Ocean News & Technology

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iXBlue's Inertial Navigation Systems
High-end at High-latitudes

Feature Story - Page 10

A Worldwide Survey of Recent Ocean Observatory Activities: 2015 Update

Editorial Focus- Page 18

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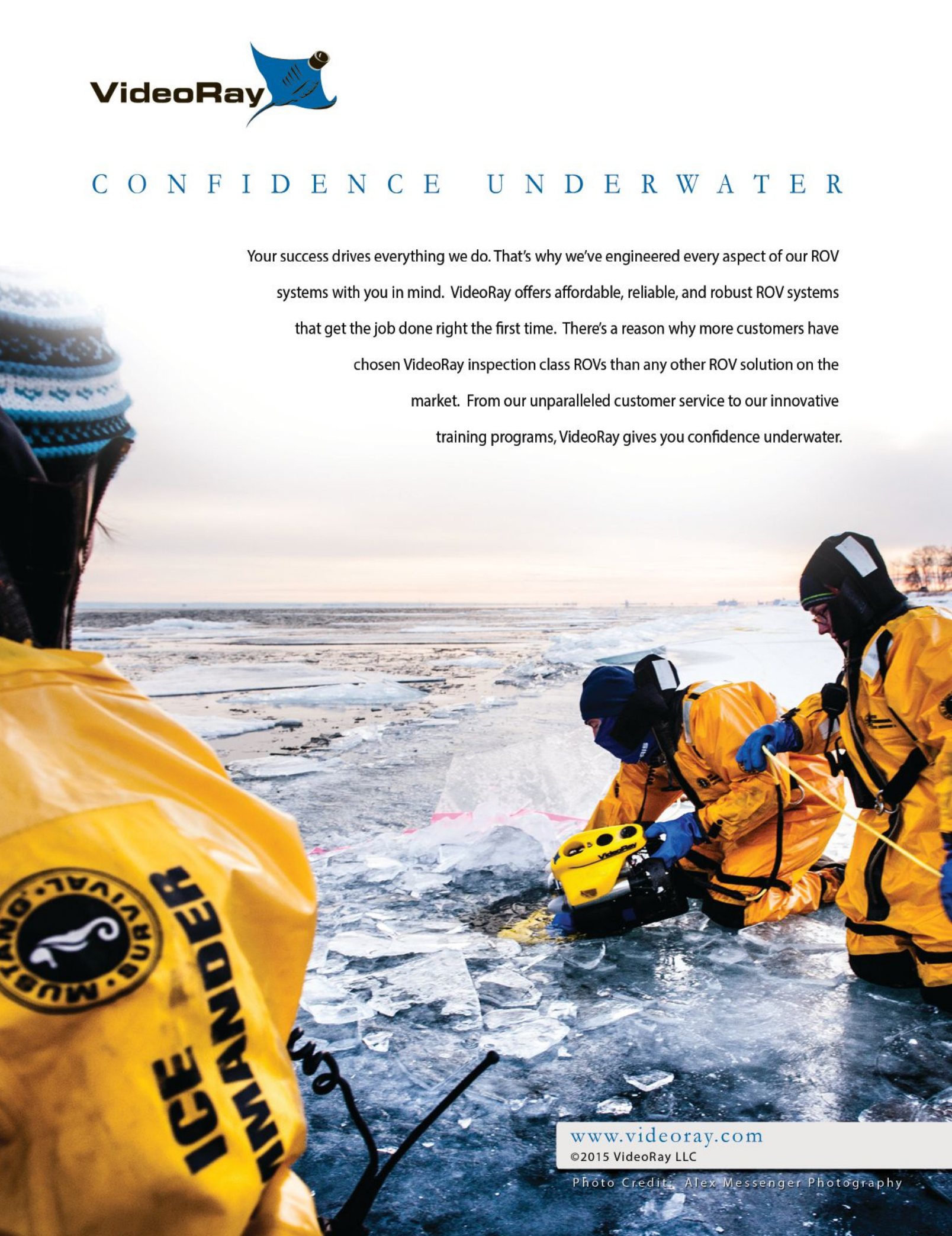

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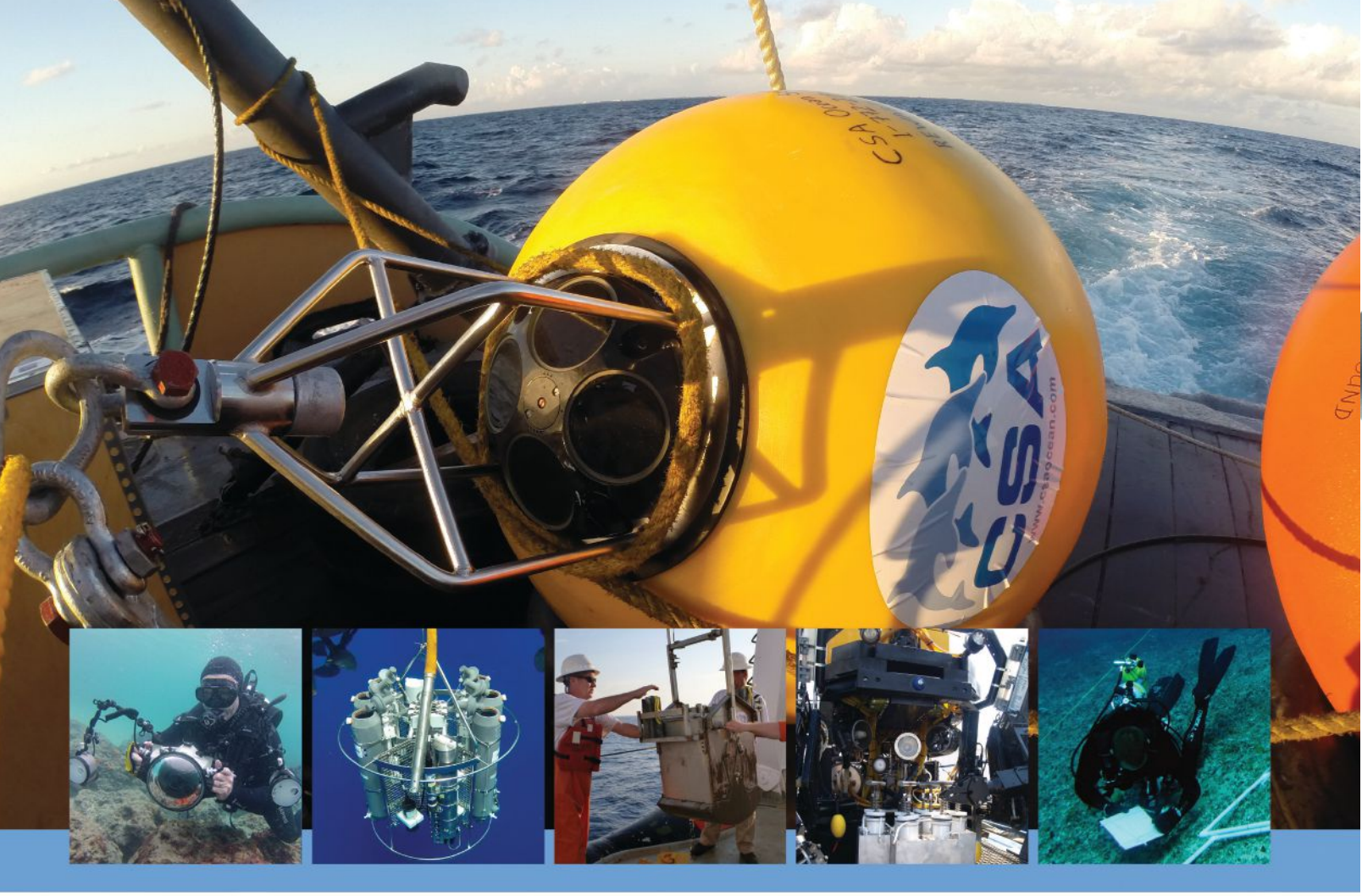

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in this issue

Ocean Industry

Offshore Industry

Feature Story

Editorial Focus

Company Spotlight

Departments

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Workers performing maintenance of an ocean buoy at sea with a U.S. Coast Guard ship in the background. Photo credit: NOAA www.nosc.noaa.gov

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in the next issue

Editorial Focus
- Offshore Communications
- Subsea Inspection, Monitoring, Repair, Maintenance

Product Focus
- Acoustic Modems, Releases & Transponders;
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Ocean Observing Trends

By: Donna M. Kocak, HARRIS Corporation, MTS President-Elect

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Samantha Burn
subscriptions@ocean-news.com

ADVERTISING SALES

SR. V.P./ SALES & MARKETING
MJ McDuffee
Tel: +1 (772) 617 6836
Fax: +1 (772) 221 7715
mj@tscpublishing.com

NORTH AMERICAN AD SALES:
Lisa Chilik
Tel: +1 (574) 261 4215
Fax: +1 (574) 255 1006
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INTERNATIONAL AD SALES:
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Mob: +44 (0) 777 6017 564
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There are a number of trends evident in ocean observing today that are reported in this year's annual update. As ocean observing systems continue to mature, we see a variety of technologies and methods used collectively to provide more integrated, effective and reliable systems capable of reporting not just over regional scales but also over global scales, which is ultimately needed for understanding our planet's ocean systems and processes. Shore stations, coastal radars, submerged moorings, moored buoys, cabled observatories, remotely operated vehicles, mobile autonomous platforms, ships, vessels of opportunity, satellites and even marine mammals are all used to support sensors that collect valuable data.

Alliances are essential, both domestic and abroad, to share information across oceans or boundaries as custodians; or to transfer technologies, share lessons learned and provide training in mentor-protégé relationships. The European Union's AtlantOS, e.g., is comprised of 63 partners from 18 countries whose charter is to provide in situ observing of the entire Atlantic Ocean in support of research, innovation and services. The aspiration is to efficiently network all of the observing systems together to share information on a global scale.

While on the topic of global, ocean observing from space borne systems is becoming more prevalent. Although NASA has been deploying satellites to observe the oceans for over 20 years, this is a relatively new field of exploration. NASA's Aquarius satellite observatory, which was an international collaboration between NASA and Argentina's space agency, ended its Earth-observing mission to measure the salinity of the ocean's surface in November 2014, providing an extra 9 months of operation beyond its intended 3 years. The emergence of small satellites, i.e. nanosatellites and CubeSats, offer a more affordable option but at a reduced payload capacity. Clyde Space and the University of North Carolina, Wilmington, e.g., are developing a CubeSat that will be launched in 2017 to measure ocean color at significantly less cost than prior larger satellite systems (http://uncw.edu/socon/).

Another approach being used today by Ocean Network Canada on a regional scale will surely become more widely used on a global scale via satellites; i.e., transmitting data from vessels of opportunity. One system currently being developed as a "hosted payload" for the Iridium NEXT satellite constellation will provide real-time data collection and dissemination anywhere on the globe as the system comes online in 2017 (http://harris.com/press/article.asp?id=3765). The (essentially) zero satellite latency is made possible by high-bandwidth crosslinks in space. The hosted payload consists of highly sensitive very high frequency (VHF) receivers designed to detect transmissions in the maritime spectrum, which includes Automated Information System (AIS) messages from Class A and B devices and Application Specific Messages (ASMs). Sensor data i.e. meteorological, oceanographic and bathymetry measurements can be stored in the ASMs. Any upcoming changes in the maritime VHF domain planned by the International Telecommunications Union (ITU) can be accommodated by the payloads reconfigurable, programmable architecture. As a result, an affordable data delivery service can be offered to global users with little-to-no hardware investment for participating vessel owners who also stand to benefit by sharing their data.

Numerous other opportunities are being sought to bolster the "Blue Economy." A great example of a project designed to help technologists overcome the research-to-operations obstacle in the development lifecycle (i.e. "Valley of Death") is U.S. Integrated Ocean Observing System® (IOOS) Ocean Technology Transition (OTT). Other concepts focus on the operational side where new data and service products are delivered by the observatories. Southern California Coastal Ocean Observing System (SCCOOS), e.g., supports regional maritime operations using wave buoy data and modeling to predict waves, swells and rip currents in high vessel traffic areas around the ports. Similarly, ArcticNet Canada intends to use collected environmental data to assist with oil and gas exploration and development decisions. ONC's Smart Ocean Systems™ plans to support decision makers in three key areas: marine safety, public safety and environmental monitoring. Many more examples are discussed in the annual update.

In summary, these trends are a tell-tale sign of significant progress being made to advance the ocean observing field. Many new and diverse technologies are being used cooperatively and new partnerships are being formed – all on a global scale. These factors alone should be enough to strengthen and grow our Blue Economy and eventually help us better understand Earth. ("How inappropriate to call this planet Earth when it is quite clearly Ocean." – Arthur C. Clarke)

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HIGH-END AT HIGH-LATITUDES

The Accuracy and Performance of iXBlue's Inertial Navigation Systems in the Far North

By: Yves Paturel, Navigation Systems Business Unit, iXBlue

As Arctic ice melts and traffic increases in the northern seas, navigation and survey of these regions becomes more frequent. No longer will navigation at high latitudes be restricted to certain types of scientific missions, but it is expected that as the ice melts, economic incentives to enter these previously frozen seas will increase. From tourism to oil and gas, even defense, most experts agree that nations bordering or near the Arctic have plenty of incentive to increase both navigation and survey operations in the high north. It is even possible that navigation through the North West Passage will allow efficient transport of goods across a much shorter distance than is possible via the Panama Canal.

The Challenge

So what happens with all these extra ships? Will navigation remain safe (and accurate) at such high latitudes?

There are not a lot of airport runways in the Far North. Consequently, inertial navigation systems (INS) aboard airplanes are typically aligned on the ground at a lower latitude. However, ocean-going vessels working in these regions are much more likely to begin their trips at high latitudes, meaning that the inertial system is both initialized and then operated at high latitudes.

This creates design challenges, because the nearer a vessel is to the North Pole, the less accurate INS output is. Simply put, the higher the latitude, the smaller the horizontal component of the Earth's rotation rate becomes. At the poles, in fact, the horizontal comment is zero, because the horizontal plane is perpendicular to the Earth's rotation rate. The resulting output is a heading error.

When paired with a global navigation satellite system (GNSS), this problem can be overcome, but this solution does not work for underwater ocean operations, where GNSS signals are unavailable due to the conductivity of salt water. Currently, navigation at high latitudes relies on gyrocompass and inertial navigation systems for subsea navigation. However, gyro compassing at high latitudes requires more accurate sensors than at lower latitudes, and the algorithms used have to be adjusted to correct for the singularity of the North (or South) Pole. All of this means that it is extremely important that all inertial equipment be expertly designed and thoroughly tested.

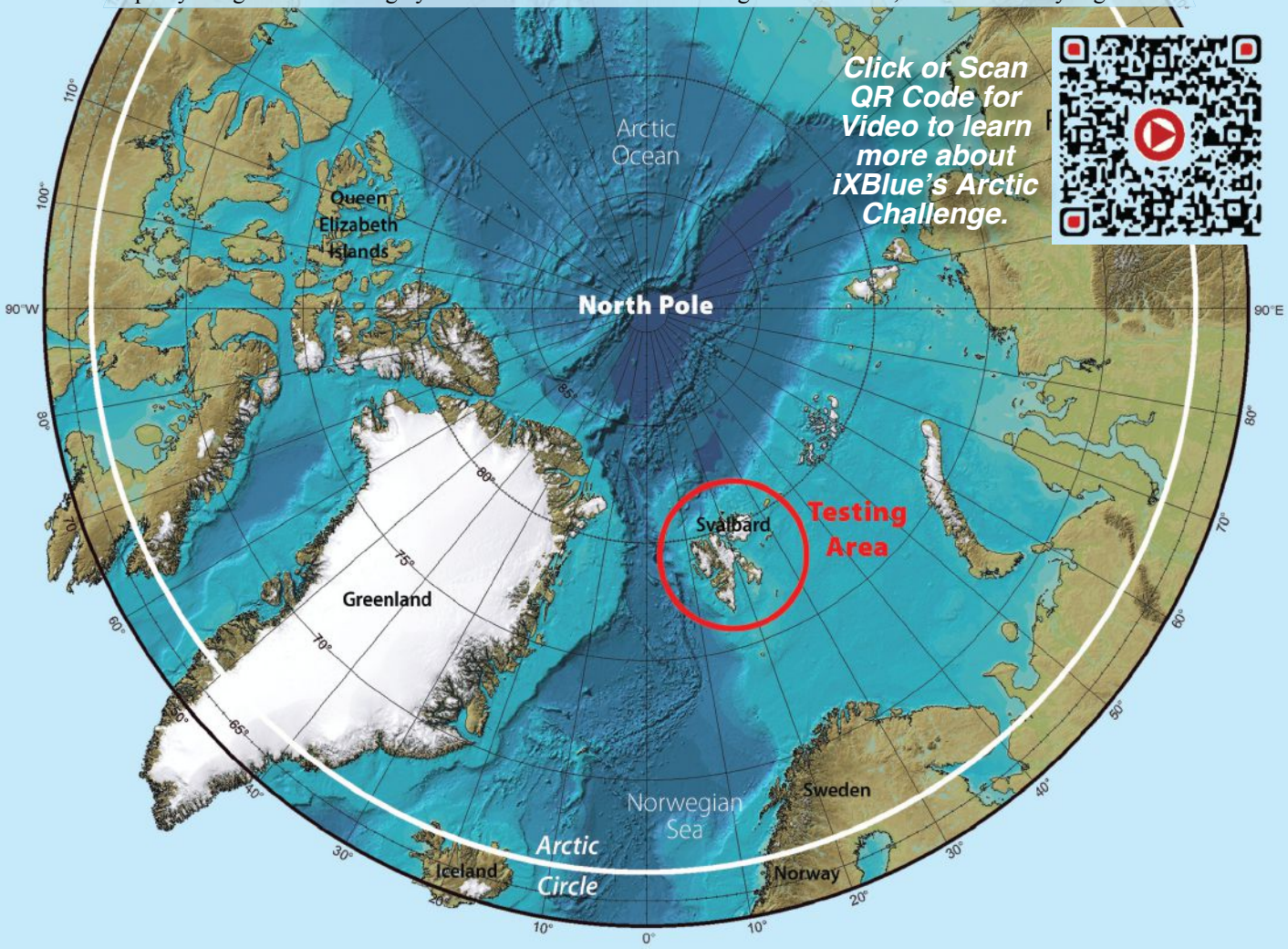
The Test

During the summer of 2014, in a collaboration with the Norwegian Polar Institute, iXBlue tested the QUADRANS gyrocompass and PHINS navigation systems aboard the RV Lance, which operates primarily in the Arctic, but has also been used for Antarctic expeditions.

On this journey, Lance traveled all the way to 81 degrees latitude. How far north is this? Well, this latitude runs through the Greenland Sea at the Prime Meridian, as well as parts of the Arctic Ocean and the Kara Sea. We're talking the Far North here.

During these tests, much was learned about the potential difficulties INS faces at high latitudes. By analyzing the heading accuracy, long term stability, and navigation accuracy of INS alone (i.e., without GNSS support), it was clear that INS at high latitudes requires high-end sensors. While iXBlue had tested equipment meeting these requirements via simulation, they were eager to compare those results to real-world operations. The chance came when the Norwegian Polar Institute offered to host the test INS aboard Lance, while the vessel recovered station moorings and deployed new ones over the continental slope to the north-east of Svalbard, a Norwegian archipelago in the Arctic Ocean halfway between continental Norway and the North Pole.

The mission planned to travel from 88.22 degrees N, up to 81.6 degrees of latitude, but an unusually high-level of sea ice



restricted the trip to 80.83 degrees N.

All equipment tested (iXBlue's new gyrocompass QUADRANS and the PHINS inertial navigation system) was mounted on the mast, with the gyros secured to the wall by a bracket. Both units were tested with and without the aid of GNSS. Measured data from a GPS receiver was provided to both systems through an Ethernet connection. A double antennae GNSS array was used as a reference. This allowed references for both heading and position. Both antennae were mounted on the aft end of the helideck by setting them on firmly secured tripods. The expected accuracy for the set up was determined to be 0.03 degrees RMS.

Results

PHINS

The PHINS navigation system can align and navigate without GNSS position aid, but the accuracy of both heading and position are improved when aided by GNSS position data. Both modes of operation were tested. When tested with GPS position data aid, PHINS performed well against the dual antennae reference. After an initial alignment period (during the first minutes of the test), PHINS converged rapidly toward the true heading. After alignment, the difference between PHINS and the referenced baseline remained quite small. Because the RMS of the heading difference was 0.04 degrees, compared to the dual antenna GPS receiver at 0.03 degrees, it is hard to provide a reliable figure of PHINS heading accuracy. What we do know, however, is that PHINS and the reference system had the same order of magnitude for heading accuracy.

PHINS second test followed 6 hours of GPS aiding, after which no external data was provided to PHINS across a 12 hour period. During these 12 hours, PHINS operated in pure inertial mode. RMS value between the reference and PHINS headings during the 12 hour unaided test was 0.09 degrees, while the PHINS specification under these conditions at this latitude is 0.12 degrees. In part, the RMS error can be attributed to the noise of the reference as well as synchronization between PHINS and the reference time. When PHINS is not aided, a check of position accuracy is needed. This is because position drift in pure inertial mode could be large if the sensors do not perform at a very high level. The maximum error over 12 hours was 2.2 nautical miles while PHINS specification for this same time period was 7.2 nautical miles. In the testing, PHINS met its specification by a factor of 7.

QUADRANS

iXBlue's latest small gyrocompass is QUADRANS. QUADRANS is able to provide heading without position aiding. The only aiding required is velocity, which allows the device to compensate for North velocity. In these tests, QUADRANS was tested in a mode when it was aided by a velocity equivalent to the one provided by an electro-magnetic log. No GPS position was provided to QUADRANS. The specification for QUADRANS at this latitude is 1.3 degrees RMS. Test results showed that after a 30 minute alignment phase, the heading error remained constantly below 0.22 degrees. With an RMS error value of 0.09 degrees, this amounts to quite a success!

Conclusion

Both PHINS and QUADRANS performed extremely well in these real world trials. According to the testers, reasons for include the fact that iXBlue products use Fiber Optic Gyro (FOG) sensors. The parameters for these sensors are very repeatable and reliable. They remain extremely stable after factory calibration, including across ON/OFF cycles, temperature variations, operational vibrations, and so forth. Another reason the products performed well is that the algorithms used take efficient advantage of any aiding to estimate small variations of the sensors' parameters. The result is a calibration of the sensors while running, which allows for real-time compensation. Because of these factors, the stability of parameters is extremely solid, so that value estimated during times when aiding is available remains valid for a long period of time. In fact, these values were so stable that the PHINS positions performance over 12 hours had a maximum error of only 2.2 nautical miles.

Because of these encouraging results, it is possible to imagine that inertial navigation systems like PHINS and QUADRANS will be a key technology for maintaining accuracy in navigation without dependence on infrastructure. In these tests, the systems showed a robust capability for autonomous, self-contained, independent operation. Their use of high-end sensors pays off in superior performance at high-latitudes, proving that these iXBlue products are ready for the challenges of operating in these regions.

For more information contact Marine Slingue at marine.slingue@ixblue.com and visit the iXBlue website at www.ixblue.com.

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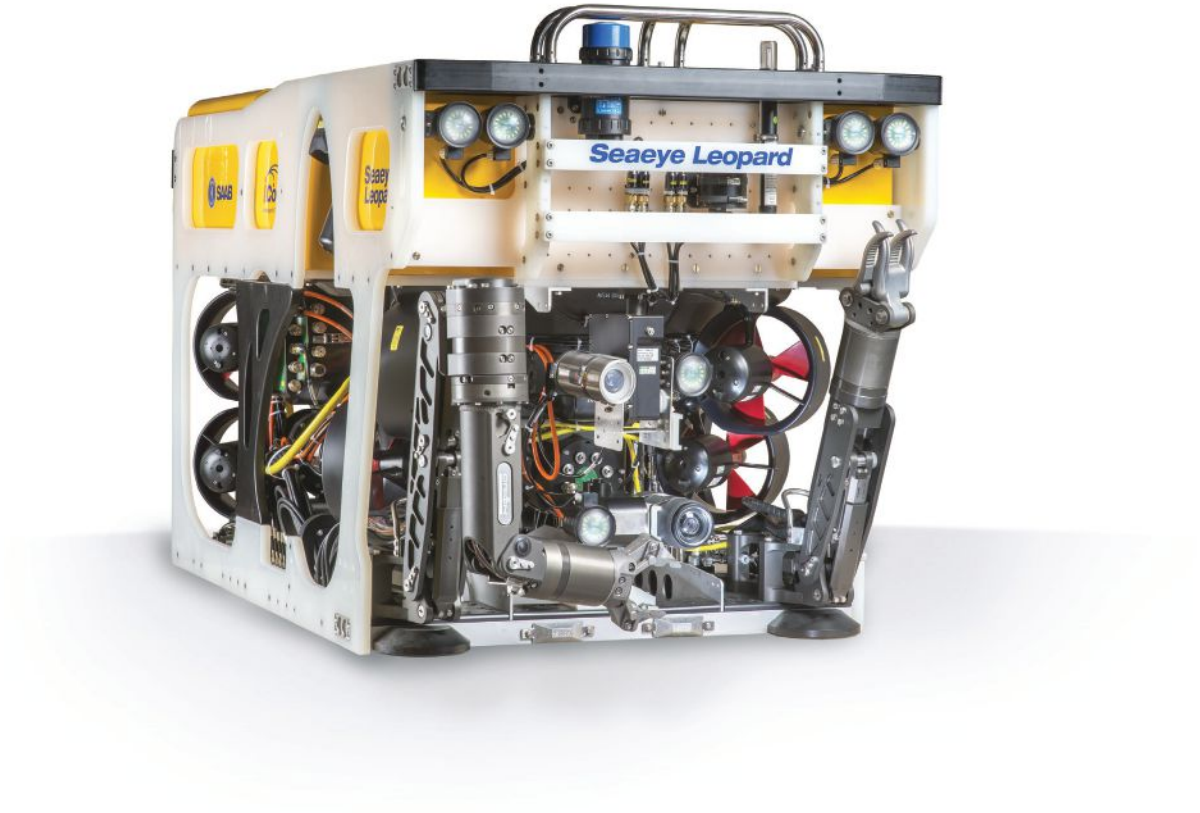

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OCEAN INDUSTRY

in this section

U.S. Navy divers, EOD help salvage CSS Georgia

Sailors from Mobile Diving and Salvage Unit (MDSU) 2 and Explosive Ordnance Disposal Mobile Unit (EODMU) 6, along with Naval History and Heritage Command and the U.S. Army Corps of Engineers, are diving the Savannah River to salvage the Civil War ironclad CSS Georgia.

Literally plunging into history, the team is in the water recovering Civil War-era ordnance and projectiles, rendering the site safe for the next stages of the mission.

"We have already recovered upwards of 100 pieces of unexploded ordnance and discarded military munitions from the river bottom," said Chief Warrant Officer Jason Potts, on-scene diving and salvage commander. "Once this portion is wrapped up, we can move on to cannon recovery and large artifact removal."

The salvage of the ship from the river is necessitated by the Savannah Harbor Expansion Project, or SHEP. In order to deepen the river from 42 to 47 ft for larger ships, the ironclad needed to be removed.

With the project in early planning stages, USACE reached out to the Navy for assistance. "The Army Corps of Engineers sent a request asking for help to the U.S. Navy," said Rick Thiel, Naval Sea Systems Command (NAVSEA) Supervisor of Salvage and Diving (SUPSALV) project manager. "That is how we got involved and coordinated all of the units out here."

The Savannah River is an 18-mile stretch of water that connects the Port of Savannah to the Atlantic Ocean. The dive site location controls when and how the team goes about the recovery process.

"The environment in the Savannah River is unique," said Potts. "With the strong current, civilian and commercial boat traffic, and the Georgia weather in July, we have had challenges, but with careful planning, we came prepared to meet those challenges."

MDSU-2 and EODMU-6 conducted training throughout May and June to prepare for the CSS Georgia salvage operation. During this time, the units had to build cohesion between the two different groups. The team also trained to familiarize themselves with the equipment they are using, and the murky conditions of the river.

The team is utilizing high-tech sonar, underwater imaging equipment and a variety of modern-day dive equipment, but the historical importance of the mission isn't lost in a slew of technology.

MTS granted official observatour status by UNESCO-IOC

The Marine Technology Society has now joined only a handful of other non-governmental organizations (NGOs) to be granted official "Observatour" (Observer) status by the United Nations Educational Scientific and Cultural Organization (UNESCO) Intergovernmental Oceanographic Commission (IOC). MTS Vice President of Research Industry and Technology Dr. Andrew Clark, a member of the U.S. National Committee to the IOC, represented MTS at the IOC General Assembly held at UNESCO Headquarters in Paris this May. Joined by Corporate Member CARIS, Ltd, MTS also sponsored the IOC Reception opening the annual meeting.

The IOC promotes international cooperation and coordinates programs in marine research, services, observation systems, hazard mitigation and capacity development in order to better manage the nature and resources of the ocean and coastal areas. The high-level objectives for the IOC include: healthy ocean ecosystems and sustained ecosystem services; effective early warning systems and preparedness for tsunamis and other ocean-related hazards; increased resiliency to climate change and variability and enhanced safety, efficiency and effectiveness of ocean-based activities.

For the first time, this year an Ocean Science Day was declared prior to the opening of the Assembly, to further increase the visibility and understanding of ocean science, current challenges and emerging issues. MTS member and Chair of the US IOOS National Federation of Regional Associations (NFRA) Dr. Scott Glenn led a panel discussion devoted to highlighting the role of sea gliders in today's pursuit of operational oceanography.

MTS member and NOAA Assistant Administrator of Ocean and Atmospheric Research (OAR) Captain Craig McLean, (Ret), led the US Delegation.

Dr. Steve Piotrowicz, Manager, NOAA Climate Program Office and Dr. Scott Glenn, National Federation of Regional Associations (IOOS) Chair join Dr. Andrew Clark, MTS VP Research Industry and Technology.

BOEM selects National Academies to form environmental committee on offshore energy resources

The Bureau of Ocean Energy Management (BOEM) announced an agreement to have the National Academies establish a new standing committee on environmental science and assessment for offshore energy and mineral resources. The committee will provide independent information on issues relevant to BOEM's environmental studies and assessment activities and support discussions on relevant issues. The committee's services will be provided under a three-year contract with the National Research Council (NRC), the operating arm of the National Academy of Sciences (NAS) and the National Academy of Engineering (NAE).

The NRC issued a call for nominations on 23 June 2015, seeking a broad pool of applicants for the standing committee. Nominations will be accepted by the NRC until 15 July 2015. The NRC expects to announce the committee membership later in the summer, followed by an announcement of its plans for the first meeting in the fall of 2015.

The NRC will appoint approximately 15 experts out of a broad pool of qualified experts from academia, the private sector and other organizations with expertise in the scientific disciplines relevant to BOEM's environmental assessment and studies programs.

Committee member expertise will encompass both natural and social sciences, and relevant disciplines within those broad areas as warranted, such as ecology and population biology, physical and chemical oceanography and marine archaeology.

The committee members will provide their expertise and advice without compensation and are not required to be members of the National Academies. The committee will meet several times a year, and may conduct workshops, studies or peer review documents relevant to BOEM's environmental programs. The work will be purely advisory in nature, and will be limited to relevant independent and objective advice. It will not include recommendations on what policy or management decisions should be made.

For more information, visit www.boem.gov.

Big data maps world's ocean floor

Scientists from the University of Sydney's School of Geosciences have led the creation of the world's first digital map of the seafloor's geology.

It is the first time the composition of the seafloor, covering 70% of the Earth's surface, has been mapped in 40 years; the most recent map was hand drawn in the 1970s.

"In order to understand environmental change in the oceans we need to better understand what is preserved in the geological record in the seabed," says lead researcher Dr. Adriana Dutkiewicz from the University of Sydney. "The deep ocean floor is a graveyard with much of it made up of the remains of microscopic sea creatures called phytoplankton, which thrive in sunlit surface waters. The composition of these remains can help decipher how oceans have responded in the past to climate change."

A special group of phytoplankton called diatoms produce about a quarter of the oxygen we breathe and make a bigger contribution to fighting global warming than most plants on land. Their dead remains sink to the bottom of the ocean, locking away their carbon.

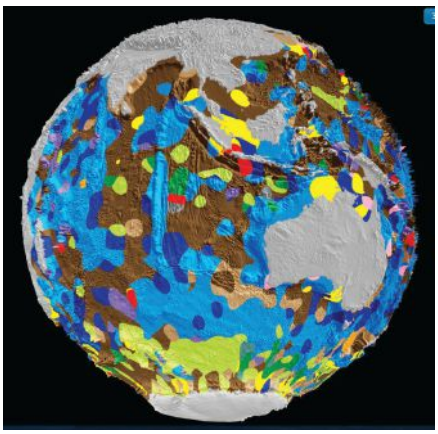
The new seafloor geology map demonstrates that diatom accumulations on the seafloor are nearly entirely independent of diatom blooms in surface waters in the Southern Ocean.

"This disconnect demonstrates that we understand the carbon source, but not the sink," says co-author Professor Dietmar Muller from the University of Sydney. More research is needed to better understand this relationship.

"The old map suggests much of the Southern Ocean around Australia is mainly covered by clay blown off the continent, whereas our map shows this area is actually a complex patchwork of microfossil remains," said Dr. Dutkiewicz. "Life in the Southern Ocean is much richer than previously thought."

Dr. Dutkiewicz and colleagues analyzed and categorized around 15,000 seafloor samples – taken over half a century on research cruise ships to generate the data for the map. She teamed with the National ICT Australia (NICTA) big data experts to find the best way to use algorithms to turn this multitude of point observations into a continuous digital map.

This research is supported by the Science and Industry Endowment Fund.



The digital data and interactive map are freely available as open access resources, and can be found by visiting http://portal.gplates.org/#SEAFLOOR.

Ocean currents offer insights into MH370

Preliminary insights into the potential pathway of the plane wreckage that washed up on Reunion Island, thought to be from the missing MH370 flight, is provided by researchers at the National Oceanography Centre (NOC).

If a plane crashed into the South East Indian Ocean, any debris floating on the surface could have ended up on Reunion by one of two possible scenarios.

In the first scenario it would have initially been carried northwards in a large 'round-a-bout' system of currents in the South Indian Ocean – called a 'subtropical gyre'. It would have then been swept westward, towards Reunion Island, in a relatively fast moving band of water known as the South Equatorial Current. This westward flowing water moves across the entire Southern Indian Ocean at the same latitude as northern Madagascar but can be partly deflected towards Reunion when it meets the Mascarene Plateau near 60°E. The speed of this current varies, although it can reach up to 50 cm/s.

An analysis of a global ocean simulation, provided by the NEMO model, gives rise to the second scenario. In this situation it appears possible that the debris could have been carried more or less directly westwards by a complex pattern of swirling currents, which include features known as "eddies." These are rotary current structures which travel slowly westwards.

The likely timescales for these routes could be between one year for the more northerly route and two years for the directly westward route. More detailed analysis is currently underway at the NOC, including the direct tracking of surface floating particles, to confirm the likelihoods of these pathways and timescales.

The NEMO ocean model was developed by an international consortium, including the NOC. The model provides full depth coverage of ocean currents, temperatures and salinities. It has also been used to track the movements of oil spills.

