conventional opportunities, high oil prices and more advanced subsea hardware solutions are resulting in fields being increasingly developed in deeper waters, in remote locations and in more extreme metocean conditions. In addition, the offshore industry is being challenged to recover smaller, more widely scattered reserves. The growing use of subsea processing technology, such as subsea separation, multi-phase pumping and gas compression, as an alternative to the use of fixed processing platforms will also tend to provide upside potential. Moves in the industry, particularly from operator BP, to develop 20,000 PSI technology could unlock fields that are currently inaccessible with existing hardware.

www.douglas-westwood.com/shop/shop-infopage.php?longref=1136

Deepwater Oil and Gas Containment Exercise

To strengthen the oil and gas industry's ability to respond in the event of a deepwater blowout and ensure that offshore oil and gas production can continue to expand safely and responsibly, Bureau of Safety and Environmental Enforcement (BSEE) Director Jim Watson recently launched an unannounced exercise to deploy critical pieces of state-of-the-art well control equipment to the ultra-deep seabed of the Gulf of Mexico. The exercise employs Helix Well Containment Group's capping stack system, equipment that is used to stop the flow of oil and gas in the event that a blowout preventer is ineffective, with Noble Energy serving as the designated operator.

During this exercise, Helix's capping stack will be mobilized and deployed to the sea floor in 5047 feet of water, latched to a test wellhead and pressurized. The exercise is also designed to test Noble Energy's ability to obtain and schedule the deployment of the supporting systems necessary for successful containment. The Helix capping stack is similar to the technology used to stop the flow of oil from the Deepwater Horizon well. Helix is one of two consortia that provide contract access to well containment equipment to oil and gas operators in the Gulf of Mexico. This equipment is required by BSEE for drilling with subsea blowout preventers in deepwater, among other situations. The other consortium, the Marine Well Containment Company, successfully completed a similar deployment exercise in July 2012.



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MMT Completes 6,000 sq. km Survey using

Kongsberg TOPAS PM40

Kongsberg TOPAS 40 data example from the MMT survey, showing outcropping bedrock covered in parts by layered clay. The clay occasionally contains gas filled sediments.

A huge amount of sub-bottom profiler data has recently been collected by MMT. MMT (Sweden) have successfully completed a survey which includes collection of parametric sub-bottom profile (SBP) data with a Kongsberg TOPAS PM 40 system. The system was hullmounted on MMT´s survey vessel Triad. The survey covered an area of 6000km2 in the Baltic Sea with an extensive amount of data. The SBP data was collected during a hydrographic survey for the Swedish Maritime Administration (SMA) where high resolution bathymetric data will be used to update sea charts. Additionally will the SBP data from TOPAS PM 40 give the client a detailed picture of the sediment layers of the surveyed area. MMT´s Technical & Operation Director Mr. Martin Wikmar said, "This particular project has given us extensive experience in high graded parametric sub-bottom profiling. By providing our client the best systems and methods on the market we continuously prove that we are a forefront survey company."

Saab Seaeye Opens
Largest Test Tank

The largest indoor test facility ever before dedicated to the development of unmanned underwater vehicles has been opened by Saab Seaeye, the company claims. Located in Linköping, Sweden, the test tank will allow new underwater systems technology to be tested in a controlled environment rather than in a lake or at sea. The tank is 6m deep, 10m in diameter and holds approximately 470 cu. m. of water. "Saab's underwater operations are currently in a very expansive phase," explains Görgen Johansson, Senior Vice President and Head of Saab's Business Area Dynamics, "and by investing in ultra-modern facilities such as this, we increase our ability to offer underwater systems and solutions for both military and civil applications." The company sees the new facility bringing significant savings in time and costs, while offering a unique opportunty to develop and trial underwater systems that will future strenghen its product portfolio.

The Salvage Bonanza

With the monsoon set to hit the Indian coast there is much expectations on the salvaging and wreck removal front most of which is likely to be highlighted during the coming conference on salvaging scheduled to take place. In recent years, there have been a number of high profile salvaging and wrecks removals on the Indian coast, particularly in Mumbai port. The MSC Chitra, which collided with MV Khalijia and the naval vessel INS Vindhyagiri that caught fire when it collided with a merchant vessel near the Mumbai harbor are just two in the series.

There have been quite a few other incidents of old vessels of more than 25 years getting grounded especially on the West coast. Creating public awareness of the continued dangers of shipping even in this day and age of advanced technology and engineering has become an issue of paramount importance. Such cases highlight the issue of growing concern to marine insurers, shipowners and the wider marine industry. Managing the wreck removal operations for these cases costs large sums of money.

Prior to the onset of each monsoon in these past few years has seen leading global players in the salvage sector getting set to grab opportunities coming their way. They keep a watchful eye on the coast for any incidents which could translate into salvage business. In this regard, Hinode Events and Services Pvt Ltd., is providing a decisive platform which will bring together a significantly large number stakeholders. They had organized the first conference in India on Salvage and Wreck Removal last year, which saw a good turnout.

The second edition of this conference was to be held on May 7, 2013. The organizers say the registration is beyond expectations and as a result of the large number of participants already registered they have had to switch over to a bigger venue in the same hotel to accommodate the large number.

The reason is that some of the world's best known companies in the field of marine emergency response, marine salvage and wreck removal have accepted invitation to participate. Besides, there being only a month left before the mon-

soon hits the Indian sub-continent hence, this forum will provide an in-depth and factual review of the prevailing guidelines of the maritime administration with their implications. It will also be an opportunity to learn about other strategies which are expected to be brought into focus and their current state of preparedness to handle marine emergencies in Indian waters.

Risk managers in ship-owning companies, maritime lawyers and maritime insurance practitioners besides most of the leading global salvage and towage companies, diving specialists, tug boat owners, ship recyclers and many others have already registered themselves as it is said to be of special interest to them. More details about registration could be had at **www.hespl.in**.

It is a fact that to prevent extensive damage and the need to maintain the environment there is an immediate need for intervention by marine and salvage professionals during any ship accident. Though oftentimes not considered a difficult task, it is the challenges that pop up that pose most of the problems including pressures from authorities, commercial commitments and other requirements. These included technical, diplomatic, legal, commercial and other challenges. The conference is expected to present the solutions.

by Joseph Fonseca, Mumbai-based blogger for MaritimeProfessional.com

Cutter Suction Dredger Cyrus II of Royal Boskalis. India heavily relies on European dredging giants, with the big players in the India being Dutch and Belgian dredging companies, particularly VanOord, Royal Boskalis,

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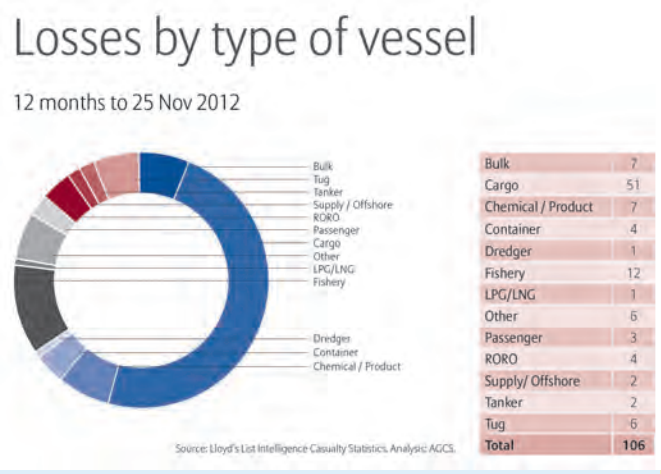
What Goes Down ...

… Arguably should come up, but that's not always the case. The business of salvage and recovery is one of the most unpredictable and harrowing ends of the subsea business, if for no other reason due to the random nature of the business (though if you read Joseph Fonseca's article "The Salvage Bonanza" on the previous pages, perhaps it is not always unpredictable.)

To help add perspective to the business, we present here the recent study from Allianz Global Corporate & Specialty's Safety and Shipping Review 2013 which focuses on key developments in maritime safety during 2012, and analyzes reported shipping losses (of over 100 gross tons) during the 12 months prior to 25 November 2012. The recently released statistics and analysis are an eye opener for any stakeholder and the annual review also examines trends and developments affecting shipping safety, future challenges to safety and looking ahead; some topics to watch. Allianz identifies 106 ship losses in the 12 months to November 25 2012 – up from 91 ships the previous year, but a 27% decrease on the ten year average of 146 ships per annum. Despite this long term downward trend, Allianz says that human error remains the core challenge. Twice as many shipping accidents centered on the seas around South China, Indo China, Indonesia and the Philippines. Shipping losses also occurred more often in the East Mediterranean and the Black Sea or around Japan, Korea and North China (10 losses).

Other key findings of the report: Human error remains a root cause of most incidents. Fatigue, economic pressures, and inadequate training are causes for concern. New regulations focus on the problem of human error. The Maritime Labor Convention (2006) will help improve safety by addressing the welfare and working conditions of seafarers. Major shipping companies have initiated self-regulation initiatives post-Costa Concordia, with the Cruise Lines International Association and the European Cruise Council partnering to lead industry-wide voluntary adoption of policies that go beyond international regulations. Eventually, self-regulation of the industry may become the core driver of safety. Technological improvements such as the introduction of mandatory Electronic Chart Display and Information Systems (ECDIS) in July 2012 are expected to reduce accidents, but only where properly applied with effective training and management oversight.