Professor Adrian New, an expert in Indian Ocean currents at the NOC, said that the discovery of the plane wreckage in Reunion might be consistent with a possible crash site in the South-East Indian Ocean though other crash sites cannot definitely be ruled out.

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

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A Worldwide Survey of Recent Ocean Observatory Activities: 2015 Update

Contributed by the Ocean Observing Systems Committee, MTS

This seventh annual update highlights new and existing ocean observing activities around the world. Thank you to all the contributors who are helping to raise awareness of the importance of these systems.

EUROPE

AtlantOS

AtlantOS (www.atlantos-h2020.eu), one of the recently launched Horizon 2020 projects under the Blue Growth portfolio, is focusing on Atlantic Ocean observations in support of research, innovation and services. Sixty-three partners from 18 countries set out to join forces to make in situ observing of the whole Atlantic Ocean more efficient. The European Union is funding AtlantOS with 21 million Euros over a period of four years. The project is coordinated by GEOMAR Helmholtz Centre for Ocean Research Kiel, Germany.

As part of the Horizon 2020 research framework program under the Blue Growth work plan, the European Union is supporting the AtlantOS project for a period of four years to transform existing observing into a more integrated, more effective, and more sustainable observing system for the Atlantic Ocean. AtlantOS will be a regional contribution to the Blue Planet Initiative under Group on Earth Observation (GEO) and the Global Ocean Observing System (GOOS). The project brings life to the Galway Statement on Atlantic Ocean Cooperation which connects actors in Europe with those in the United States and Canada with ambition to better understand the Atlantic Ocean and to promote the sustainable management of its resources.

The challenge for AtlantOS is to transform the excellent ongoing in situ activities into more strategic and effective networks of observing systems for the Atlantic Ocean. These include in situ observing networks such as drifters, moorings, gliders and ships as a complement to the space-based capabilities. Assembly, management and dissemination of the diverse and complex data are not trivial tasks. Yet such data and the derived products and services are crucial for understanding the many natural and human induced processes in the Atlantic Ocean and to develop strategies to manage ocean risks and develop new sustainable business opportunities. Interaction with the private sectors are key to promote the development of an increasing number of user oriented products and services. "AtlantOS provides a unique opportunity to bring together the ocean observing and data management communities in a truly integrated, end-to-end value chain supplying the data, products and services needed by an increasing number and diversity of users on both sides of the Atlantic. This will improve the quality, quantity and accessibility of marine observations and information for evidence-based ocean governance and to stimulate blue-green growth opportunities," says Jan-Bart Calewaert, the Head of the European Marine Observation and Data Network (EMODnet) Secretariat.

In Europe the Copernicus Marine Environment Monitoring Service has set up a service required by a wide range of marine and maritime applications and allowing the development of a sustainable blue economy. "The delivery of the service strongly relies on the timely provision of both satellite and in situ observations that are integrated into global and regional ocean analysis and forecasting systems. AtlantOS is a major and highly needed initiative to sustain and develop further Atlantic in situ observing systems that are critical for the Copernicus Marine Environment Monitoring Service and its applications" says Pierre Yves Le Traon scientific director of Mercator Ocean and research director at IFREMER France.

AtlantOS builds on the recently developed framework for ocean observing which describes the process of setting requirements for ocean observing, developing a finite list of essential ocean variables, advocates the complementarily of different observing networks (space-based and in situ) and states the need for well organized data management, analysis and information product delivery. "AtlantOS is an important contribution to the GOOS, which is envisioned as a permanent global system for observations, modeling and analysis of marine and ocean variables to support operational ocean services worldwide" says Albert Fischer, Director of GOOS Project Office. GOOS provides accurate descriptions of the present state of the oceans, including living resources; continuous forecasts of the future conditions of the sea for as far ahead as possible, and the basis for forecasts of climate change. Erik Buch, Chair of EuroGOOS adds: "Operational Oceanography is extremely dependent on high quality ocean observations to generate reliable products and services. This can only be achieved via international cooperation and I truly believe that AtlantOS can generate a strong synergy for ocean observation in the Atlantic region."

Offshore Communications Backbone – Cyprus

CSnet International's Offshore Communications Backbone (OCB) became the anchor tenant on Radius' Poseidon network in April 2014 and has been online and transmitting data continuously with zero down time since switching to the broadband submarine fiber network (Figure 1).

During the reporting period, CSnet signed a data sharing agreement with the Institute of Geodynamics, National Observatory of Athens (NOA) covering seismic data. Seismic sensors in or near the Levant Basin provide a valuable extension to land based sensors, allowing analysts to more accurately geolocate and classify seismic events throughout the Eastern Mediterranean. Additionally, a multi-year pod swap maintenance plan is currently underway. Pods at nodes 3 and 4 have been replaced within the last 14 months, with the remaining 3 to be serviced/replaced over the next 2 years.

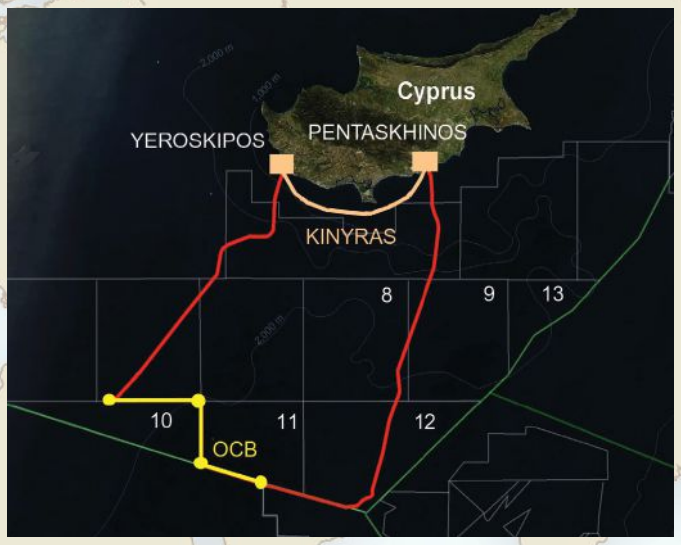

Figure 1. CSnet Offshore Communications Backbone and Poseidon.

CSnet has also executed recent agreements with Cypriot government authorities with the issuing of an updated permit that reflects recent changes in regulations governing marine scientific research operations and data collection in the Cyprus EEZ.

LoVe – Norway

The Lofoten-Vesterålen (LoVe) Ocean Observatory (Figure 2), in operation since September 2013, collects temporally resolved acoustic data (Figure 3) on biomass densities, vertical distributions and behavioral characteristics. It is situated on an ecological hotspot supporting the productive fish stocks of the Barents Sea. Oceanographic sensors provide information about the drivers behind the observed phenomena, and interpretation of the acoustic data is supported by catch data from scientific surveys and commercial catches.

The data collected to date have been used to quantify the large flux of oceanic biomass of cod and herring over the winter season where the time of arrivals and departures can be precisely estimated. Detailed target tracking of individuals in combination with biomass distributions of cod show clear changes in individual and group spawning behavior from the beginning of February to the end of April. The ecosystem is strongly affected by internal waves and strong currents and variable influx of Atlantic waters sometimes flushing over the area. Behavioral characteristics from seconds to seasons uncover inter and intra specific interactions including feeding interactions.

In late June 2015 funding was received from the Norwegian Research Council to extend the observatory from one node to a maximum of seven nodes (dependent on available funding), in the form of an approximately 60 km long offshore transect to a maximum depth of 2,000 m (Figure 4). Each node will have a basic set of instruments, including upwards-looking echosounders, current profilers, hydrophones, cameras, and a set of oceanographic and biological sensors. Some nodes will have specialized sensors of relevant to the nodes' immediate environment. All nodes will allow for easy connection of additional sensors for testing and research requirements. Depending on the tendering process, the installation will occur in the Northern summer of 2016 or 2017.

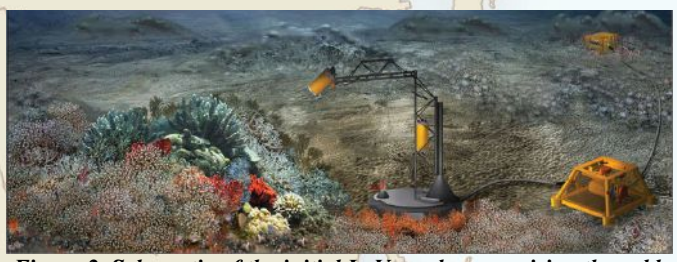

Figure 2. Schematic of the initial LoVe node, comprising the cable termination (upper right), echosounder (lower right), and satellite (center).

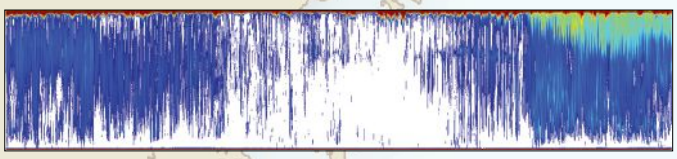

Figure 3. Echogram showing biological backscatter from October 2013 through to July 2014. Vertical extent is from the surface to the echosounder transducer on the seabed at 225 m depth.

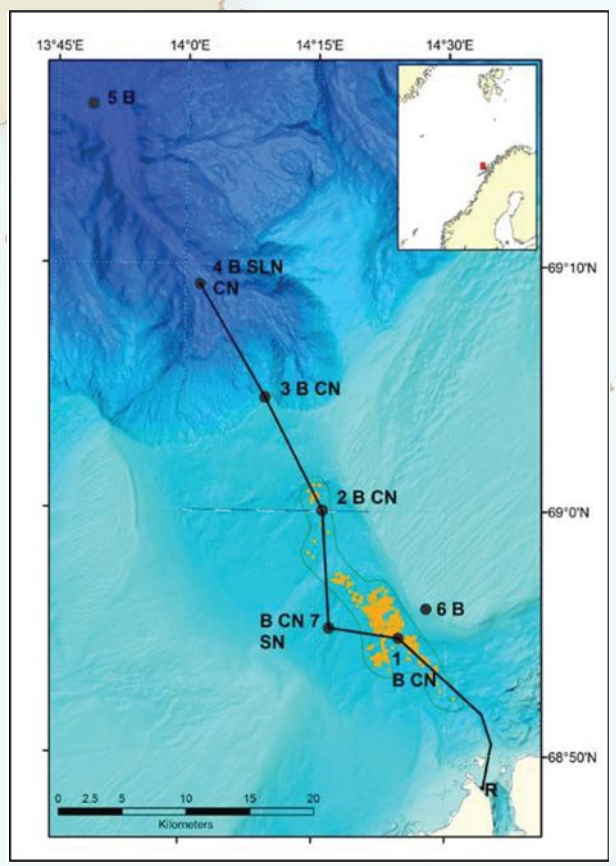

Figure 4. Future nodes (2-7), planned to be installed in the 2016 or 2017 Northern summerSnet Offshore Communications Backbone and Poseidon.

PLOCAN – Canary Islands

The Oceanic Platform of the Canary Islands (PLOCAN) is a Spanish multipurpose technical-scientific service infrastructure to support research, technology development and innovation in the marine and maritime sector. PLOCAN offers land-based and sea-based novel infrastructures to promote long-term observation and sustainability of the ocean, providing a cost-effective combination of services, such as observatories, test site, base for underwater vehicles, training and innovation hub.

PLOCAN is a joint initiative of the Government of the Autonomous Region of the Canary Islands and the Spanish National Government (Ministry of Economy and Competitiveness) and member of the Spanish Singular Scientific and Technological Infrastructures Network (ICTS). Its main objective is to construct and operate a fixed offshore platform that will be located both close to the coast and near of the edge of the continental shelf, in shallow waters, and it will be operative by 2016. It will have a net surface around 2,500 m^2 of research capacity, space for laboratories, instrumented containers and capacity to accommodate researchers distributed in a multi-story building with a main dock of 1,000 m^2.

The Oceanic Platform of the Canary Islands is able to provide access and multidisciplinary logistic support through its onshore facility and two marine test sites (Taliarte´s harbor and offshore). The facility and test sites are located in the NE coast of Gran Canaria Island (Figure 5). The onshore testing facility has dedicated 400 m^2 equipped workshops for electronics and mechanical integration, repairs, storage and logistics, including a wet-lab with testing pool with target seawater. Also a dedicated control room for piloting and related issues is available. The harbor testing facility is located very close to onshore facility (just few meters with direct view between both) and has clear and calm waters with maximum depths of 8 m. It is an optimal place for the beginning sea trials.

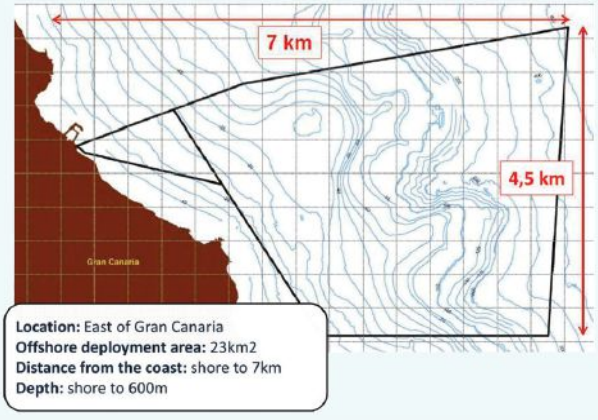

Figure 5. POLCAN location.

The PLOCAN off-shore test site area is 23 km^2, located three nmi from the harbor testing area and also quite near to the major harbor of Gran Canaria Island (Las Palmas´ Port). The area offers progressive depths from shore up to 600 m. dedicated to study the behavior and efficiency of different types of maritime devices and technologies and contributing to speed up the process of their introduction into the market.

The marine area of PLOCAN test site was comprehensively studied with the view of offering an optimal space in terms of logistics, supported infrastructures and grid connection. In addition, the area has excellent environmental conditions facilitating from 9 to 12 months of operational window and optimal wind and wave energy resources for testing/demonstration operations, which ranges from 300-400 W/m^2 for wind power density and from 4 to 8 Kw/m of wave power.

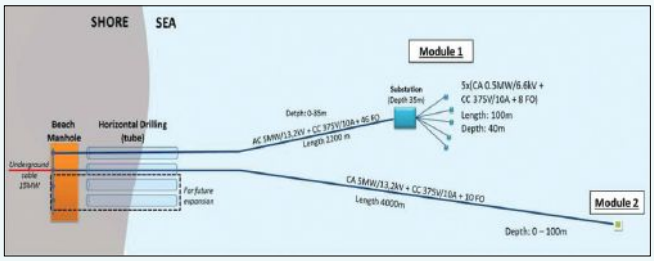

Figure 6. Marine Test Site ECI.

The evacuation of the electricity produced during experimental assays in PLOCAN Marine Test Site will be done through its Electrical and Communication grid Infrastructure (ECI) (Figure 6). The ECI will be operative during the first term of 2016 and it will be composed by 2 main modules of 5 MW of electricity evacuation capacity. Module 1 will be dedicated to wave energy converter demonstrators, with 5 positions of 1 MW each. Module 2 will be dedicated to offshore wind technologies with one position of 5 MW.

Regular sea-operations are covered by PLOCAN's own boats as part of the main equipment available. A fleet of unmanned underwater vehicles (ROV and gliders) for survey and work applications up to 1,000 m and moored buoys suited with meteorological (MET) and ocean sensors are available in order to cover real-time monitoring needs in the area. In addition, a new glider school has been established for training.

THE AMERICAS

North America

U.S. IOOS – Integrated Ocean Observing System®

The Ocean Technology Transition (OTT) project in the U.S. IOOS aims to bridge the gap between basic research and operational systems by funding technology development projects for sensors or platforms that are mature prototypes in need of modest funding in order to transition them to operational systems.

OTT's mission is to accelerate the transition of viable systems that monitor coastal and oceanic regions from research to operational mode. OTT focuses on developing and improving observation technologies for ocean chemical, biological and physical parameters at multiple spatial and temporal scales to monitor changing conditions in the oceans, coasts, and Great Lakes. Marine observation technologies include hardware and software platforms, sensors and data transfer technologies that collect observations in the ocean, marine, and Great Lakes' environments.

U.S. IOOS OTT is designed to reduce the research to operations transition period, commonly referred to as the "Valley of Death," for ocean observing technologies. This is accomplished by investing in the transition of emerging and promising marine observing technologies from the mid- to latter phases of research (Technical Readiness Level 6-9) into operational status. US IOOS OTT is an ongoing, multi-year effort to transition prototype marine observing technologies to operations in a stepped, parallel and scalable process that includes stakeholder engagement from industry, government, academia and others invested in the monitoring and assessment of the nation's ocean and coastal regions. More information about the OTT process and funded projects can be found at www.ioos.noaa.gov/ocean_tech/welcome.html.

Since its 2013 launch, U.S. IOOS OTT has awarded over $5.4 million to universities, research institutions and associations to accelerate ocean observing technology research into operations. Funded projects include the acceleration of innovative technologies to improve: monitoring of ocean acidification for shellfish growers in the States of California, Oregon,

Washington, and Alaska; advancing harmful algal bloom (HAB) detection in Washington State, the Gulf of Maine and the San Francisco Bay; developing an economical sensor package to accurately predict the onset of ice formation in the Arctic; and transitioning state-of-the-art nutrient sensing technology to develop an Operational Nutrient Observatory for the northeastern United States. The following are two examples of successful OTT projects.

Transition of the Imaging Flow CytoBot (IFCB) to Support Water Quality Analysis in the San Francisco Bay

The San Francisco Bay has long been recognized as a nutrient-enriched estuary, but one that has exhibited resistance to some of the classic symptoms of nutrient over-enrichment, such as high phytoplankton biomass and low dissolved oxygen. However, recent observations suggest that the Bay's resistance to high nutrient loads is weakening. The combination of high nutrient concentrations and changes in environmental factors that regulate the Bay's response to nutrients has generated concern about whether the Bay is trending toward, or may already be experiencing, nutrient-related impairment.

The University of California Santa Cruz was awarded a three year grant by OTT in 2014 to incorporate consistent and cost-effective observations of HAB and phytoplankton composition into the San Francisco Bay monitoring program to use as a metric to support ecosystem assessments. The project will integrate the Imaging Flow CytoBot (IFCB) into existing USGS R/V Polaris vessel transects, onto a planned mooring in the South San Francisco Bay, and on existing piers and/or fixed platforms to evaluate the potential to replace or augment phytoplankton enumeration (traditional microscopy) and HPLC pigment analysis to monitor phytoplankton composition and HABs in the San Francisco Bay.

Ocean Acidification Monitoring in the Pacific Region

In collaboration with NOAA's OA Program, US IOOS' OTT awarded the University of Washington Applied Physics Laboratory a three year grant to advance four new objectives regarding an OA observing system that addresses the needs of impacted and potentially vulnerable US industries and stakeholders. The project will develop and test three iterations of new, low-cost OA sensors. These instruments will allow low-cost measurement of pCO_2, temperature (T) and salinity (S), and ultimately pH and dissolved O_2 (O_2, aq) in a variety of deployment configurations. These will include small commercial fishing or tourist vessels, field moored locations, and autonomous free-drifting GPS-tracked and cell-phone-reporting systems. The project will also involve the development of best practices and QA/QC procedures in collaboration with NOAA's Pacific Marine Environmental Laboratory; implementation of data flow to end users; and performing of outreach and education services to OA-impacted stakeholders.

SCCOOS – Southern California Coastal Ocean Observing System

Approximately 26,000 commercial vessels participate in the Marine Exchange of Southern California and Vessel Traffic Service of Los Angles per year. There are approximately 45 movements of some of the largest vessels in the world per day. Combined, the Port of Los Angeles and the Port of Long Beach are the busiest ports in the United States for vessel transport; therefore, oceanographic parameters are extremely important in assuring the safety and operations of vessel traffic.

NOAA's National Ocean Service project, with the Port of Long Beach and SCCOOS, have installed three wave buoys in support of maritime operations in the San Pedro Bight (Figure 7), operated by the Coastal Data Information Program (CDIP) based at the Scripps Institution of Oceanography, UC San Diego. The most recent deployment of the Long Beach Channel buoy, is an additional validation point to be used in the model development for the Ports Under Keel Clearance (UKC) Project which analyzes the safety for tanker transits with a deadweight over 175,000 DWT or with a draft over 55ft.

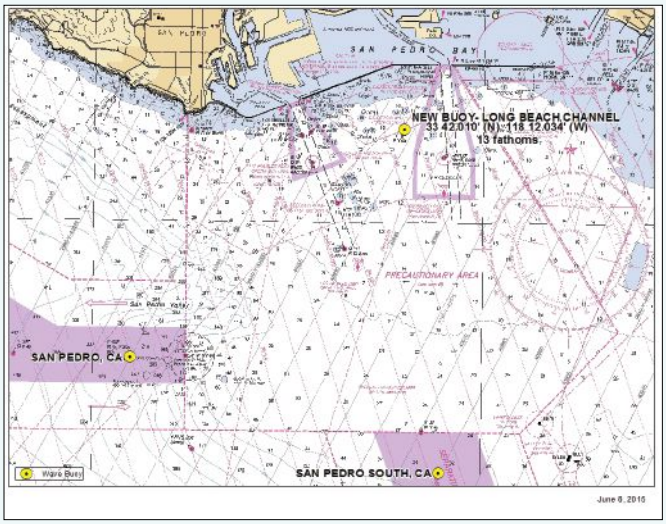

Figure 7. The map displays the three wave buoys in the San Pedro Channel.

These wave buoys are used for both real-time operations and wave model validation. They contribute greatly towards operations for the tugs and barges, ferries, harbor pilots, the PROTIDE UKC Project, offshore oil terminal operations in El Segundo, and the US Coast Guard. Services related to two projects are mentioned here.

Under Keel Clearance (UKC) Project

The Dutch Based firm, PROTIDE, hosts a variety of products and services standardizing environmental observations and forecast products. The National Weather Service and National Center for Environmental Prediction have developed a series of high resolution, near shore wave models called the Nearshore Wave Prediction System (NWPS), providing accurate forecast guidance of waves and swell for the coastal zone that support activities such as maritime navigation and rip current forecasts. In addition, the Office of Coast Survey conducted a full bottom coverage hydrographic survey. The PROTIDE UKC system uses existing astronomical tide predictions from the existing observational water level station located in the Port of Long Beach provided by Center for Operational Oceanographic Products and Services (CO-OPS).

Swell Vulnerability

The unique geography of this area makes the ports extremely susceptible to wave energy. Based on long-term measurements from the San Pedro Buoy, the most frequent swell direction is from the west and the second most common swell direction is from the south. There is minimal protection or island shadowing from the Channel Islands from the west or south. South swells are most common in the summer months and west swells are most common in the winter. In addition to the lack of protection from the Channel Islands from west and south swells, the bathymetry tends to channel wave energy right into the ports. The deep channel between Santa Catalina Island and Los Angeles provides the perfect funnel for high south swell events into the port. By monitoring these conditions, SCCOOS can provide the Los Angeles/Long Beach pilots and the local mariners with an accurate forecast to prevent hazardous conditions.

Many local, state and federal partners are involved with the UKC Project: Jacobsen Pilots, Tesoro, the National Ocean Service, the National Weather Service, State of California Oil Spill Prevention and Response, the US Army Corps of Engineers and the California Department of Parks and Recreation. The Marine Exchange of Southern California serves as the administrator for the project.

Data from these buoys are available through the custom CDIP display for the Marine Exchange (http://cdip.ucsd.edu/custom_pages/marine_exchange/), the NOS PORTS website (http://tidesandcurrents.noaa.gov/ports/index.html?port=ll) and NWS National Buoy Data Center (NDBC) website (www.ndbc.noaa.gov). For further information email www@cdip.ucsd.edu.

AOOS – Alaska Ocean Observing System

On July 11, 2015, a Teledyne Webb Slocum G2™ glider was deployed in the Chukchi Sea off the northwest coast of Alaska for the third year of a multi-year monitoring study funded by AOOS to examine relationships between marine mammal distributions and oceanographic conditions.

The buoyancy-controlled glider is equipped with a passive acoustic device called DMON (digital acoustic monitoring instrument), which is installed inside the glider. A hull-mounted faired hydrophone is attached to a science payload at the midpoint of the glider and can monitor frequencies between 10 and 7500 Hz, the frequency range for both marine mammals as well as background noise. A Sea-Bird Electronics Slocum Glider Payload CTD™ is also part of the science package used to collect hydrographic conditions while underway.

In previous years, the glider was successful at making spatial marine mammal surveys lasting around 10 days at most. This year, the glider is equipped with lithium batteries that will allow it to operate unattended for an entire Arctic summer season. Over the course of two months, it will zigzag unsupervised inshore and offshore from south to north in the eastern Chukchi Sea (Figure 8).

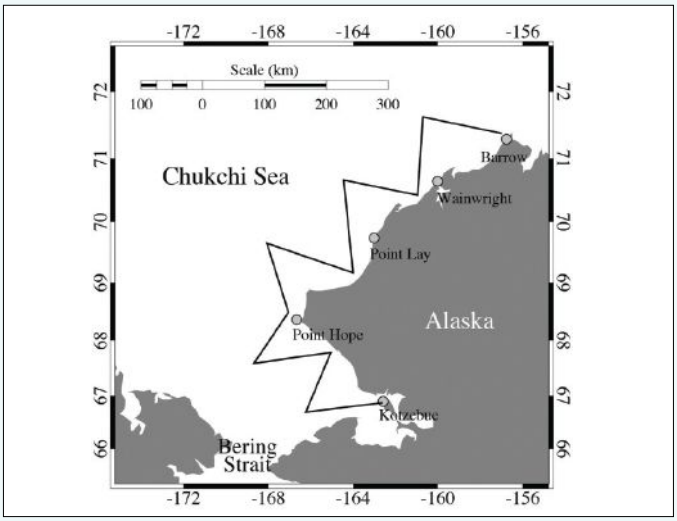

Figure 8. Map of the planned glider trajectories for summer 2015.

Periodically, when the glider surfaces, data are sent back to the shore-based project computer using the glider's Iridium satellite modem. Data are quickly reviewed and quality controlled, and data reports and plots made available at the publicly accessible http://dcs.whoi.edu/chukchi_2015/chukchi_2015.shtml.

Several species of Arctic occurring marine mammals, including fin, bowhead, and beluga whales, as well as bearded seals and walrus are being tracked simultaneously with the collection of high resolution spatial and temporal water column conditions (Figure 9).

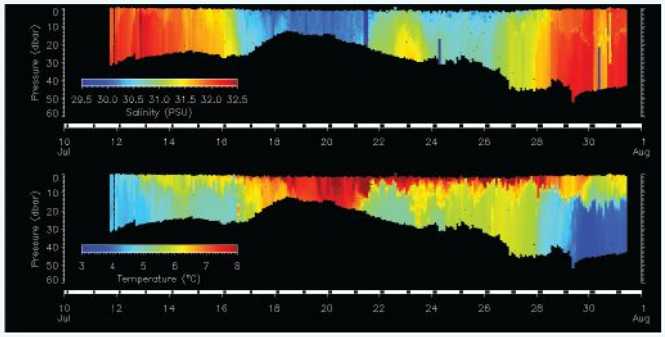

Figure 9. Recent temperature and salinity data from the mammal tracking glider clearly illustrates the difference between the offshore colder (blue) and salty (red) waters from those observed within the Alaska Coastal Current starting around 16 July and measured to 21 July showing fresher (blue) and warmer (red) conditions.

With these data, scientists are investigating marine mammal occurrence with respect to water column conditions and mixing fronts, and are comparing northern versus southern Chukchi community composition as well as marine mammal occurrence between the inshore (Alaska Coastal Current) waters and the offshore (Bering Sea) waters.

Development and application of this cutting edge autonomous technology is benefitting others monitoring in Arctic regions, where shipboard access is not only expensive, but limited to fair weather conditions during the openwater (ice free) seasons of summer to early fall. Collecting data using autonomous platforms, such as gliders, also allows for better spatial and temporal marine observations in the Arctic because of their capability to operate continuously without the arduous supervision of a nearby ship, regardless of weather and sea state. AOOS hopes to continue these longer endurance glider surveys annually as part of a comprehensive Arctic Ocean observing system.

ONC's VENUS and NEPTUNE – Canada

The University of Victoria's Ocean Networks Canada (ONC) continued to push the boundaries of cabled ocean observatory technology and operations in 2014. ONC manages the NEPTUNE and VENUS cabled ocean observatories off the coast of southern British Columbia (BC) and the Cambridge Bay observatory in the Canadian Arctic.

The observatories represent a $200 million infrastructure investment for Canada and are unique on the global stage because their fixed infrastructure makes data available, free and in real-time, from over 200 undersea instruments distributed across the most diverse ocean environments found anywhere on Earth. Almost 900 km of powered fiber optic cable service eleven undersea sites, from the northeast Pacific to the remote Arctic Ocean.

In addition to maintaining and expanding the current seafloor infrastructure, in 2014 ONC continued to test mobile observing systems, expanded surface monitoring, and began planning installation of additional coastal radars, which will move ONC into operational oceanography in the future. ONC also signed agreements to expand its footprint along the Pacific coast, from Vancouver to Prince Rupert, with five new observatories planned for 2015-16. Additionally, ONC began hosting data from a tidal energy wave facility in the Atlantic Ocean using its powerful Oceans 2.0 data system, ONC's comprehensive data acquisition, archiving and visualization system. ONC now streams ocean data and information from all three of Canada's oceans.

Beginning in early March, the year's first expedition headed to four VENUS coastal observatory sites, conducting seafloor platform maintenance with the ITB Sub-sea ROV Oceanic Explorer on board the CCGS John P. Tully. The expedition was critical in ensuring that sensors were operational for the spring bloom and freshet events in the Salish Sea.

Throughout May, maintenance operations with the CSSF ROPOS ROV and CCGS John P. Tully shifted to NEPTUNE's offshore observatory in the northeast Pacific, west of Vancouver Island. Highlights on this second expedition included servicing the five instrumented NEPTUNE science sites: Folger Passage, Barkley Canyon, Cascadia Basin, Clayoquot Sound and Endeavour. New instruments were added to measure oxygen, track vocalizing sea mammals, and delineate the growth of gas hydrate mounds. A comprehensive water properties sampling plan was also implemented to study the springtime dynamics of deep low oxygen water.

An Inshore Profiling System was deployed in 200 m of water in Saanich Inlet in June. Connected to the VENUS observatory by a three km fiber optic cable, the Inshore Profiler is a seven meter buoy with a moon-pool and winch system. Four times per day an instrument cage profiles the seasonally low oxygen waters of the inlet from the surface to 200 m.

September saw the final maintenance expedition of the year with the ROV Oceanic Explorer on board the CCGS John P. Tully. Major objectives included recovery and servicing of all instrument platforms on the VENUS observatory sites, as well as relocating the forensic platform with two new pig carcasses to the East Node Strait of Georgia seafloor site—one of ONC's longest running experiments led by researchers in criminology.

ONC's first foray into nearshore glider operations with the deployment of a Slocum Webb glider in Saanich Inlet to conduct science missions began in July. Tidal conditions and confined waters created a challenging operating environment and a steep learning curve for the operations team; however, the missions were successful and will pave the way to longer deployments in the Salish Sea.

ONC's Strait of Georgia surface monitoring program expanded operations to a second BC Ferries vessel, the MV Spirit of Vancouver Island, in October 2014. The MV Spirit of Vancouver Island's southerly route from Vancouver Island to the lower BC mainland is of research interest because of the broad range of conditions – from oceanic through to fresher Fraser River influenced waters – traversed by the ferry numerous times each day. The onboard Seakeeper instrumentation and weather station capture high-resolution measurements of sea surface and meteorological properties every 10 seconds. A second ferry, the MV Queen of Alberni, makes similar and complementary measurements along a north-south diagonal route between Nanaimo and Vancouver. To monitor the northern region of the Strait, a third and final ferry system will be added in 2015.

ONC's operations team members headed to the Arctic in September to conduct the second annual maintenance of the observatory at Cambridge Bay, Nunavut. Lessons learned from last year's expedition were put to good use and the observatory was recovered, overhauled and successfully redeployed. Cambridge Bay students and residents were also introduced to Ocean Sense, ONC's new observatory education program.

The Canadian government announced $9.1 million in funding in April for Smart Ocean Systems™, a bold new direction for the future as ONC aims to support realistic solutions for both economic development and environmental sustainability. Smart Oceans Systems™ will combine ONC's proven and new marine sensing technology with its powerful data management system, Oceans 2.0, to ensure that coastal and offshore areas of Canada can be managed safely following environmentally sound approaches. Smart Oceans Systems™ will strategically place five new observatory sites along the BC coast to support science-based decision making in three key areas: marine safety, public safety and environmental monitoring. The observatory systems and related land-based infrastructure will be installed over the next two years (Figure 10).

Figure 10. Canadian map showing ONC's expanding footprint, current and planned.

In November, ONC provided the Fundy Ocean Research Centre for Energy (FORCE) in the Atlantic with a customized real-time data portal using Oceans 2.0. The freely available portal streams environmental data from the centre's tidal demonstration platform in Nova Scotia's Bay of Fundy, as well as wave, tidal and video information from the weather station at the tidal energy test site. With this east-west collaboration, ONC has now established operations in all three of Canada's oceans.

One of Canada's four Major Science Initiatives, the University of Victoria's ONC Ocean Observatories have developed over the past ten years with major funding from the Government of Canada and include partnerships with IBM Canada.

ArcticNet – Canada

ArcticNet (www.arcticnet.ulaval.ca) is a Network of Centres of Excellence of Canada that brings together scientists and managers in the natural, human health and social sciences with their partners from Inuit organizations, northern communities, governments and the private sector to study the impacts of climate change and modernization in the coastal Canadian Arctic. Over 150 researchers and 1,000 graduate students, postdoctoral fellows, research associates, technicians and other specialists from 34 Canadian universities and numerous federal, provincial and

regional departments and agencies collaborate on 41 ArcticNet research projects with more than 150 partner organizations from 14 countries.

ArcticNet's multidisciplinary research effort is focused on addressing the challenges and opportunities facing the coastal Canadian Arctic, with the objective of filling identified knowledge gaps to help the formulation and implementation of policies and adaptation strategies.

Following a general Call for Proposals launched in late 2014, ArcticNet announced the funding of 41 new projects starting 1 April 2015 as part of the Network's Phase IV research program (2015-2018). The 41 projects focus on five main themes: marine systems; terrestrial systems; Inuit health, education and adaptation; northern policy and development; and knowledge transfer and operate across northern Manitoba, northern Yukon and the four Inuit regions of Canada (Inuvialuit Settlement Region, Nunavut, Nunavik and Nunatsiavut). These projects also contribute to four Integrated Regional Impact Studies (IRISes), each corresponding to one of the main political-physiographic-oceanographic regions of the coastal Canadian Arctic.

ArcticNet has deployed long-term oceanic observatories in the Canadian Arctic since 2002 to monitor changes to ecosystems and the services provided to local communities. These observatories, or oceanographic moorings, consist of lines anchored to the seafloor on which recording instruments are suspended at different depths. These instruments record current speed and direction, salinity, temperature, nutrients, chlorophyll and ambient noise including marine mammal vocalizations, and collect particles sinking from the surface layer of the ocean to the seafloor. The moorings are retrieved and redeployed yearly in order to collect a continuous record of data.

In 2014-2015, ArcticNet, with partners from Golder Associates Ltd., Fisheries and Oceans Canada-Institute of Ocean Sciences, the Canadian Coast Guard and Imperial Oil, received funding through the Environmental Studies Research Fund (ESRF) for its integrated Beaufort Observatory (iBO) project, a partnership aimed at maintaining and enhancing the monitoring of environmental conditions in the Beaufort Sea commenced under ArcticNet's marine observatories project funded through the multi-stakeholder Beaufort Regional Environmental Assessment. Over the next four years, the iBO project will collect a range of oceanographic data from moorings deployed in the Beaufort Sea using the CCGS Amundsen and CCGS Sir Wilfrid Laurier. Along with other ESRF-funded projects, the data from iBO will assist in decision-making related to oil and gas exploration and development on Canada's frontier lands.

SmartBay to SmartAtlantic – Canada

SmartBay (www.SmartBay.ca) is an initiative of the Centre for Applied Ocean Technology (CTec) of the Fisheries and Marine Institute of Memorial University of Newfoundland. SmartBay has provided continuous service to Placentia Bay, one of Canada's busiest tanker ports, since September 2006. In 2012, SmartBay was expanded to include Newfoundland ports of Port aux Basques, Corner Brook, Lewisporte and St. John's through a shared initiative of the Province of Newfoundland and Labrador and Transport Canada.

Since its inception SmartBay has evolved from both an applications and technology perspective to the extent that its role today is solidified as a source of valuable information in support of the safety and efficiency of maritime operations. Those involved in ensuring the safe and efficient movement of vessels in other areas of the country have taken notice. CTec in partnership with Halifax-based Institute for Ocean Research Enterprise (IORE) and in cooperation with the Canadian Marine Pilots' Association, Atlantic Pilotage Authority, port authorities and industry has recently extended the SmartBay model to the ports of Halifax, Nova Scotia and Saint John, New Brunswick under a SmartAtlantic Alliance banner – all built around the communications and technology architecture originally developed by CTec as part of the original SmartBay observing system.

The basic premise of SmartAtlantic is to integrate and deliver information created from both static and dynamic data in a manner best suited to the particular needs of a broad base of mariners and other users. The vision is "to provide simple access by all stakeholders to data and information in support of effective management and sustainable development of coastal ocean areas and the safety and security of life at sea." Accordingly, SmartAtlantic is a user-driven ocean observing system, serving the information needs of a broad base of users throughout Atlantic Canada; including the marine transportation sector, the oil industry, the fishing industry and the recreational community in support of better decision-making, whether that is from a safety, efficiency, situational awareness, policy or environmental perspective. The SmartAtlantic motto: "Better Information – Better Decisions."

SmartAtlantic infrastructure includes a combination of AXYS Technologies 3 meter and 1.7 meter meteorological/oceanographic buoys (Figure 11) strategically situated at seven locations around the island of Newfoundland and 3 meter buoys off Halifax and Saint John (Figure 12), all providing real-time meteorological and oceanographic data. Additional shore station data is provided for Holyrood, Newfoundland and for the Port of Halifax. Tidal and meteorological data is also collected within each of the Newfoundland ports. The data is accessible from the web as well as directly from the buoys via Aids to Navigation Information Systems (ATONiS).

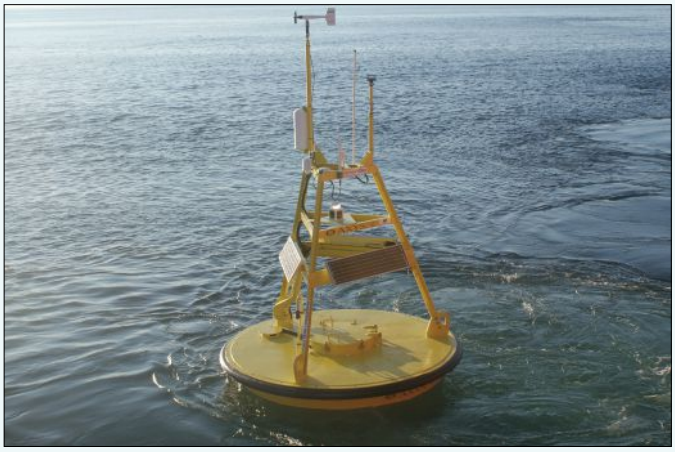

Figure 11. AXYS Buoy.

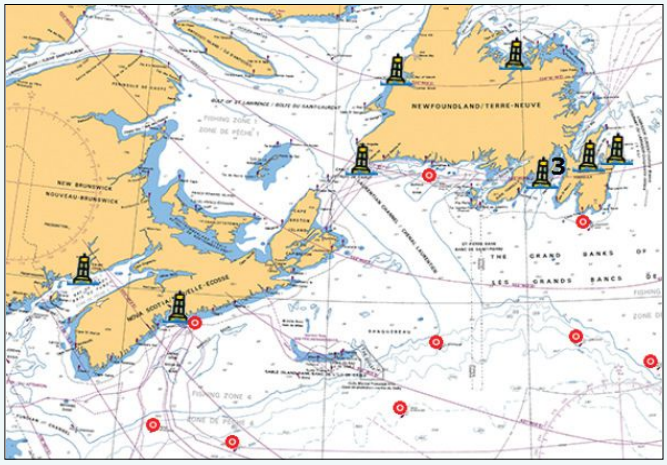

Figure 12. Monitoring locations.

For Placentia Bay, Halifax and Saint John, the buoy data supports daily custom regional forecasts and accompanying site-specific forecasts generated by SmartAtlantic Alliance industry partner AMEC Foster Wheeler Environment and Infrastructure. The buoy locations, near real-time data feeds and custom forecasts, along with a host of static information are readily accessible to all users via the SmartAtlantic web portal (www.SmartAtlantic.ca). In addition, Automatic Identification System (AIS) equipped vessels can access the data directly from the buoys via (ATONiS).

ASIA

DONET – Japan

DONET is a submarine cabled real-time seafloor observatory network for earthquake and associate tsunami monitoring (http://www.jamstec.go.jp/donet/e/index.html). Two independent networks are schedule to deploy to the hypo-central regions of megathrust earthquakes in western Japan. The original DONET development program began in 2006 and the observatory has been operational since 2011. An electric failure occurred in a science node in May 2014 and a replacement node was installed successfully in March 2015 (Figure 13). At this time the network is operating successfully.

The second system, DONET2, was modified from the original DONET for a large scale network (500 km length of backbone cable system with 7 science nodes and 32 observatories).

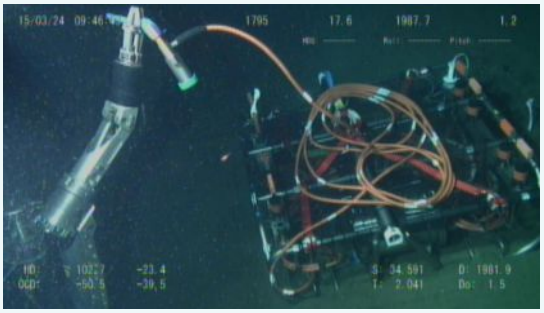

Figure 13. Replacement of a failed science node.

The system began development in 2010 and is currently being constructed. About half of the DONET2 system is complete as of the end of May 2015 and the rest should be completed and installed by 2016. Real-time, continuous data from DONET is transmitted to DONET Control Center located in JAMSTEC Yokohama Institute of Earth Science (YES) and is shared between the government enterprise and potential researchers worldwide (Figure 14).

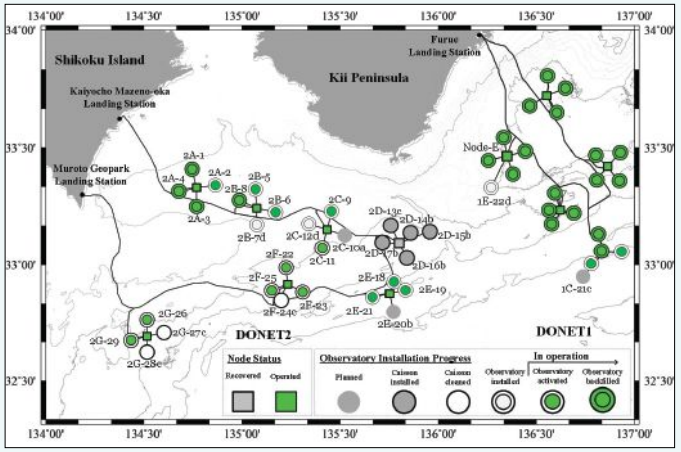

Figure 14. Management Status of DONET1 and DONET2 in May 2015.

Indian Ocean Observing Systems

Under the Ocean Observation Network program of the Ministry of Earth Sciences, National Institute of Ocean Technology (NIOT) has established the moored buoy network in the Indian Seas (Figure 15). Considering the importance of continuous measurements of data of high reliability and quality, which is of scientific relevance, optimal numbers of buoys are maintained at strategic locations in the Bay of Bengal (BoB) and Arabian Sea.

The Ocean Observing Systems (OOS) group has undertaken 18 Cruises and 3 field trips; 354 days of sailing covering a distance of approximately 31,000 nmi; 1,770 man-days for a completion of 93 operations at BoB, Arabian Sea and Arctic Ocean to maintain the moored buoy networks. Many technological challenges relevant to long-term working of components and integration have been successfully achieved. It is also to be noted that they have successfully developed Prakruti (Indigenous OMNI buoy system), which is the heart of the buoy system and has the facility to interface with all the buoy sensors allowing the programming of data collection, process, store and transmit in real-time via satellite to the data center. This unit needs to work autonomously in a hostile environment without any technical disruptions for long periods. After testing and trials, industry-developed units are functional and have been in operation since 2010. Presently all Met-Ocean buoy, Tsunami buoy and coastal buoy systems are equipped with the Indigenous Buoy Data Acquisition System. It has a facility to transmit data through INSAT, INMARSAT and GPRS. The coastal buoy systems are presently transmitting data through INSAT and GPRS.

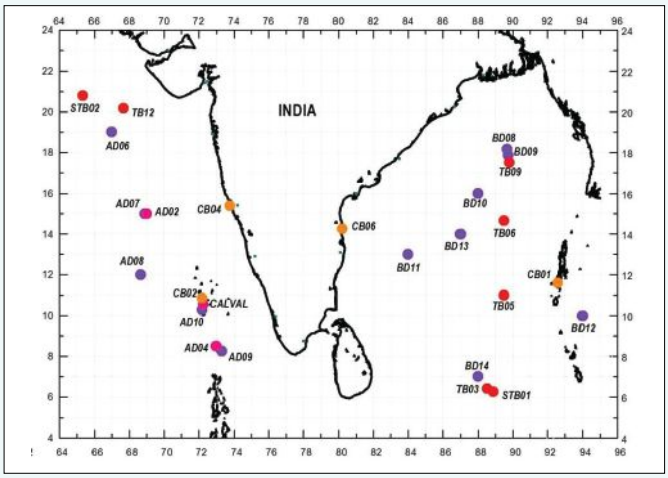

Figure 15. Indian Ocean Moored Buoy Network.

As a part of the developmental projects undertaken by OOS, second phase development of the laboratory scale AquaBot prototype with individually controlled pectoral fins for pitch control and a caudal fin for propulsion has been manufactured. Presently a fiber reinforced plastic outer hull is manufactured to give a hydrodynamic shape and fish like appearance. The prototype was tested to verify the behavior in salt water and sea conditions.

OOS, ESSO-NIOT and ESSO-NCAOR teams jointly achieved a milestone in the annals of Ocean Research on 23rd July 2014. The team became successful in establishing IndARC, the first Indian moored underwater observatory in Polar waters.

IndARC at Kongsfjorden, just 1,000 km away from North Pole basin, holds a suite of ten oceanographic sensors for measurement of temperature, salinity, current profiles and other vital parameters. Data obtained by IndARC would add impetus to the research on cause, impact and effect of climate variability from a regional to global perspective. This observatory was serviced in July 2015 with augmentation of additional sensors.

Updates on several ongoing projects are summarized here.

Sub-surface Data from the Mooring

The sub-surface data on salinity and temperature from the northern BoB location plays a major role in understanding the freshening of the bay during the southwest monsoon season, which in turn is related to rainfall received over the catchment area in northeastern and eastern India. The intense freshening is always associated with stratification and warming of the northern BoB. This region exhibits large inter-annual variability and even can determine the intensity of the post monsoon cyclone formed over the BoB. The Hudhud cyclone formed during 7-14, October 2014, passed very close to the BD13 buoy, which recorded the lowest pressure of 995 hPa. The severity of the cyclone was felt when the wind speed reached 21 m/s and upwelling cool sub-surface waters rose to the surface resulting in a reduction of sea surface temperature by 1.5^0C. The divergence of the waters away from the centre of the cyclone track was felt by the buoys on both sides of the cyclone track.

Another important characteristic of the Arabian Sea is the warming during the spring transition months and their inter-annual variability was studied with the help of the downwelling Rossby wave signals and barrier layer formation. The sub-surface data for temperature and salinity are very helpful for density calculations and thereby computing barrier layer thickness. The sub-surface current data with 5 m vertical resolution are very critical for computing the shear in the sub-surface levels in order to understand its downward propagation with time and peak periods. During 2014 the warming extended until May and was supported with the prolonged barrier layer advection. The intense turbulent mixing supported by high shear in the current speed with the high winds during southwest monsoon season interrupts the warming of the southeastern Arabian Sea.

'HUDHUD' Cyclone

A depression formed over north Andaman near latitude 12.3^0N and longitude 92.9^0E on 7th October 2014. It further intensified into a cyclonic storm on 8th October 2014 and moved in the west-northwestwards direction. The system crossed north of Andhra Pradesh and south of Odisha coast near Visakhapatnam around noon of October 12, 2014. Real-time data from moored buoys made the forecast more precise, which was well appreciated by local residents, thereby showing the importance of such an observation.

OMNI buoys deployed in the BoB have captured the signals of the Hudhud cyclone passage and the time series observations clearly exhibit the importance of the proximity of the location of the buoys to the cyclone track. The buoys BD12, CB01 and BD13 were closer to the track with the MET and surface observations showing its severity. Buoys BD11 and BD10 were within the cyclonic radius of influence and the signature of the cyclone passage were captured by these buoys too.

Indian Tsunami Buoy System

Tsunami buoys are also deployed and maintained at identified locations near geographical fault lines with an indigenous surface buoy system consisting of in-housed CPU and other components. From the feedback of OOS based on real-time performance at various locations the Tsunameter (BPR) was fine-tuned and the performance of the system is now satisfactory. Tsunameters are working at five locations and provide real-time water level data which is being disseminated to the Indian Early Tsunami Warning Centre at Hyderabad. NIOT Tsunami buoys have successfully reported 6 seismic events generated on the seabed and the data is being shared with the global community. Indian Tsunami buoy data is available at the NDBC-NOAA website (http://www.ndbc.noaa.gov/) for sharing with other warning centers and scientific communities. Currently, 7 Tsunami buoys systems are being maintained in the Northern Indian Ocean, of which 5 are from NIOT and 2 were deployed by SAIC (USA) with support of NIOT.

Indian OMNI Buoy System (Prakruti)

With the objective of self-reliance, the NIOT-OOS team initiated the process of indigenizing the OMNI buoy system. Subsequently, a prototype Indigenous OMNI buoy system was designed, developed, integrated and tested as per standard procedure. During the first trial the system was successfully deployed in Arabian Sea (AD-04) location in October 2013 and was successfully retrieved during July 2014. Plans for a second trial is in progress.

Automatic Identification System (AIS) for Buoy

A prototype passive monitoring system was developed in-house for marine applications. AIS (Automatic Identification System) was integrated onto a buoy system and successfully deployed at CB04 location. The system captures information on the vessels passing by the buoy location. The buoy operated satisfactorily for 146 continuous days. In the second phase of development it is planned to transmit information on vessels passing by in real-time to NIOT through GPRS / INSAT / INMARSAT telemetry.

Twin Mode Communication

As the complete tsunami buoy system is being indigenized, the Indian satellite (INSAT) technology is also proposed for telemetry of tsunami buoy data in real-time. This is a strategic plan for data security and cost reduction of transmitted data. There is limitation of using INSAT in tsunami mode so INMARSAT would be used for tsunami mode and INSAT for health monitoring (i.e. INSAT for normal mode and INMARSAT for event triggered mode). Buoy ITB03 was deployed with this facility on 18th August 2013 and has captured a tsunami event on 24th March 2014. This achievement greatly reduces the latency and ensures security of data with technology independence in addition to the cost advantage involved in the data transmission (via INMARSAT).

Integrated Marine Surveillance System

OOS of NIOT successfully developed technology for real-time measurements of oceanographic and meteorological parameters. One such development is the Integrated Marine Surveillance System (IMSS) for buoy surveillance. This was developed and deployed successfully off Goa on 24th May 2014. This system is capable of transmitting video data from the buoy location in real-time to share via 3G telemetry. IMSS is installed to monitor the sea state so as to correlate with the Ocean data. This was selected for National Research Development Corporation, Department of Science and Technology award under the title "Societal Innovation-2013".

INDO–US Project

The Ocean Mixing and Monsoon (OMM) Project is a collaborative program out of Earth System Science Organization (ESSO), India. Under this project, persistence of shallow stratification in the North BoB is critical for monsoon air-sea interaction. Six cruises have been undertaken involving US Research Vessel Roger Revelle and Indian Research Vessel Sagar Nidhi; one workshop at IISc Bangalore; one science meeting with 80 participants involving 30 young researchers / scientists at Chennai by NIOT; one WHOI scientist; and, the air-sea flux mooring was successfully deployed in December 2014. Further, more than 10,000 CTD profiles and 500 km of upper ocean ADCP current profiler data were collected. Additionally, the first direct telepoles measurement was conducted in BoB.

MoES – WHOI Collaboration

The Ministry of Earth Sciences (MoES) of the Republic of India and WHOI entered into a Letter of Intent (LOI) to encourage collaboration in the areas of mutual interest and benefit at National Institute of Ocean Technology (NIOT) Chennai on 23rd February 2015. The LOI was exchanged and signed by the Dr. Shailesh Nayak, Secretary for Ministry of Earth Sciences and Dr. Susan K Avery, President and Director for WHOI during the inauguration of International Symposium on Underwater Technology 2015 organized at NIOT. The key focus of this LOI will be to encourage joint research activities in areas of ocean science and technology, meteorology climate sciences, ocean life, polar systems, ocean resources and ocean circulation.

Indo-Japan and Other Collaboration in Ocean Observation

Ministry of Earth Sciences and Japan Agency for Marine Earth Science and Technology (JAMSTEC) have signed a LoI for technical cooperation including ocean observations. In the "Joint Statement of Prime Ministers of India and Japan", which was announced September 1st. 2014, "ocean technology and ocean observations" is listed in the Tokyo Declaration for Japan-India Special Strategic and Global Partnership, which is the "joint statement" between India and Japan during the visit of Honorable Prime Minister of India.

Dialogues have been initiated between India and Peru to conduct a bilateral workshop to identify various collaborative agencies from both countries. The objectives will be achieved by capacity-building on both sides through technology transfer and skill development and training. Delegates from South Africa visited NIOT and discussed on various aspects to identify areas for collaborative initiatives

OCEANIA

ALOHA Cabled Observatory – Hawaii

The ALOHA Cabled Observatory (ACO) is a general purpose "node" providing power, communications and timing connectivity for science use at Station ALOHA 100 km north of Oahu (Figure 16). Included are a suite of basic sensors making core measurements, some local and some sensing the water column. At 4,728 m deep, it is the deepest scientific outpost on the planet with power and Internet.

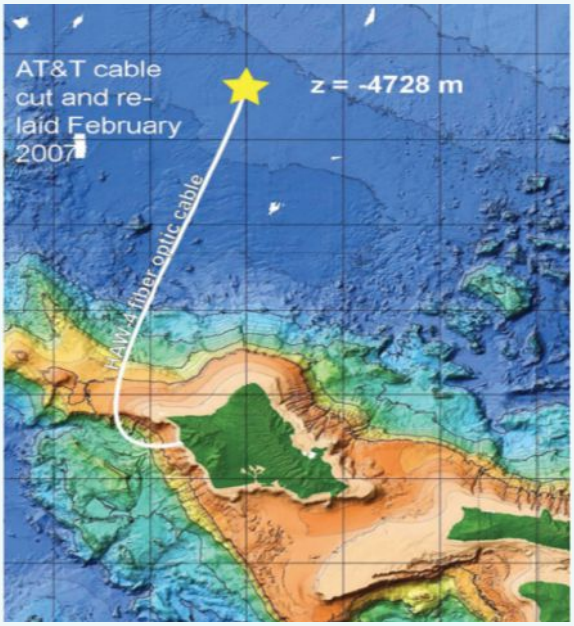

Figure 16. The ALOHA Cabled Observatory (ACO) is at Station ALOHA 100 km north of Oahu in 4,728 m water depth.

The NSF-funded project was started by Fred Duennebier, Roger Lukas, and Dave Karl in 2002. In 2007 the AT&T HAW-4 retired telecommunications cable was cut, one end was moved slightly and a 'proof module' hydrophone was attached. In June 2011, a general purpose 'node' was connected and the ACO and has been providing power (1,200 W), network communications (100 Mb/s) and timing (1 µs) to the seafloor node and instruments since. Last November, the equipment was serviced adding another camera and lights, and a basic sensor package (Figure 17). The observatory allows the capture of extremely rare episodic events, including biological activity (e.g., fish-shrimp interaction) and circulation dynamics (sudden 20 mK temperature changes). Station ALOHA is unique in the world for the combination of long-term world-class ocean sampling coupled with multitudes of short to long term process studies and other research.

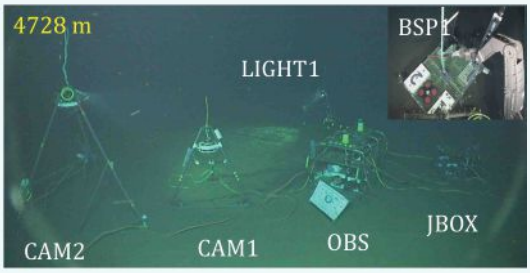

Figure 17. The current ACO configuration: BSP1 sits off to the right about 18 m; Jason is just about to cut floats above free. A banner with contributors is by the OBS (photos by Jason).

The new UH/SOEST ROV Lu'ukai will figure prominently in the coming years; this September more instruments will be added and ground faults and failed lights will be repaired. For more information about the ACO see the web page http://aco-ssds.soest.hawaii.edu/dataDisplay.php.

IMOS – Australia

Australia's Integrated Marine Observing System (IMOS), a national collaborative research infrastructure supported by Australian Government, is now in its 9th year of operation. IMOS has been routinely operating a wide range of observing equipment throughout Australia's coastal and open oceans, making all of its data accessible to the marine and climate science community, other stakeholders and users, and international collaborators.

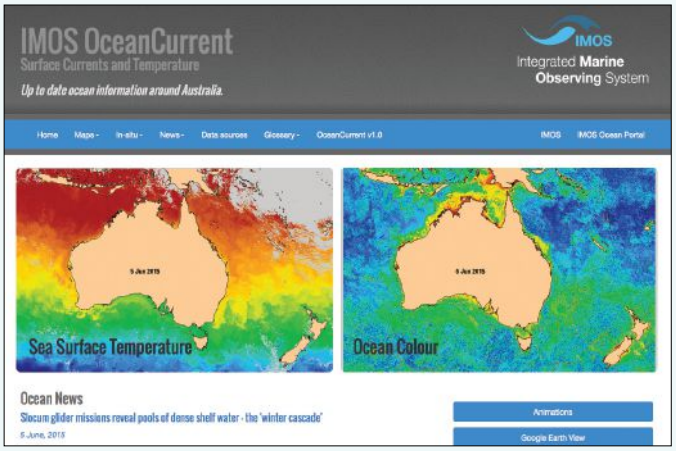

Figure 18. The new look IMOS OceanCurrent website.

All IMOS data is freely and openly available through the IMOS Ocean Portal, https://imos.aodn.org.au. The Ocean Portal was upgraded in 2014 and it now has a "faceted search" func-

tion, grouping similar types of measurements together. The site allows navigation through available IMOS datasets using comprehensive menus of parameters, organizations and collection platforms to narrow a search. Faceted menus group the free, online data collections into related, intuitive classifications that make it easy to pinpoint the desired data and to quickly see other related datasets of interest. The IMOS *OceanCurrent* website, http://oceancurrent.imos.org.au, produces daily maps of surface currents and temperature (Figure 18).

In July 2014 the Intergovernmental Oceanographic Commission (IOC) of UNESCO formally recognized IMOS as a Regional Alliance of the Global Ocean Observing System (GOOS). It acknowledged the accomplishments of IMOS and welcomed the intention of IMOS to serve regional needs in addition to national programs.

IMOS data has contributed to a database of hydrographic profiles from tagged elephant seals in the Southern Indian Ocean, outside the conventional areas of Argo autonomous floats and ship-based studies. By affixing satellite-linked CTD tags to wild elephant seals (Figure 19), researchers have built 75,000 temperature and salinity profiles since 2004, extending our knowledge of this key component of the Southern Ocean. This landmark dataset concentrated on the sector between the Kerguelen Islands and Prydz Bay and continues to grow through the coordinated efforts of French and Australian marine research teams.

Figure 19. Elephant seal tagged with a satellite-linked CTD (Photo courtesy Clive McMahon, SIMS).

IMOS hosted the second Australian Coastal and Oceans Modeling and Observations Workshop (ACOMO) in October 2014. The meeting supports the co-evolution and engagement between IMOS and the national coastal and ocean modeling capability. Themes explored were: modeling toolkits, shelf reanalysis requirements, biogeochemistry and developments in coastal modeling and observation.

Researchers aboard Australia's icebreaker Aurora Australis collected the first water samples alongside the Totten Glacier in early 2015. The samples discovered that warm ocean water is melting the largest glacier in East Antarctica from below. At 120 km long and more than 30 km wide the Totten Glacier is one of the world's largest and least understood glacial systems. It was thought that glaciers on the East Antarctic ice sheet were relatively immune to the kind of melting taking place on the much smaller West Antarctic ice sheet. But satellite data show that the Totten has been thinning faster than other glaciers in East Antarctica and until now the cause was unknown.

The team of 23 researchers and technicians on the Aurora Australis were from the Australian Antarctic Division, the Antarctic Climate and Ecosystems CRC, the University of Tasmania's Institute for Marine and Antarctic Studies and CSIRO Oceans and Atmosphere Flagship. The researchers used instruments such as autonomous floats and gliders, designed to sample the ocean beneath sea ice and traditional oceanographic tools like Conductivity, Temperature and Depth (CTD) profilers lowered from the ship. The data gathered from these instruments at the Totten Glacier will be used to assess how much ocean heat is available to melt the base of the Totten Glacier.

A highlight of the voyage was the successful recovery of US and Australian moorings on the sea bed for up to two years at six different locations adjacent to the Totten glacier (Figure 20). The Australian moorings are part of IMOS. The instruments were deployed by the US icebreaker Nathaniel B. Palmer and recovered by the Australian icebreaker Aurora Australis as part of an ongoing international collaboration. The mooring data will provide the first ocean measurements spanning the full year in this area, providing ocean observations of what happens during the long cold winter months when access to the region is impossible. The observations will be crucial for setting a benchmark that can be used to assess future change.

A comprehensive view of the world's oceans afforded by the global array of profiling Argo floats reveals the ongoing and steady rise of global climate system heat content. Although the rate of ocean heat gain during the past eight years is not unusual, a team of scientists, led by Dean Roemmich, of Scripps Institution of Oceanography, reported in the 2 February issue of Nature Climate Change that the rate and patterns of ocean heat gain are revealed over a period as short as eight years. Data from the Argo array (of which IMOS deploys 30 floats per annum) show that the warming signal extends to 2,000 m and deeper, and that it is occurring predominantly in the Southern Hemisphere ocean south of 20°S. The study puts a widely reported 'hiatus' in global surface air temperatures since 1998

into context by illustrating that the hiatus in warming of the sea surface and the lower atmosphere is not representative of the steady, continuing heat gain by the climate system.

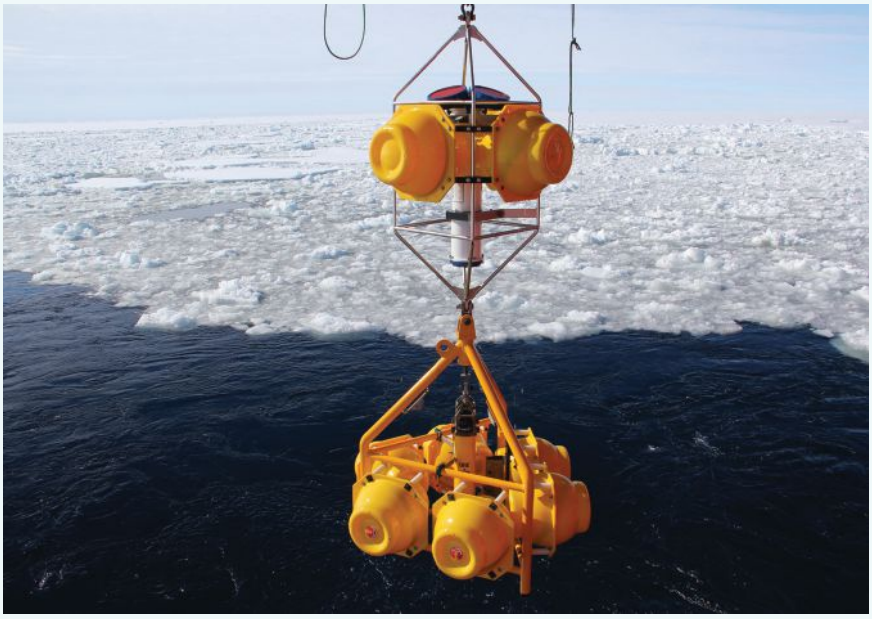

Figure 20. Deep water mooring at the Totten Glacier (Photo courtesy Steve Rintoul, CSIRO and ACE CRC).

In March, this year Australia's new National Marine Facility, the RV Investigator, redeployed three IMOS high-precision deep-water moorings in the Southern Ocean to monitor a large array of ocean properties including temperature, salinity, currents, waves, and biological activity, as well as atmospheric conditions. The largest mooring, the Southern Ocean Flux Station, measures the air-sea heat flux, building on IMOS observations at the site since 2008. Data on heat transfer are relayed back via satellite, where they can be viewed in near real-time on the IMOS data portal.

IMOS partners Antarctic Climate and Ecosystems Cooperative Research Centre and the Bureau of Meteorology led the voyage and will analyze data from the moorings as well as data collected via the vessel's new radar equipment. These data are already providing unprecedented insights into the ways that climate change is affecting the physical, chemical and biological properties of the Southern Ocean.

On the second Investigator voyage in May the research vessel redeployed the IMOS deep water moorings in the East Australian Current (EAC). The six large moorings measure the full-depth transport of the EAC, from the continental slope to the deep ocean off Brisbane. The collaboration between IMOS, CSIRO, and the Marine National Facility will enable the maintenance of multi-year monitoring of the current's average flow and how it varies over time.

The EAC shows variations over a range of timescales from seasonal to decadal. Much of what is known about the current has come from irregularly distributed observations collected over many decades. What is lacking is a sustained time-series of observations of the EAC across its entire extent and of sufficient duration to understand seasonal, inter-annual and decadal signals. The IMOS observations will provide significant new insights into the variable nature of the EAC.

The EAC has important implications for Australia's weather and climate. It is the dominant mechanism for the redistribution of tropical Pacific Ocean heat between the ocean and atmosphere in the Australian region. The waters in the Tasman Sea have warmed by more than 2°C, faster than other parts of the world's oceans. Western boundary current regions, such as the EAC system, are highly variable and linked to large-scale ocean changes. Monitoring the EAC therefore, provides information of the large-scale drivers of regional ocean change. These changes may result in subtropical marine species moving into temperate waters, altering the habitat of many species.

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

World's first dual-fuelled dredger to be powered by Wärtsilä

A new generation "Antigoon" class dredger, called "Scheldt River", being built by Royal IHC (IHC) in the Netherlands on behalf of the Belgium based DEME Group, is to be powered by Wärtsilä dual-fuel (DF) engines. This will be the first ever dredger to operate on engines capable of utilising either liquefied natural gas (LNG) or conventional marine fuels. The contract with Wärtsilä was signed in July.

The 104 m long vessel will have a hopper volume capacity of approximately 8,000 cu. m. The scope of supply includes one 12-cylinder and one 9-cylinder Wärtsilä 34DF engines, two Wärtsilä controllable pitch propellers and two transverse thrusters as well as the company's patented LNGPac gas supply and storage system.

"Wärtsilä's unmatched experience and extensive reference list in dual-fuel engine applications, plus our complete solutions portfolio, were key considerations in the award of this contract. We congratulate the shipyard and owners for taking the decision to have this new dredger become the first to be capable of using LNG or diesel fuel," says Lars Anderson, Vice President, Engine Sales, Wärtsilä Marine Solutions.

Jensen-designed LNG ATB receives "approval in principle" by ABS

A Jensen Maritime-designed, liquefied natural gas (LNG)-bunkering articulated tug-barge (ATB) has been granted "approval in principle" by classification society American Bureau of Shipping (ABS). The designation establishes that Jensen's vessel concept, which is classed as an A1 Liquefied Gas Tank Barge, is compliant in principle with ABS rules and guides.

Ideal for mobile bunkering, Jensen's ATB is also oceans rated, meaning that it is not limited to the intracoastal waterways, like many other similar types of LNG ATBs. This flexible design feature allows the vessel to facilitate the transfer and use of small-scale LNG in places with limited infrastructure, including offshore locations.

The ATB will be built with four 1,000-m^3 Type C LNG tanks (seven bar working pressure), enough LNG to fill up a large containership twice before having to replenish its own supply. This capacity, combined with flexible operational areas, makes it an ideal solution for a customer who has significant LNG needs at one or more ports not located near an LNG terminal.

The barge measures 360 ft x 60 ft x 35 ft, with a combined tug-and-barge length of 452 ft. The tug (under 500 GT US regulatory) features two GE 6L250 engines (Tier 3), each offering at least 2,035 HP, and two Rolls Royce 205 Z-drives, with a speed of 12 kts. The ATB will carry 30,800 gallons of fresh water and 90,100 gallons of ballast water and provides enough space for 12 crewmembers.

Safety features include a double hull, designed to help to protect the ATB's 4,000-gallon fuel tank, and firefighting capabilities. Classed as a firefighting vessel (FFV-1), the vessel is well equipped to handle emergencies on board and can satisfy most requirements to have at least one FFV-classed tug escorting LNG tankers into port. Finally, because there is no linkage between the tug and barge, the two can disconnect quickly in the event of emergency.

GE powers and propels next generation of UK Navy vessels

Building on GE's portfolio of proven technology in the naval market, GE Marine is now the chosen supplier to BAE Systems in providing the propulsion motors and drive system for the first three Type 26 Global Combat Ships for the UK Ministry of Defence (MOD). GE will supply its advanced and reliable electric power and propulsion solution which meets the demanding and varied operational requirements. In particular the equipment will meet a tough shock rating requirement and provide low noise performance.

Type 26 Global Combat Ships are multi-mission warships capable of joint and multinational operations across the full spectrum of warfare and defence, including complex combat operations, counter-piracy, and humanitarian and disaster relief work. Designed to be among the most advanced modern combat ships in the world, the Type 26 class is powered and propelled by GE technology.

Renovated Marion Dufresne II sets sail

The renowned French research vessel, Marion Dufresne II left Damen Shiprepair Dunkerque (part of Damen Shiprepair & Conversion) in northern France on 28 July having recently undergone sea trials and a complete renovation. Delivered on time, the oceanographic research vessel set sail for the Port of La Réunion where she will resume her logistic and scientific journey to the French Southern and Antarctic Lands.