Bulk	7
Cargo	51
Chemical / Product	7
Container	4
Dredger	1
Fishery	12
LPG/LNG	1
Other	6
Passenger	3
RORO	4
Supply/ Offshore	2
Tanker	2
Tug	6
Total	106

Allianz

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Cause of Losses: 2001-2012

CAUSE / YEAR >	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	TOTAL
Collision	20	21	13	24	25	16	11	13	10	3	6	162
Allision	2	1	3	4	4	2	1		1		2	20
Foundered	51	59	72	62	61	68	74	62	58	50	52	669
Fire/Explosion	35	22	21	18	18	15	17	14	12	6	11	189
Hull Damage	24	12	7	7	5	11	3	8	3	3	5	88
Missing/Overdue			1	3	1	1			1			7
Machinery Failure	15	13	9	10	7	17	8	7	3	5	6	100
Piracy			1	1		1		1	2			6
Wrecked/Aground	22	34	28	23	26	39	33	24	18	24	23	294
Miscellaneous	8	7	1	2	2	2	1	2	2	1		28
Grand Totals	177	169	156	154	149	172	148	131	110	91	106	1563

The rate of losses declined over the period in general, with cargo and fishery vessels making up 61% of losses, despite making up approximately 45% of the average world fleet. Passenger vessel losses make up a small number of the overall shipping losses, despite media attention.

Losses By Type of Vessel

Type / YEAR >	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	TOTAL (11)
Barge	4	3	2	5	7	5	4		1			31
Bulk	9	11	6	8	8	10	8	12	10	12	7	101
Cargo	70	68	65	58	56	76	55	49	57	35	51	640
Chemical/Product	6	9	9	7	10	5	9	8	4	4	7	78
Container	1	1	1	2	5	3	1	5	4	2	4	29
Dredger	4	1	4	3	2	4	3	1	1	2	1	26
Fishery	43	31	30	38	23	34	36	30	20	17	12	314
LPG/LNG	2			2			1			1	1	7
Other	13	9	4	3	2	7	4	6	3	2	6	59
Passenger	11	14	10	13	12	7	5	5	2	8	3	90
RORO	5	7	9	7	10	5	8	5	1	2	4	63
Supply/Offshore	1		3	3	3	5	1	3	1	2	2	24
Tanker	2	4	3		2	1	3	2	3	1	2	23
Tug	6	8	9	5	8	9	9	5	3	3	6	71
Unknown		3	1		1	1	1					7
Totals	177	169	156	154	149	172	148	131	110	91	106	1563

MHI to Build for PGS

Mitsubishi Heavy Industries, Ltd. (MHI) received an order for two vessels capable of three-dimensional (3D) seismic data acquisition for sea bottom resource exploration from Petroleum Geo-Services ASA (PGS). The order for the two vessels, which was signed on April 25 in Tokyo, was placed upon exercise by PGS of the option right that was provided when two same type vessels were ordered to MHI in April 2011. The two newly ordered vessels are scheduled for delivery in the first and second half, respectively, of 2015. With this latest order, MHI will build a total of four vessels to support PGS's highly efficient deep water natural prospecting services.

The vessels ordered are the "Ramform Titan-class," the newest generation in the Ramform series featuring advanced 3D seismic data acquisition/analysis capability. The 104m vessel has a wide 70m breadth. For quiet operation, the vessel adopts diesel electric for the main propulsion system. The vessel is capable for receiving supply at sea to enable a long-term exploration over an expansive area. The Ramform vessel tows multiple streamer cables from the vessel's stern, and in fact the Ramform Titan-class vessels ordered by PGS have a wider stern compared with existing vessels; this feature permits deployment of a greater number of streamer cables—up to 24 lines—enabling exploration of a wider area at one time. MHI is currently building two previously ordered Ramform vessels at its Nagasaki Shipyard & Machinery Works.

Kongsberg to Supply Seismic Operation Systems

The two new state-of-the-art Ramform Titan-class seismic vessels under construction at MHI for PGS will feature a significant delivery from Kongsberg Maritime including integrated navigation, Dynamic Positioning and an extensive back-deck handling systems package. The contracts, valued at more than $50m, were signed by Kongsberg Maritime and Mitsubishi Heavy Industries, following PGS' decision to exer-

cise its options to order a further two Ramform Titan-class vessels (3 & 4) from MHI. The new Kongsberg Maritime 'Full Picture' packages for PGS Ramform Titan-class vessels 3 & 4 are based on the systems supplied for the first two vessels, which are close to completion and expected to be delivered in 2013. Ramform Titan-class vessels 3 & 4 are scheduled for delivery in 2015 respectively.

The Ramform Titan-class includes a significantly upgraded GeoStreamer based seismic package and is designed to maximize the full benefits of the GeoStreamer towing efficiency.

Supporting the advanced PGS developed GeoStreamer seismic technology is an extensive delivery including back-deck handling systems, hydraulic and winch systems and integrated control system from Kongsberg Maritime subsidiary Kongsberg Evotec. These systems are designed for the safe and efficient handling of streamers and other equipment on the back-deck. A specialized redundant seismic track system will be delivered as part of the Kongsberg Maritime K-Pos DP class 2 system and Thruster Control Systems, while navigation for Ramform Titan-class vessels will be carried out using the advanced K-Bridge integrated bridge system.

Navy Launches New Oceanographic Survey Ship

The Navy christened and launched its newest oceanographic survey ship, USNS Maury (T-AGS 66), the last of its class at VT Halter Marine's shipyard in Moss Point, Miss., in a traditional Navy ceremony on March 27. The 350-ft. ship is named for Cmdr. Matthew F. Maury, considered to be the father of oceanography, nicknamed the "Pathfinder of the Seas" and the first superintendent of the U.S. Naval Observatory. Maury is 24 ft. longer than its six sister ships to accommodate a 300 sq.-ft. moon pool for easier deployment and retrieval of unmanned underwater vehicles.

Matthew Maury developed wind and tide charts in the 1840s from ship's logs, and realized the importance that understanding the natural environment has for ship operations. That lesson has persisted. USNS Maury will survey the world's oceans, collecting ocean data, for Navy operations, continuing the work in the 21st century that Matthew Maury started in the 19th. The ship will be operated by the U.S. Military Sealift Command (MSC) for the Naval Meteorology and Oceanography Command (NAVMETOCCOM).

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Exploring the Abyss

GEOMAR & theABYSS AUV Study the S. Atlantic Seafloor

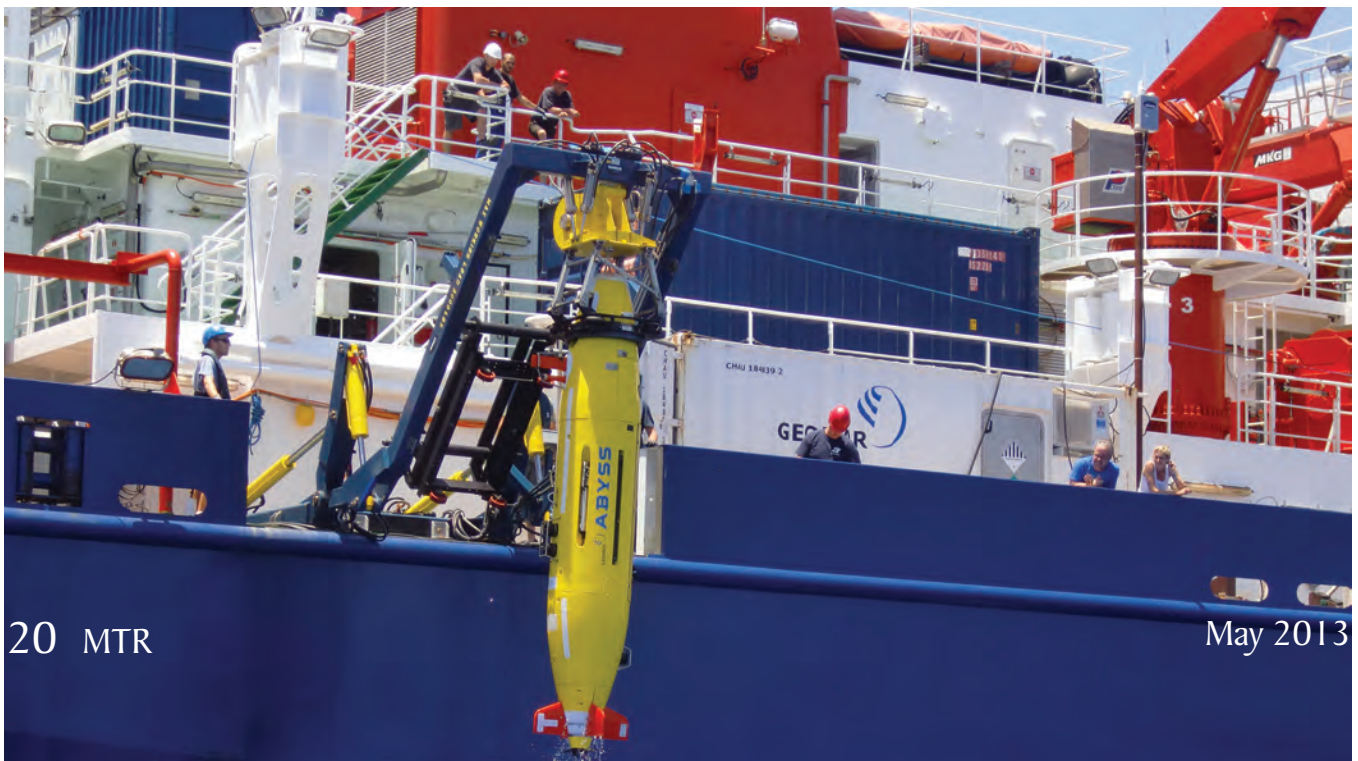
By Graham Lester, Director Hydroid Europe

For most of human history, the size and depth of the Earth's oceans have made it nearly impossible for surveyors and scientists to collect valuable and comprehensive data on the seafloor. In recent years, this led to the question: "Why is it that we cannot map our own planet as well as we've mapped the Moon and Mars?" Since the development of sonar instruments at the turn of the 20th century, surface ships have been the primary means of bathymetric data collection and seafloor study. The near extinction of sunlight and electromagnetic waves in general at depths beyond 100 m, however, limits optical imaging underwater. Acoustic signals of relatively long wavelength penetrate to great depths; however, the resulting bandwidth from a surface ship is fairly small. Thus, the high-resolution of optical and acoustic images obtained in shallow water is not readily possible at abyssal ocean depths—until very recently.