"The excellent cooperation between the yard and the vessel's crew was important in this project's successful planning, coordination and execution. We rebuilt a large part of the vessel within 4 months to extend her life by 20 years. The client was satisfied with our performance, cooperation and the end result," explains Head of Marketing & Sales at Damen Shiprepair Dunkerque, Khalil Benjelloul.

Mr. Benjelloul sums up the work carried out by the yard. "We replaced the vessel's most important scientific apparatus, the multi-beam sonar. We scrapped the existing equipment, rebuilt the hull and installed a new gondola and control room. Furthermore we completely renewed the ILOT capstan, a system used to take sea water samples, and installed new equipment. The hull has been blasted and repainted as well as some of the ballast tanks. The vessel's accommodation areas have been redone in cooperation with the client's subcontractor, this included laboratory facilities used by IPEV scientists. Marion Dufresne II can accommodate 114 passengers or scientific researchers and 46 crew."

The multi-purpose vessel owned by French administration "Les Terres australes et antarctiques françaises" (TAAF) and managed by CMA CGM, supplies French southern islands 4 months a year, and carries out oceanographic research 217 days per year under the responsibility of the Institut Polaire Paul-Emile Victor (IPEV). Operating out of the Port of La Réunion, the vessel transports passengers and supplies to the French islands of the Indian Ocean and performs scientific works in all ocean conditions, but for iced covered. Marion Dufresne II is now returning to the French Southern and Antarctic Lands to continue her logistic work and scientific research.

Besides her research and scientific capabilities, this multi-purpose vessel has a heli-deck and can be used as a supply vessel to transport containers and fuel to remote areas.

For more information, visit www.damenshiprepair.com.

Workboat demand in offshore wind sector provides military benefits

Lessons learned from the prolific increase in building workboats for the offshore wind farm sector can benefit the military user, according to CTruk CEO Andy White.

Andy told the audience at a Royal Institute of Naval Architects conference entitled Warships 2015: Future Surface Vessels that developments in vessel design, construction and operation as a result of the demanding requirements of the offshore wind sector could translate to future procurement of military craft.

Because of budgetary pressures, naval customers were looking for substantial through-life savings in operating, training, maintenance and support of their craft. Craft built for the wind farm sector were already delivering those benefits, as evidenced by the performance of composite vessels from Essex-based CTruk, which has built nearly 30 boats for the sector.

A key element in delivering those savings was CTruk's unique flexible pod system which has enabled wind farm service operators to reconfigure boats for different roles.

"Procuring a platform to fulfil one task is now the exception rather than the norm. A modular philosophy and genuine ability for platforms to carry out multiple roles is appealing in a sector where reliability, maintainability, availability and durability (RAMD) are standard Key User Requirements," explained the CTruk CEO.

There was also synergy between the operational demands of boats used for the offshore wind sector and military requirements. Like the transport of technicians to offshore wind farms, military personnel required a high speed and comfortable transit; flexible payload capacity; good range and endurance; a stable platform; ability to operate in shallow inshore waters and disrupted sea states; maximum craft availability and minimum maintenance.

Catamaran, SWATH and SES (Surface Effect Ship) technology offered those capabilities, explained Andy, while the growing demand for composite craft in the wind farm industry underlined the advantages of this hull material.

For more information, visit www.ctruk.com.

All American Marine and UNH sign construction contract for new scientific research vessel

All American Marine, Inc.(AAM) together with the University of New Hampshire (UNH) are pleased to announce a contract for the design and construction of a new aluminum catamaran research vessel. All American Marine will build the 48 ft x 17 ft catamaran custom devised by Teknicraft Design, Ltd. of Auckland, New Zealand. The new vessel, funded through a grant from the NOAA will serve the Joint Hydrographic Center (JHC) at UNH. It will be joining the University's existing fleet and will complement capabilities by offering a highly complex multi-mission platform.

The aluminum hull will feature the Teknicraft Design signature hull shape with symmetrical bow, asymmetrical tunnel, and integrated wave piercer. Power for the propeller driven vessel will be provided by a pair of Cummins QSB 6.7 Tier 3 engines rated 250 mhp @ 2600 rpm and auxiliary power will be supplied via a Cummins Onan 21.5 kW generator. The suite of deck gear

includes a hydraulic A-frame, davit, scientific winch, side mount sonar strut, and moon pool with deployable sonar strut.

Inspiration for the vessel design comes from the success of NOAA's R/V Auk, built by AAM in 2006 and the 48 ft R/V David Folger built for Middlebury College in 2012. "We are honored to have the opportunity to build this new vessel for UNH. It is exciting to see that our early work with NOAA has helped establish All American Marine as a leader in the production of innovative aluminum research vessels and this new catamaran design promises to impress," remarked AAM's Vice President of Business Development, Joe Hudspeth. Delivery for the new boat is set for early 2016.

For more information, visit www.allamericanmarine.com.

IAI introduces an innovative robotic shipping container storage & handling system

Israel Aerospace Industries (IAI) is introducing the Robotic Container Management & Storage System (RCMS), an innovative autonomous solution for container management and storage in ports.

The RCMS is a revolutionary concept that offers a flexible and effective solution for minimizing storage operations. Containers are mounted on low-cost robotic carts that move on robotic elevators. The robotic carts and elevators increase throughput and enable optimal use of all available storage areas.

An advanced, state-of-the-art command and control center using algorithms developed by IAI provides constant, autonomous supervision augmented by human operators. IAI recently received a contract from Horizon 2020, the European Union's largest research and innovation program, to provide technological leadership for a consortium of ten companies.

IAI is focusing on converting defense systems and applications to commercial product lines. The RCMS system is an addition to IAI's growing line of robotic products.

Ran Braier, head of Commercial Robotics at IAI, said: "This revolutionary system will change the perception of transportation and storage methods used around the world. The RCMS is a sustainable and environmentally responsible system which is energy efficient and reduces greenhouse emissions. We look forward to additional cooperation projects and new opportunities for use of robotics in ports."

With worldwide container traffic expecting an annual increase of 4% by 2030, ports are facing challenges of an increasing number of containers and limited space, coupled with limited manpower and machinery that do not meet the market demand. The RCMS offers increased operational efficiency and significant cost savings. It can reduce up to 50% of the volume at a port and also lessens the need to drain the sea during port construction, the cost of which is estimated at hundreds of millions of dollars. Containers can be loaded and unloaded 1.5 times faster than they are currently. This system has the option of cancelling the shuffling (or rearrangement) of the containers, which reduces profits and hinders the loading and unloading process.

For more information, visit www.iai.co.il.

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Bioluminescence and vision on the deep seafloor

From 14 to 27 July 2015, scientists used their combined expertise in bioluminescence, taxonomy, visual ecology, imaging and molecular biology, together with the unique collecting capabilities and camera systems of the remotely operated vehicle, the Global Explorer, to continue studies of the deep-sea benthic environment in the Gulf of Mexico.

Despite some frustrations along the way, the expedition was a tremendous success, with several findings and plenty of specimens and data to comb through to reveal even more discoveries.

They also used some advanced hi-tech equipment, such as the Deep Sea Systems Global Explorer ROV and the Medusa lander, which is an upgrade of the Eye-in-the-Sea (EITS) system that gave the researchers phenomenal footage of deep-sea animals in their natural environments on previous expeditions. Unfortunately, despite several mechanisms to bring it back to the surface, Medusa didn't return from its second deployment. If it stays missing, scientist will go looking for the lander on the seafloor.

In 2009, on an expedition funded by the NOAA Office of Ocean Exploration and Research (OER) to the Bahamas, a team of scientists explored the deep-sea benthic environment and looked for new sources of bioluminescence.

Bioluminescence is biologically produced light. While it is relatively rare on land, it is very common in the oceans, at least in the pelagic zone (the water column), where 80% of the animals that live between 200 and 1,000 m are bioluminescent.

"We were expecting similar results from the benthic zone (the ocean bottom), and were surprised to find that fewer than 20% of the species that we collected from the bottom were bioluminescent. However, this was the first systematic survey of bioluminescence in deep-sea benthic species, so this lack of bioluminescence may be specific to this location, and not a universal phenomenon," says Tamara Frank of the Halmos College of Natural Sciences and Oceanography, Nova Southeastern University.

In 2015, in order to see whether benthic bioluminescence really is that much more rare than pelagic bioluminescence, on he scientists did similar studies at several sites in a completely different location – the Gulf of Mexico. They also took a close look at bioluminescent interactions, and the vision capabilities of deal-sea isopods.

New study provides insight on the formation and fate of internal waves

A scientific research team spent seven years tracking the movements of skyscraper-high waves in the South China Sea. University of Miami (UM) Rosenstiel School of Marine and Atmospheric Science scientists were part of the collaborative international field study trying to understand how these waves, which rarely break the ocean surface, develop, move and dissipate underwater.

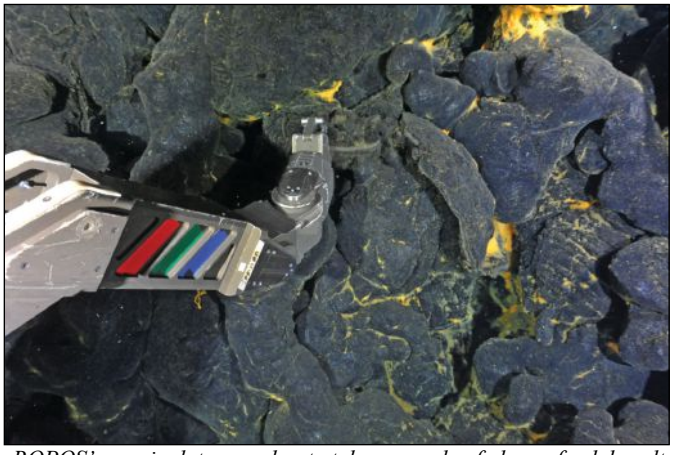
These waves, known as internal waves, occur in all the oceans, as well as in lakes and fjords. In the Luzon Strait, between Taiwan and the Philippine island of Luzon, they can reach up to 170 m (558 ft) tall and travel several hundred km, making them some of the largest waves in the world.

Using satellite imagery collected at UM's Center for Southeastern Tropical Remote Sensing (CSTARS), scientists were able to detect and track them from above. The team discovered that internal waves are generated daily from internal tides, which also occur below the ocean surface, and grow larger as the water is pushed westward through the Luzon Strait into the South China Sea.

"The internal wave produces a current that organizes the ripples on the surface, which are picked up by the radar satellite," said study co-author Hans Graber, a UM Rosenstiel School professor of ocean sciences and director of CSTARS. "This allows us to study how these waves, which largely go unnoticed at the surface, propagate and move."

Tracking internal waves from start to finish helps scientists understand these waves for a number of reasons. They move huge volumes of heat, salt, and nutrient rich-water, which are important to fish, industrial fishing operations and the global climate. In addition, they are important to monitor for safe submarine operations.

OOI team first to see 24 April 2015 eruption of axial seamount



ROPOS's manipulator reaches to take a sample of glassy, fresh basalt from the 2015 eruption. Orange bacterial mats coat the crevices. (Credit: NSF-OOI/UW/ROPOS; V15)

At 7:33 p.m. PST on 26 July 2015, after descending ~1,840 m beneath the oceans surface, the remotely operated vehicle ROPOS and the University of Washington Ocean Observatories Initiative (OOI) Cabled Array team set first eyes on the April 24th, 2015 voluminous eruption of Axial Seamount during the VISIONS' 15 cruise. Within two minutes of reaching the seafloor, fresh bulbous pillow flows on top of older flows were encountered.

ROPOS slowly ascended the huge mound of glassy basalts, which had cascaded down from a 30° slope above. Spectacular, twisted tubular forms marked the face of the lava flow. From the toe of the eruption, the ROV ascended 90 m (295 ft) up its face, before reaching the summit of this massive flow that reaches 670 m across at its thickest point. A prior bathymetric survey of this area shows that the eruption extends ~ 7 km along the northern rift zone of Axial Seamount.

At the flow summit, ROPOS drove through a 'blizzard' of white flocculant material issued from small crevices between pillow flows, where water temperatures reached up to 18°C. Methane and sulfur-utilizing organisms, thriving within voids beneath the new lava flow, likely generated this material. Perhaps most impressive were thick orange mats of bacteria that completely coat broad expanses of this three month old flow.

The 24 April eruption was detected in real-time by seismometers, hydrophones and pressure-tilt instruments on the summit of the volcano as part of the OOI Cabled Array infrastructure. Indeed, over an ~24 hr period, the instruments streaming live data back to shore detected ~8,000 earthquakes, a drop in the seafloor of 2.4 m, and acoustic signals reminiscent of underwater explosions.

For more information, visit www.oceanobservatories.org.

Whale research takes flight

A research team has successfully demonstrated a new non-invasive tool to obtain hard-to-get health measurements of large endangered whales in the wild: Using a small remote-controlled hexacopter, scientists for the first time collected both breath samples from the whales' spouts combined with aerial photos of their body condition.

With breath samples, scientists can analyze whales' DNA, hormones, and bacteria for things such as family history, stress levels, and health. The high-resolution photos provide researchers with a way to assess general health and body condition such as fat level and skin lesions.

Scientists at Woods Hole Oceanographic Institution (WHOI) and the National Oceanic and Atmospheric Administration (NOAA) used the small (32-in. diameter), 6-rotor hexacopter in an experiment in July 2015 on humpback whales in Stellwagen Bank National Marine Sanctuary off New England. Rigged with a specialized camera system, the unmanned airborne vehicle flew 125 to 150 ft above sea level to get full-body photographs of 36 animals. It swooped down to 10 ft above seal level to collect 20 breath samples from 16 whales.

The breath samples will be analyzed to find the assemblage of microorganisms in the whales' respiratory tracts, the most common source of cetacean disease. The scientists plan to use the hexacopter next winter to collect breath samples from the same whale species living near the Antarctic Peninsula. They will compare the samples from animals living in relatively pristine conditions there with those from animals in Stellwagen, which has more ship traffic, fishing, and pollution. Dr. Moore suggested "this will give us a new understanding of the relationship between whale body condition and health in the context of habitat quality."

For more information, visit www.whoi.edu.

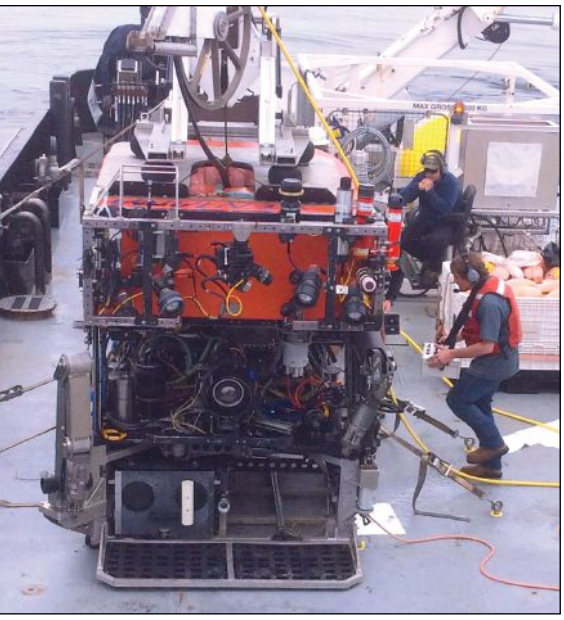
Greensea upgrades MBARI ROV

Greensea, a world leader in automation and navigation for unmanned underwater vehicles, announces the completion of its control system upgrade for Ventana, Monterey Bay Aquarium Research Institute's (MBARI) work class ROV. The 1,850-m rated vehicle received a new software platform that supports advanced automation and control for the vehicle. Integrated station keeping is just one of Greensea's technology features that excites MBARI's ROV crew.

"Being able to put the vehicle in station keeping, it will just stay where it is and we don't have to worry about drifting around and banging into things when the visibility is poor, " said Craig Dawe, Technical Support Manager and Chief Ventana Pilot. "It also allows us to do manipulation without actually sitting down on the sea floor. The fine control that we experienced with the vehicle with the Greensea system is good. We're pleased with the performance."

Ventana successfully completed mid-water and benthic collections in the first operational days after the upgrade, and plans to follow up with a cable survey. Dawe explained that such a task will be exponentially easier with Greensea's integrated waypoint following. "You just enter your end points and your start points and away you go, as opposed to having [programmers] write a whole bunch of control code, do this and do that, integrate the DVL," he said. "Every time we did it [in the past] was a big effort, so having it integrated is a big advantage for us."

Marybeth Gilliam, Greensea's chief marketing officer and VP of sales, notes the new technology will help unify the scientific community. "We appreciate the importance of underwater exploration and work hard to support our science and



academic partners with the most innovative and reliable technology in the industry. Our goal is to create a single technology platform for scientists to communicate and share data, and this integration is another big step in that direction."

For more information, visit www.greenseainc.com.

2015 Gulf of Mexico dead zone above average

Scientists have found this year's Gulf of Mexico dead zone–an area of low to no oxygen that can kill fish and marine life–is, at 6,474 sq. mi, above average in size and larger than forecast by NOAA in June. The larger than expected forecast was caused by heavy June rains throughout the Mississippi River watershed.

The measured size this year–an area about the size of Connecticut and Rhode Island combined–is larger than the 5,052 sq. mi measured last year, indicating that nutrients from the Mississippi River watershed are continuing to affect the nation's coastal resources and habitats in the Gulf. The size is larger than the Gulf of Mexico / Mississippi River Watershed Nutrient Task Force (Hypoxia Task Force) target of 1,900 sq. mi.

"Dead zones," also called hypoxia areas, are caused by nutrient runoff from agricultural and other human activities in the watershed and are highly affected by river discharge and nitrogen loads. These nutrients stimulate an overgrowth of algae that sinks, decomposes, and consumes the oxygen needed to support life in the Gulf. Dead zones are a major water quality issue with an estimated total of more than 550 occurring annually worldwide. The Gulf of Mexico dead zone is the second largest human-caused hypoxic area in the world.

"An average area was expected because the Mississippi River discharge levels and associated nutrient data from May indicated an average delivery of nutrients during this critical month which stimulates the fuel for the mid-summer dead zone," said Nancy Rabalais, Ph.D. executive director of the Louisiana Universities Marine Consortium (LUMCON), who led the 28 July to 3 August survey cruise. A suite of NOAA-sponsored models forecasted a range of 4,633 to 5,985 sq. mi based on May nitrogen loading data provided by USGS. "Since the models are based largely on the May nitrogen loads from the Mississippi River, the heavy rains that came in June with additional nitrogen and even higher river discharges in July are the possible explanations for the larger size," said Rabalais.

For more information, visit www.noaanews.noaa.gov.

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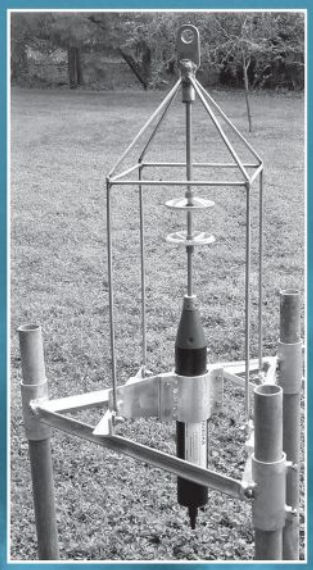
MAVS-4WTG	•	•	•	•	•	•	Directional Wave/Tide
MAVS-4LAB	•				•		For Flume or Lab Tank
MAVS-4Analog	•	•	•	•	•	•	4 Chan Analog Output



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European funding brings ZephIR 300 wind lidar to Malta

The University of Malta has successfully brought wind lidar technology to the country, with funding from an EU Project. The industry's single most validated wind lidar, ZephIR 300, will be utilised by the University to assist with Degree program course delivery and further research within the academic communities based at the University. Furthermore, the high-resolution 50Hz wind data will aid in the prospecting of coastal wind resources.

The University of Malta looks for the highest quality in all instrumentation in terms of accuracy, reliability and also technical support. The ZephIR 300 has been assessed and accepted to deliver against this strict criteria. Following a successful tendering process, and with the support of EU Funding, the University of Malta can now bring wind lidar to Malta for research opportunities that will benefit the Island over. Further, the introduction of wind lidar to Malta ensures engineers and scientists of tomorrow's world will start their adventure with ZephIR 300 wind lidar technology as the core.

ZephIR 300, a continuous wave (CW) wind lidar, provides high resolution measurements at an unmatched data rate of 50Hz, with up to 50 points per second measured in the free space targeted by the sensor, and chosen by the user, anywhere from 10 m (33 ft) up to 200 m (656 ft).This type of CW wind lidar gives very accurate measurements of the wind speed, direction and other wind characteristics including Turbulence Intensity (TI).ZephIR 300 is also the single most validated wind lidar at a consistent IEC compliant met mast site.

For more information please visit www.zephirlidar.com.

Tocardo merges with Mosscliff to form MT Tidal Ltd.

Tocardo International BV, producer of tidal and free-flow water turbines, has reached an agreement with Mosscliff Environmental to create a new company in the renewable energy market – MT Tidal Ltd.

MT Tidal involves the merger of Tocardo International's UK business, Tocardo Tidal Energy Ltd, with elements of Mosscliff Environmental Ltd – a UK market leader in the supply and installation of renewable energy systems, including wind turbines, solar PV and biomass boilers.

MT Tidal will be jointly owned by Mosscliff Environmental Ltd and Tocardo International B.V – both of which will continue to trade separately. The new company will be based in the UK, but will compete on the international market. It will be led by CEO Paul Morris – who formerly headed Tocardo Tidal Energy Ltd in the UK – with Jon Bell from Mosscliff Environmental taking the role of Project Director. Starting with six employees, MT Tidal has already attracted significant backing – with $200 million raised from private and institutional investors.

As well as combining Tocardo's expertise in tidal turbines with Mosscliff's track record in wind, solar and biomass, MT Tidal will also have a distinctive offer in renewable energy project development. Mosscliff is already highly experienced in project development, which entails identifying and exploiting suitable sites for renewable energy installations. Tocardo has been keen to build on its manufacturing capability by extending into this fast-growing area, identifying and managing turn-key projects that can utilize its proven technology.

Block Island Wind Farm completes first "steel in the water"

In an historic moment for the American offshore wind industry, the Block Island Wind Farm has reached its "steel in the water" milestone with the installation of the first wind farm foundation component.

Deepwater Wind's offshore foundation installation contractor set the first, 400-ton steel jacket on the sea floor on 26 July, at the wind farm site, roughly three miles off the Block Island, Rhode Island coast. A joint venture between Weeks Marine and Manson Construction is serving as Deepwater Wind's offshore foundation installation contractor.

Deepwater Wind's leaders were joined by Rhode Island Governor Gina M. Raimondo, U.S. Secretary of the Interior Sally Jewell, U.S. Bureau of Ocean Energy Management Director Abigail Ross Hopper, the state's Congressional delegation, and more than a hundred other elected officials, leaders of national environmental advocacy organizations, federal and state regulators, Block Islanders and project supporters to celebrate the milestone during a ferry tour of the offshore construction site.

"We know the world is watching closely what we do here, and we're incredibly proud to be at the forefront of a new American clean-tech industry launching right here in the Ocean State," said CEO Jeffrey Grybowski. "This moment has been years in the making – and it's just the start of something very big."

This first of five foundation installations kicks off a busy construction period for the 30-MW Block Island Wind Farm. During the roughly eight-week construction period this summer, more than a dozen construction and transport barges, tugboats, crew ships and monitoring vessels will be active at the offshore construction site.

For more information, visit www.dwwind.com.

Europe's industry unites behind a common strategy

Ocean Energy Europe, the industry group for ocean renewable energy in Europe, exceeded 100 members recently, when Wavepower, Marine Power Systems and Mojo Maritime joined as members. They join a growing list of industry representatives uniting behind a common plan for industrializing the ocean energy sector.

"The sharp increase in membership over the past years is indicative of the importance of industrial collaboration and the role the EU can play in securing the sector's future" said Rob Stevenson, President of Ocean Energy Europe.

Formerly the European Ocean Energy Association, the industry group was re-launched as Ocean Energy Europe in 2013, with the aim of positioning ocean energy as an emerging mainstream energy production technology, which will be essential to meet the EU's climate and energy objectives. The results of this strategy have been indisputable: the sector's profile has increased significantly, and EU support has increased accordingly.

"We are very pleased with the mandate the industry has given us to represent its interests across Europe. Industrializing ocean energy will be a European success story, but the industry needs to work together to make this happen. With the right support, we are confident that ocean energy can provide over 10% of Europe's electricity by 2050," concluded Stevenson.

Since 2013, membership of Ocean Energy Europe has increased by 65% and today it is the largest global network of ocean energy professionals in the world.

For more information, visit www.oceanenergy-europe.eu.

Danish Energy Agency opens test scheme for offshore wind technology

The Danish Energy Agency (DEA) has opened calls for applications for a test scheme of 50 MW for the test and demonstration of new offshore wind technology. The test scheme, which is a part of the Danish energy agreement from 2012, aims at the development of new and innovative wind turbine projects which have the potential to reduce the production costs of electricity from offshore wind turbines. Reduction of the production costs has been in the recent years, one of the main focuses of the industry.

The deadline for applications is 15 October 2015 and the first commitments are expected to be assigned by the DEA within the end of the year. As a part of the evaluation of the applications, the DEA will rely on evaluations from independent experts.

The projects will be rated on their development potential as well as on their potential to lead to real cost reductions in the market. Projects, which are assessed to have the overall largest effect on the possibilities to reduce the cost of offshore wind farms, will be granted the aid.

The test scheme, which is as a part of the Danish energy agreement about the near shore wind power projects, was agreed in November 2012 by the parliament.

The offshore wind turbines that will be installed under the scheme gets a fixed aid of DKK 0.70 per kWh for a production corresponding to 50,000 full load hours.

The pool has been implemented in the Promotion of Renewable Energy Act in spring 2013. In December 2014, the DEA received a state aid approval from the European Commission.

For more information, visit www.ens.dk.

Delta Marine working off Grimsby for 'Big 6' energy companies

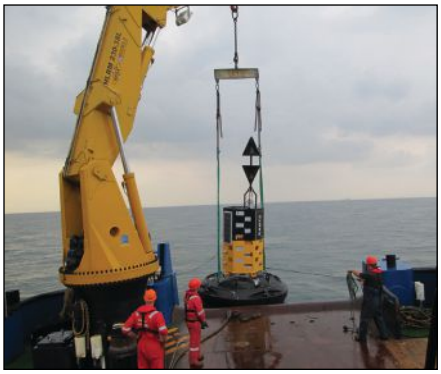
Delta Marine's vessel Whalsa Lass has demonstrated its versatility during recently completed works on the large windfarm off the coast of Grimsby UK for one of the 'Big 6' energy contractors.

The windfarm consists of 73 Vesta V112 3-MW turbines located in water depths of some 15 m and is now providing electricity sufficient to power up to 170,000 homes.

When the Shetland based operator chartered its Damen 2611 Multicat for a basic remit to serve as anchor handler for the cable laying vessel it had no idea what further scope of services the vessel would be called upon to perform.

Work started with Whalsa Lass handling a six by 7.5 tonne delta flipper anchor spread for the cable lay vessel, with the anchors pre-laid and the Multicat hooking up to cable lay vessel wires in up to 3 kts of tide. Soon Whalsa Lass was delivering water and provisions to other project vessels within the 25 sq/km work area. She was then conducting cardinal buoy inspections, retrieving and returning them to shore for maintenance and subsequently redeploying them.

She was called upon for the delivery of cable protection systems and the deployment of rock bags over cables in shallow water, deploying a 4 tonne bag every 14 min. She could be equipped as a dive support platform, with a full dive spread encompassing decompression chamber, welfare, quads, a dive shack and three point mooring, all while still conducting anchor handling duties with the dive spread onboard. This allowed her to work with the divers moving boulders clear of the cable lay route. A full ROV spread was also brought onboard, with a 20 ft ROV container, control shack, provision of 120A power from ship's generators and three point mooring, again whilst concurrently still anchor handling. Also performed were PLGR works, dragging a grapple train along the cable route checking for other obstructions which could affect the subsequent cable lay.



Delta Marine created method statements, risk assessments and storyboards for all the above tasks, reducing the workload for the client's management and minimizing delay to works proceeding. Delta sourced all rigging and anchors, replaced all worn or damaged components and provided a weekly inventory to the client detailing the location and condition of each individual component. Delta even extended the push knees at Whalsa Lass's bow, allowing crew transfer vessels to push on for optimized safe passage of project personnel whilst on site.

For more information, visit www.delta-marine.co.uk.

UK is market leader in tidal energy solutions

The growing emphasis on renewable and carbon neutral energy generation has pushed tidal energy into the spotlight. Tidal energy being more reliable than wave energy has a few operational plants with substantial capacity across the globe. New, experimental concepts such as dynamic tidal power, which enable production even in low-tide regions, possess the potential to disrupt existing technologies and make tidal power a key energy resource.

New analysis from Frost & Sullivan, Tidal Energy: Current Status and Future Outlook, finds that the UK is the frontrunner in the development of newer tidal energy solutions buoyed by an ideal tidal pattern and a supportive regulatory scenario. Canada, China and South Korea are also showing steady progress. The U.S. is one of the top innovators.

"The success of smaller demonstration plants will propel the immediate adoption of tidal stream and tidal barrage technologies," said Technical Insights Research Analyst Lekshmy Ravi. "The deployment of hybrid energy systems consisting of a combination of tidal and offshore wind energy seems probable in the long term."

Although the basic technology of tidal energy is similar to that of wind turbines, the harsh conditions of the ocean multiply the issues faced during operation. Hence, parameters such as material strength, performance, maintenance and lifespan of tidal converters are aspects that research and development (R&D) efforts must address. Low capacity factor and high costs are further drawbacks.

The setting up of R&D centers and funding institutions dedicated to the cause of tidal energy generation will be crucial to speed up advancements. For example, the Fundy Ocean Research Centre for Energy (FORCE) is a main driver for the progress of in-stream tidal energy in Canada.

For more information, visit www.frost.com.

European offshore wind sets record in first half of 2015

In the first six months of 2015, the European offshore wind industry installed more new capacity than in any other year on record as several projects reached completion and deployment of larger turbines increased.

Installations in the first half of 2015 touched 2,342.9 MW - tripling the grid-connected capacity for the same period last year. As a result, total installed offshore wind capacity in Europe hit 10,393.6 MW in 82 wind farms across 11 countries.

Kristian Ruby, Chief Policy Officer at the European Wind Energy Association, said, "It has taken the offshore wind industry just six months to set the best year the sector has ever seen in terms of installed capacity. While this clearly shows a commitment to offshore wind development in Europe, a number of completed projects, explosive growth in Germany and the use of higher capacity wind turbines are major contributors to these numbers."

With 584 wind turbines fully grid connected in the first half of 2015, the average machine size rose to 4.2 MW from 3.5 MW a year earlier as manufacturers continue to develop larger models with higher energy capture.

Ruby added, "To ensure healthy growth in the coming years, and to guarantee offshore wind energy plays its role in meeting the EU's competitiveness, security and decarbonization objectives, the industry needs long-term visibility. Strong reforms to the operation of Europe's electricity market and much-needed upgrades to infrastructure to help the integration of wind energy must be a priority. It is also critical that Member States meet renewable energy commitments toward the end of this decade and set out a clear game plan to meet Europe's 2030 targets."

For more information, visit www.ewea.org.

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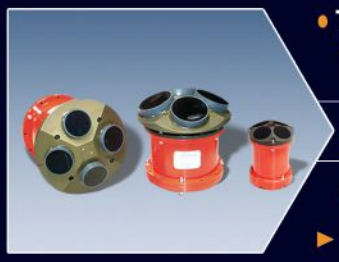

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Ocean Aero signs multi-million dollar deal with Department of Defense

Ocean Aero announced that it signed a multi-million dollar two-year contract with the Department of Defense under the Rapid Innovation Fund (DoD RIF) program. Ocean Aero was selected to create a prototype long range unmanned underwater and surface vessel, similar to their current Submaran model. This contract is the result of a year of developing this exclusive concept, drafting and writing the proposal, as well as negotiating the contract with the DoD.

The Department of Dod RIF was created to implement small business technologies into programs designed for national security needs. RIF issued a Broad Agency Announcement (BAA) early last year looking for firms who had the ability to produce a "long range, high endurance hybrid unmanned underwater/surface vehicle that can transit for long, open ocean distances on the surface with a relatively low signature and then submerge to avoid surface traffic; and conduct intelligence, surveillance, and reconnaissance (ISR) operations."

CEO and President, Eric Patten, noted the magnitude and value this contract to the local San Diego business, "We are very excited about this opportunity to grow as a company and demonstrate how valuable the Submaran is to major organizations around the world. This contract further validates that our team is on the right path with our technology and vision."

For more information, visit www.oceanaero.us.

HII awarded $564M contract for submarine engineering and industrial work

Huntington Ingalls Industries announced that its Newport News Shipbuilding division was awarded a $106 million contract to provide engineering and industrial support on U.S. Navy submarines, special mission submersibles, submarine support facilities and related programs. If all options are exercised, the total value of the contract will be $564 million.

Work will include engineering, design, configuration management, integrated logistic support, database management, research and development, modernization and industrial support. Work will begin immediately and is expected to continue through September 2019.

Newport News is one of only two U.S. shipyards capable of building nuclear-powered submarines and has completed hundreds of ship repair projects for the U.S. government, ranging from paint repair to complete hull and machinery renovation.

Safe Boats International awarded $17M for partrol boats

Safe Boats International LLC, Bremerton, Washington, is being awarded a $17,777,307 modification to previously awarded firm-fixed-price contract (N00024-14-C-2230) to exercise an option for the purchase of two MK VI patrol boats. The option is for the construction and delivery of two MK VI patrol boats (PB) complete with basic boat equipment.

The MK VI PB is the Navy's next generation patrol boat and will become a part of the Navy Expeditionary Combat Command's fleet of combatant craft. The MK VI PB's mission is to provide operational commanders a capability to patrol shallow littoral areas beyond sheltered harbors and bays, and into less sheltered open water out to the departure sea area for the purpose of force protection of friendly and coalition forces and critical infrastructure.

Work will be performed in Tacoma, Washington (82%); Kent, Washington (7%); Wichita, Kansas (6%); New Zealand (3%); and various locations of less than one percent each, totaling two percent, and is expected to be completed by March 2018. Fiscal 2015 National Guard and Reserve Equipment Appropriation funding in the amount of $17,777,307 will be obligated at time of award and will not expire at the end of the current fiscal year. The Naval Sea Systems Command, Washington, District of Columbia, is the contracting activity.

US Navy launches AUV from submerged sub

The USS North Dakota (SSN 784) returned to its homeport at U.S. Naval Submarine Base, New London, Connecticut, on 20 July after conducting groundbreaking operations in the Mediterranean Sea.

Under the command of Capt. Douglas Gordon, the ship finished its first-ever mission by deploying and retrieving a Remus 600 from the ship's dry deck shelter (DDS) in an operational environment. The seven-week mission was conducted prior to completing the ship's post shakedown availability (PSA), joining a small group of Virginia-class submarines to accomplish the feat. Others have been the USS Virginia (SSN 774), USS Hawaii (SSN 776) and USS New Hampshire (SSN 778).

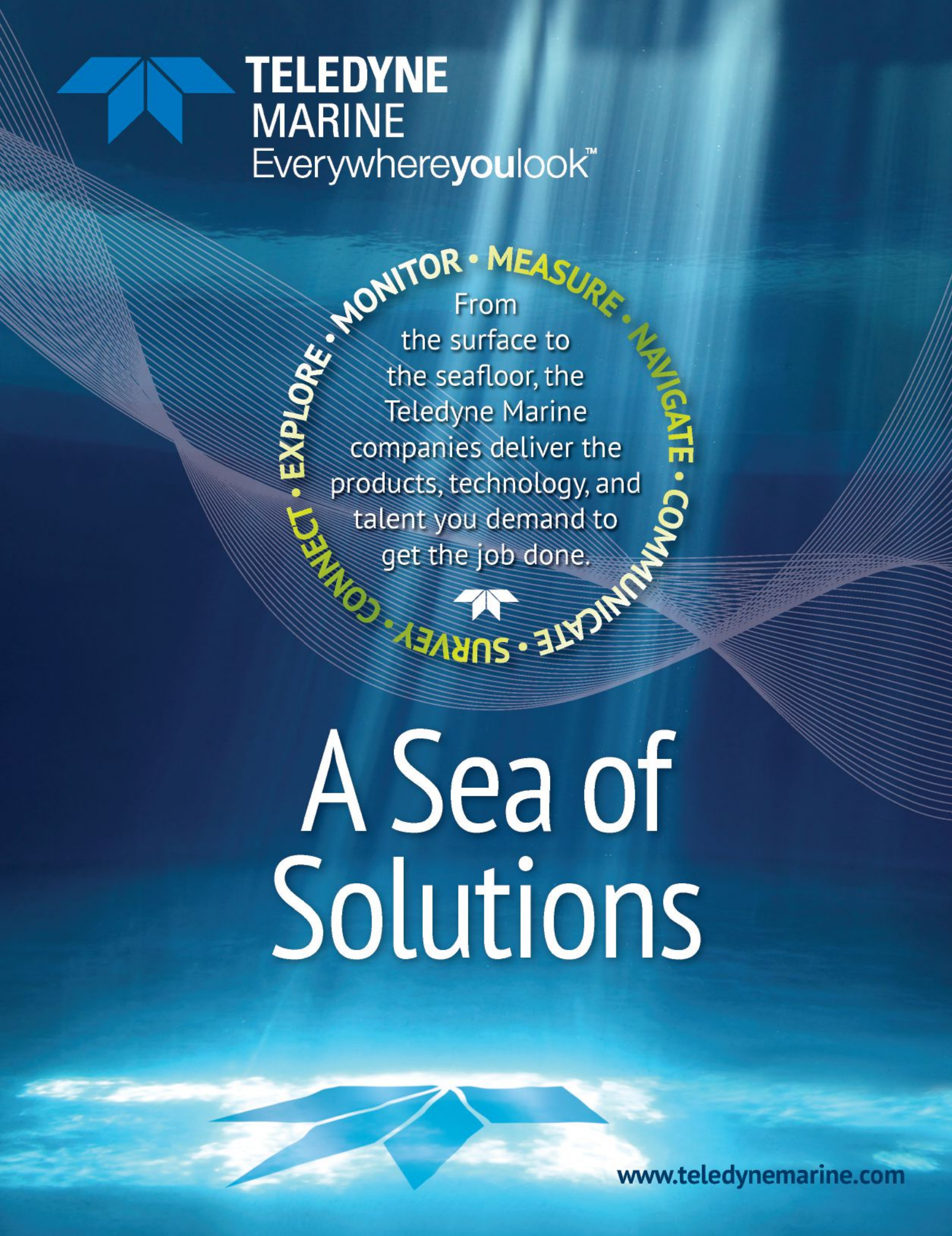
"The crew was very excited to be chosen to take the ship forward and conduct operations in support of fleet and combatant commanders' operational objectives," said Gordon. "It was a rare opportunity for the crew to be able to deploy prior to executing its post shakedown availability. Many crew members had never deployed before and were able to experience first-hand the hard work and effort required in preparing a ship for deployed operations. They trained hard and expertly executed our mission. I could not be more proud of their performance and the professionalism that they exhibited during our operations." Capt. Jim Waters, commander, Submarine Squadron 4 and the submarine's immediate superior in the chain of command, expanded on the captain's comment. "The timing within USS North Dakota's schedule, along with its highly-trained and certified crew, made it the optimal choice to conduct this mission," said Waters. "The mission completed by North Dakota also demonstrated the promising and emerging technology of UUVs within the Submarine Force."

U.S. Navy accepts delivery of LCS 6

The Navy accepted delivery of the future USS Jackson (LCS 6) during a ceremony at the Austal USA shipyard in Mobile, Alabama, on 11 August. Jackson is the fifth littoral combat ship (LCS) to be delivered to the Navy, the third of the Independence variant to join the fleet.

Capt. Warren R. Buller II, commander, Littoral Combat Ship Squadron 1 was on hand to mark the occasion.

"We are pleased to receive the future USS Jackson into the LCS class," Buller said. "Jackson will operate out of Mayport, Florida, while conducting full ship shock trials,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prior to joining her sister littoral combat ships in their homeport of San Diego in late 2016."

Delivery marks the official transfer of LCS 6 from the shipbuilder, an Austal USA-led team, to the Navy. It is the final milestone prior to commissioning, which is planned for December 2015 in Gulfport, Mississippi.

Department of Defense awards funds to Scripps researchers to develop instrumentation

The Department of Defense (DoD) announced awards to researchers at Scripps Institution of Oceanography, UC San Diego that will help scientists characterize waves, improve ocean weather and climate prediction, and analyze acoustics in the deep ocean.

The Defense University Research Instrumentation Program (DURIP) grants support the development of instruments that have a wide range of military applications. In all, 14 researchers from UC San Diego received awards.

"These awards will enable significant advancements that have immediate importance to military applications and long-term societal benefits," said UC San Diego Chancellor Pradeep K. Khosla. "I am especially proud of our researchers this year because of the unprecedented number of awards our university received. This underscores the significance of our work, as well as the positive impact and return on investment that our campus provides."

The awards, administered through the Office of Naval Research (ONR), continue a history of collaboration between Scripps and the U.S. Navy that dates back to the years immediately prior to World War II, when the Navy would charter Scripps' sole research vessel, E.W. Scripps, for research.

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

USNS Spearhead completes fleet experimentation period two

USNS Spearhead (JHSV 1), operated by the Military Sealift Command (MSC), completed Fleet Experimentation (FLEX) period two from 15 to 22 July.

Southern Partnership Station-Joint High Speed Vessel 2015 FLEX phase 2 explored JHSV's ability to support broader maritime C2 capabilities, by supporting the organic deployment of two un-manned aerial systems (UAS), Scan Eagle and RQ-20A (Puma).

The UAS operations were enhanced by embarkation of a Littoral Surveillance System (LSS) which provided an air and surface search capability by way of a telescopic mast mounted radar. In addition to the maritime C2 enhancements, JHSV also embarked a small vessel operations pier that consisted of eight floating dock sections which could be rapidly deployed to provide an additional small boat berthing capability, from which stores, personnel and fuel transfers could occur simultaneously.

Subject-matter expert exchanges allowed for building partner capabilities with members of the Colombian Navy. Capt. Juan C. Suarez, Colombian Naval frigate commander, and Chief Gustavo Archila, Colombian Naval sub-official, were distinguished guests from the Republic of Colombia invited to see the expanded mission capabilities of the JHSV 1.

"During this second phase of the NAVSOUTH Fleet Experimentation campaign, we were able to meet all exercise objectives and more fully inform the concept of operations for afloat forward sea basing of the JHSV class," said Capt. Bob Cepek, SPS-15 mission commander, "I am very satisfied with the flexibility and can-do spirit of the military and MSC team on Spearhead."

FLEX two campaign participants came from Navy Expeditionary Combat Command, U.S. Navy's MSC, Naval Meteorology and Oceanography Command, Navy Warfare Development Command, Boeing and the Insitu demonstration team.

"Although some of the technologies we employed are in regular use throughout the fleet, we had the chance to employ them in new ways and that's the advantage of the FLEX process, a controlled environment to test some of the great ideas floating around out there," said Cepek.

Bollinger delivers the CGC Heriberto Hernandez

Bollinger Shipyards has delivered the Heriberto Hernandez, the 14th Fast Response Cutter (FRC) to the United States Coast Guard.

The announcement was made by Bollinger's President & C.E.O., Ben Bordelon. "We are very pleased to announce the delivery of the latest FRC built by Bollinger Shipyards, the Heriberto Hernandez, to the 7th Coast Guard District in Puerto Rico. We are looking forward to honoring and celebrating the heroic acts of Hernandez at the vessel's commissioning."

The 154 fo patrol craft is the 14th vessel in the Coast Guard's Sentinel-

class FRC program. To build the FRC, Bollinger used a proven, in-service parent craft design based on the Damen Stan Patrol Boat 4708. It has a flank speed of 28 kts, state of the art command, control, communications and computer technology, and a stern launch system for the vessel's 26 ft cutter boat. The FRC has been described as an operational "game changer," by senior Coast Guard officials.

For more information, visit www.bollingershipyards.com.

Contracts give Royal Navy frigates a power boost

The MOD has awarded contracts worth £80 million to upgrade the backbone of the Royal Navy surface flotilla, the Type 23 Frigates.

A £68 million contract, with Rolls-Royce subsidiary MTU, which includes a training and transitional support package, will see each ship supplied with four new diesel generators and associated upgraded power distribution.

A second contract, worth £12 million, with Hitzinger UK, will provide voltage converters to deliver greater power to the frigates.

The work is part of a program of upgrades to weapon systems, infrastructure and navigation equipment which will ensure that these adaptable frigates, built between 1985 and 2002, continue in service and are able to be deployed worldwide for a number of years to come.

The new generator equipment, being manufactured in Germany and Austria, will be installed at Her Majesty's Naval Base, Devonport, during planned upkeep periods. The contract is set to be completed in 2024.

The current generator sets were first used in the 1970's and have provided the power generation for this class to deliver its contribution to the Royal Navy; however, improvements in efficiency, power density and availability mean the new diesel generators will be able to produce much more power from roughly the same size engine.

For more information, visit www.royalnavy.mod.uk.

COMPANY SPOTLIGHT

www.OceanSonics.com

Ocean Sonics
The Smart Hydrophone Company

By: Pierre Almeida

Ocean Sonics Commissioning the Whale Tracking Network This Summer

The international marine community will have its eyes focused on a Nova Scotia ocean technology company as its launches a program to help protect killer whales or orcas from man-made threats in Active Pass in British Columbia's Gulf Islands archipelago near the Port of Vancouver. The success of the project could have a positive impact on declining killer whale populations globally.

Ocean Sonics Ltd. of Great Village, a small community near the Bay of Fundy, will work with Fisheries and Oceans Canada and use its smart hydrophone technology to produce underwater data to help protect the whales from shipping and possible oil spills.

The whales are from the J and L pods which are endangered because of their low numbers. As of March 15 of this year, the J pod had 27 whales and the L pod 35.

The Whale Tracking Network, to be employed in the project, was developed by Ocean Sonics using its icListen Smart Hydrophones, recording hubs and shore interfaces to form a large synchronized network. Ocean Sonics designs and manufactures the icListen Smart Hydrophones which is an innovative passive acoustic monitoring system.

The project starts in Active Pass, which is bordered on both sides by islands that concentrate sounds of ships and other vessels passing through it making underwater navigation difficult for the whales, three listening points will be set up, one at each end of the Pass and the third in the middle. Each listening point will use multiple hydrophones to locate the killer whales, which are vocal animals, and identifiable by the sounds they make.

Collecting multiple positions over time will provide a track of the animals. Each listening point, or node, operates independently of the others but the data can be combined at a central station to create a bigger picture of whale activity. A graphical chart will show the animal and vessel locations.

Knowing where the pods are and the direction they are traveling in real time will give vessel operators and port authorities information they need to direct nearby shipping and avoid potential problems.

Ocean Sonics, with partners at Polytechnic University in Catalonia, Spain (UPC), have developed the proprietary sound classification and localization software which presents highly processed information at a high level suitable for operations personnel.

Mark Wood, President of Ocean Sonics and the developer of the smart hydrophone concept said from the collected data a 2D (two dimensional) map can be produced of the whales and ship movements so shipping can be redirected if required. The information will also help biologists who are looking to observe interaction between whales and shipping. That interaction is not well understood at this point and it is a concern because shipping in the area is expected to increase significantly over the next few years, said Wood.

A further concern with the whales is the threat of oil spills and the impact they might have on their habitat. Wood said that earlier this year, there was a small oil spill near Vancouver in English Bay. "They cleaned it up in a few days but it was a wake-up call," said Wood. If there had been killer whales in the area before the clean-up it could have been a serious issue.

"So if there is an oil spill in the future, knowing where those animals are would be really important," he said.

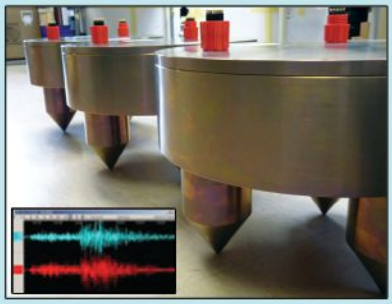
Ocean Sonics plans to have the first instrumentation in the water by the end of the summer and shortly afterward collecting data.

DFO will do the constant monitoring of the system which will produce important of information for decision makers.

Photo credit: Kristen Kanes

Local authorities support the project and the long-term plan is to interface with the port so they can manage shipping, said Wood. "By knowing where the whale pods are, if there is any kind of an incident they will be able to respond quickly," he said.


Photo credit: Kristen Kanes



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Offshore Communications Backbone

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

OFFSHORE INDUSTRY

in this section

Decline in oil prices holding up majority of projects, analyst says

The impact of falling oil prices on budgets led to deferrals of more than 45 major oil and gas projects by mid-year, according to Wood Mackenzie. The analyst estimates that as a result, decisions on 20 Bboe of reserves has been pushed back from a range of shallow-water, deepwater and onshore projects, creating a $200-billion hole in the industry's investment pipeline.

Technically demanding projects with major upfront costs and low returns have proven most vulnerable, said principal analyst Angus Rodger, with more than 50% of the deferred reserves in deepwater projects. The main drivers for the deferrals, he added, are the release of capital in response to the oil price, and the need to develop improved designs, cost optimization, and other measures to improve overall economics.

Inflationary pressures have made many projects economically marginal, so operators are reworking costs and development solutions. But this will not be easy, Rodger claimed: "We estimate that half of the new greenfield developments still produce sub-15% development IRRs, which is below most companies' economic hurdle rate."

For most operators, targeting a 10% reduction in capital spending will not be sufficient to reach a final investment decision, he said, as only very few can break even below $50/bbl. So only those assets with the most robust economics can expect to make the grade.

Wood Mackenzie says the majority of these projects now have a targeted start-up between 2019 and 2023. However, if the major IOCs continue to cut future capital commitments, these dates will be pushed back further.

FLNG capital spending to reach $58.3B to 2021: Douglas-Westwood

Capital spending for floating LNG (FLNG) vessels is estimated by analyst Douglas-Westwood to reach $35.5 billion during 2015-2021. FSRU capex is forecast at $22.8 billion for the same time period. That makes the overall FLNG spending $58.3 billion for the period as predicted in World FLNG Market Forecast 2015-2021.

The delivery of Petronas' PFLNG 1, also known as the PFLNG SATU, will put the world's first FLNG vessel into operation by the end of 2016. This will be followed by Shell's Prelude FLNG vessel, a significantly larger project and one that is likely to shape future FLNG developments. Construction of the 1,601-ft long facility started in 2012 at Samsung in Korea and is expected to start up by 2017.

Following these projects is a second wave of new projects that are yet to be sanctioned but are expected to drive a growth in expenditure from 2019 onwards. This includes major projects in frontier regions such as East Africa.

Douglas-Westwood anticipates more floating regasification units are to be sanctioned, with Asia and Latin America being the dominant regions. Upcoming projects are visible in Indonesia, China, Pakistan, India, Vietnam, Bangladesh, and Sri Lanka, mostly led by national oil companies. Latin America will see deployments of floating regassification units in Chile and Puerto Rico.

EIA reports deal making down sharply in 2015 second quarter

Oil companies conducted fewer mergers and acquisitions in the second quarter than they have in nearly seven years despite the persistent crude slump that's forced many firms to pare back and lay off workers, according to the U.S. Energy Information Administration.

EIA reported a total of 137 deals were announced between April 1 and June 30, the lowest number since the fourth quarter of 2008. But the value of deal-making swelled during that time frame, the increase driven by a Shell's decision to acquire BG Group, which was announced in early April.

That transaction, valued at $84 billion, represented nearly three-quarters of the $115 billion in deals unveiled in second-quarter. The Shell-BG deal helped boost the value of oil company mergers and acquisitions to levels not seen since Russian state oil company, Rosneft, in October 2012 agreed to buy TNK-BP, a joint venture between oil giant BP and a group of billionaires.

At the time, the $54.8 billion Rosneft-BP deal was considered the third-largest oil acquisition ever, according to Bloomberg reports. Without that Shell-BG deal, the second-quarter deal-making value would've been at its lowest point since at least 2008, EIA said.

Schlumberger to acquire Cameron

Schlumberger Limited and Cameron jointly announced a definitive merger agreement in which the companies will combine in a stock and cash transaction. The agreement was unanimously approved by the boards of directors of both companies.

Under the terms of the agreement, Cameron shareholders will receive 0.716 shares of Schlumberger common stock and a cash payment of $14.44 in exchange for each Cameron share.

Based on the closing stock prices of both companies on August 25, 2015, the agreement places a value of $66.36 per Cameron share, representing a 37.0% premium to Cameron's 20-day volume weighted average price of $48.45 per share, and a 56.3% premium to Cameron's most recent closing stock price of $42.47 per share. Upon closing, Cameron shareholders will own approximately 10% of Schlumberger's outstanding shares of common stock.

Schlumberger expects to realize pretax synergies of approximately $300 million and $600 million in the first and second year, respectively. Initially, the synergies are primarily related to reducing operating costs, streamlining supply chains, and improving manufacturing processes, with a growing component of revenue synergies in the second year and beyond. Schlumberger also expects the combination to be accretive to earnings per share by the end of the first year after closing.

The transaction combines two complementary technology portfolios into a "pore-to-pipeline" products and services offering to the global oil and gas industry. On a pro forma basis, the combined company had 2014 revenues of $59 billion.

The transaction is subject to Cameron shareholders' approval, regulatory approvals and other customary closing conditions. It is anticipated that the closing of the transaction will occur in the first quarter of 2016.

Goldman, Sachs & Co. is acting as financial advisor, and Baker Botts LLP and Gibson Dunn & Crutcher LLP are serving as legal counsel, to Schlumberger. Credit Suisse is acting as financial advisor and Cravath, Swaine & Moore LLP is serving as legal counsel to Cameron.

Rig construction orders expected to be down in 2015 and 2016

Drilling contractors have nearly ceased new orders this year, following on the heels of the latest offshore rig-building boom and in the wake of falling oil prices, said IHS Petrodata, adding that these trends, in turn, have significantly reduced demand for new rig programs.

As of mid-May, only four orders were placed with shipyards -- for three jack-ups and one semi-submersible. No new orders for drillships or tender-assisted rigs had been placed as of August. The semi-submersible and two of the jack-ups were set to be built at shipyards in China, while the remaining jack-up was to be built in the United Arab Emirates.

Meanwhile, 187 rigs were under various stages of construction by mid-July: 117 jack-ups, 40 drillships, 21 semi-submersibles, and nine tender-assisted rigs. China continued to have the bulk of the jack-up building work with 65 under construction. However, none of these currently has a contract in hand for work upon delivery, and nearly half have scheduled delivery dates in 2015.

This is true across the board and not just at Chinese yards. For example, in mid-February, Transocean announced that it had amended its construction contracts with Keppel FELS in Singapore to delay delivery on five jack-ups by about six months each. Then in early May, the rig contractor announced further delays for these same units, this time by about a year-and-a-half each.

Focusing on jack-ups, a few orders have been outright canceled. However, it is expected that many owners will simply elect not to take delivery of their rigs, thus avoiding a lump sum payment due upon completion. Meanwhile, semis and drillships, also called floaters, are also struggling to find work upon delivery. While the situation may not seem as dire as for jack-ups because there are 61 floaters under construction versus 117 jack-ups, the difference in build costs is substantial.

For floating rigs currently under construction, the average build cost was around $720 million. Compare this to the average build cost of around $235 million for currently under-construction jack-ups, and one can understand why floating rig owners are so concerned about finding work for these units. Out of the 61 under-construction floaters, 32 were committed upon delivery. And these were likely candidates for further delays.

In general, new rig orders were not expected to stop altogether, as rig contractors needed to upgrade their fleets with rigs that have the latest technology and high-end specifications operators prefer. These include items such as dual blowout preventers (BOPs), increased BOP ram stacks, dual activity drilling, greater hookload capacity, and more deck space. But orders are not expected to stay at the level seen over the past few years.

Offshore oil rig under construction.

This year will be a quiet year for new rig orders, as will 2016, IHS Petrodata said, adding that contractors are understandably more concerned about finding jobs for uncontracted newbuilds with looming delivery dates, and would prefer to have a contract in hand for these units before placing any additional orders, unless they are backed by a contract.

EIC Monitor records decline in worldwide contracting activity

The most recent EIC Monitor report shows a continuing decline in contracting activity. A total of 49 major contracts engineering, procurement, and construction (EPC); front-end engineering and design (FEED); and subsea/subsea, umbilicals, risers, and flowlines (SURF) were awarded in the second quarter of 2015 across 37 upstream developments, rising 20% from 41 awards in the first quarter of 2015, but 71% down from 69 contract awards in second quarter of 2014. A total of 28 EPC contracts, nine FEED contracts, and 12 subsea-SURF contracts were awarded.

Brazil and Norway were hot spots in the second quarter of 2015, combining for 13 EPC contracts across 10 different upstream developments. In Brazil, a total of eight EPC contracts were awarded. In the North Sea, five EPC contracts were awarded on developments offshore Norway as operators proceed with current development projects. Almost half of the upstream FEED contracts awarded were for projects in the Asia-Pacific region.

On the subsea-SURF front, the United States is a hot spot, accounting for three contracts in the deepwater Mississippi Canyon area of the Gulf of Mexico. Offshore Brazil accounts for two such projects, and the North Sea, Statoil accounts for several projects.

Handful of players dominate $12B a year subsea sector, report says

Five major players in the subsea sector service the annual $12-billion annual requirements of the global exploration and production (E&P) industry, according to analyst Douglas-Westwood.

The two largest – FMC Technologies and OneSubsea – account for roughly two-thirds of the market, and have both formed strategic partnerships this year to consolidate their position. This has become increasingly critical, Douglas-Westwood claims, as projects have grown in scale and complexity.

In recent years, the analyst adds, there has been a shift in emphasis away from mechanical subsea tree designs toward value-added instrumentation, monitoring, and processing technologies.

Hence the recent partnership between FMC Technologies and Technip to form Forsys Subsea, which combines the two companies' capabilities in subsea production, processing, and installation in order to minimize supply chain and technological interfaces for the end user.

Fifteen years ago, there were different manufacturers for the trees and controls of nearly a fifth of subsea wells installed. This year, however, Douglas-Westwood forecasts that more than 95% of subsea trees installed will have wellheads and controls from the same manufacturer.

The trend could strengthen due to demand for standardization of subsea equipment brought on by cost pressures, the lower oil price, and the imperative to deliver projects on budget and on time.

U.S. reduces crude oil production forecast as prices curb rig count

The U.S. Energy Information Administration (EIA) cut its U.S. crude production outlook for this year and next, as lower prices reduce the number of drilling rigs. The agency reduced its forecast by 1.2% to 9.36 mmbbl a day this year, according to its monthly Short-Term Energy Outlook. Production will still be up 650,000 bbl a day from 2014. It reduced its 2016 forecast to 8.96 mmbbl a day from 9.32 mm.

America's oil drillers have sidelined more than half the country's rigs since October as prices have tumbled. But even with less rigs, output is set to reach the highest level in more than three decades as new techniques boost the productivity of wells in shale formations from North Dakota to Texas.

Oil production probably began to decline in May and will continue falling into early 2016, the EIA said, returning to an average of 9.6 mmbbl a day during the last three months of the year.

IMCA publishes annual safety and environmental statistics

The International Marine Contractors Association (IMCA) has published its annual safety and environmental statistics. Drawn from 264 IMCA contractor members and based upon 798 million man-hours of work overall (558 million man-hours relating to offshore work), the 2014 dataset shows that the overall "flat line" tendency in lagging safety indicators has continued in the longer term.

Statistics gleaned from the 264 companies and organizations represent around 60% of the contractor membership, excluding drilling contractors and contractors who report as part of a greater group, with 62 contractors taking part for the first time.

Direct causes of lost time injuries (LTIs) continue to be the usual candidates, with struck by moving-falling objects the highest accounting for 110 incidents (26%); falls on the same level (including slips and trips) in second place with 88 incidents 21%) and struck against, entrapment, and falls from height accounting for 37 (9%), 34 (8%) and 33 (8%) incidents respectively. In all there were 424 LTIs recorded by IMCA members.

"We actively continue to urge members, and non-members alike to make good use of our extensive collection of safety posters, pocket cards and DVDs all designed to increase awareness and lower incident levels as we continue to strive for the 'holy grail' of zero incidents," said Jane Bugler, IMCA's technical director and acting chief executive,.

Jane Bugler

The statistics also include environmental data of one form or another that was provided by 59% of members. This is the third year that IMCA has collected information from contractor members on their environmental performance. Listed or publically traded companies are in many cases required to provide annual information of this sort for their stockholders.

For the purposes of comparison, the safety statistics recorded by IMCA members are said to be consistent with those of other main industry trade associations, International Association of Oil & Gas Producers (IOGP) and International Association of Drilling Contractors (IADC). Further information on IMCA and its work on behalf of its 1,000-plus member companies in over 60 countries is available from www.imca-int.com and imca@imca-int.com.

Shell finally begins exploration work in Chukchi off Alaska

Shell finally launched Arctic drilling in late July. The company had until September 28 to drill the top portions of up to two wells at its Burger prospect in the Chukchi Sea about 70 mi northwest of the Alaska coastline, but after fixing a damaged icebreaker is hoping to convince regulators to let it go deeper this year.

"The prospect . . . has the potential to be multiple times larger than the largest prospects in the U.S. Gulf of Mexico, so it is huge," Royal Dutch Shell chief executive Ben van Beurden told reporters in a call. "If, indeed, we do find oil, and if we find an acceptable path to develop it, it will start to produce in 2030."

Shell's first test was excavating a 20-ft wide, 40-ft deep cavern in the seabed that can shelter an emergency device known as a blowout preventer from passing icebergs. Such mud-line cellars are relatively rare -- and building the one at Shell's Burger J well required the Transocean Polar Pioneer to employ a specialized 20-ft-wide drill bit. It turns at three revolutions per minute, with discs plowing up mud as it burrows down. Before that work could begin, the rig was anchored over the target and then drilled a pilot hole at the site to check for the presence of gas hazards.

Transocean Polar Pioneer

However, drilling into prospective oil-bearing layers beneath the sea floor could only begin after the repaired ice-breaker MSV Fennica arrived at the drill site. Interior Department officials said they expected to approve the deeper drilling quickly once the Fennica had returned to the Arctic.

The Fennica was forced to Portland's Vigor shipyard after tearing a three-foot gash in its hull on an uncharted rock in Alaska's Dutch Harbor on July 3. Owned by Arctia Offshore, Fennica is a primary ice management vessel and carries the capping stack that would be used by the company to cap a well in case of a blowout.

Shell has spent more than $7 billion on the current project. The company drilled wells into the same area decades ago, but abandoned the projects in the face of high costs and low oil and gas prices. The drilling now is designed to prove the resource and determine whether it is big enough to justify continued development.

UK guidelines target improved offshore maintenance shutdowns

Oil & Gas UK has unveiled new guidelines to minimize the frequency and duration of planned maintenance shutdowns on the UK continental shelf, and to improve the reliability and safety of offshore installations.

The Guidance for the Efficient Execution of Planned Maintenance Shutdowns (PMSDs) sets out good practice for all types of planned shutdowns including corrective, breakdown maintenance, inspection activities, engineering and construction work, ranging from new tie-ins to modifications.

Topics covered include minimizing the frequency and duration of PMSDs, good planning and delivery, and ensuring that the industry identifies resources required well in advance.

UK offshore production efficiency – a measure of how much oil and gas an offshore installation actually produces compared to its maximum production potential – declined from 80% in 2004 to 60% in 2012, the agency claimed, leading to a substantial decline in production. Since 2013, the Production Efficiency Task Force has been working on remedial measures with the industry, and efficiency has recovered to 65%.

Meanwhile, Recent provisional figures from Britain's Department for Energy (DECC) suggest oil and gas production across the UK continental shelf during the first six months of this year could be 2.5% up on the same period last year.

"It's still early days, but initial indications suggest that production could increase this year for the first time in 15 years," Deirdre Michie, chief executive officer of Oil & Gas UK. "We will be able to discuss annual estimates with more certainty by the end of the summer maintenance season ..."

Oil & Gas UK attributes part of the improvement to growing production from CNOOC/Nexen's large Golden Eagle field in the UK central North Sea, which started up last November, and to stronger delivery from existing North Sea facilities.

Rapp Bomek signs agreement with Statoil for fire doors

The Bodø, Norway-based company Rapp Bomek AS, owned by the PE-company Nord Kapitalforvaltning AS, has signed a frame agreement with Statoil for the delivery of external and internal fire doors to the Johan Sverdrup field development on the Norwegian Continental Shelf (NCS). This is one of the largest contracts in the company's history. In addition, there is an option in the contract for deliveries to the following projects: Johan Sverdrup Phase II, Johan Castberg, Snorre 2040 and Peregrino.

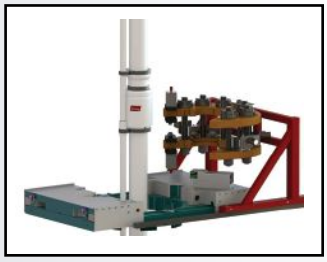
"This agreement is very important for Rapp Bomek as the company consolidates its position as a world leader in the global oil and gas market for fire doors. It is a confirmation that our work over time with delivering safety products in competitive conditions, has led to this contract," said Rapp Bomek, chief executive officer of Terje Bøe. The Johan Sverdrup field may well turn out to be the most significant on the NCS since the 1980s.

Technip to tie-in PFLNG1 facility to platform in Malaysia

Petronas Carigali has awarded an engineering, procurement, construction, installation and commissioning contract to Technip for the tie-in of Petronas first floating liquefied natural gas (PFLNG1) facility. Under the contract, Technip will tie-in the facility to KAKG-A central processing platform in Kanowit field, which is located 200 km offshore Bintulu, East Malaysia, at a water depth of around 80 m. Technip will be responsible for the procurement and installation of a 3.2 km flexible flowline between the existing KAKG-A platform to the PFLNG1 riser, while scope of work also includes modification and tie-in at the platform.

SRP awarded contract to develop Nimway connector

Subsea Riser Products Ltd. has secured a contract to develop and qualify its Nimway 510 and Nimway 710 completion and workover riser connectors for a leading subsea wellheads and production systems provider. The commitment of more than U.S.$4 million is against SRP successfully qualifying the connectors to ISO 13628-7:2005 and the latest working draft of API specification 17G (2015); with the client obtaining exclusive rights to the 5 ¼-in. and 7 ⅜-in. 10,000 psi connectors for at least two years.



Nimway is a new design of high-capacity, quick-make-up connector involving proven technologies and a novel tensioned sleeve design that has evolved from SRP's experience in designing high-pressure dynamic flanges. Reliable metal sealing and dual bore capability are two of the connector's system architecture benefits.

PGN contracts DCN to repair pipeline tear in Java Sea

Indonesian state-owned Perushaan Gas Negara has awarded DCN International Diving and Marine Contractors and its Indonesian partner SGI a contract to seal a tear in a four-year-old pipeline in the Java Sea. The tear on a weld seam was discovered in 2013. PGN had a temporary repair carried out. Last year, following extensive research, PGN decided to carry out a permanent repair to the 32-in pipeline, at a depth of 89 ft. The repair will be carried out by DCN in the fourth quarter of 2015, while the pipeline remains fully pressurized. Fifteen divers will be specially trained for the PGN project at DCN in Bergen op Zoom.

New study explores transboundary energy exploration in GoM

As drilling exploration continues to move into deeper Gulf of Mexico waters, negotiations continue between the United States and Mexico over the allocation of oil and gas discoveries that straddle an invisible international barrier at the bottom of the sea.

Dr. Richard McLaughlin, endowed chair for Marine Policy and Law at the Harte Research Institute for Gulf of Mexico Studies at Texas A&M University-Corpus Christi, has collaborated with the Center for U.S. and Mexican Law at the University Law Center. He will release the first bi-national study examining the legal issues involved with exploring and exploiting transboundary offshore oil and gas deposits in the Gulf.

McLaughlin and Guillermo J. Garcia Sánchez, a doctorate candidate at Harvard Law School, have completed the first research study sponsored by the Center for U.S. and Mexican Law. The study is titled "The 2012 Agreement on the Exploitation of Transboundary Hydrocarbon Resources in the Gulf of Mexico: Conformation of the Rule or Emergence of a New Practice?" The Houston Journal of International Law was to publish the paper this summer.

"There is a maritime boundary between the U.S. and Mexico, and the question we had as a nation is, what do you do when you have these boundary-straddling reservoirs of oil and gas and how do you exploit these resources efficiently and still be in compliance with international laws?" McLaughlin said. "This has become increasingly important as we have discovered oil and gas reserves that very likely cross this boundary."

The study examines current laws and practices in other parts of the world concerning transboundary oil resources, and sees how the current agreement governing these issues – the 2012 U.S.-Mexico Transboundary Resources Agreement – compared. Research found that, generally, it was standard to find the most efficient way to exploit shared oil resources while preserving them as a single unit. However, the current U.S.-Mexico policy contains an unusual provision that allows a nation to unilaterally exploit the disputed oil reserve if an agreement isn't reached.

Legal and regulatory issues must be discussed before the two nations can even begin to manage transboundary resources in the Gulf. With Mexico opening up its energy sector to foreign investment, national oil company Pemex will no longer hold a monopoly on energy exploration in Mexico's Gulf holdings – something unknown when the treaty was written.

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The Maersk Endurer jack-up rig .

Maersk Drilling decommissions oldest jack-up drilling rig, Endurer

Maersk Drilling has decided to decommission the Maersk Endurer from the fleet and to recycle the rig at Zhoushan Changhong International Ship Recycling in China. The Endurer is Maersk Drilling's oldest rig. The jack-up rig, which was built in 1984, most recently worked offshore Cameroon.

"Given the current market situation and the over-supply of drilling rigs in the offshore market, there is a strong need to retire older rigs. Therefore, Maersk Drilling has decided to decommission its oldest rig in the fleet, Maersk Endurer," said Morten Pilnov, head of global sales in Maersk Drilling.

The rig was to go to Zhoushan Changhong, and it was to take approximately 15 weeks to recycle.

Keppel Shipyard signs $684M LNG conversion contract with Golar

Keppel Offshore & Marine's wholly owned subsidiary Keppel Shipyard has signed a $684 million contract with Golar Gandria to convert a liquefied natural gas (LNG) carrier into a floating liquefaction facility. Under the contract, the Singapore-based Keppel will convert Moss type Gandria carrier into a Golar Floating Liquefaction (GoFLNG) facility.