Recent advances in autonomous underwater vehicle (AUV) technology have revolutionized 21st century oceanography. AUVs routinely descend to depths that manned submersibles can reach only with great difficulty, great expense and high risk to human life. AUVs allow researchers to collect high-resolution seafloor data faster and more reliably in deep water than ever before.

One organization on the forefront of scientific AUV deployment is the German research facility GEOMAR – Helmholtz Center for Ocean Research Kiel. Using a specially designed REMUS 6000 type AUV called ABYSS, scientists at GEOMAR are exploring seafloor regions at depths up to 6,000 m, and have collected geological and bathymetric data of unprecedented quality. The ABYSS has explored several deep seafloor regions with tectonic and volcanic activity that was previously unmapped.

For example, recent multidisciplinary studies of hydrothermal vents on slow spreading ocean ridges have benefited greatly from data collected with the ABYSS. The studies reveal a remarkable diversity of hydrothermal systems in the Atlantic, Indian and Arctic oceans. When hydrothermal systems were first discovered on the East Pacific Rise and other Pacific Ocean ridges in the late 1970s, the community consensus held that the magma delivery rate of intermediate to fast spreading ridges was necessary to support black smoker-type high-temperature systems, associated chemosynthetic ecosystems,



and polymetallic sulfide deposits. Contrary to the consensus, data gathered by Prof. Colin Devey, Scientific Head of the AUV Team at GEOMAR, reveal that hydrothermal systems occur not only on slow spreading ocean ridges, but they are also generally larger, exhibit different chemosynthetic ecosystems and produce larger mineral deposits compared to systems on intermediate to fast spreading ridges. In brief, hydrothermal systems occur in a much greater diversity of geologic settings, and awareness of the full diversity of hydrothermal systems on slow spreading ocean ridges has been aided greatly by data gathered with the ABYSS. This knowledge opens an exciting new frontier for ocean ridge exploration.

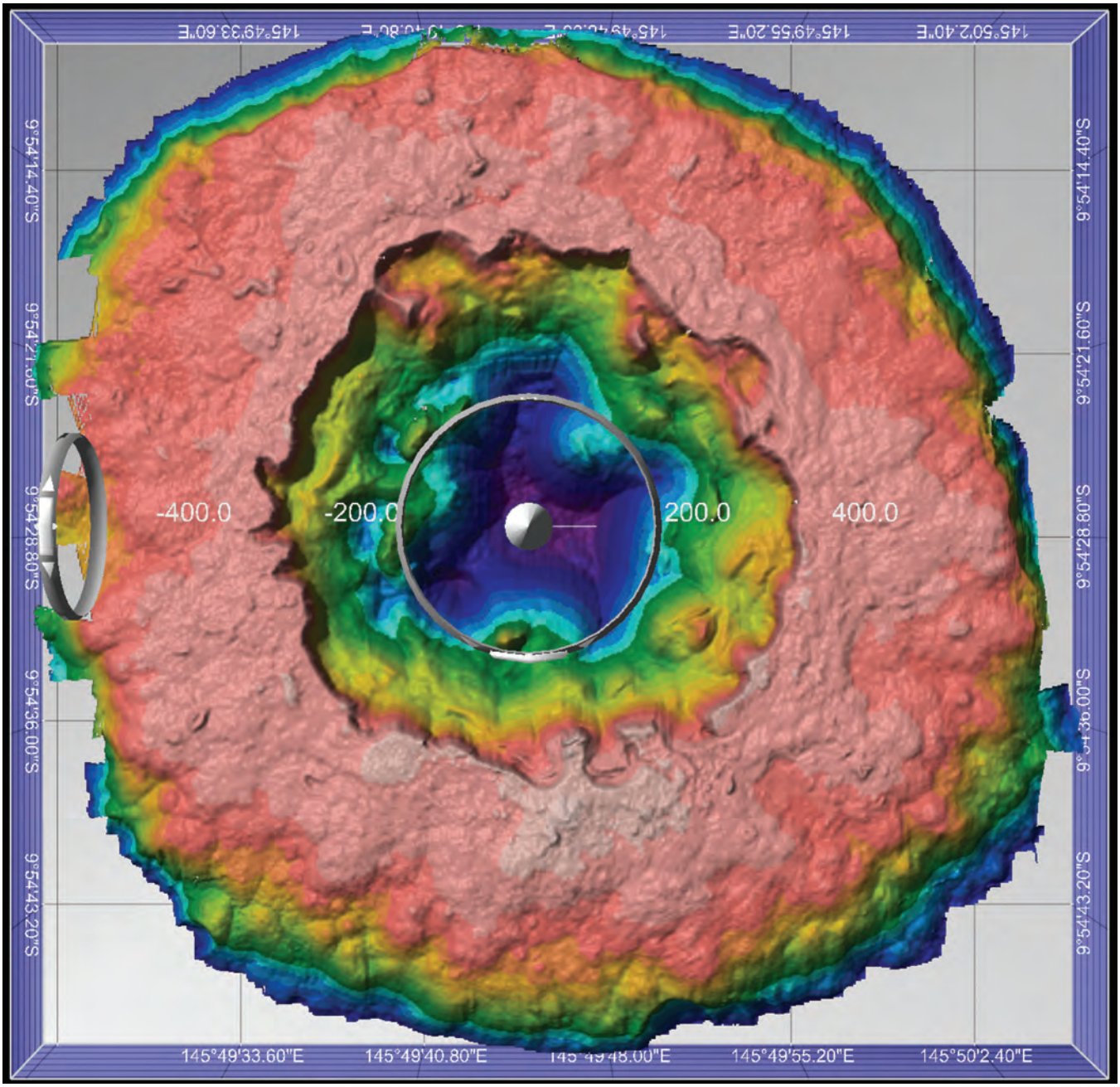
ABYSS, like all REMUS 6000 AUVs designed by Hydroid Inc., is a modular vehicle and has several different sensor options available to meet the requirements of the mission at hand. When deployed to survey seafloor volcanoes, the AUV is typically equipped with a Seabird SBE 49 FastCat CTD, an Edgetech 2200-MP 120/410 kHz sidescan sonar and a SeaBat Reson 7125 multibeam (200/400 kHz). On a mission-to-mission basis, the on-board multibeam echo sounder can be swapped with a 4 Megapixel monochrome AVT Pike camera or an Edgetech 2200-MP sub-bottom profiler (4-24 kHz). Additionally, the AUV has an onboard turbidity sensor which is used to detect plumes of mineral-rich water generated by black smokers, hydrothermal vents and other seafloor landforms which usually occur in areas of volcanic activity.

"The ability to operate these instruments from on-board a deep-water AUV like ABYSS rather than from a surface ship gives us several advantages," said Prof Devey. "For one, we're able to avoid the 'wavelength handicap' of surface ships, which must use relatively low-frequency sound waves in order to reach depths equivalent to those explored by ABYSS. The long wavelengths of these low frequency waves produce poor resolution images. Because we deploy these sonar instruments on ABYSS, which typically flies within a few hundred meters of the seafloor, we're able to use high-frequency sonar typically reserved for shallow-water imaging, which provides much higher resolution data."

In addition to providing significantly higher resolution imaging, AUV-mounted instruments also improve data quality by operating in a much lower-noise environment than their surface ship counterparts. Unlike surface ships, ABYSS is able to maintain a constant altitude for the duration of a mission, and is not affected by surface phenomena like chop, wake, near-surface bubble entrainment, and swell.

While onboard the support vessel or surfaced nearby, engineers can program and control the vehicle using the AUV's Vehicle Interface Program (VIP), which is provided by Hydroid and is standard across the REMUS AUV line. The VIP software allows users to perform quality control checks, export data from a previous mission and program the AUV for future deployments. The software runs on a waterproof, ruggedized laptop, allowing it to be moved around the support vessel and not be damaged in severe weather.

A suite of navigation tools, both onboard ABYSS and its support vessel, allow the AUV to safely operate at depth. The AUV's on-board Kearfott T-24 Inertial Navigation System (INS) and Teledyne RDI 300kHz ADCP/DVL are the backbone of its navigation suite. ABYSS can also receive additional support during its mission from a Long Baseline (LBL)



positioning system, which enables it to occasionally fix its exact position while submerged. Finally, the AUV's standard loadout includes an Imagenex 852 forward-looking Echo Sounder for detecting unexpected obstacles and a Paroscientific 8B7000 pressure sensor, which helps the vehicle maintain a consistent depth.

GEOMAR has used ABYSS to study seafloor volcanism around the world since its first cruise in 2009; so far, the vehicle has been used on scientific expeditions to the Greenland continental slope, the Southern Pacific, the Central Indian Ridge and the south Atlantic. Currently, the AUV is being used to survey previously unexplored hydrothermal vent sites in the Atlantic south of 10°S, with the aim of testing a model proposed by Prof. Devey for the relation of hydrothermalism and volcanism. This cruise is a continuation of previous work by GEOMAR studying the Mid-Atlantic Ridge, and will focus on the section between 13° and 33°S.

"Data from our previous expeditions suggests that hydrothermal activity is nearly constant on marked within-axis volcanic highs, but relatively rare at deeper parts of the axis," said Prof Devey. "Since the individual seafloor volcanoes in the deeper parts of the ridges in this region likely have a timescale of activity on the order of thousands of years, we're using geography as a proxy for time on this cruise. Instead of monitoring a single area of the ridge for an eruption to study, we're using the long dive times ABYSS makes possible to cover roughly 100 km every 36 hours. At that rate, we expect to encounter and examine nearly 2,000 volcanoes during the expedition, and, using our conservative eruption rate estimates, at least two of those will have erupted in the last year. Data from these recent eruptions will be critical to testing our model."

In addition to the AUV's applications in seafloor volcano research, ABYSS has also been used by GEOMAR for numerous other projects, including deep sea mineral exploration.