According to Keepel, the new award marks the implementation of the second of two options, which were part of a contract awarded to it by Golar to convert the Moss LNG carrier HILLI into a GoFLNG facility.

In December 2014, the first option was exercised for the conversion of another Moss type LNG carrier, GIMI.

"GoFLNG facilities are set to reduce the cost and time required to monetize and deliver offshore gas to market," said Michael Chia, Keppel Offshore & Marine managing director of marine and technology. "Now a year underway, the Hilli conversion project is progressing to plan. This third GoFLNG contract re-validates our delivery timeframes and price levels, further demonstrating the technical and commercial competitiveness, and lower implementation risks inherent in our solution."

As part of the work, Keppel Shipyard will provide the design, detailed engineering and procurement of the marine systems, as well as delivering all of the construction services related to conversion. Design, procurement and commissioning support services for the topsides would be provided by engineering company Black & Veatch.

Complete construction activities of the Gandria are set to begin after Keppel Shipyard receives a notice to proceed, which is expected in 2016. Upon receiving the notice, the GoFLNG Gandria is estimated to be delivered in around 31 months.

Latest Lula floater on station in Iracema Norte area offshore Brazil

Petrobras' newly-converted FPSO Cidade de Itaguaí is now anchored in 7,349 ft of water in the Iracema Norte area of the Lula field in the presalt Santos basin. The Schahin-Modec consortium, which was responsible for converting the hull, constructing, and integrating the topsides modules at the BrasFELS shipyard in Angra dos Reis, will also operate the vessel.

It will eventually be connected to eight producer and nine injector wells, with capacity to produce 150,000 bbl per day of oil, to store 1.6 mmbbl, to compress 282 mmcf per day of natural gas, and to inject 264,000 bbl per day of water.

Oil production is expected to begin later in the current quarter, with gas exported to shore via a subsea gas pipeline. Ten of the modules were at the EBE shipyard in Itaguaí, Rio de Janeiro, and two more at the Schahin shipyard in São Sebastião, São Paulo.

The FPSO Cidade de Itaguaí.

Iracema Norte is in exploration block BM-S-11. Petrobras operates, in partnership with BG and Petrogal Brasil. BM-S-11 is being developed through a consortium featuring Petrobras (leader and operator, with a 65% stake), BG E&P Brasil Ltda with 25% and Petrogal Brasil SA with 10%.

Rowan sells two jack-ups, enters into multiple drilling rig contracts

Rowan Companies said the Rowan Alaska and Rowan Juneau were retired from service as drilling units as the company entered into contracts to sell them. However, Rowan did not include perspective buyers. The contracts are expected to close by the end of July, with the agreements prohibiting future use of the rig as a drilling unit.

The Rowan Louisiana jack-up remained cold stacked. The company also reported that the Rowan Gorilla III jack-up, working off Trinidad for a rig share group, was expected to become available in mid-August due to an early contract termination.

Rowan Juneau is one of two rigs sold.

Rowan also picked up several contracts since its last report. The Rowan Gorilla IV jack-up was awarded a multiple well contract by Energy XXI with an estimated total duration of three months that will keep it booked until September.

Additionally, Rowan Gorilla V jack-up received a priced option for one well with an estimated duration of 260 days at a day rate higher than the firm term. The rig is working for Total offshore the UK. Among other jack-up contracts, Saudi Aramco offered extensions to three rigs working off Saudi Arabia.

Changes were also reported within Rowan's four ultra-deepwater drillships, including the Rowan Renaissance, contracted by Repsol. It is mobilizing to the U.S. Gulf from offshore West Africa at a reduced day rate, with operations expected to commence in September.

Sembcorp to build giant crane vessel for Heerema

Heerema Offshore Services has awarded Sembcorp Marine (SCM) a $1-billion engineering and construction contract to build a new DP-3 semi-submersible crane vessel. This follows a letter-of-intent signed in March by Heerema and SCM's subsidiary Jurong Shipyard.

The vessel, due to be delivered late in 2018, will be built at the Sembcorp Marine Tias Boulevard yard. It is designed for installation and decommissioning of large offshore facilities worldwide.

It will feature two Huisman heavy-lift offshore cranes, each with 11,023-ton lifting capacity, and a large reinforced work deck area. Dimensions include an overall length of 722 ft, width of 334 ft and a displacement of 301,703 tons, making this the world's largest dual-fuel semi-submersible crane vessel, SCM said.

"The new vessel's two tub-mounted cranes and dual fuel engines will enable Heerema Marine Contractors to offer unparalleled installation and decommissioning services," said Jan Pieter Klaver, chief executive officer of Heerema Marine Contractors.

DOF Subsea collects multiple vessel contracts

SubC Partner granted DOF Subsea UK a contract in support of its project to replace selected buoyancy modules on a live riser for Maersk Oil in the Dumbarton field. Under the terms of the contract, Polar King will be chartered, and DOF Subsea will provide work-class ROVs, and project personnel. The vessel comes mobilized with two work-class ROVs.

DOF Subsea previously entered into a 100-day time charter agreement with Norway's CG Rieber Shipping for Polar King. The charter began in April and contained options for up to five months additional work. Polar King is a purpose-built ROV survey and subsea construction vessel. The vessel is designed for operation under severe weather conditions. Additionally, Petrobras has extended the contract for DOF Subsea's research and supply vessel Geoholm for a period of 18 months, until December 2016. The vessel has been operating for Petrobras since January 2014. The extension is a direct continuation of the current contract.

Polar King set for harsh conditions.

Icon wins order for anchor handling tug-supply vessels

Icon Offshore Berhad's subsidiary has received two contracts worth $14.5 million from an unidentified oil company to provide two anchor handling tug and supply vessels (AHTS). Both the two year charter contracts were effective from 5 July with an option for an extension of one year.

As part of these long term contracts, Icon Offshore Group will provide services including transportation of supplies from supply bases to drilling rigs-platforms and vice-versa to the oil major. The new contracts are in addition to the $26 million long-term contract secured in Brunei earlier this year by its wholly owned subsidiary, Icon Bahtera, for the time charter of its new DP2 accommodation work boat (AWB), the Icon Valiant.

"These new long-term contracts reflect positively on the company despite the challenges faced. Our operations remain strong. We hope to be able to secure more contracts in the future through value-added services to our clients ..." Icon deputy CEO Hassan Ali was quoted by thesundaily.com as saying.

Maersk subsea construction vessel nears completion

Damen Shipyards Group has launched its latest subsea support vessel, Maersk Connector. The vessel, owned and operated by Maersk Supply Service, will work initially for DeepOcean under a seven-year charter agreement.

Its 7,716-ton carousel is suited to installation and burial projects from land-fall to deep water and also for operations in remote geographical locations. It is also designed to comply with North Sea oil and gas standards, the company added.

The 453-ft long, 9,300-dwt vessel has 23,680 ft of unobstructed deck with a loading capacity of 20t/sq m, and will have a top speed of 12 knots.

It was berthed at Damen Shipyards Galati preparing for installation of its helideck, cranes and bridge, and fitting-out of its interior. Sea trials should start by the end of this year.

Thialf completes Edvard Grieg platform installation

Heerema's heavy-lift vessel Thialf has completed installation of the topsides modules onto the Edvard Grieg field jacket in the central Norwegian North Sea.

The vessel lifted four modules – the main deck frame, the utility and living quarters module, the processing module and the flare boom, with a total weight of 24,251 tons.

Final offshore hook up and commissioning of these modules has started, and Lundin continues to target first production during the fourth quarter. Two of the production wells have been drilled and completed and are ready to be tied-in to the platform.

Lundin operates in partnership with Wintershall, OMV, and Statoil.

Topsides installation complete on Chevron's Alder field

The sail-away and installation of the Alder project's topsides module has been successfully completed, Chevron Upstream Europe said. The 881-ton topsides structure was built in a Newcastle shipyard and traveled via transport barge 110 mi to the Firth of Forth. The module was transferred to the Oleg Strashnov heavy-lift vessel, which set sail for the UK central North Sea.

After arriving on location in late June, the module was successfully installed onto the Britannia bridge linked platform, where Alder-produced fluids will be processed following the offshore hook-up and commissioning campaign. Alder is a high-pressure-high-temperature gas condensate field located in 492 ft of water, around 99 mi from the Scottish coastline and 37 mi from the UK-Norway median line. Project daily capacity is 110 mmcf of gas and 14,000 bbl of condensate. First output is expected in 2016.

ARKeX awarded first offshore East Coast U.S. exploration permit

ARKeX Ltd. has received the first geophysical exploration permit by the U.S. Bureau of Ocean Management (BOEM). The ARKeX survey will acquire an airborne broadband gravity and magnetic survey over U,S. outer continental shelf blocks offshore the East Coast. It is the first such permit issued for the region in more than 30 years.

The broadband gravity system uses a full tensor gradiometer which will remotely map geological structures, potentially revealing the location of billions of barrels of untapped oil and gas reserves. The ARKeX survey will be acquired in three phases covering nearly 5,791 sq mi between Virginia and South Carolina.

This large, regional survey will provide a wide bandwidth and high signal-to-noise ratio data set which will become a valuable and long lived component of the exploration knowledge base. The measurement techniques employed are completely passive, using no energy source, such that the environmental footprint is only that of a small aircraft.

The new data will be integrated with existing complementary geophysical and geological data including 2D seismic, bathymetry, and satellite imagery to develop geological understanding of the area. The ARKeX survey will be acquired in anticipation of BOEM's five-year U.S. Outer Continental Shelf oil and gas leasing program. Acquisition is expected to commence in the fourth quarter of 2015.

Mexico revises rules for second phase of Round One auction

Mexico's oil regulators will ease the terms of the second phase of the Round One auction after previous rules discouraged investors, leading to a bust in the first phase.

The changes included allowing interested bidders more time and flexibility by extending the deadline to apply and find financial partners. The oil regulator also relaxed the corporate guarantee required for each bidder, which has been changed to 18 times the value of the minimum work required of each contract. The letter of credit has been reduced to 50% of a company or consortium's work program.

Only two of the 14 offshore oilfields were awarded in last month's auction. The government had targeted five. The previous rules required a $6-million corporate guarantee and a letter of credit for the amount needed to complete its work program.

Mexico's oil regulator, the National Hydrocarbons Commission, will implement the changes ahead of the next auction, which is set to be held at the end of September for five blocks of offshore oilfields containing proven reserves, according to the commission.

Greece bids include oil and gas prospects offshore island of Crete

Greece has received three bids to carry out deepsea oil and gas drilling for the reserves in the west of the country and south of the island of Crete. Last year, the country floated bids asking companies to offer bids to explore 20 offshore blocks spanning more than 200,000km² across Ionian Sea and south of Crete.

However, in order to get more bidders, the government extended the deadline for the submission of bids by two months to mid-July, and it expects Russian companies to show interest in the projects.

Reuters cited the energy ministry as saying: "Positive step, taking into account difficult conditions presently prevailing in the oil and gas market. It is assessed as a positive step in the country's attempts to utilize its subsea wealth."

The country signed a deal with eurozone creditors in July and has previously tried many times to find oil and gas reserves to increase its revenue.

Greece previously awarded the first drilling licenses for three onshore and offshore blocks in western Greece to Hellenic Petroleum, which is one of the largest oil companies in the Balkan region. Hellenic Petroleum in a consortium with Petroceltic and Edison International and submitted a successful bid for the Patraikos block, offshore western Greece in 2013.

The Patraikos block is located in the Gulf of Patra spread across an area of 1,892 sq. km with water depths between 100 m and 300 m.

Faroes Islands is planning further offshore license round in 2017

The government of the Faroe Islands said it will invite applications for new offshore licenses in 2017, under the country's 4th Exploration Round.

"To some, it might be a bit unexpected to announce a new round, given the current low oil prices and the overall situation in the oil industry," Minister of Trade and Industry Johan Dahl said.

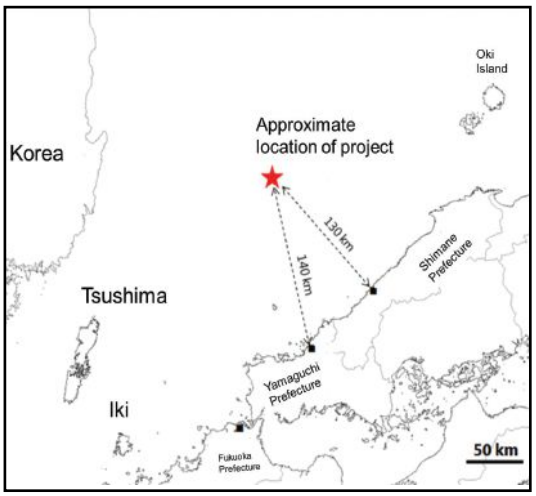
"However, time brings change. We know that there is oil to be found in our subsoil and that our subsoil is underexplored. Therefore, between now and 2017, we will be working diligently to optimize the conditions for a successful round."

Over the past 15 years, nine wells have been drilled in Faroese waters and hydrocarbons have been discovered, but not in commercial quantities. However, the Faroese Earth and Energy Directorate claims that several areas on the Faroe shelf warrant further exploration and that prospects are good for commercial discoveries. By announcing the next round so far in advance, the government aims to give interested parties sufficient time to prepare and to provide seismic contractors with the opportunity to acquire new data.

UK regulator awards 41 offshore exploration licenses on shelf

The UK's Oil and Gas Authority said the 28th Offshore Licensing Round was one of the largest rounds in the five decades since the first licensing round took place in 1964. The remaining winners were recently announced. There were 41 new licenses awarded, in addition to the 134 confirmed in late 2014, making a total of 175 licenses covering 353 blocks.

The 28th Offshore Licensing Round was launched on January 24, 2014, and a total of 173 applications were received. The main tranche of awards was announced in November 2014 and the newest awards were confirmed following additional environmental assessment and consultation.



Inpex to undertake exploratory well drilling offshore Japan

The Agency of Natural Resources and Energy of Japan's Ministry of Economy, Trade and Industry (METI) has selected Tokyo-based operator Inpex to drill an exploratory well in the country's offshore waters in the Sea of Japan.

The Heisei 26~28 Domestic Offshore Drilling Program in Japan is aimed at determining the presence of hydrocarbon deposits in addition to conducting geological studies. Inpex is scheduled to start drilling the exploratory well in May 2016 in a location offshore Yamaguchi and Shimane prefectures.

As part of its domestic oil and natural gas exploration project, the Japanese Government conducted a geophysical survey from Shigen, the seismic survey vessel in these prefectures in 2011.

Drilling will continue until August 2016 at a location 140 km north of Yamaguchi Prefecture and about 130 km northwest of Shimane Prefecture, in water depths of 210 m.

As part of its preparation plans, the company was to conduct a site survey in August to map the subsea surface and observe currents at the location to be drilled. Inpex said that the company's decision to take up the project will be in line with its initiatives to improve its exploration and production activities.

The project is expected to contribute to the improvement in Japan's energy self-sufficiency in case it leads to the production of oil and natural gas at a level that is commercially feasible. In June, Inpex encountered a new oil column at the onshore Minami-Kuwayama oil field in the Nigata prefecture, approximately 800 km northeast of Shimane.

Ophir Energy prepares to drill first wells offshore Thailand

Ophir Energy said it was close to securing a rig to drill offshore Thailand later this year on acreage the company gained following its takeover of Salamander Energy. The company plans two exploration wells on the G4/50 license.

Elsewhere in the region, Ophir said a 4,170-sq mi 3D seismic data study it commissioned offshore Myanmar has been completed.

After integrating Salamander's operations and another asset package acquired from Niko, Ophir has implemented a company-wide cost rationalization program designed to achieve $60 million annually in cost savings by removing overlapping, streamlining of operations, and lower group and contractor staffing levels.

Ophir is closing five of its 11 offices and has scaled back operations at the other six.

The company adds that it has only $100 million of contractually committed exploration and appraisal expenditure between now and 2017, and that its costs for the proposed Tanzania LNG project are manageable with only $40 million of spending allocated through 2016.

China Oilfield Services to undertake drilling operations in East China Sea

Primeline Energy has signed a letter of intent (LoI) with China Oilfield Services (COSL) to carry out drilling operations in an upcoming exploration program in Block 33/07 in the East China Sea. The drilling contract is worth $20 million and was due to begin in August.

Under the LoI, COSL will perform turnkey drilling works for two wells in Block 33/07 for Primeline. According to Primeline, the first well will be LS23-1-1 and after assessing its results the second well will be selected from two further candidate locations.

This exploration drilling program is said to be the initial step in Primeline's rolling development strategy. The production infrastructure hub and access to gas market have been established and LS36-1 has been in production, Primeline said.

COSL's drilling program is aimed at finding more hydrocarbons to capitalize the infrastructure hub and access to market. China-focused Primeline has a 75% contractor's interest in PPC (25%), and is the operator of the petroleum contract with CNOOC for Block 33/07.

Ecopetrol strikes hydrocarbons in Colombia's ultra-deepwater

Ecopetrol said the Kronos-1 well discovered hydrocarbons in ultra-deepwater of Colombian south Caribbean area at a depth of 3,720 m. Located in block Fuerte Sur 53 km offshore, the Kronos-1 well is 50% owned by operator Anadarko and the remaining 50% by Ecopetrol.

After completing drilling at a water depth of 1,584 m, the well reached a total depth of 3,720 m and encountered a net pay thickness between 40 m to 70 m of gas bearing sandstones.

The drillship Bolette Dolphin will move to Fuerte Norte Block to continue drilling Calasu-1 well after completing activities at Kronos-1 well. Calasu-1 well is located 145 km north-east of Kronos-1.

The Ecopetrol-Anadarko partnership carried out exploration activities in the South Caribbean in blocks Fuerte Norte, Fuerte Sur, COL5, URA4 and Purple Angel in 2012.

Exxon's Guyana discovery may be a dozen times larger than economy

An ExxonMobil Corp. discovery in the Atlantic Ocean off Guyana may hold oil and natural gas riches a dozen times more valuable than the nation's entire economic output, according to Bloomberg. The Liza-1 well, which probably holds the equivalent of more than 700 mmbbl of oil, may begin producing crude by the end of the decade, Raphael Trotman, the South American country's minister of governance, said in an interview with the news organization. The prospect would be on par with a recent Exxon find at the Hadrian formation in the Gulf of Mexico, and would be worth about $40 billion at today's international crude price, Bloomberg said.

Guyana produces no oil and has a gross domestic product of $3.23 billion. Exxon has declined to provide an estimate for Liza-1. However, Exxon, which began drilling the well in March, did report that it found a 295-ft column of oil-and gas-soaked rock in a subsea region known as Stabroek Block. The well is 120 mi offshore and 5,710 ft beneath the sea surface.

"A find of this magnitude for a country like ours, which sits on the lower end of the scale of countries in this hemisphere, this could be transformational," Trotman said. "From my sense, from speaking to experts outside of Exxon, it has to be something in excess of 700 million barrels."

Equipment keeps watch on Sakhalin platform integrity

Berkut platform is subject to big waves and powerful ice floes.

Fugro has supplied a structural monitoring system to Exxon Neftegas, operator of the Sakhalin-1 consortium. The equipment will be used to monitor the structural integrity of the Berkut oil platform in the Arkutun Dagi field off the north-east coast of Sakhalin Island.

This is one of the world's largest floatover platforms, designed so that the topsides are isolated from the base using friction pendulum bearings (FPBs). The area is prone to 59-ft waves, 6.6-ft ice floes and temperatures ranging from minus 47.2°F to plus 90°F.

Fugro was asked to provide an integrated system to monitor the platform's seismic response and the performance of the FPBs. The solution also had to satisfy the Russian GOST and GOST-Ex certification requirements, and to withstand the environmental conditions.

The contractor configured the equipment at its complex in Glasgow, Scotland, using a proven sensing and data acquisition equipment. The company's SIMS data acquisition software allowed additional functions requested by the client to be incorporated during the system build.

Fugro said that the factory acceptance test was witnessed by WorleyParsons, lead contractor for the project, before the equipment was shipped to the platform for installation.

Dragon ramps up artificial lift offshore Turkmenistan

Dragon Oil aims to procure additional water injection facilities later this year for installation on the Dzheitune (Lam) field in the Cheleken Contract Area (CCA) in the Turkmen sector of the Caspian Sea. The company is applying water injection progressively to arrest reservoir pressure decline, sustain production rates, and increase reserves recovery.

To date it has also installed four jet pumping systems, including one on the Dzheitune (Lam) 22 platform, and expects to install and commission further jet pumping systems later this year on other platforms. Again, the aim of this artificial lift application is to increase production and enhance recovery.

In parallel, Dragon Oil is procuring electric submersible pumps (ESP) to start a pilot application later in the year.

Construction continues on the new wellhead and production platform Dzheitune (Lam) E and associated pipelines under a contract awarded in February 2014. The platform, due to be completed during the first half of 2016, will have eight slots, with provision for another four slots to be installed later, and can accommodate a jack-up drilling rig.

The newly installed Dzheitune (Lam) F production platform is ready for drilling. Tenders are out for contracts to extend the Dzheitune (Lam) A and B platforms with a view to adding slots for future drilling.

Lundin installs topside modules on Edvard Grieg field

Lundin Norway has completed installation of topside modules in the Edvard Grieg field off the Norwegian coast. As part of the Edvard Grieg project, Lundin Norway lifted four modules onto the pre-installed jacket.

Modules comprise the main deck frame, the utility and living quarters, the processing module, as well as the flare boom weighing 22,000 tons. Heerema's heavy-lift vessel Thialf was used to perform the lift operation.

Lundin began the final offshore hook-up and commissioning of the modules, with production expected to begin in the fourth quarter of 2015. The company said that two of the production wells have been drilled and are ready to be tied-in to the platform.

Edvard Grieg oil field is located in Block 16/1 in production license PL338, 45 km south of the Grane and Balder fields, 180 km west of Stavanger. The field contains under-saturated oil without a gas cap and its gross 2P reserves are estimated at 186 mmboe. As the operator, Lundin has a 50% working interest in PL338. Other partners in the license are Wintershall Norway with 15%, OMV Norway with 20%, and Statoil holding 15%.

2H receives contracts for Hess' Stampede development

2H Offshore, an Acteon company, has won two separate contracts, one by Hess Corp. and a second contract by Enbridge Energy Co., to verify the design, fabrication, and installation phases of the steel catenary risers (SCR) for the Stampede field development in the central U.S. Gulf of Mexico.

The Stampede field is operated by Hess. Enbridge plans to build, own, and operate the oil export pipeline from the Stampede tension leg platform. The subsea development is located in the GoM's Green Canyon blocks 468, 511, and 512 in water depths of approximately 3,500 ft.

The primary objective of 2H's work is to verify the acceptability of the Stampede SCR design, fabrication methods, and installation activities for both Hess and Enbridge, and ensure that there is consistent adherence to the relevant codes, standards, and specifications.

The Stampede project award follows 2H's completion of the design, fabrication, and installation verification work for the production SCRs in the Hess-operated Tubular Bells field development last year. Tubular Bells lies 135 mi southeast of New Orleans in 4,300 ft of water in the Mississippi Canyon area. The discovery well was drilled in 2003, and project construction began in October 2011.

The Tubular Bells floating production facility, a classic spar hull with traditional three-level topsides, is producing from the Miocene trend. The field has an estimated production life of 25 years. Interest in the Tubular Bells development is Hess 57.14% and Chevron 42.86%.

Operator Hess holds a 25% interest in Stampede. Its partners are Union Oil (Chevron) (25%), Statoil (25%), Nexen (25%). 2H's Houston office will be responsible for the contract and the execution of this work.

World Bank OKs $700M investment in Ghana's offshore gas project

The World Bank has approved a $700 million investment in guarantees for offshore Sankofa gas project in Ghana. The latest project will develop new sources of clean and affordable natural gas for domestic power generation, helping address the country's energy shortages.

For the project, the bank approved a combination of two guarantees, which include an International Development Association (IDA) payment guarantee of $500 million and an International Bank for Reconstruction and Development (IBRD) Enclave loan guarantee of $200 million.

IDA guarantee supports timely payments for gas purchases by Ghana National Petroleum Corporation (GNPC) and IBRD loan guarantee enables the project to secure financing from its private sponsors.

According to World Bank, the guarantees are jointly set to mobilize $7.9 billion in new private investment for offshore gas. Expected to bring significant benefits for Ghana, the Sankofa Gas Project development is set to begin production in early 2018. Once the production starts, Ghana will be able to cut its oil imports by up to 12 mmbbl a year.

InterMoor concludes bpTT's Juniper gas contract off Trinidad and Tobago

InterMoor has completed the Juniper contract offshore Trinidad and Tobago, with the installation of Diamond Offshore Drilling's Ocean Victory semi-submersible drilling rig to the preset mooring spread. Carried out in a water depth of 100 m, the project marks the completion of the company's mooring and foundation installation campaign for BP Trinidad and Tobago's (bpTT) gas project.

Diamond Offshore Drilling's Ocean Victory.

According to InterMoor, the hookup required 14 InterMoor personnel offshore, including rig coordinators and superintendents, riggers and engineers aboard the UOS Pathfinder anchor-handling vessel and took less than four days to complete.

Prior to the hookup project, InterMoor completed a contract with bpTT, which included the initial design of a mooring system.

The project also included fabrication of driven piles in addition to the installation of a preset mooring spread.

At its facility located in Morgan City, Louisiana, InterMoor designed and fabricated eight piles and provided offshore project management services for the mooring campaign. As part of this, the driven piles were installed using H-links and 300 m of ground chain per leg from the Boa Deep C construction vessel.

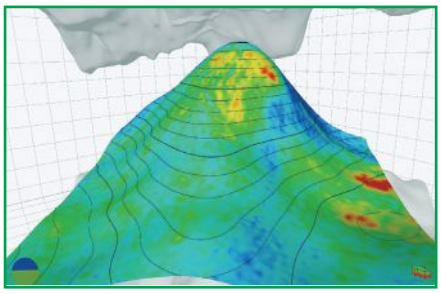
Schlumberger launches Depth Domain Inversion Services

Oilfield services major Schlumberger has launched its Depth Domain Inversion Services. Its petrotechnical experts use the services to improve the reliability and consistency of seismic structural and quantitative interpretation in complex environments.

"Conventional seismic inversion in the time domain introduces inconsistency between the seismic images and the rock properties, especially where there's a significant overburden, such as subsalt," said Maurice Nessim, president, Schlumberger PetroTechnical Services.

"With Depth Domain Inversion Services, customers receive more information derived from seismic data for reservoir characterization. This helps reduce uncertainty in complex reservoir environments, improve the confidence in prospect delineation, reservoir properties and volumetric calculations."

Performing seismic inversion in the depth domain fully integrates the inversion with the imaging products to improve the reliability of estimating rock properties for reservoir characterization. This is done by correcting for depth space and dip dependent illumination effects during seismic amplitude inversion directly in the depth domain. Depth Domain Inversion Services has been successfully applied in complex geological environments in North and South America.



In the Green Canyon area of the Gulf of Mexico, Schlumberger petrotechnical experts used a Depth Domain Inversion workflow in a complex subsalt area that was poorly illuminated. Reverse time migration produced seismic amplitudes adversely imprinted by the illumination effects. Executed in the Petrel E&P software platform, the workflow improved structural and quantitative interpretation, corrected illumination effects and provided a much sharper reflectivity image for better event continuity, more reliable seismic amplitudes and a higher fidelity acoustic impedance volume.

For more information concerning Depth Domain Inversion Services, visit www.slb.com/ddi.

Software said to help cut offshore Norway exploration well P&A time

eDrilling said it worked with Wintershall and Maersk Training to improve planning and optimize drilling for an exploration well in the Norwegian Sea. The information gathered using the company's in wellPlanner and wellAdvisor software helped decision making during construction of well 6406/2-8 and assisted P&A operations.

Up to 25% of time on offset wells in this area has been spent on P&A, eDrilling claimed, whereas the percentage for this well was 12%.

This was a vertical exploration well in the Haltenbanken region on the Imsa prospect, drilled by the semi-submersible Transocean Arctic. The Live Well Support service started on February 4. Hydraulic-simulations, risk analyses, and 3D visualization of the wellbore were conducted daily.

Caley trials system to test deep subsea manifold components

Seanamic Group's unit Caley Ocean Systems has trialed its intervention work over control system (IWOCS) deployment system, to test the manifold functions on four deepwater subsea manifolds. The self-contained portable skid features A-frame, umbilical reeler-power unit and deployment frame.

The IWOCS system was deployed from a vessel, and evaluated manifold mounted valves through the manifold subsea control module (SCM). The deployment frame was overboarded and retrieved using the IWOCS umbilical.

IWOCS deployment frame ready for overboarding. Photo: courtesy of Caley Ocean Systems.

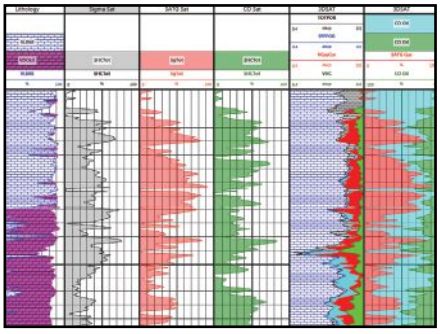
It is designed to provide the subsea interface for the umbilical, hydraulic flying lead and two electrical flying leads that facilitate subsea manifold with electro-hydraulic power and communications.

"The ability to use a wide range of vessels of opportunity, and the Caley IWOCS deployment system's integrated design and operation, brings a new level of efficiency to deepwater interventions," Caley Ocean Systems Sales Director Gregor McPherson said.

The A-frame and docking unit manage the IWOCS subsea deployment frame and umbilical. Once in the water, the deployment frame is guided subsea by remotely operated underwater vehicle (ROV). Compared with traditional IWOCS reeler and sheave arrangement, the IWOCS system is said to occupy less deck space, and is safer and efficient.

Halliburton shows new pulsed neutron reservoir monitoring tool

Halliburton's Wireline & Perforating business has introduced the Reservoir Monitor Tool 3-Detector (RMT-3D) pulsed-neutron tool that is designed to help solve for water, oil, and gas saturations within reservoirs using three independent measurements (Sigma, CO, and SATG). The data is collected with one trip in the hole, reducing nonproductive time. The tool is deployed through the casing to quickly log and calculate saturations and other properties that help identify and characterize pay zones.



Graphic results from new RMT-3D.

Halliburton said the RMT-3D analysis packages are useful particularly in recovery projects because they are designed to work in these challenging environments. Using the independent measurements helps to correct saturations for influences from the secondary and enhanced recovery fluids, so better oil saturation profiles can be calculated.

ASV completes 10 days of passive acoustic monitoring in GoM

ASV has collaborated with the Littoral Acoustic Demonstration Center Gulf Ecological Monitoring and Modeling (LADC-GEMM) consortium to conduct 10 days of Passive Acoustic Monitoring (PAM) data collection for its BP/Gulf of Mexico Research Initiative (GoMRI) funded project.

ASV worked closely with Seiche Measurements Limited to integrate its PAM technology on both the C-Worker 6 and C-Enduro Autonomous Surface Vehicles (ASVs). The ASV crew operated from the R/V Pelican coastal research vessel to collect extensive data, which will undergo analysis in the coming months.

The two ASV's were able to identify approximately 30 marine mammals whilst operating in challenging sea conditions up to sea state 5.

Passive Acoustic Monitoring is increasingly used by the scientific community to study, survey, and census marine mammals, especially cetaceans. The three year BP/GoMRI sponsored project intends to investigate how the 2010 Deep Water Horizon oil spill has affected marine mammal populations in nearby spill areas, as well as improve methods for monitoring everyday operations in the Gulf of Mexico.

ASV is a leading manufacturer of Unmanned Marine Systems with specialized expertise and experience in design, build, operation, and maintenance. ASV provides solutions for commercial, defense, and scientific applications across the globe.

For more information, visit www.asvglobal.com.

IMCA publishes world-wide ROV stats for 2014

The International Marine Contractors Association's (IMCA) 2014 survey of remotely operated vehicle (ROV)s, and ROV personnel reveals that in February 2014 a total of 3,369 ROV personnel (superintendents, supervisors, pilot techs and other offshore ROV support personnel) were working, and in August the total figure was 3,617. The total number of ROVs in February was 677 and in August 726.

These figures compare with 3,663 personnel in February 2013 and 3,962 in August 2013; and 580 ROVs in February 2013 and 636 in August 2013.

The types of ROV in operation are broken down using the classes of ROV defined in IMCA R 004 Rev. 3 - Code of practice for the safe and efficient operation of remotely operated vehicles – Class I – Observation ROVs; Class II – Observation ROVs with Payload Option; Class III – Workclass Vehicles; Class IV – Towed and Bottom-Crawling vehicles; Class V – Prototype Development Vehicles. Class III vehicles were the most in use at the time of the two surveys – 518 in February, and 561 in August.

"These statistics are intended to reflect personnel and vehicle levels on two occasions in the year roughly six months apart – February and August," explains IMCA's Technical Director and Acting Chief Executive, Jane Bugler. However she warns: "From 2014 the figures were required for all personnel working on ROV operations both offshore and onshore and also for total numbers of ROVs in fleets. Some respondents did not fully understand this revised data collection requirement and therefore the figures for 2014 may not entirely reflect the status of the ROV industry exactly as intended.

"Also as the figures represent a snapshot, they do not take into account any major contract start or finish times. Though these statistics represent personnel and vehicles of IMCA members submitting statistics.

"We believe that the information here is broadly representative of a significant proportion of the ROV industry. 26 member companies reported their statistics for 2014 which was lower than the 32 reported in the previous year which has also affected the results. We look forward to receiving the 2015 figures for comparison purposes."

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

Güralp ocean bottom seismometers maximize value of marine seismic survey

Güralp Systems' customer, Australian Geophysical Observing System (AGOS) has published initial findings from an active marine seismic survey off the coast of Australia showing the benefits of using ocean bottom seismometers (OBS) in addition to hydrophone streamer based surveys.

Güralp provided 20 OBS instruments, engineered to withstand ocean depths to 6,000 m. Each OBS incorporated a Güralp 6T-OBS 3-component broadband (0.0167 Hz–100 Hz) seismometer, with a titanium housing; a hydrophone (1Hz–30KHz) attached to the fourth channel and a high precision Güralp real time clock with accuracy of better than a microsecond. The instruments can remain on the seafloor continuously recording for up to 12 months and can be commanded to return to the surface using an acoustic communication link.

AGOS found that the Güralp OBS allowed for recovery of information from much deeper crustal features which would not typically be recovered via streamer based surveys during marine seismic acquisition. In addition they found that the hydrophone records considerably less information and appears to be more sensitive to water-born multiples than the seismometer.

AGOS identified a number of findings from their recent surveys for the future of OBS technology development which include: The possibility to image whole crust and upper mantle velocity distributions and unequivocally define the Moho boundary from analysis of both reflected and refracted phases, generated by an industry standard airgun array with certain specifications; Extension of 3D imaging capability, utilising OBS-recorded signal from 3D surveys at larger offsets than achievable with streamer survey configurations; and, Analysis of background noise and understanding the interaction of broadband airgun generated signal and the ocean/Earth system.