Unmanned Su

Locked and Loaded for Hydrographic Missions

In recent years, the proliferation of unmanned surface vessels deployed for hydrographic missions has mushroomed as the collaborative effects of propulsion, software and sensor technologies has cumulatively made these vessels, large and small, more capable for a multitude of missions. In this edition, and on the heels of the Ocean Business exhibition last month in Southampton, Marine Technology Reporter examines recent developments.

The Sonobot

The Sonobot from Evologics, a Berlin, Germany-based manufacturer of underwater communication and positioning systems, was on hand recently at the Ocean Business 2013 exhibition in Southampton, U.K. to demonstrate its updated Sonobot Autonomous Hydrographic Survey Vehicle.

Sonobot was developed to provide surveyors, service providers and researchers with a smart lightweight solution for hydrographic surveys and other applications in harbors and inland waters, with the design objectives being usability, robustness and versatility, paired with high-performance of the onboard sensors.

"As geological mapping of the seafloor in near shore or shallow water areas presents technological challenges due to the dynamics of the environment, high volume of data collected, and the limitations of operating in very shallow water, a remotely operated or autonomous seafloor mapping USV is a great solution for the problems of shallow water settings," said Francisco Bustamante, Senior Operations Manager, EvoLogics. "The main idea behind EvoLogics Sonobot was to present a small, simple and usable platform for planning and executing a hydrographic survey that can deliver accurate geo-referenced bathymetric measurements and high-quality imagery with minimum transport, launch and recovery efforts."

The concept of SONOBOT is to offer the end user a modular system with several configuration options and deliver a ready-to-use vehicle with all the onboard equipment installed and ready for immediate action.

Specifically for the SONOBOT, EvoLogics used the patented S2C broadband communication technology to build an advanced single-beam echo sounder, capable of delivering precise and accurate depth measurements even in very shallow waters. The side scan sonar, a highly accurate DGPS system and other equipment options were preselected among commercial off-the-shelf products to best fit the SONOBOT

The Sonobot

rface Vessels

platform and offer the user the best configuration for his particular requirements.

A survey USV must be convenient for day-to-day use by survey service providers, so simplicity to launch, operate and recover were recognized as essential features of the vehicle. Therefore, the SONOBOT was constructed of lightweight materials and was designed to be assembled without any tools or special skills. Larger payload capacity was given up for better transportability, so the SONOBOT system fits into a car trunk and does not require a bulky trailer or container. Designed as a turnkey solution, the Sonobot delivers precise and accurate bathymetry data in autonomous mode.

As anyone in the field knows, there exists no single solution for every hydrography scenario, and Sonobot does have its limitations. "There are compromises to be made in terms of the size of the equipment and its autonomy, or in terms of how many parameters can be measured at the same time versus the operating time," said Bustamante. "One of the biggest limitations still is when operating in unknown areas, as there is always the possibility that the vehicle will have to be rescued if there are trees around, for example. We minimize the chances of this happening by adding sensors and the option to monitor the operation in real time even with video streams."

While Sonobot is indeed an important system for EvoLogics, the company has a judicious investment plan to help it further penetrate this emerging market. "EvoLogics is investing in the development of modular platforms that can be deployed flexibly in different scenarios to collect a wide range of sensor data," said Bustamante. "Our focus is on a segment that needs to operate the vehicle quickly without big logistical needs. Therefore our vehicles have a relative small size, but without compromising stability. At the same time, we aim at ease of use by having components that can be assembled easily on the field without needing tools. In addition, we are looking at

Case Study

Sonobot Goes to Work

A growing metropolis, Berlin has an arsenal of big building projects, with the 2.2 km underground extension of Berlin metro in the city center an example. The construction works put the surrounding buildings and infrastructure at risk, moreover, as the line is to go underneath the river Spree, a potential flood at the site increases the risk levels and requires regular assessment. **To enable early detection of a potential threat, it was important to perform geological mapping of the initial conditions of the river bottom, and proceed with regular monitoring missions to track the changes that might occur during the construction period.** Hydrographic survey operations at the construction site were carried out with the EvoLogics Sonobot - a light unmanned surface vehicle for bathymetry and seafloor imaging in harbors and inland waters. Equipped with an accurate DGPS with RTK, it provided positioning data with centimeter accuracy. The Sonobot's single-beam echo sounder, based on EvoLogics patented S2C broadband communication technology, delivered accurate depth measurements even in shallow waters at the metro line's construction site. Sonobot offered the commissioned service provider the benefits of conducting fully-automated survey missions. It is equipped with an autopilot for waypoint-based navigation, so a once established survey grid can be repeated as often as necessary for regular monitoring of the river bottom.

Due to its flexibility and compact size, the Sonobot was chosen for the mission as a clear advantage over a survey boat. Its transportability, fast setup time and low maintenance proved valuable due to the structural and technological particularities of the construction site to be monitored.

Sonobot Key Features

- Differential GPS for high-accuracy cartography (GPS, GLONASS and Galileo)
- Side-scan sonar option
- Integrated camera for operation in remote locations and surveillance
- Fast access to points of interest, accurate maneuvers and efficient area scanning with precisely controllable hydro jet thrusters
- Batteries for more than 10 hours of operation (at optimum operation speed)
- Software for field operation and data processing with visual geo referenced representation
- Autonomous and radio controlled operation modes
- Wi-Fi communication (GPRS/UMTS)
- On-board data logging, wireless transmission on demand
- Carbon fiber floaters, corrosion-free materials, resistant to seawater and industrial waste water
- Can be handled by a single person

alternatives in terms of autonomous navigation, in particular collision avoidance to reduce the amount of supervision that is necessary for these vehicles and increase the ability to react to different situations."

While there are many drivers propelling the use of USVs in this sector, Bustamante said that resource monitoring and management is a big issue today. "Therefore we have continuous requests for collection of data for water reservoirs, industrial process residues an waterways, amongst others. A periodical collection of data makes it easier to identify trends and outliers. By using autonomous vessels that automate a big part of this activity, the results become more reliable. Additionally, many of these surveys happen in areas that are not necessarily accessible or safe. In this case it is better to use an autonomous vehicle than to risk somebody's life."

The "Newcomer"

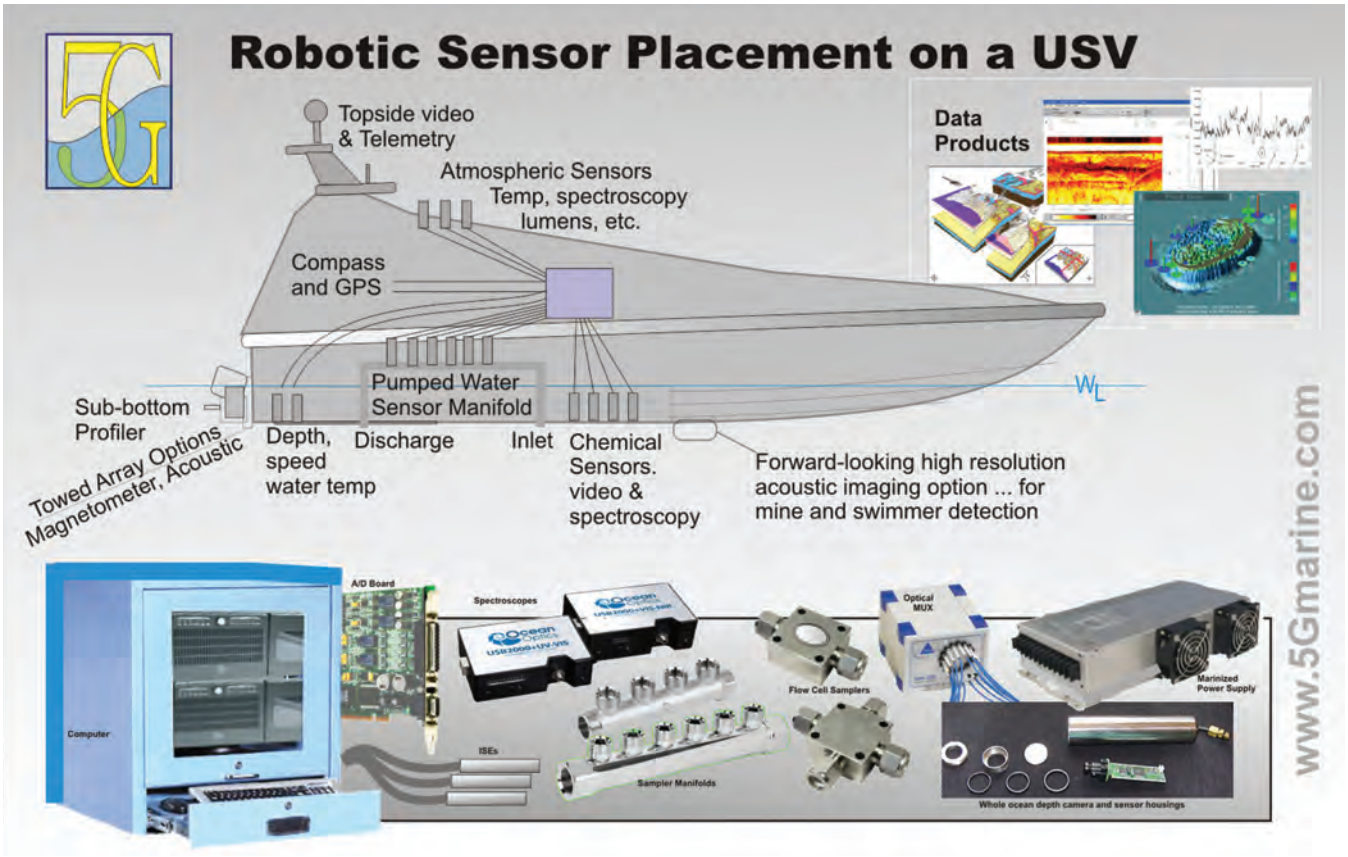
It would certainly not be accurate to call Robert J. Murphy – who some consider the father of modern unmanned surface vessels – a "newcomer," it is fair to label his latest endeavor, a link-up with an Abu Dhabi based company to co-develop, manufacture, market and sell a new family of USVs, is indeed in its infancy.

Marine Technology Reporter was in Abu Dhabi, UAE, in January 2013 specifically to meet with Murphy and his team, which at the time was working to and through partner Al Seer Marine on the project to unveil its new Unmanned Surface Vessel family at the International Defense Exhibition and Conference (IDEX) in Abu Dhabi mid-February 2013. The "family" includes:

- Sea Serpent, the small 3-m "jet ski" version;
- Boomeranger, the larger 11-m RIB; and
- Eclipse, the top-of-class 11-m monohull.

Personally, Murphy is certainly no stranger to the world of autonomous robotic marine vehicles, having worked in the field for more than a quarter of a century, dating to the mid-1980s. But the latest turn for Murphy and his 5G International crew is perhaps the most intriguing in the link-up with Al Seer Marine. While the family of USVs is primarily targeted to the growing demand for offshore security missions, it is in effect an agnostic unmanned marine platform suited to most any

The Newcomer The 5G International team (Above: L to R: Keith Henderson, Mike Peters, Robert Murphy, Aditya Nawab) & Al Seer Marine in Abu Dhabi have debuted a new family of USVs.Below is the proposed scientfic lab proposed configuration.



mission, including hydrography.

The partnership between Murphy's 5G International and Abu Dhabi-based Al Seer Marine is not unlike many other budding business relationships, a matter of coincidence, timing and opportunity. For Murphy it is a chance to see his lifelong ambition come to life again on the water, with a motivated partner that has the financial and technical wherewithal. "They have a real need to protect vital coastal assets here; these unmanned surface vessels are now coming into their own, finally," said Murphy.

In Al Seer Marine Murphy's 5G has a partner with broad ambitions to not simply produce a prototype for display, but with the aim to develop, design and mass produce large number of USVs to serve local military and globally security needs. "Our primary business is super yacht management, operations, repair and refit," said Russel Bartlett, Operations Manager, Al Seer Marine. "It is our core business and always has been."

Making the leap from Superyacht specialist to USV manufacturer might seem a large chasm to bridge, but not in the United Arab Emirates, where business is booming on many fronts and there is a palpable push for growth and diversity across many industries, as the government invites and inspires innovation with an eye towards the future when one day energy production is not the primary driver of the country's economy.

Al Seer Marine is a small local company with an enviable core of talent and technical expertise, and some big ambitions. "About seven years ago we were approached to do a joint venture with a company for the exact same style of project and vessel; and it never went anywhere." Fast forward to the Spring of 2012, when Bartlett received a call from top management to essentially ask "can we do it;" meaning could the company as currently situated design, build and deliver a USV to serve the home military market.

"I told them that technically we can design and build them, but we couldn't do the integration and telemetry," Bartlett said. "So he said 'alright, find me a company who can.'" Enter 5G.

"We did our research and came up with 5G Marine, based on their history building unmanned vessels," Bartlett said. And in keeping with trends today in the UAE, when things start to move, they tend to evolve quickly. What started in the summer of 2012 as an eight-month contract to design and deliver one boat, has been recently extended to a 14-month contract to design and deliver three boats. But to be perfectly clear, this is not a long-term development plan. From Day one, the goal

was to design, build and deliver a vessel that was "100% ready to go, where we could actually sell the boats to a customer," said Bartlett.

In the budding relationship between Al Seer Marine and 5G International, the initial target for the vessel was the UAE military, but as the project has evolved and markets explored, the collective believe the potential outside of military circles is much larger in potential. Focusing first on the UAE military, however, has helped to create an end product that is attractive to both sectors. "First and foremost, it has to be off-the-shelf, designed and built in the UAE," said Bartlett. In part this harkens back to the government's desire to inspire and develop home-grown technology and industry.

"We are putting together a world-class project, [and there are other competitors in the world] but not in this country," said Bartlett. "There are of course competitors outside of the UAE, but we've got a better product, and we certainly have a better price."

Today the fleet of USVs centers on three vessels, from the Sea Serpent, a small 3-m "jet ski" version; to the Boomeranger, the larger 11-m RIB; and the Eclipse, the top-of-class 11-m monohull.

An outstanding feature of the top model, the 11-m Eclipse monohull, is a proprietary hybrid propulsion system. Powered by twin Fiat N67500 engines with a light commercial rating of just over 500 hp driving Rolls-Royce jets through ZF gears, the USV sports a top speed excess of 60 knots. But it is when the vessel slows down that it truly shows its value.

Featuring a pair of 13kW electric motors, the proprietary hybrid propulsion system gives the USV the ability to loiter for extended lengths of time, an intelligent system that allows the user, for example, to use only one jet at a time to hold station, effectively extending battery life and subsequently loiter time by eight to 10 hours.

"A lot of the hybrid systems have been developed for recreational use to give you electric power out of the marina. But we are obviously looking for something that will provide hundreds of thousands of hours of reliable use," said Keith Henderson, Director, 5G Marine Systems LLC, and the man that Murphy credits with identifying and bringing together the suppliers and components in quick, seamless order. "The system is robust, with only minimal moving parts and with service after 20,000 hours at sea before anything has to be replaced."

The Fiat engines were selected because of their high power to weight ratio, in part, and the fact that they have been proven to be a successful performance power plant, particularly in the international race sector. The Rolls-Royce (KaMeWa) jets were a natural for Henderson, as he points out Rolls-Royce has its own hydrodynamic test cell, helping to make their units highly efficient. The team submitted the hull design to Rolls-Royce, which in turn was able to provide speed prediction based on the engines specified as well as the gear ratio matched each boat's waterjet. Henderson was also quick to point out the value of the ZF reversing gearbox in the autonomous environment. "By using a reversing gearbox, it not only changes the engine speed to the ideal speed for the waterjet, but also gives us the reversing capability, which is important if the waterjet gets clogged, you can back-flush it to free the obstruction. When you're operating remotely it is a very important feature."

"One of the key advantages in using the hybrid is first, you get a longer life in the sea," said Aditya Nawab, Director, M.S. Robotics, Robosys Automation and Robotics Private Ltd., who brings robotics and computer code writing expertise to the team. "Second, in mission specific times when you want the USV to loiter, the battery management system switches between the engines and the hybrid motors (to ensure maximum deployment time each mission. In addition, if on a mission it actually runs out of fuel and runs out of batteries, it can actually home itself to recharge the batteries."

Automated Marine Laboratory

The plan to use the USV in the scientific and commercial markets is centered on the Automated Marine Laboratory concept, an expandable, easy to operate system based on anticipated needs for marine biological and geophysical investigation.

While the primary mission in its hook-up with Al Seer was military, 5G has interest for an USV combined with the ability to deploy computerized environmental sensors and analytical systems with both the capacity for remote, hands-on and automatic, software-controlled, data collection. The core problem for which the initial systems are to be used is investigating factors relating to harmful algae blooms, but the base system with slight modification is suitable for a wide range of geological, biological, chemical and radiological analyses.

Today 5G is collaborating with marine scientists who have broad objectives for the types and quantity of data in which they are interested. The desired data includes, but is not limited to, the collection of sensor data and physical samples from the atmosphere, the water's surface, subsurface (the water column), the bottom and the sub-bottom. Objectives for this proprietary system include the capability for supplementing automated analytical work with onboard work performed by lower-level technical personnel where technicians may use the same equipment.

This robotic laboratory system is a PC-based system for marine investigation of the atmosphere, water column and sub bottom samples where the collected data is time and GPS stamped and then logged for post-acquisition collection and/or transmitted electronically.

As described, the system will perform the following basic functions (manned, remotely or entirely unmanned):

- Through hull pump system to sensor manifold
- In-line electrode and spectroscopic analysis
- In-line digital microscopy

- Topside and underwater video
- Sub bottom high resolution imaging
- Topside atmospheric measures
- Provide multipurpose tools for lab technicians doing simultaneous,onboard analyses
- Line of sight broadband data transmission

The system is designed to accommodate substantially greater complexity than the base system, as, for example it is contemplated that the investigators may eventually want systems like a towed eel with dozens of sensors.

The laboratory system as specified includes a capable sub bottom imaging system. It is a plug and play system, with its own processing. The included device has an over the side mount and can be interfaced with the notebook computer or to either of the rack mounts. The data it produces is industry standard SEG-Y format but other formats are included with the third party software. Other remote sensing devices may be desirable and can be added, such as side scan sonar, magnetometer and radiometer.

Deep Ocean's H-1750

Deep Ocean Engineering (DOE) based in San Jose, California, is certainly no stranger to the subsea community, starting as a small engineering company in 1982 and delivering to date more than 500 ROV systems worldwide. While the DOE name is perhaps most immediately and closely associated with ROVs, it has considerable experience in the design and delivery of sophisticated unmanned surface vessels, including the new RC Survey Boat H-1750, a catamaran which was on display at Ocean Business in Southampton, a unique USV that helped to spark a number of interesting conversations over the course of the three day event.

According to the company, the H-1750 offers a number of logistics advantages, but topping the list is the fact that it is lightweight, designed to be easily shippable and assembled in minutes by one person. (In fact, the DOE is quick to point out that its size makes it easily shippable as oversized checked baggage for plane flights.)

The vessel can be launched from land via a shoreline or launched off a pier, dock, boat etc, and it fits fully assembled

Deep Ocean's new RC Survey Boat H-1750, a lightweight catamaran, is designed to be easily shippable and assembled in minutes by one person.