Dr Alexey Goncharov, Australian Ocean Bottom Seismograph Science Coordinator commented, "Australian National OBS Fleet instruments that were built by Güralp have proven their capability to record high quality data from commercial seismic surveys airguns to very large offsets. There is significant interest from industry, government and researchers for future OBS surveys. We are currently processing data from the Shell Dirk-Adventure Bart survey and have obtained fantastic results for some long refraction lines, including high-quality first arrivals at large offsets. Moho refractions are clearly visible in the majority of the refraction profiles. We are also processing 'eavesdropped' signal from nearby 3D reflection shots and exploring the full capability of this unique dataset."

For more information, visit www.guralp.com.

Oceanica's Petrobras operations get enhanced Lynx ROVs

Brazilian subsea engineering company, Oceanica, is expanding its Saab Seaeye ROV fleet with two new Lynx vehicles extensively fitted with cameras and tools.

Each Lynx will be used in conjunction with two new vessels being built for Oceanica's growing Petrobras activities in the vast Brazilian oil fields.

Head of ROV operations, Manoel Teixeira Lopes Filho, says, "I am really happy with the two Falcons we bought and believe the two Lynx will be equal in reliability and performance."

Both of the 1,500 m rated, six thruster strong Lynx, will be used primarily for observation and inspection of pipelines and Automatic Mode Function systems on wells.

Each comes with an exceptionally wide range of cameras, comprising Seaeye wide-angle low-light colour camera, a rear-facing mini colour camera, a monochrome high-definition enhanced CCD camera and a Kongsberg high-definition HDTV camera with fibre optic output.

Also fitted is a Super SeaKing dual frequency sonar head and a Fibre Optic Gyro System. In addition each comes with a four-function manipulator, a water jetting system and hydraulic 25 mm cable cutter. Each Lynx has a Tether Management System and A-Frame Launch and Recovery System.

For more information, visit www.seaeye.com.

Pioneer Array mooring deployments and AUV testing

An OOI team, led by Woods Hole Oceanographic Institution (WHOI), conducted the fourth phase of infrastructure deployment for the Pioneer Array during 28 April to 14 May on the R/V Atlantis.

The team deployed five Coastal Profiler Moorings (CPMs), recovered three CPMs, and recovered three Coastal Gliders on the first leg of the cruise. On the second leg, three Coastal Surface Moorings (CSMs), one Coastal Surface Piercing Profiler and three Coastal Gliders were deployed, and one CSM was recovered. In addition to the deployments and recoveries, operations on the two cruise legs included CTD casts at each mooring site, a cross-shelf CTD survey coordinated with an AUV transect, and a variety of small-scale bathymetry surveys.

A notable accomplishment on the Pioneer-4 cruise was deployment of the Pioneer REMUS-600 AUV. The AUV conducted a cross-frontal transect coordinated with a seven-station shipboard CTD survey.

The region of the New England continental shelf where the Pioneer Array is located is characterized by sharp gradients in ocean temperature, salinity and other properties across the shelf, currents that flow along the shelf, and strong biological productivity. The Pioneer Array will provide oceanographic and meteorological observations from this highly productive region, allowing scientists to examine several important coastal processes including shelf break fronts, frontal upwelling, and the role of filaments and eddies in cross-shelf exchange of parameters such as nutrients, heat, and biomass.

By the fall of 2015 the Pioneer Array will complete its transition to the Operations and Maintenance phase, with a mooring and glider service cruise scheduled for 12 to 31 October on the R/V Atlantis.

For more information, visit www.whoi.edu.

Seebyte, ASV and the Marine Biological Association of the UK awarded funding for Autonomous Ocean Research Study

Following the successful completion of the initial phase, SeeByte, ASV and the Marine Biological Association of the UK have been awarded funding to carry out phase two of the Adaptive Autonomous Ocean Sampling Networks (AAOSN) SBRI call.

The aim of the project is to reduce the complexity and frequency of operator input when supervising large fleets of autonomous systems from the shore. Extending the tagged fish work carried out in phase one, this second phase will seek to design autonomous behaviours to address five scenarios including oil spill, passive acoustic monitoring (PAM), seabed mapping, fish tracking and tidal mixing.

The behaviours will integrate sensor data and interpretation methods to enable adaptive, multi-vehicle missions

using combinations of ASV, AUV and Glider assets.

Trials for this project will be conducted integrating SeeByte's Neptune, which already forms the basis of the UK Maritime Autonomy Framework (MAF), onto various autonomous assets including the ASV's C-Enduro, a long endurance Autonomous Surface Vehicle, using a common interface and control system. The C-Enduro will operate a multi-beam echo sounder and PAM system.

SeeByte's Neptune is an adaptive planning tool for optimising the execution of AUV operations. It supports high-level goal-based mission descriptions and allows the matching of mission requirements against vehicle capabilities. Neptune also includes behaviours capable of adapting the mission based on changes in the environment, assets and mission objectives; benefits which will be useful for future unmanned operations.

For more information, visit www.asvglobal.com.

Subsea training center revamps ROV and closed bell training

Students undertaking ROV pilot technician and closed bell training at the Fort William-based subsea facility, The Underwater Centre, are to benefit from newly revamped courses providing even more contextual modules.

The Centre has been working with industry to identify areas of its ROV and closed bell training suites which can be enhanced and courses for the remainder of 2015 will reflect this with major developments across the board.

Students on the three-week ROV pilot technician course will now benefit from entirely unique training elements including time on the Centre's Loch Sunart ROV vessel and training in the ROV electrical and mechanical workshops, features unavailable at any other facility.

Loch Sunart is the Centre's work class ROV support vessel fitted with an operational work class ROV, and this will provide students with invaluable first-hand experience in all areas of ROV operations and mobilisation, from launch and recovery to operating a suite of ROV navigation sensors as part of in-water practical exercises.

In addition to this, the Centre has overhauled the seven week premium ROV course to include a condensed and more focused electronics module as well as introducing courses covering high voltage and electrical safety awareness, T4: Introduction to Titan 4 manipulator training, fiber optics, working at height, and experience using our VMAX Triton XL simulator.

For the remainder of 2015 the HSE closed bell courses will include a new practical introduction to using an self-propelled hyperbaric lifeboat, practical introduction to bolt tensioning, Kirby Morgan hat users course and the IMCA diver medic ticket, helping add to the competency of its students when they enter the industry.

For more information, visit www.theunderwatercentre.com.

SMD supply Quantum MkIII work class ROVs to China's COOEC

SMD are pleased to announce the delivery of three Quantum Work Class ROV (WROV) systems to China's largest offshore engineering construction company, COOEC Subsea Technology Co Ltd.

SMD were awarded contracts to supply COOEC with three Quantum MkIII 3,000 m rated WROV systems in the first quarter of 2015. The orders include one 12Te and two 15Te launch and recovery systems, SMD DVECS-S control systems for each vehicle and a comprehensive spares and support package.

In addition to supporting COOEC during system mobilisation, the contract includes a comprehensive SMD customer training package for COOEC personnel, with the option for training to take place at SMD's industry leading training suite in North East England, or at the customers' preferred location.

The Quantum WROV is the ultra-heavy duty construction class vehicle in SMD's WROV range. Utilising the latest multi-platform Curvetech™ components, SMD Quantum users report formidable performance and reliability, with the

machines capable of supporting the most demanding of subsea operations.

DVECS-S control includes an advanced dynamic positioning system, allowing hands free hovering and navigation and thus enabling the pilot to concentrate on the job in hand. The user friendly system allows the pilot to simply point-and-click on the map screen to move the ROV. Through communication with commonly fitted ROV instruments DVECS-S can accurately control the position of the ROV throughout the water column - even in high currents.

SMD first supplied COOEC with WROVs over ten years ago. COOEC now have a total of nine SMD WROVs in their fleet following delivery of the three new Quantum systems.

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

Robotic gliders herald sea of change in ocean survey work

Robotic underwater Seagliders used by the Oban-based Scottish Association for Marine Science (SAMS) have now gathered the equivalent of five years of oceanographic data, most of which was collected in the past 18 months.

This milestone highlights a major change in how marine scientists collect information such as sea temperature, salinity, pressure and oxygen, as the 6 ft long Seagliders can spend months at sea collecting data that contributes to our understanding of climate change.

To date, the seven SAMS Seagliders have spent the equivalent of five years at sea, travelling more than 33,000 km. One of the Seagliders, Ardbeg, has broken a SAMS distance record by completing a return trip of more than 3,400 km along the Extended Ellett Line, a route from Scotland to Iceland that has been surveyed by scientists for 40 years.

Dr. Stefan Gary, a research associate in physical oceanography at SAMS, said, "Seagliders allow oceanographers to make cost-effective, long-term, and long-distance observations, often in hard-to-access regions that ships rarely frequent and other ocean robots rarely go.

"Because of their durability we often deploy them in the winter, as they have been known to withstand extreme storm-force conditions. Seagliders also allow for very dense sampling of the ocean, collecting a profile every 3 km, while a survey vessel usually samples every 10 to 30 km."

SAMS owns two Seagliders – purchased in 2009 and 2011 – and has operated another five from the Natural Environment Research Council's (NERC) Marine Autonomous and Robotic Systems (MARS) instrument pool since April 2014. SAMS, which is ideally situated for deep-sea Atlantic research, runs the Scottish Marine Robotics Facility, a command and control centre for Seaglider operations.

Currently, the SAMS Seagliders are contributing to three major NERC-funded projects: the Extended Ellett Line, a time series monitoring the evolution of the waters flowing between Scotland and Iceland; the FASTNEt project, looking at physical exchange processes between the deep ocean and shelf seas; and the international OSNAP project, which will monitor the oceanographic circulation across the subpolar North Atlantic until 2018. Scientists across Europe are working together towards maximising the gliders' potential in terms of data quality, quantity, accessibility and cost effectiveness through projects such as AtlantOS or as part of the glider community group EGO.

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

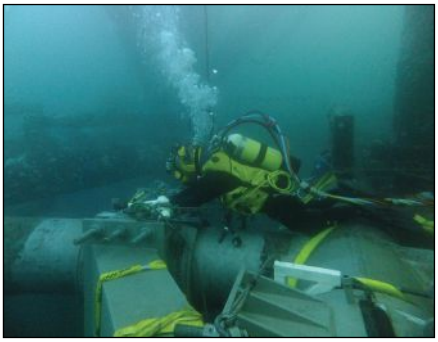
Harkand achieves two survey firsts in Mexico

Harkand has successfully carried out the first ever free inertial metrology in Mexico's waters and at a new depth for this approach in the region.

The global inspection, repair and maintenance company achieved the survey results for their client at a depth of 380 fsw in the Bay of Campeche.

The scope of work saw Harkand working in collaboration with their metrology technology partner Zupt to complete the survey project in support of the installation of an expansion spool piece for a new pipeline and platform campaign in Mexico.

AJ Jain, Harkand managing director North America and Africa said: "Our client wanted to know if the inertial metrology would better suit the project over the acoustic method. Our personnel are experienced in both techniques so after reviewing the work we were able to determine the free inertial metrology was the most time-saving and cost effective solution in this circumstance. Although a diver had not performed



inertial metrology in this water depth before, we were confident in our saturation diving team's experience and capabilities. Our client had the results in just 12 hours allowing the expansion spool piece design and fabrication to proceed very quickly. In comparison, the acoustic method would have taken three days to be reported back."

The expansion spool piece was fabricated onboard the vessel in two days, with the Harkand saturation diving team successfully installing the spool piece without any issues.

For more information, visit www.harkand.com.

Ashtead Technology helps solve riddle of lost World War II ship

An Aberdeen-headquartered firm has donated specialist subsea equipment to help solve one of the most tragic mysteries of the Second World War.

Ashtead Technology has been supporting attempts to discover exactly what caused the loss of 645 crewmen when the HMAS Sydney sunk on 19 November 1941.

In addition, the leading independent provider of subsea equipment rental, sales and services to the offshore industry, has provided 3-D survey equipment to study the wreck and inform conservation of what is a mass grave site.

The vessel had gone missing following a battle with the German cruiser Kormoran, which also sank. Since then it was never known why the Australian ship went down so quickly when it was pitted against a relatively small opponent.

The final resting place of the HMAS Sydney was only discovered in 2008 off the West Australian coast at a depth of 2,000 m.

Ashtead became involved after being approached by DOF Subsea on behalf of the Western Australia Museum which has been working with Curtin University.

The specialist technical equipment supplied by Ashtead allowed researchers to carry out subsea surveys with navigation at depth, studying water speeds, sampling water conditions and providing depth and distance information.

The technology provided included an iXsea ROVINS System, Valeport BFM 803 Current Meter, Valeport MIDAS CTD, Valeport MIDAS BathyPack 3000m, Tritech PA500 Bathy Altimeter, Teledyne Blueview P900-130, and a PMAC CPacq single cell system.

With more than 70 years of mystery into precisely what happened, the survey work was able to show the ship had a 15 cm shell hole through the compass platform at the bridge. The damage would have disabled the control systems and meant the HMAS Sydney would subsequently struggle to defend itself.

Investigators are now assessing how the vessel has corroded and ways that it can be conserved.

Wendy Lee, regional manager of Ashtead Technology's Singapore office, said, "The mystery of what happened to the HMAS Sydney has been a puzzle that led to many different theories over the years. I am glad we could help the

families and descendants of those who died on that day to learn just what happened. The technology we supplied played a key role in surveying the wreck, establishing the state it is in and what the sea conditions are around it. This is work we are well used to at Ashtead through our support for the offshore industry and the systems used have meant those investigating what happened to the vessel have been able to build up an accurate current picture of the HMAS Sydney and its past."

The survey work on the HMAS Sydney was all done from the outside of the vessel to protect the integrity of the grave site.

For more information, visit www.ashtead-technology.com.

Slocum glider service expansion in Asia-Pacific Region

Teledyne Webb Research (TWR), a leading manufacturer of AUVs including the Slocum G2 glider and Slocum hybrid glider, announced an agreement has been signed with Blue Ocean Monitoring (Services) of Perth, Australia for Slocum glider service, support, and repair in Australia and surrounding countries. Blue Ocean Monitoring (Services) will be the exclusive third party Slocum service provider for a number of countries in the Asia – Pacific (APAC) region including Australia, Brunei, Cambodia, East Timor, Indonesia, Malaysia, New Zealand, Philippines, Papua New Guinea, Singapore, Thailand, Vietnam, Myanmar, and Laos.

Slocum customers in this region will now have the option of dealing directly with a Slocum service provider in closer geographic proximity, which will enhance the level of support to the rapidly growing Slocum user base in the area, greatly reducing maintenance turn-around times and spare part lead times. Blue Ocean Monitoring (Services) will stock Slocum glider spare parts and will have the capability for many Slocum glider repairs.

Blue Ocean Monitoring (Services) is a subsidiary of Blue Ocean Monitoring Pty. Ltd, an operator of Slocum gliders based in Perth, Australia. Blue Ocean Monitoring Pty. Ltd. specializes in the implementation and operation of remote ocean data collection systems for Oil & Gas and Environmental applications. Blue Ocean Monitoring key employees have over a decade of Slocum glider operations and a wealth of experience supporting Slocum glider programs.

The Slocum glider is an AUV driven by a buoyancy engine capable of long-term deployment for measuring oceanographic parameters.

For more information, visit www.teledynemarinesystems.com.

Panasonic completes ITC Global acquisition

Panasonic Corporation has completed its acquisition ofITC Global, a leading provider of satellite communication services for the energy, mining, and maritime markets. Founded in 2001 with regional headquarters in Houston, Texas; Sion, Switzerland; and Perth, Australia, ITC Global serves customers at more than 1,200 remote sites across 70 countries and all the world's oceans. Panasonic, through its subsidiary Panasonic Avionics Corporation, is a leading provider of inflight communications and entertainment systems to the aviation market.

Paul Margis, President and Chief Executive Officer of Panasonic Avionics said, "We are extremely pleased to have completed the acquisition of ITC Global. Together, we will set a new standard in global satellite services by delivering robust entertainment and business critical communications solutions to the energy, mining, maritime and aviation markets."

As a result of this transaction, ITC Global becomes "ITC Global, A Panasonic Company" and will operate as an independent unit of Panasonic Avionics. The ITC Global management team will remain in place and will continue to focus on its customers in the energy, mining, and maritime markets, while Panasonic Avionics will remain dedicated to its customers in the aviation market.

For more information, visit www.itcglobal.com.

Speedcast to provide internet for "hotel experience" vessels

SpeedCast International Limited has been awarded a multi-year communications contract by international shipping company, Vroon. The new Ku-band satellite service will facilitate high-performance broadband connectivity with multi-megabit speeds, providing "hotel experience" Internet facilities for Vroon clients aboard specific categories of vessels. These include subsea-support vessels (10-25 passengers), walk-to-work vessels (with up to 60 passengers) and wind turbine installation/maintenance vessels (up to 110 passengers).

Vroon operates and manages a diverse fleet of approximately 170 vessels, with more than 400 shore-based staff and around 4,000 marine personnel worldwide. Vroon's modern vessels are active in livestock transportation, offshore support, offshore wind turbine installation and maintenance, dry cargo, container and other segments, including product/chemical tankers, asphalt/bitumen tankers and car carriers.

Vroon conducted a competitive tender process to find a new VSAT supplier for client Internet access on board the "hotel experience" vessels. SpeedCast was selected for its ability to meet a stringent set of requirements, which will enable Vroon to deliver future-proof, high-capacity and scalable VSAT internet services to accommodate clients' demanding Internet requirements.

"With an ever-increasing demand for Internet services from our clients, we selected SpeedCast to deliver these services in order to fulfil our clients' current and future needs," said Rob Frenks, Vroon Group ICT Manager.

SpeedCast's solution will provide seamless connectivity, enabling high-speed Internet access and voice services for the "hotel experience" vessels. The always-on 24x7 broadband communications platform will support a wide range of services, including Internet, voice and video streaming, with real-time connectivity at sea.

"With our global infrastructure and innovative technology we can deliver a solution that will meet Vroon's needs today, and for many years to come," said Piers Cunningham, VP of Maritime Services, SpeedCast. "Looking forward, by delivering our satellite communications solution, we can help Vroon to deliver a future-proof and scalable Internet service that will meet the needs of their clients today and in the future."

This announcement follows SpeedCast's recent acquisitions of Hermes Datacomms and Geolink Satellite Services, as well as select NewSat assets, which further enhanced SpeedCast's products and services tailored for the energy and maritime sectors.

For more information, visit www.speedcast.com.

Global Marine installs CEM in North Sea for Tampnet

Global Marine successfully completed the transportation and installation (T&I) of a Cable End Module (CEM) in the North Sea, which was not without its challenges. Global Marine's project engineering department was tasked with demands that included pre-planning, interfacing with project stakeholders, design engineering and precision installation.

When the contract from Tampnet, an expert in offshore high capacity communication networks, was awarded to Global Marine in October 2014, the initial concept design for the CEM was very different to what was finally deployed. Indeed, the early involvement of the company's project engineering team in the design phase was a key part of this successful platform-to-platform fibre optic communications project.

The design changes requested by the project engineers were important to allow successful installation given the tight parameters set by the client. Essentially, the CEM had to be installed within a set distance of a pre-installed SSIV (subsea isolation valve) to allow jumper cables to be connected by divers at a later date. Additionally, the operation was to be performed in close proximity to surrounding structures, which added further complications to the offshore execution.

A further important aspect of installing subsea structures is positioning on the seabed. On the Tampnet project, tolerances of ±2.5 m for position and ±2.5° for heading meant Global Marine used a Sonardyne Ranger 2 USBL acoustic positioning and tracking system (with transponders fixed to the structure), while EIVA Navipac template software was used to ensure precise placement.

Of course, contingency plans are also a pre-requisite when it comes to positioning subsea structures, and on this project the secondary method in place was a second USBL system, while a third strategy was the deployment of pre-installed sandbags to box-in the target area for landing the CEM.

The CEM was installed successfully in April 2015, achieving all of the necessary installation tolerances. Positioning this subsea structure accurately was a crucial part in the overall delivery of the project, and relied heavily on sound project engineering both in the planning phase and subsequently during marine operations. Indeed, the CEM deployment for Tampnet builds on Global Marine's historical success in similar projects, such as the T&I of subsea nodes for scientific research at VENUS (Victoria Experimental Network Under the Sea), a unique subsea laboratory that provides live data to the ocean research community.

For more information, visit www.globalmarinesystems.com.

SK Telecom to test LTE maritime network

SK Telecom plans to launch the world's first pilot LTE-M (LTE for Maritime Wireless Communications) network, as part of a research and development project led by the Ministry of Oceans and Fisheries (MOF).

LTE-M supports high-speed wireless telecommunications on ships located approximately 100 km from shore. In particular, LTE-M is expected to significantly enhance navigation safety of small ships that have relatively poor inbuilt communication and safety system than large vessels.

SK Telecom plans to deploy the test network by May 2016 in the East Sea of Korea. Radio signals transmitted from a high-gain antenna located at high altitude in the eastern coast will be received by LTE-M router installed on a ship to be converted to Wi-Fi.

To this end, the company will develop a high-gain antenna that covers up to 100 km offshore as well as an LTE-M router that can receive LTE signals in a stable manner in the maritime environment by withstanding high humidity, strong wind and salt-laden atmosphere.

"SK Telecom will successfully deploy LTE-M, high-speed maritime wireless communications network, by leveraging its extensive expertise in communications technologies, and thereby contribute to enhanced safety of ships," said Choi Seung-won, Senior Vice President and Head of Network Strategy Office.

For more information, visit www.sktelecom.com.

Thuraya offers flexible, affordable 75MB bundles

Thuraya Telecommunications Company has developed a 75MB bundle plan adding to its list of flexible, value-for-money voice and data bundles and zero up-front fees on hardware. With the maritime sector enduring financial pressures, end-users can now take advantage of Thuraya's tailor-made communication packages without the worry of over-spending on company budgets – thanks to the new 75MB data bundles which include three convenient options.

Thuraya's Product Manager, Maritime, Keith Murray, said, "Ship owners and managers were stuck between a rock and a hard place, but we're now offering them a real choice. Our new bundles will help companies save money from the offset without compromising on quality. Thuraya's 75MB bundle plans are designed for

those whose only previous options have been to buy a low-end plan, while having to use expensive out-of-bundle data, or a 250MB plan where you pay for data from other suppliers that you end up not using."

These latest maritime broadband bundles come at a time when maritime users are increasingly cost-conscious, and the need for quality data connectivity at cheaper rates is of vital importance. The new bundle plans complement existing Thuraya plans, which offer flexible contracts and unlimited plans – ensuring best-in-class rates for broadband data.

These packages are built for end-users at a time when the maritime communications landscape is experiencing rapid change.

For more information, visit www.thuraya.com.

SpeedCast strengthens maritime business with acquisition of SAIT Communications

SpeedCast International Limited has signed a definitive agreement to acquire SAIT Communications, a fast-growing maritime communications service provider in southern Europe. SAIT Communications is one of the leading suppliers of L-band satellite services in the southern European maritime market, in particular Greece, which is one of the largest maritime markets in Europe, as well as Cyprus. SAIT Communications has demonstrated consistent strong organic growth for the past few years, with further sustained organic growth expected as it benefits from the adoption of broadband services on a growing number of vessels in the merchant shipping sector. The acquisition will bolster SpeedCast's strength in the global maritime market, enhance its services portfolio with additional offerings, and significantly expand SpeedCast's exposure to the important shipping sector.

SAIT Communications has been active in the maritime communications business for close to 10 years. The company prides itself as a leading provider of advanced communications and IT services to Greek ship owners wherever their vessels operate around the globe. SAIT Communications boasts a marquee customer list, including most of the top Greek shipping companies, and services about 2500 ships. It has experienced impressive growth rolling out Fleet Broadband, an Inmarsat service, to close to 1,500 vessels over the past few years, and has more recently started providing VSAT broadband services. The Company is based in Cyprus with employees in Cyprus and Greece.

SAIT Communications uniquely complements and extends SpeedCast's maritime business thanks to its long term customer relationships with large Greek shipping companies, a strong L-band expertise, an innovative portfolio of value-added services, and a very experienced management team that will drive the growth of SpeedCast's business globally. With this transaction, SpeedCast acquires a strong foothold in Southern Europe, a region with continued L-band growth and ripe for accelerated VSAT services growth, in particular in Greece and Cyprus, countries that host many large ship owners and fleet managers. The combined entity will be one of the largest service providers to the maritime sector in the market today, servicing over 5,000 vessels with a wide portfolio of communications and IT services, and an impressive global support network.

For more information, visit www.speedcast.com.

Voyager IP and National Space Centre win Irish Naval Service contract

On 9 July 2015, at Elfordstown Earthstation in Cork, Ireland, Mr. Simon Coveney TD, Ireland's Minister for Defence, Agriculture, Food and the Marine, officially launched the new satellite communications service to the Irish Naval Fleet provided by the National Space Centre and Voyager IP, the first All-Irish providers to win the contract.

The two companies were awarded the circa €0.5-million Naval Service contract earlier this year and will now jointly manage the entire satellite communications service for the Irish Naval Fleet at home and abroad. The new satellite network infrastructure has been configured and new equipment installed across the fleet. Voyager IP is providing the satellite airtime, technical assistance for the onboard systems and a 24 hour helpdesk while the NSC is providing the satellite network infrastructure.

Speaking at the event, Minister Coveney said, "It's great to see Irish companies like National Space Centre and Voyager IP competing for and winning a contract like this. I wish them well for the future. Both companies will pay an important role in supporting the Irish Naval Service with their current humanitarian mission in the Mediterranean."

The Irish Naval Service has been using satellite communications systems for operational and non-operational purposes for 10 years but up until now, by necessity, it had been managed by overseas providers.

For more information, visit www.nationalspacecentre.eu.

NORSAT announces follow-on order from major Eurasian defense contractor

Norsat International Inc. announced that the company has received an approximate $700,000 follow-on order to the original $3.5 million award announced on 19 February 2015, from a Tier 1 Eurasian defense contractor for a range of Norsat's portable satellite terminals. This follow-on order increases the total contract awarded to approximately $4.2 million.

The increase in order is for additional units of Norsat's MarineLink maritime VSAT terminals and for the 0.9m Journey Manpack portable satellite terminal, the newest in Norsat's broad portfolio of satellite solutions. Norsat's MarineLink shipboard terminals offer a 3-axis operating platform and a 360° high-speed tracking antenna that ensures a reliable link in even the most difficult sea conditions. The 0.9 m Journey Manpack consists of an easily portable, rapidly deployable, satellite terminal that weighs less than 25 kg.

Norsat expects to ship the majority of the terminals in late 2015 with follow on deliveries throughout 2016.

Dr. Amiee Chan, chief executive officer of Norsat, commented, "We continue to execute on bringing to market a diversified suite of products and solutions that meet the high standards of defense contractors around the world. This follow-on order by a Tier 1 Eurasian contractor demonstrates the high level of satisfaction they have with the Norsat solutions to meet their needs of providing communications in remote and challenging applications. Additionally, this order builds upon the bookings momentum that we have had over the last year, especially within our military related businesses, helping to set the stage for growth in the back half of 2015 and into 2016."

For more information, visit www.norsat.com.

Motive signs agreement with MTN for TV service

Motive Television PLC has announced that its fully-owned subsidiary, Motive Television Services Limited, has signed a Memorandum of Understanding with MTN Satellite Communications. Under the MOU, Motive will provide Motive's BYOD TV technology and paid engineering support to assist MTN in developing new services to be marketed by MTN to its worldwide clients.

Supported by one of the world's most secure networks, covering 99% of the world's populated regions and the majority of all ocean regions, MTN provides communications and content services to the maritime industry. These include end user products, enterprise and technical solutions, network management and bandwidth optimization.

Under this MOU, Motive will make the modifications and customization necessary to make it possible for MTN to provide a demonstration of BYOD TV to its customers at a key trade exhibition in September 2015. Should MTN decide to go forward following the exhibition, Motive will complete a marketing agreement with MTN whereby MTN is licensed to market and offer such services to MTN clients and customers.

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

Eirgrid welcomes EU funding for Ireland-France interconnector

Ireland's state-owned electricity grid operator EirGrid has welcomed the announcement of €3.8 million EU funding that will go towards EirGrid's joint feasibility study into an electricity interconnector with France, the Celtic Interconnector, which is being carried out with the French grid operator, RTE.

The results of the feasibility study are due from mid-2016, at which point a decision on whether or not to proceed with the Celtic Interconnector will be made.

EirGrid Chief Executive Fintan Slye said, "We have been in touch with the European Commission on this study from the beginning and we are delighted with the allocation of €3.8 million in funding. Part of EirGrid's role is to explore interconnection with other EU countries, in order to ensure security of supply and drive down prices through increased competition.

"An interconnector with France is the strongest prospect after an interconnector with Britain, which we have already constructed," Slye continued. "A decision on whether or not to proceed with the Celtic Interconnector is expected from mid-2016. Today's European funding will continue to ensure that we carry out the strongest feasibility study possible."

Minister for Communications, Energy and Natural Resources Alex White said, "The allocation of €.8 million in European funding is a welcome endorsement of EirGrid's work towards interconnection, and we will continue to work closely with our partners in the EU."

"Interconnection is a key EU target in the energy sector and is particularly important from an energy security perspective for poorly interconnected Member States such as Ireland, and in order to ensure that we avail fully of the benefits of an integrated energy market. I look forward to the results of the Celtic Interconnector feasibility study in a years' time," White added.

For more information, visit www.eirgrid.com.

Prysmian secures contract for Bligh Bank 2

Prysmian Group has been awarded contracts by Nobelwind NV, an offshore wind farm developer, to supply wind turbine inter array cables for the Bligh Bank 2 offshore wind farm, located off the coast of Zeebrugge in Belgium.

Prysmian is responsible for the design, manufacture and supply of the 33 kV submarine cables with various cross-sections to be used to connect the 55 individual wind turbines and an Offshore High Voltage Substation (OHVS) that form the 181.5 MW wind farm located near the existing OHVS of Belwind1.

In addition a 33 kV coupling cable shall be supplied for use as a back-up connection between the Belwind1 OHVS and the Bligh Bank OHVS. Prysmian will also provide the offshore cable termination and testing services for the project. The cables will be produced in Prysmian's facility in Drammen, Norway, one of the Group's excellence centers for submarine cables. Installation works are scheduled to be complete by the first half of 2017.

Over the years Prysmian has moved ahead with major investments in new and upgraded assets, broadening the range of its offered products and innovative technologies, strengthening services and capabilities in production and execution in order to serve the market as a trusted and dedicated partner for offshore wind parks cabling needs, whether for medium voltage inter-array cables, HVAC and/or HVDC export cables, as well as turn-key EPC installation services.

Prysmian can rely on three production facilities dedicated to submarine cables, situated in Arco Felice (near Naples, Italy), Pikkala (Finland) and Drammen (Norway); two installation vessels, Giulio Verne and the recently upgraded Cable Enterprise, together with well-proven in-house cable protection equipment, and specialized operations teams.

Within its portfolio, Prysmian holds already an ever-increasing track record of offshore wind power connections. Recently the Group has been awarded a contract for inter-array turnkey supply of medium voltage submarine cables for the Wikinger offshore wind farm in the Baltic Sea in Germany.

For more information, visit www.prysmian.com.

ABB hands over DolWin1 link

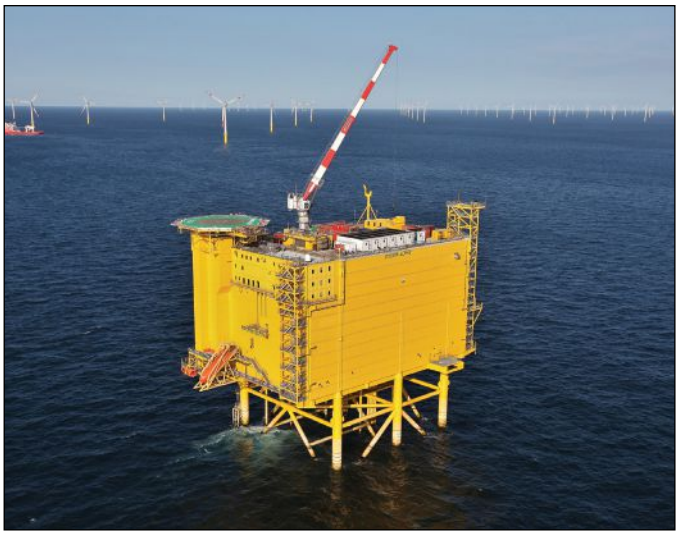


ABB has successfully commissioned and handed over the DolWin1 offshore wind grid connection to the Dutch-German transmission system operator TenneT.

The 800 MW High Voltage Direct Current (HVDC) link connects offshore wind farms around 75 km off the German coast in the DolWin cluster, with the country's transmission grid. The DolWin1 grid connection can integrate 800 MW of offshore wind power, enough to supply around one million households with clean energy.

The DolWin1 grid connection is part of Germany's ambitious energy transition roadmap, called "Energiewende," which foresees the generation of more than 6.5 GW from offshore wind by 2020 and 15 GW by 2030.

ABB deployed its Voltage Source Converter (VSC) technology, called HVDC Light®, for the project and was responsible for the design, engineering supply and installation of the offshore and onshore converter stations, as well as the submarine and underground cable systems.

The wind farm Borkum West II and the wind farm Borkum Riffgrund I are connected via submarine cables to DolWin alpha, the offshore converter station. Here the alternating current from the wind farms is converted into direct current before being transmitted at a voltage of +/- 320 kV via 165 km of extruded DC submarine and underground cables to the grid connection point at the Dörpen West substation in Heede, northern Germany.

For more information, visit www.abb.com.

Huawei Marine begins installation of NCSCS

Huawei Marine Networks Co. Ltd. has commenced the marine installation of the Nigeria-Cameroon Submarine Cable System (NCSCS).

The NCSCS system is Cameroon's first wholly-owned submarine cable with investment provided by the Cameroon Government. Spanning approximately 1,100 km, the NCSCS will directly link Kribi in Cameroon with Lagos in Nigeria, delivering 12.8 Tbps of capacity to broadband users in both countries by the end of 2015.

Presiding over the installation ceremony, Mr. Jean-Pierre BIYITI bi ESSAM, the Minister of Posts and Telecommunications, said, "The Government of Cameroon has embarked on putting in place the necessary facilities to boost the demand and supply of services in quality, in quantity and at affordable prices, as well as to increase telecom-

munications universal access and universal service". The installation of the NCSCS further demonstrates "the willingness of the Government to implement a true broadband infrastructure development policy throughout Cameroon's national territory", the Minister added. The NCSCS system forms part of Cameroon's broader strategic plan for building a National Broadband Network. The implementation of this submarine cable system will significantly enhance the development of e-government, e-trade, e-education and e-health programs and boost the economic and commercial development of Cameroon."

Utilizing Huawei Marine's industry leading Wavelength Division Multiplex (WDM) and Optical Transport Network (OTN) technologies, the NCSCS system also incorporates the world's first titanium-cased six-fiber pair repeater. Huawei Marine's second generation RPT 1660 represents a substantial advancement in innovation as it is not only the smallest repeater but also 40% lighter than any other optical amplifier. The slim-line titanium casing supports enhanced burial capability through simultaneous lay and burial beneath the seabed which reduces both marine installation costs and associated system risk.

For more information, visit www.huaweimarine.com.

Capacity sales robust on SEA-US

Hawaiian Telcom announced it continues to sell capacity on its portion of the South-East Asia – United States (SEA-US) submarine cable system, with total sales now nearing $30 million. Hawaiian Telcom along with its consortium partners began construction on the landmark fiber network linking Indonesia, Philippines, Guam, Hawai'i and California.