H-1750 Main Particulars

Length ..... 1750mm (5.74 ft)
Width: ..... 1000mm (3.28 ft)
Type .....Unmanned Surface Vessel
Propulsion..... 2 DC outdrives
Speed, top ..... 5 m/s (11 mpg)
Speed, survey..... 1-2 m/s (2.2-4.5 mph)
Length 1.75m
Width..... 1m
Range..... 2km
Battery type Li
Battery Life
1 hour @ top speed
4 hours @ survey speed
Payload ..... 44 lbs.
Weight..... 99 lbs.
Remote frequency.....2.4 GHz

Applications

- Water quality
- Discharge
- HD Video Inspection
- Lightweight
- Portable
- Bathymetry
- Port security
- 2km Range
- Easily integrated with 3rd party options

Standards

- RC Control/GPS based autonomous mode switchable
- On-board data logging and real time telemetry
- On-line line-following QC and control
- Real time HD video forward looking camera
- On-site quick assembly and disassembly by one person

Options

- Rigil LIDAR integration
- ADCP integration
- Extra battery packs
- Side-Scan sonar integration
- Scaled up models
- Sub bottom profiler inegration
- Multibeam echo-sounder, integrated with motion sensor and dual GPS Heading
- Automated multibeam sonar deployment with RC control
- Automated SVP cast with remote controlled winch

in the back of a pickup truck as well.

While the H-1750 is customizable pending a specific client or mission requirements, the vessel measures 5.74 x 3.28 ft. but weighs just 99 pounds, with a 44-pound payload, designed for simple launch and recovery by two people. Its top speed is 11 mph with a battery run time of one hour at top speed. Survey speed is 2.2 to 4.5 mph with a battery run time of four hours.

As mentioned previously, while there is no single solution for most efficient and effective work using USVs, as it is highly dependent upon a number of factors, including weather and locale, to name two, it too has its limitations. The H-1750 is designed for protected waters (bays, estuaries, rivers, lakes, etc.) and not made for the surf zone or high seas. Though it is worthy to note that DOE is in the process of creating larger (and smaller) versions of the H-1750 so there are other options for any required work in high seas. In fact, this investment is central to the DOE mission, as it is beginning to market a suite of USVs ranging from 0.8m up to 2.5m+ saleable versions of its I-1650 and our H-1750.

For the moment, ocean, river, lake, estuary and bay surveys worldwide are all easily conducted utilizing the H1750, and with its 2km communicable range, the vessel encompasses an inherent method to cover a multitude of disciplines, from port security, inspection, bathymetry, water quality and any other sensor under the 100kg payload a user wants to attach to the vehicle. In fact, according to DOE, it's the tumultuous surf zone that physically is the only area that seems limited for the use of USVs in this regard, and the company is currently working on a solution.

The Hybrid

Liquid Robotics Debuts Wave Glider SV3

Known well in the industry for it's innovative approach to gathering and disseminating information from the world's waterways, Liquid Robotics has further advanced its cause with the introduction last month of the Wave Glider SV3, what is touted by the developer as the world's first hybrid wave and solar propelled unmanned ocean robot.

According to Liquid Robotics, Wave Glider SV3 incorporates the latest advancements in energy harvesting technology, providing the ability to use both wave and solar energy for forward propulsion, innovations that will enable users to explore portions of the world's oceans 24/7, in conditions that previously were too challenging or costly.

The ocean data solution proposed by Liquid Robotics' new integrated platform is designed to provide ocean data collection and processing at the point of collection with real time delivery of information to shore.

Essentially, Wave Glider SV3 is envisioned by its developer to provide more information, more efficiently and cost-effectively.

"SV3 is a tremendous step forward in terms of what we can accomplish in the ocean and gives customers a competitive advantage to capture data in the most challenging ocean conditions," said Bill Vass, CEO, Liquid Robotics. "By providing the ability to deploy Wave Gliders across most of the planet and deliver ocean data in a new and cost-effective way, we are enabling broad access to affordable ocean exploration." The Wave Glider SV3 leverages the basic design principle of the Wave Glider SV2 platform, which was introduced in 2009, and has since traveled more than 300,000 nautical miles globally.

Wave Glider Main Particulars

Vehicle config
Sub and Float joined by 4m (13 ft.) tether
Dimensions.....Float: 114 x 26 in.
.....Sub: 8 x 75 in.
.....Wings: 56 in.
Weight.....270 lb.
Water speed .....SS1: 1.0 knots
.....SS4: 1.7 knots
Depth rating..... Continuous wash and spray
..... Brief submergence to 6.5 ft.
Shipping.....Air freight compatible
.....Ships in two wooden crates (530 lb. total)
Power
Propulsion.....Mechanical conversion of
.....wave energy into forward thrust
Auxiliary thruster
Battery .....980 Wh rechargeable Li-Ion standard
..... Increments (980 Wh) up to 7.84 kWh
Solar power..... 170W peak
Communications ..... Iridium 9602
RUDICS (option)
Cellular (option)
802.11g WiFi
Max. payload weight .....100 lb.
Max. payload volume .....3.3 cu. mft.
Peak payload power..... 400W

ASV C-Stat Mobile Buoy USV System

The C-Stat from ASV offers a new capability in the dynamic positioning of equipment at sea for extended durations without the need of ships or seabed anchoring. The C-Stat uses a state-of-the-art autonomous controller and station keeping system integrated with the company's C-Nav DGNSS system and a novel diesel-electric hybrid power system. The hull has been optimized for ocean performance and ease of launch and recovery.

The C-Stat embodies many of the advantages found in advanced unmanned systems, in that they can provide persistent, designed to collect and disseminate data at a fraction of the cost of manned operations. In the case of the C-Stat, it is designed for continuous operations, pending environment and mission, of between four and 30 days.

The mobile buoy type design of the C-Stat is designed to provide excellent stability in heavy seas, with the dual propulsion system for redundancy. Station keeping capability within less than 10m has been demonstrated, as well as deep ocean acoustic data transmission operations. Command and control via the ASView software system allows for both interactive piloting and preprogrammed activity during missions. Depending on configuration, the C-Stat Series of ASVs can maintain steerage at 0.5 to 5 knots.

The robust diesel-electric propulsion system is designed not only for redundancy and cost-efficient operation, but to carry a varied and heavier payload, vastly expanding its scope of operation.

Flexible payload options include echo sounders, acoustic modem/positioning, ADCPs, magnetometers, CDT, weather station, environmental sensors, passive acoustic monitoring and security related sensor systems, including video, camera and infrared systems.

C-Stat Specifications

Hull length	2.5m
Breadth	1.5m
Propulsion	Diesel-electric
Duration	4 - 30 days, continuous
Surface Positioning	C-Nav DGNSS
Comms	UHF surface comms
	suitable for up to 7+ miles range

Additional technological advancements introduced in the Wave Glider SV3 are hpc@sea (high performance computing), adaptable power and storage providing support for sensors and the introduction of a new, adaptable operating system designed for intelligent autonomy for fleet operations. "Riding the advancements in consumer electronics, smart phone, tablet computing and a new generation of extremely capable processors, we are now able to provide processing onboard - actually as powerful as a supercomputer from not long ago," said Roger Hine, CTO and inventor of the Wave Glider. "With that computational power and the ability to tirelessly swim across vast oceans, the Wave Glider SV3 represents a big step forward in the state-of-the-art of unmanned monitoring and exploration."

SV3: Hybrid Propulsion. Adaptable Power. Intelligent Autonomy.

- Hybrid Propulsion System: Wave-powered and solar energy storage with an auxiliary, vectored thruster for extra speed to address high currents, doldrums or to quickly accommodate changes in mission operations.
- Adaptable Modular Power System: Large, flexible power system design able to accommodate the most "power hungry" payloads (e.g., sonar, bathymetry, image analysis) and multiple sensors. Allows generation of power from other sources (i.e. wave to electricity generators, fuel cells).
- Modular Architecture: Provides maximum flexibility, ease of integration for fast deployment: pre-integrated for plug-and-play and reconfiguration.
- Regulus: Advanced Vehicle Operating System for intelligent autonomy to enable coordinated fleet operations. Designed around an open, cloud-based architecture to provide high availability, massive scalability and secure multi-tenancy. Includes the ability to dynamically download software changes or new applications to reconfigure a mission at sea.
- hpc@sea: Powerful on-board computer capabilities for local processing (at sea) to enable faster decision making and transmitting just the answer instead of raw data.
- Built-in Scalability: Across power system, sensors, computing, applications and geographic range.

Ocean Business Sold

Ocean Business 2013, held April 9-11, 2013 in Southampton, U.K., recently concluded another successful run, three days packed with conferences, exhibition and on-water demonstrations. Held every two years since 2007 at the National Oceanography Center, Southampton, Ocean Business has quickly emerged as one of the leading subsea events, drawing an estimated 300 exhibitors and 4,000 attendees.

While there were plenty of new technology and business deals announced during the course of the exhibition, the biggest news came from the show organizer itself, which announced on day two that it – Intelligent Exhibitions Ltd. – had been sold to Diversified Business Communications U.K. The acquisition also includes Offshore Survey and Ocean Careers, which will continue to be organized by the Intelligent Exhibitions team, according to the press release. The deal, which was consummated for an undisclosed sum, also includes LIDAR International and LIDAR Europe, which will be transferred to Diversified's offices in Portland, Maine. The ensuing pages highlights much of the news eminating from Southampton last month.

Partrac, Rockland Scientific Announce Partnership

Partrac and Rockland Scientific announced a strategic partnership to provide turbulence measurement solutions for the U.K. and European tidal energy industry. Rockland Scientific, based in Victoria, British Columbia, Canada, specializes in the design and manufacture of turbulence measurement instrumentation while Glasgow-based consultants, Partrac, focus on marine data collection and processing at complex tidal energy sites. Partrac Director, Kevin Black, said "We are very pleased to add this unique capability to our suite of measurement services; we can offer to the commercial tidal energy sector multi- and single-point measurements across the blade span in both the flow and wake-field of a tidal energy device, as well as map the turbulence field spatially across prospective sites."

Fabian Wolk (left), Rockland Scientific EVP and Kevin Black, Technical Director at Partrac.

As a result of this partnership, Rockland and Partrac are the first to offer an integrated approach to gathering marine turbulence data throughout the life cycle of tidal energy projects. Such information is useful to te optimization of turbine design, site selection, turbine layout assessment and to an enhanced understanding of environmental impact. Partrac has begun offering this service to U.K. and European customers as of March 2013.

www.rocklandscientific.com

Ashtead Increases Sonardyne 6G Rental Pool

Ashtead Technology purchased £1.3 million of Sonardyne 6G acoustic positioning equipment. This latest acquisition is Ashtead's second significant order for 6G in the last 12 months, further strengthening the company's fleet of Compatt 6 transponders, including various sound velocity, digiquartz and inclinometer sensors, GyroCompatts, RovNav 6 LBL transceivers and both omni and directional Wideband Sub Mini transponders. The fleet is available to rent globally

(Credit: Sonardyne)

Pictured on the opening day of Ocean Business 2013: Ross MacLeod (Ashtead Technology) and Barry Cairns (Sonardyne International).

(Credit: Teledyne)

David Currie, MD of Seatronics (left) and Martyn Grange, sales manager of Teledyne TSS confirm the sale at Ocean Business.

from Ashtead Technology's bases in Aberdeen, Houston and Singapore and through its agents in Stavanger, Perth and Abu Dhabi. Ashtead Technology also purchased Sonardyne's new back deck acoustic transponder test and configuration device, iWand.

ww.sonardyne.com

Seatronics Invests in Teledyne TSS Products

Seatronics Ltd. placed orders totaling £1.7 million with Teledyne TSS within the past three months. The purchases cover no fewer than 56 Meridian Surveyor gyrocompasses and four TSS 440 pipe and cable tracking systems. The Meridian Surveyor gyrocompass and the TSS 440s are developed and manufactured at the Teledyne TSS factory near Watford, U.K. They will be added to the Seatronics inventory of rental equipment in readiness for the forthcoming work season.

www.teledyne-tss.com

Geomatrix Buys Applied Acoustics' Energy Source

Director Tom Nicols of Geomatrix took delivery of his company's first CSP seismic energy source from Applied Acoustics at Ocean Business in Southampton. Geomatrix, based in Leighton Buzzard, UK, specialize in the sale and rental of an extensive range of land and marine geophysical products so the new energy source provides a welcome addition to its oceanographic equipment rental pool.

Applied Acoustics manufactures a variety of systems for sub-bottom profiling that extend in output from 50 to 12,000J. The 1200J unit selected by Geomatrix will operate with various Applied Acoustics' sound sources including the triple boomer plate, the S-Boom, and the new long-life Dura-Spark 240 in the future. Its flexibility means that just one power unit is

Tom Nicols of Geomatrix left, receiving his new seismic power supply, from Applied Acoustics' Gavin Willoughby.

available for high resolution and deep penetration geotechnical surveys in near shore or deeper water.

"We're very excited about being able to offer this versatile equipment with its high standards of performance and numerous safety features to our clients. It complements the marine data acquisition options we have available to geophysical engineers investigating seabed characteristics," said Tom Nicols, "and we fully expect it to become a key 'workhorse', supplying our customers with many of their seismic energy needs."

New Gyro Changeover System

Teledyne TSS launched a new gyrocompass changeover system that protects navigation equipment against the danger of a sudden loss of heading input. The new system can be connected to up to four gyrocompasses and has been designed to automatically switch its throughput to that of another gyro should the principal one fail. The system can also be used to enable the manual changeover of gyro throughput if required, and the manufacturer claims it is currently the only system on the market that is capable of covering every failure situation. The system consists of a rugged, bulkhead-mounted enclosure for the retransmission circuits and up to two separate display units that employ touch screen panels to provide the user interface. The availability of two displays enables rapid operator intervention at key locations on the vessel. The LED TFT panels show the condition and performance of all gyros in use and provide all of the operational controls in a clear

(Credit: Teledyne)

Teledyne TSS Gyro compass changeover system.

format to permit immediate interpretation of the alarm and equipment status. The status and alarm interface is designed to comply with DNV rules for nautical safety which specify that no single failure shall result in a loss of heading information to receiving devices. With 16 IEC 61162 serial data outputs, the new changeover system is particularly suitable for use with Teledyne TSS Meridian gyro compasses. It can also be used to undertake the changeover of any other makes of gyrocompass that use the same data output formats should they fail. It also has the option of enabling one channel to be reformatted if necessary.

www.teledyne-tss.com

Sonardyne Aids NOC

Sonardyne International Ltd.'s Ranger 2 USBL acoustic positioning system played a role in the recent discovery of the

Isis is deployed from the RSS James Cook, Ready for further exploration of the newly discovered vents.

(Credit: Sonardyne)

world's deepest known undersea volcanic vents by a team from the National Oceanography Center (NOC) in Southampton. The expedition used Ranger 2 to track the Remotely Operated Vehicle (ROV) Isis from the RRS James Cook, 5,000 meters beneath the surface as it recorded video and imagery whilst collecting samples from the newly discovered vents in the Cayman Trough. The expedition, funded by the Natural Environmental Research Council (NERC), saw the researchers, from NOC and the University of Southampton, return to a set of vents – in the Beebe Hydrothermal Vent Field – that they discovered during an expedition in 2010. At the time, these were believed to be the world's deepest. Geraint West, Head of NOC's National Marine Facilities, Sea Systems, which provides ships and submersibles to the U.K. marine science community on behalf of NERC, explained, "The science team and ROV crew came across a further set of vents located even deeper at 4,968 meters, or almost three miles beneath the ocean surface. NOC has used Sonardyne's positioning systems since the Isis ROV was first commissioned in 2003 and the Ranger 2 system is central to Isis' precise positioning system. This enabled the ROV to explore this latest discovery; using various sensors and samples, they were able to determine that these vents are among the hottest on the planet, blasting out water at around 401°C."

www.sonardyne.com

EvoLogics Showcase Latest Developments

EvoLogics extended its ranges of underwater acoustic modems (S2CR series) and combined positioning and communication devices (S2CR USBL series), with new products - the S2CR 42/65 and S2CR 42/65 USBL, high-speed devices with hemispherical beam patterns for transmissions in vertical, slant and horizontal channels. Both devices rely on the EvoLogics patented S2C (Sweep-Spread Carrier) broadband communication technology.

• The SiNAPS (S2C intelligent Navigation and Positioning Software) was designed to control the EvoLogics USBL (ultrashort baseline) underwater positioning systems and provides display features for tracking of multiple targets, supports interfacing with external instruments and offers advanced data management tools. After releasing the SiNAPS software in 2012, EvoLogics updated it to a newer version in March 2013.

• The S2C acoustic modem emulator

is EvoLogics' new tool for underwater network protocol developers and end-users of EvoLogics devices. A network of virtual underwater acoustic modems, configured and run on EvoLogics server, can be accessed remotely and provides framework for development and end-user training.

• The underwater acoustic modem emulator extends the EvoLogics developer solutions range that already includes the WiSE (White Line Science Edition) line of underwater acoustic modems with an embedded network protocol development platform, providing a flexible framework for designing new network protocols on real hardware.

www.evologics.de

Forum Subsea Rentals Adds iXBlue Systems

Forum Subsea Rentals made further investment in inertial navigation technology from supplier iXBlue. The equipment is due to be utilized for ROV positioning in survey and construction support applications on projects worldwide. The contract includes a quantity of ROVINS subsea inertial navigation systems as well as OCTANS gyrocompasses that are upgradable to full INS capability of the ROVINS.

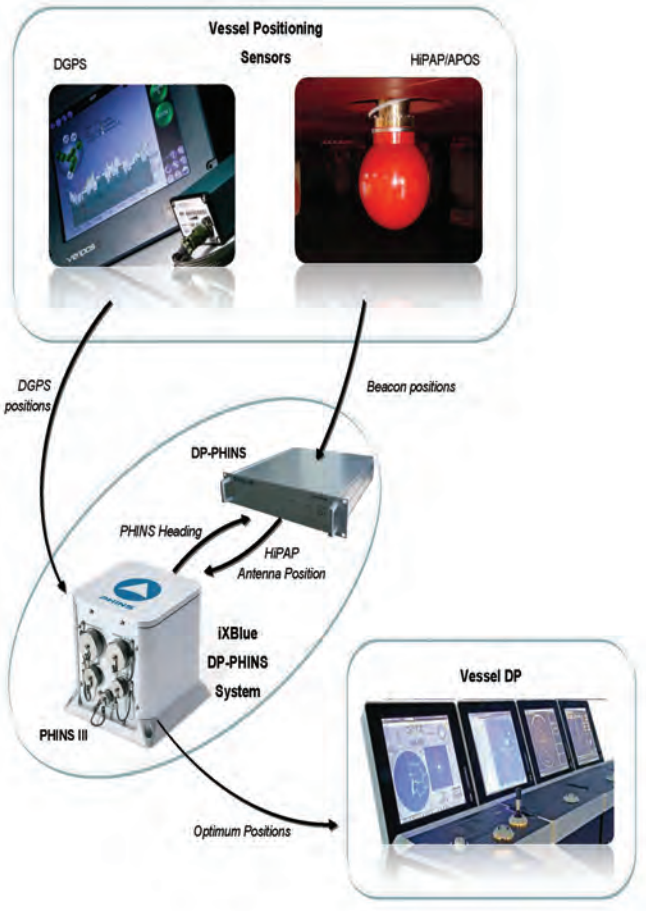
The positioning solution provided by ROVINS can be enhanced with the use of a Doppler Velocity Log which can be coupled directly to the INS or fitted elsewhere on the vehicle. In either case, for best performance, it is necessary to perform an alignment calibration procedure. This can be performed on site however users often prefer to have the sensors coupled and calibrated prior to mobilization to a project.

iXBlue engineers assisted Forum in the preparation and calibration of six ROVINS/DVL sets to be mobilized to a project in the Spring of 2013. A survey vessel was hired for a week during which the coupled systems were calibrated and a number of Forum Engineers were fully trained in the procedure by the iXBlue engineers.

Caption: (Credit: Forum Subsea Rentals)

DP-PHINS Adds to Acoustics

iXBlue expanded the functionality of its PHINS inertial navigation system (INS) to interface with third-party acoustic positioning equipment, providing INS-enhanced acoustic data input to marine dynamic positioning (DP) systems. DP-



(Credit: iXBlue)

PHINS can also take data from a range of additional sensors, some not normally associated with DP, such as Doppler velocity logs (DVL), for use in maintaining vessel position. Using INS with acoustics in this way produces positioning data that is smoother, more accurate and is updated at a higher rate. Consequently, station-keeping performance is significantly improved, vessels use less fuel, and wear and tear on the DP system components is reduced.

Kongsberg to Offer AUV Rentals

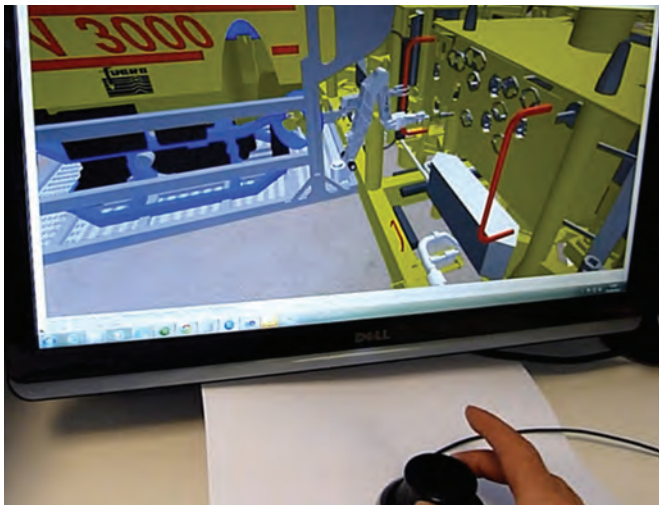
Kongsberg Maritime Ltd announcesd it will add a number of Autonomous Underwater Vehicles (AUV) to its rental pool during 2013/14. The addition of AUV capability will further enhance the existing portfolio of Kongsberg's rental equipment, which supports customers within the offshore oil and gas, environmental and renewable energy markets. Other leading Kongsberg products available via the rental service include acoustic positioning systems and transponders, multibeam echosounders and DP reference sensors.

www.km.kongsberg.com

Fugro Upgrades DeepWorks

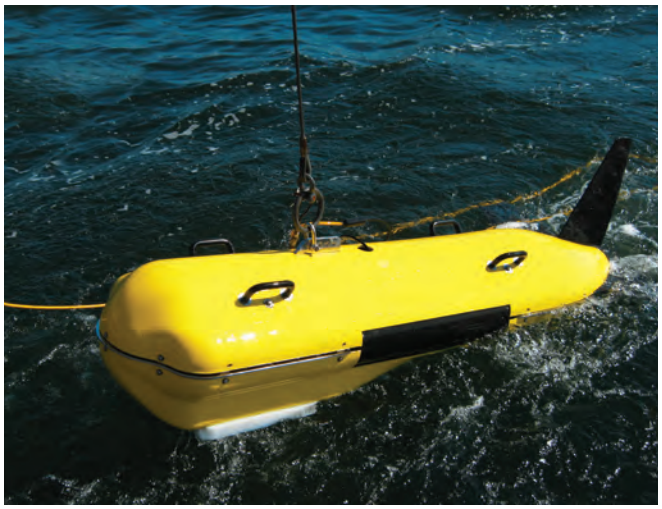
Fugro Subsea Services enhanced tooling capabilities on its DeepWorks simulators. Improvements have been made to ROV manipulator deployed tools to provide easier access verification as well as more realistic deployment behaviors.

In addition to the traditional approach using a Schilling T4 master arm, a new method has been introduced in DeepWorks Engineer to enable engineers who do not have specific ROV piloting skills or access to a master arm controller to precisely control manipulator tools. The tool tip is driven manually from a suitable input device such as a space navigator/3D mouse or automatically



(Credit: Furgo)

3D mouse control of manipulator tool simulation.



(Credit: Teledyne)

C3D on the water.

from a predefined set of instructions in a file. Manipulator joint positions follow the tool and are adjusted automatically. This engineering solution supports full collision detection and with user-configurable receptacle tolerances can be used for position feedback and to verify successful tool deployment.

Similar improvements have also been made on the DeepWorks ROV pilot simulator using powered tooling components. Using the master arm controller, pilots can lift tools out of a holster and deploy them into receptacles with realistic collision and dynamic response. Tolerances of receptacles can be changed to cater for the skill level and experience of trainees. Torque tool can turn a valve to its open or closed position and this can activate linear actuators or hydraulic rams.

These enhanced tooling capabilities are available with new orders for DeepWorks and as an upgrade to existing installations.

www.fugro.com

Teledyne Moves Portfolio to Odom

Teledyne Benthos and Teledyne Odom Hydrographic announced the transfer of the Benthos geophysical sonar portfolio, including the Chirp III Subbottom profiler, C3D interferometic sonar and SIS-1725 side-scan sonar to Odom Hydrographic. This realignment of products and technologies allows both organizations to better serve their primary markets and build upon their core competencies. The two business units will collaborate over the course of 2013 to establish manufacturing at Odom's facility in Baton Rouge, while maintaining product support to customers.

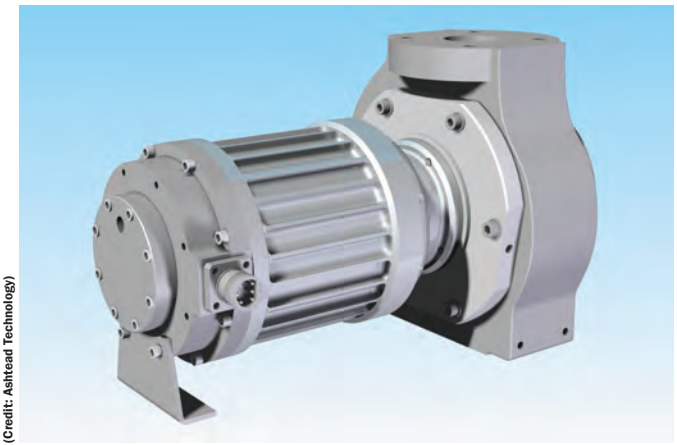
www.teledyne.com

Ashtead Technology Launches Electric Dredge

Ashtead Technology debuted what it calls the subsea market's smallest electric dredge pump. Targeted at the 2.5-3" dredge market and small electric ROVs, the pump can be customized to meet varying customer needs and onboard power supplies. The dredge motor is fitted with a six pin Burton plug and can be connected to different types of ROV electrical boxes through a custom power cable. With up and coming offshore field trials, the electric dredge pump will continue to be developed to ensure its long term sustainability and adaptability to evolving customer requirements. Options to be trialed include a skid mounted dredge and the incorporation of the dredge as a custom made system.

The pump will be available to rent exclusively from Ashtead Technology through an agreement with the manufacturer, Vortex International. Under its exclusive rental agreement with Vortex, Ashtead Technology also supplies a wide range of powerful dredge pumps, cutters, hoes and sampling tools.

Vortex electric dredge.



(Credit: Ashtead Technology)

Credit: Ohmex Instruments

Navigation, Tide and Weather Information via Twitter

Whereas the proliferation of social media has generally not had dramatic impact on the b2b community, particularly in the technical realm, an interesting new service from Ohmex Ltd. was a hot topic in the hallways in Southampton: Using Twitter to deliver near real time navigation, tide and weather information direct from sensors.

The original suggestion for a Twitter based service came from a Navigation Pilot working at a small port on the N.E. coast of England using tide and weather instruments made by Ohmex Ltd. On occasions the Pilot had to escort a vessel when the harbor office was closed and nobody could relay the tide and weather information to the vessel on its approach to harbor. The IT solution proposed was for a web based service with the Pilot using a mobile phone application to view the data, this suggestion did not allow for the poor mobile signal reception offshore. The proposed Twitter solution proved the best as it was available for both web based users and also SMS text message services over GSM, the 140 character message being easily understood and including basic information such as instrument location and data age.

The measurements are based around the Ohmex PortM8 instrument, parameters include tide height, water temperature, wind speed/direction, air temperature and barometric pressure. Calculated and derived parameters include significant

Credit: Ohmex Instruments

Twitter page showing PortM8 data.

wave height and wave frequency.

The information is traditionally provided by the Harbormaster's staff at a port, normally as a voice message using marine VHF radios in reply to a request. At some ports the live data is publically available through the authority's web site or in some rare cases the data is provided electronically over AIS.

Why Twitter?

Twitter is a real-time information network service that connects to the latest information on a specific topic the user finds interesting. At the heart of Twitter are small bursts of information called Tweets. Each Tweet is up to 140 characters long, brief but concise information packets. Every day, millions of people use Twitter to connect to information about their interests and find out what's happening in the world right now. Anyone can read, write and share messages of up to 140 characters on Twitter. These messages, or Tweets, are available to anyone (deemed as 'followers') interested in reading them, whether logged in or not.

In addition, there are some significant advantages to the medium, including:

- Gauge location information embedded in tweets
- UTC timestamp embedded in data tweets
- Last two days tweets available directly on-line
- User controlled tweet following and distribution
- Data Tweets available as direct SMS message.
- Data available by mobile web applications and clients.

The TweetM8 gauge is PortM8 instrument programmed to send an SMS text message over a simple GSM modem every 10 minutes. The PortM8 equipment is an autonomous low power integrated tide gauge and weather station that can be powered by a small low voltage power adaptor or by a solar panel and rechargeable battery arrangement.

The Tide Gauge element can be either a pressure transducer or a non-contact Radar sensor, the pressure transducer version has the benefit of also measuring water temperature while the radar senor has the benefit of non contact with the water level being measured The GSM modem is the preferred medium for communicating with the Twitter server, the modem's telephone number identifies it when connecting to Twitter without any further security checks. Depending on the carrier service there is normally a short number which quickly connects the modem direct to Twitter without the need for area codes. The PortM8 only requires a minimum (12vdc 100ma) power supply which is easily achieved with rechargeable batteries and a solar panel charging system.

www.ohmex.net

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March 15- November 8, 2013

Coming this spring!

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

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