"Hawaiian Telcom joined the SEA-US consortium because our community and our customers' thirst for broadband capacity was growing exponentially, but the trans-Pacific capacity required to meet this demand just wasn't being addressed," said Scott Barber, Hawaiian Telcom's president and CEO. "We are pleased that the interest in bandwidth on the SEA-US network has been very strong and we are well ahead of forecasted sales projections with contracts secured to date. These sales validate the need for bandwidth in this route and confirm a strong return on investment for Hawaiian Telcom."

Internet traffic is growing exponentially due to increased demand from broadband and mobile subscribers for video, applications and other online content. This demand and the growing availability of increasing broadband speeds are leading to explosive growth in overall bandwidth demand. The Asia-Pacific region is a leading driver of Internet traffic growth, which will continue to push trans-Pacific connectivity demand beyond existing capacities. According to a recent global bandwidth forecast published by TeleGeography, trans-Pacific demand is expected to increase at a compounded annual rate of 33% between 2013 and 2020.

Answering this demand, the SEA-US submarine cable system, when completed, will deliver a state-of-the-art 100 Gbps ultra-long haul system that will provide an initial 20 Tbps of capacity over approximately 9,300 mi of fiber.

For more information, visit www.hawaiiantel.com.

Telefónica strengthens its infrastructure in the Americas with PCCS

Through its Wholesale Business Unit, Telefonica Business Solutions has strengthened its infrastructure in the Americas with the deployment of the Pacific Caribbean Cable System (PCCS), a submarine cable with a transmission capacity of up to 80 Tbps, which links Jacksonville (Florida, USA) with Manta (Ecuador). The cable has been constructed by a consortium of 5 operators which includes Telefonica.

Telefónica's international network consists of more than 65,000 km of fiber optic cables deployed on a terrestrial and submarine infrastructure which connects the USA, Americas and Europe. One of its main assets is the Sam-1, a submarine cable system deployed in 2000, which forms a 25,000 km ring linking the USA, Central America and South America. Telefónica also utilizes the Unisur cable which connects Uruguay with Las Toninas (Argentina).

The 6,000 km PCCS joins up Telefónica's infrastructures in the region which considerably strengthens connectivity and reliability of communications, especially in the Caribbean and Central America areas. In addition to Florida and Ecuador, the system connects the islands of Tortola, Puerto Rico, Aruba and Curacao, as well as Cartagena in Colombia and Maria Chiquita and Balboa in Panama.

With a total capacity of 80 Tbps the new cable substantially increases connectivity and the availability of broadband services, thus addressing the exponential data transmission demand generated by Telefónica's corporate clients, telco operators, internet companies and consumers. The PCCS helps increase the reliability of communications, reducing the risk of interruptions by providing diverse routing options and alternative access to other broadband cables in the region. The new cable also offers great flexibility and scalability to deliver multiple transmission speed options. Furthermore, it is able to increase its capacity transparently, without interruption to traffic.

For more information, visit www.telefonica.com.

Hibernia Express enables Ireland to expand global commerce

Hibernia Networks is completing its project for a new 4,600 km low latency submarine cable route connecting Halifax, Nova Scotia to London, England and Cork, Ireland. Ready for service in September 2015, Hibernia Express will serve as a foundational element to Ireland's preeminent position in the global cloud infrastructure marketplace, providing data centers and Internet exchanges the connectivity to address the immense bandwidth needs of businesses in North America and Europe. The highly scalable Hibernia Express cable will yield in excess of 10 Tbps per fiber pair, which is nearly triple the capacity delivered on current transatlantic systems.

There has been a recent surge in demand for data center services in Ireland. According to a recent article by The Irish Times, demand from global businesses is expected to at least triple Ireland's data center capacity within the next three years.

Hibernia Networks provided Ireland with the country's first direct network connecting North America five years ago.

"Hibernia Express is the latest milestone in the company's commitment to bringing the most advanced telecommunications infrastructure to Ireland," states Bjarni Thorvardarson, CEO of Hibernia Networks. "The new low latency cable provides the international connectivity it needs to support the big data and cloud applications that are driving the transformation of telecommunications globally, enabling businesses to operate more efficiently and competitively."

For more information, visit www.hibernianetworks.com.

Alcatel-Lucent, Quintillion to build system along Alaska's North Slope

Alcatel-Lucent Submarine Networks (ASN), the undersea cables subsidiary of Alcatel-Lucent, and Quintillion Subsea Holdings LLC have entered into a turnkey contract for the design and construction of a submarine cable system from Prudhoe Bay to Nome. ASN has commenced marine route survey and installation activities for the implementation of the system.

The system will offer a unique route to bring reliable, affordable high-speed broadband access to the North Slope of Alaska and will bridge the digital divide in an area of Alaska where bandwidth is currently still limited. With a capacity of at least 10 Tbit/s per fiber pair, it will enable the delivery of advanced services, including improved health and education services more cost effectively, and spur economic development by empowering local businesses.

The system will consist of three fiber pairs capable of carrying 100 wavelengths, each of which can support 100 Gbps of data capacity. Phase 1 will be a 1,850 km segment linking the Alaskan communities of Nome, Kotzebue, Wainwright, Point Hope, Barrow, and Prudhoe Bay and will provide for future extensions to Asia and Europe. Scheduled for completion by the end of 2016, Phase 1 will incorporate advanced routing and burial techniques to protect the cable and enhance the integrity of the system.

For more information, visit www.alcatel-lucent.com.

Huawei Marine, WACS consortium complete upgrade

Huawei Marine Networks Co. Ltd. has completed upgrades on the section from South Africa to Portugal and Portugal to the UK of the West Africa Cable System (WACS) using Huawei Marine's leading-edge 100 G transmission solution. With the length of the Digital Line Segment (DLS) between South Africa and Portugal beyond 11,450 km, it is one of the longest 100 G submarine links in the industry.

The upgrade solutions over 11,450 km utilize Huawei Marine's innovative 3rd generation Soft Decision-Forward Error Correction (SD-FEC) and bit interleaved technologies which guarantee the compatibility of 100 Gb/s channels with 10 Gb/s channels on the existing network, thereby optimizing the available optical spectrum.

For more information, visit www.huaweimarine.com.

African Internet growth continues to lead world

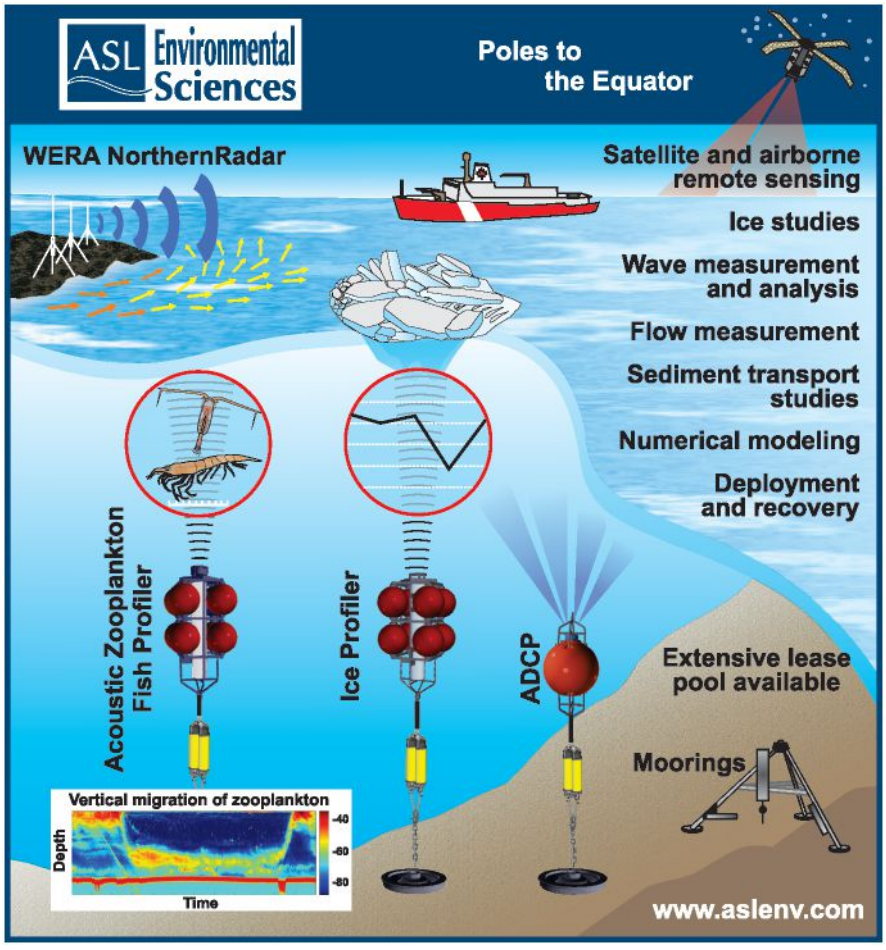
Worldwide international Internet capacity growth continues to slow, falling from 41% in 2011 to 31% in 2015. However, even with the declining pace of growth, backbone operators deployed 43 Tbps of new capacity in the past year alone. New data from TeleGeography's Global Internet Geography research service reveal that growth in international Internet capacity connected to Africa continues to outpace that of any other region.

African Internet bandwidth grew 41% between 2014 and 2015, and 51% compounded annually over the last five years, to reach 2.9 Tbps. Oceania saw the second fastest growth rate of 47% per year between 2011 and 2015 to reach 2.1 Tbps, and capacity in Latin America and the Middle East grew 44% per year to 20.6 Tbps and 8.4 Tbps, respectively. While international Internet capacity in each of these regions has doubled every two years over the period, growth in Europe and the U.S. and Canada was far slower, at 33% compounded annually.

Despite the varying pace of new deployments, Internet capacity growth has slowed in all regions over the past five years. This trend has been especially apparent in Africa. Despite the continent recording strong capacity growth between 2011 and 2015, it was a far cry from the 93% compound annual growth rate seen between 2006 and 2010.

Furthermore, while North African and Sub-Saharan African international Internet bandwidth increased more than 90% compounded annually between 2006 and 2010, growth rates among the subregions have varied substantially in recent years. Between 2011 and 2015, Internet bandwidth connected to countries in Sub-Saharan Africa rose at a much faster clip than that connected to North African countries, growing 66 and 43% per year, respectively.

"New cable builds on the east and west coasts of Africa, including ACE, SEACOM, EASSy, WACS, and others, along with new terrestrial networks, have greatly increased available capacity in the Sub-Saharan region," said TeleGeography Senior Analyst Patrick Christian. "Meanwhile, content is moving to Africa as CDN services emerge and Google Global Cache servers are installed, tempering demand for long-haul capacity."



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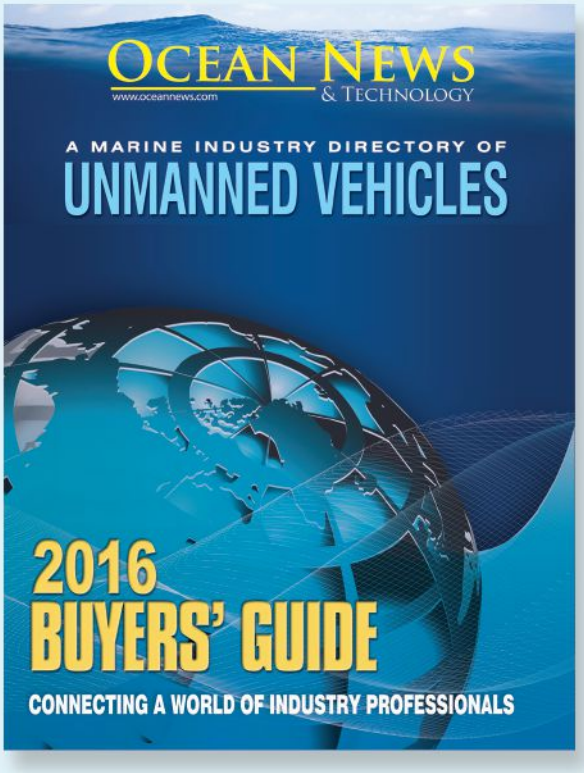

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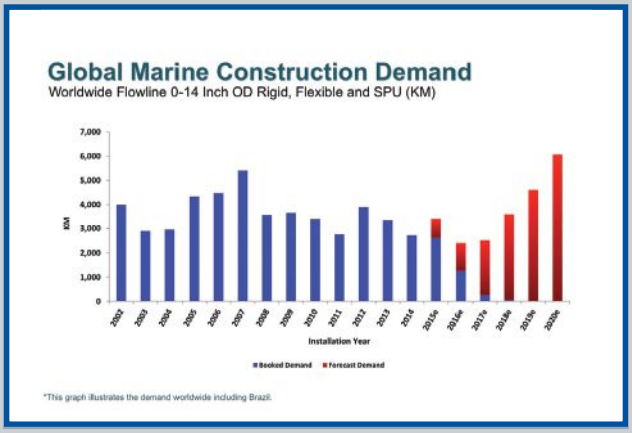
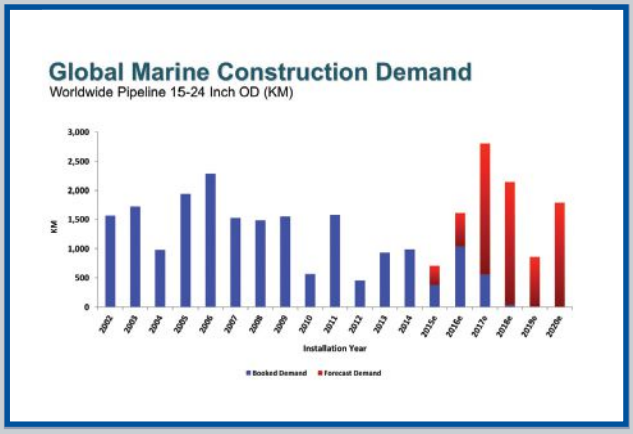
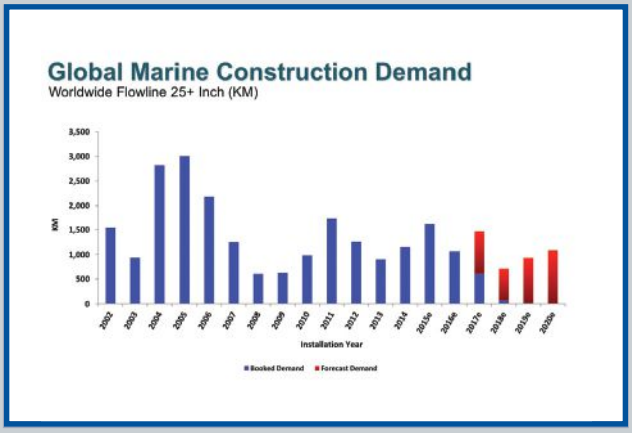
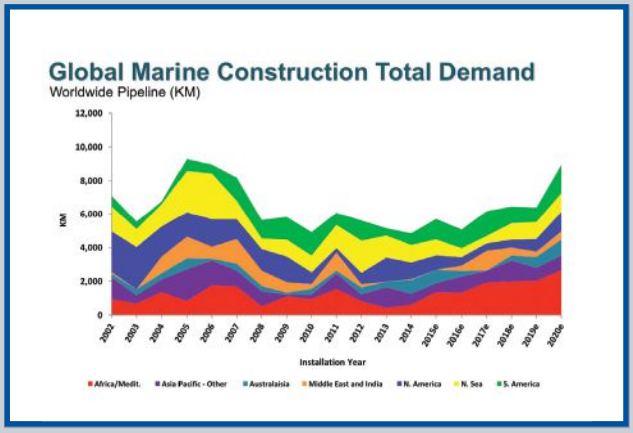
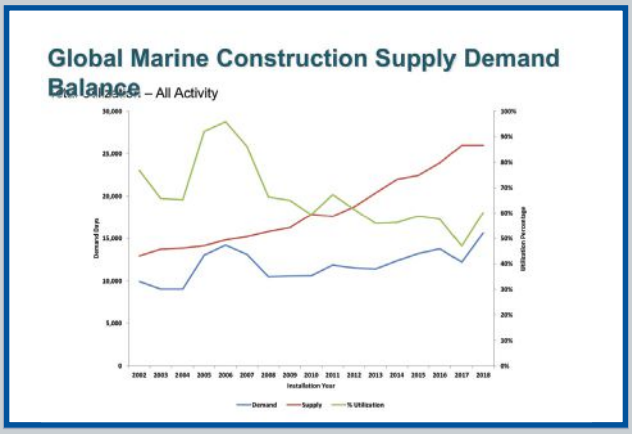
Quest Offshore Activity Report

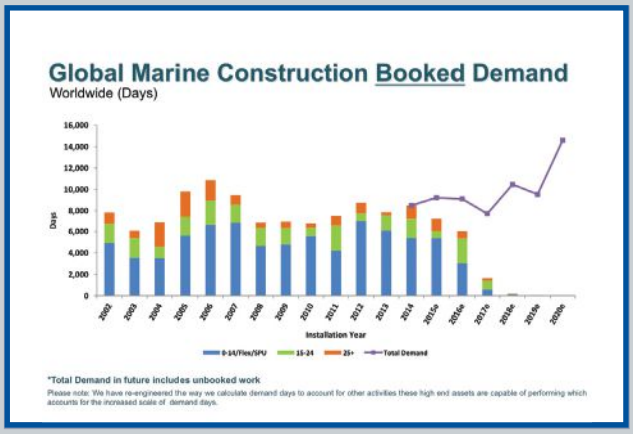












Monthly Stock Figures & Composite Index

Industry / Company Name	Symbol	Close(*Mid*) *August*	Close(*Mid*) *July*	Change	Change %	High 52 week	Low 52 week
Diversified, Production Support and Equipment Companies							
Baker Hughes, Inc.	BHI	53.34	59.50	-6.16	-10.4%	70.51	47.51
Cameron Intl. Corp.	CAM	47.21	50.72	-3.51	-6.9%	74.89	39.52
Drill-Quip, Inc.	DRQ	59.60	67.22	-7.62	-11.3%	102.00	56.24
Halliburton Company	HAL	39.12	41.07	-1.95	-4.7%	70.50	37.21
Tenaris SA	TS	25.34	25.80	-0.46	-1.8%	47.06	23.72
Newpark Resources, Inc.	NR	6.70	7.68	-0.98	-12.8%	13.00	6.65
Schlumberger Ltd.	SLB	80.91	86.63	-5.72	-6.6%	112.00	75.60
Superior Energy Services, Inc.	SPN	15.42	19.30	-3.88	-20.1%	36.07	15.34
Weatherford International, Inc.	WFT	9.05	11.34	-2.29	-20.2%	23.98	9.02
Deep Down, Inc.	DPDW	0.75	0.60	0.15	25.0%	1.55	0.44
FMC Technologies	FTI	31.65	36.53	-4.88	-13.4%	62.00	31.45
Total Diversified, Production, Support and Equipment		**369.09**	**406.39**	**-37.30**	**-9.2%**	**613.56**	**342.70**
Geophysical / Reservoir Management							
Dawson Geophysical Company	DWSN	4.42	4.60	-0.18	-3.9%	12.54	3.81
Mitcham Industries, Inc.	MIND	4.22	4.29	-0.07	-1.6%	13.52	3.67
Compagnie Gnrale de Gophysique-Veritas	CGV	4.15	5.00	-0.85	-17.0%	10.95	4.10
Total Geophysical / Reservoir Management		**12.79**	**13.89**	**-1.10**	**-7.9%**	**37.01**	**11.58**
Offshore Drilling Companies							
Atwood Oceanics, Inc.	ATW	18.00	23.81	-5.81	-24.4%	49.52	17.74
Diamond Offshore Drilling, Inc.	DO	22.40	23.99	-1.59	-6.6%	45.01	21.51
ENSCO International, Inc.	ESV	16.28	20.01	-3.73	-18.6%	50.50	15.66
Nabors Industries, Inc.	NBR	10.45	12.85	-2.40	-18.7%	27.34	9.91
Noble Drilling Corp.	NE	12.44	13.99	-1.55	-11.1%	28.50	11.36
Parker Drilling Company	PKD	2.75	2.98	-0.23	-7.7%	6.84	2.34
Rowan Companies, Inc.	RDC	16.46	18.69	-2.23	-11.9%	30.32	16.16
Transocean Offshore, Inc.	RIG	13.56	14.51	-0.95	-6.5%	38.87	12.08
Total Offshore Drilling		**112.34**	**130.83**	**-18.49**	**-14.1%**	**276.90**	**106.76**
Offshore Contractors, Services, and Support Companies							
Helix Energy Solutions Group, Inc.	HLX	6.46	12.38	-5.92	-47.8%	27.70	6.36
Gulf Island Fabrication	GIFI	12.63	10.53	2.10	19.9%	23.57	8.74
McDermott International, Inc.	MDR	4.03	4.86	-0.83	-17.1%	7.61	2.10
Oceaneering International	OII	39.86	43.06	-3.20	-7.4%	72.19	37.85
Subsea 7 SA	SUBCY.PK	7.69	8.8	-1.11	-12.6%	17.28	7.67
Technip ADS	TKPPY.PK	13.07	13.8	-0.73	-5.3%	23.53	12.73
Tetra Technologies, Inc.	TTI	7.07	6.17	0.90	14.6%	12.01	4.62
Total Offshore Contractors, Service, and Support		**90.81**	**99.60**	**-8.79**	**-8.8%**	**183.89**	**80.07**
Offshore Transportation and Boat Companies							
Seacor Holdings, Inc.	CKH	61.92	67.74	-5.82	-8.6%	62.48	61.43
Gulfmark Offshore, Inc.	GLF	7.69	10.18	-2.49	-24.5%	40.54	7.66
Bristow Group	BRS	35.72	50.72	-15.00	-29.6%	75.00	35.29
PHI, Inc.	PHII	25.96	31.89	-5.93	-18.6%	52.98	22.25
Tidewater, Inc.	TDW	17.02	21.97	-4.95	-22.5%	50.99	16.57
Trico Marine Services, Inc.	TRMAQ.PK	11.65	12.81	-1.16	-9.1%	14.35	11.63
Hornbeck Offshore	HOS	17.88	19.33	-1.45	-7.5%	43.89	16.12
Total Offshore Transportation and Boat		**177.84**	**214.64**	**-36.80**	**-17.1%**	**340.23**	**170.95**

Monthly Stock Figures & Composite Index

Industry	Close(*Mid*) *August*	Close(*Mid*) *July*	Change	Change %	High 52 week	Low 52 week
Total Diversified, Production, Support and Equipment	369.09	406.39	-37.30	-9.2%	613.56	342.70
Total Geophysical / Reservoir Management	12.79	13.89	-1.10	-7.9%	37.01	11.58
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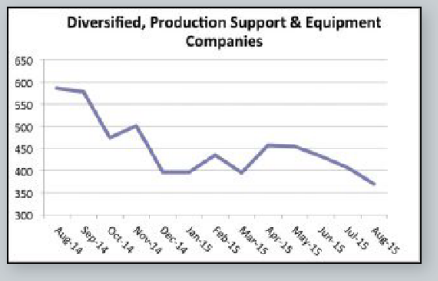
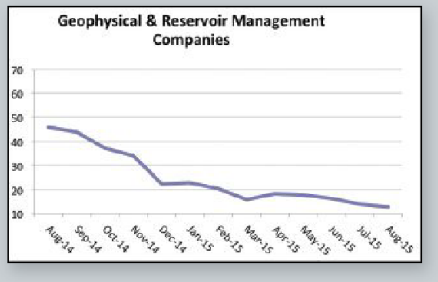
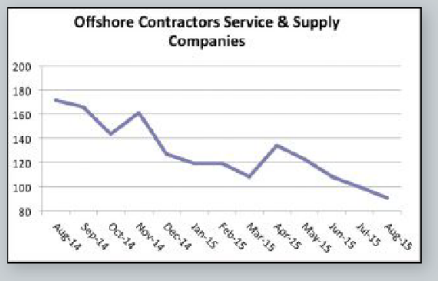
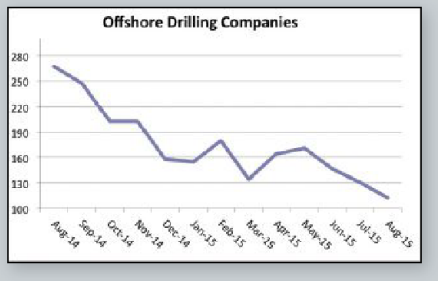
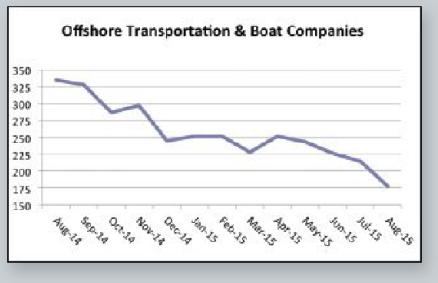
Total Offshore Transportation and Boat	177.84	214.64	-36.80	-17.1%	340.23	170.95
Total Offshore Source Index	762.87	865.35	-102.48	-11.8%	1,451.59	712.06

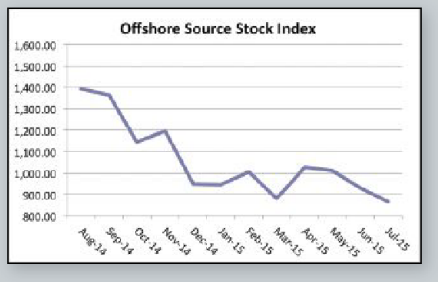










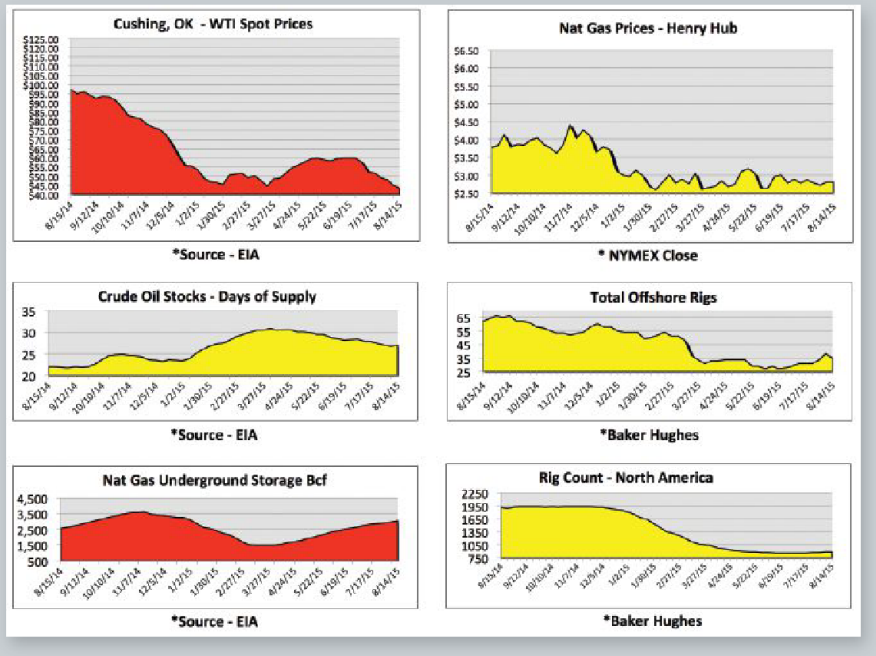


DISCLAIMER

The information on this page is provided for information and comparison purposes only and should not be used to make financial and business decisions and is accurate to the best of our knowledge for the period indicated.

Oil & Gas Industry Trends

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



Positive trend, at least 3 weeks

Changing trend, less than 3 weeks

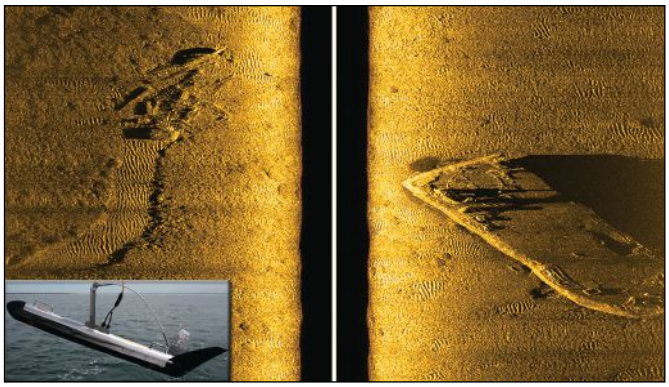
Negative trend, at least 3 weeks

EdgeTech introduces new frequency pair for 4200 side scan sonar

EdgeTech, the leader in high resolution sonar imaging systems and underwater technology, recently added a new frequency pair to the popular 4200 Side Scan Sonar. The EdgeTech 4200, a multi-purpose survey system that can be configured for shallow or deep water operations is now available with a 100/600 kHz frequency pairing. This unique dual simultaneous frequency combination allows surveyors the ability to achieve an along track resolution of 2.5 m at 200 m range (with MP Technology) and 0.45 m at 100 m range. Across track resolution is 8 cm and 1.5 cm respectively.

With its unique Multi-Pulse (MP) technology, which places two sound pulses in the water rather than one pulse like conventional side scan sonar systems, the EdgeTech 4200 can be towed at speeds of up to 10 kts while still maintaining 100% bottom coverage. In addition, the MP technology will provide twice the resolution when operating at normal tow speeds, thus allowing for better target detection and classification ability.

For more information, visit www.EdgeTech.com.



New integrated single axis rotator (ISAR)

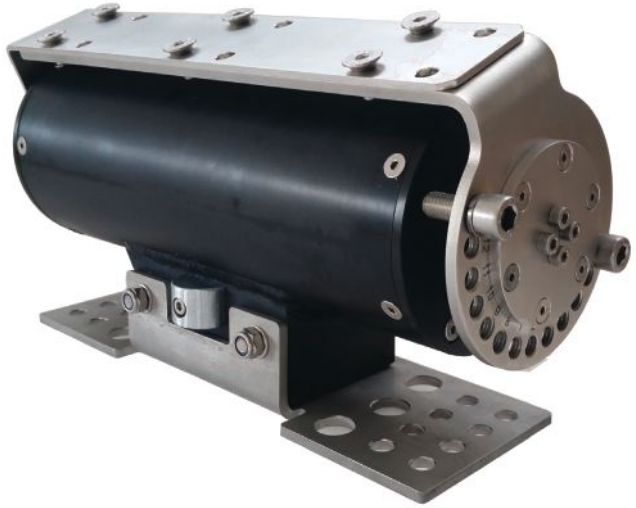
Coda Octopus announces the launch of its new Integrated Single Axis Rotator (ISAR). The ISAR delivers a robust, light and cost effective single axis solution for vessel or ROV operations and complements the capability delivered by our dual-axis Integrated Pan and Tilt.

The ISAR is operated as an integrated solution from within our Underwater Survey Explorer (USE) software. This enables simple point-and-click positioning of the ISAR in the USE control window. Additional functionality includes user-defined pre-sets for fast indexing between known positions or viewpoints. The ISAR delivers accurate dynamic positional offsets to the Echoscope acoustic centre for real-time fusion with the external navigation and attitude data.

The ISAR is also designed to be used as a standalone system. Its mounting bracket weighs less than 11 kg. The mounting bracket allows for straightforward mounting in any orientation to suit different types of platform and vehicle.

The ISAR is designed to work with the Echoscope range of sonars in the Coda Octopus 3D family. Its light weight and ease of mounting make it a natural choice for ROV operations combined with our new Compact Echoscope, the C500.

For more information, visit www.codaoctopus.com.



New full-range dimming L-300 LED spot or floodlight

The new ROS L300 AC flood or spotlight features a new, full-range dimming technology as well as brilliant illumination. The L300 offers 7,500 lumens illumination and features full-range, flicker-free dimming control, from zero to max.

The compact 42 LED light array design is also new and offers brilliant spot or flood illumination and long operating life underwater.

Light color temperature is 6,300° Kelvin with beam angles of 90° flood or 38° spot. Power is 120 VAC or 24 VDC and includes overheat protection. Dimming is via AC phase control, DC RS485, or analog 0-5 VDC / 0-10 VDC.

The unit weights 3 lbs (1.4 kg) in air and 1.5 lbs (.7 kg) in water, and is a direct replacement for the QLED lights.

The LED is housed in hard anodized aluminum and is rated to 6,000 m (19,680 ft).

Connection options include side or rear mounting with multiple connectors available.

The L300 comes with a 2-year warranty

For more information, visit www.rosys.com.

TE Subcom and Nistica announce undersea qualified wavelength selective switch modules

TE SubCom, a TE Connectivity Ltd. company and an industry pioneer in undersea communications technology, and Nistica, a Fujikura subsidiary supplying agile optical networking solutions, today announced the availability of fully qualified wavelength selective switch (WSS) modules to be used in undersea networks.

The joint development program between TE SubCom and Nistica focused on a rigorous design and development process to ensure the high-reliability requirements of undersea systems were met. The teams completed Highly Accelerated Life Testing (HALT) and all undersea reliability milestones, thus clearing the way for product deployment.

"SubCom continues to innovate to deliver the most technologically advanced and cost-effective solutions to our customers," said Neal Bergano, chief technology officer, TE SubCom. "Our grid-flexible branching units will improve network capacity and robustness as well as flexibility in next-generation undersea networks. As cable owners seek out future-proof technologies to route and equalize spectrally efficient modulation formats, SubCom stands ready to deliver to their requirements."

Under the counsel of TE SubCom, Nistica modified their terrestrial WSS modules to meet unique undersea high-reliability requirements, while maintaining differentiating features, namely, multiple 1xN WSS within one package, a 5.2 THz bandwidth window and a grid-flexible channel plan with a granularity of 3.125 GHz. These features allow SubCom to provide reliable system architectures at the highest spectral efficiencies.

"We are delighted to have completed the undersea qualification work with TE SubCom," remarked Ashish Vengsarkar, CEO of Nistica. "The lessons learned from this project can be applied in the deployment of future products for our terrestrial customers as well. The acceptance and deployment of our technology by SubCom in one of the most rigorous undersea applications demonstrates our industry leadership in reliable, high-performance optical switching."

For more information, visit www.SubCom.com.

Crystal IS introduces Optan SMD

Crystal IS's newest Optan product is a surface mount device (SMD). Like other Optan offerings, the high-performance UVC LED is based on native Aluminum Nitride (AlN) substrates, proven to overcome limitations of other UVC LEDs in the market. For manufacturers of instruments, Optan SMD:

• Enables more effective and efficient biofilm and biofouling control. Damage resulting from bacteria and biofilms has wide ranging impact across industries which is estimated to cost several hundred billion dollars annually.

• Supports Total Organic Carbon (TOC) monitoring in water. High levels of TOC can degrade industrial water purification systems – reducing semiconductor yields, contaminating pharmaceutical batches and damaging power and steam generation equipment.

• Can be used as a low voltage

source of UVC light for calibration of cameras, photodetectors, etc.

Optan SMD is a long life solution, with low power consumption, giving users an increase in intervals for instrument maintanence. Optan SMD is environmentally friendly, essential for biofilm and biofouling control where solutions available today are either not completely effective or being phased out due to toxicity concerns.

For sensor and instrumentation manufacturers, performance and reliablity are critical to success. With the introduction of Optan SMD, the latest Optan UVC LED offering, Crystal IS can meet manufacturers' sensing needs while also protecting costly instruments in ocean and industrial process instrumentation.

For more information, visit www.cisuvc.com.

Industry group launches marine safety and pipeline alert system

The Coastal and Marine Operators (CAMO) group announced it has successfully completed the first step in rolling out a major initiative to protect the safety of mariners, the environment and hydrocarbon pipelines from being damaged. The CAMO group began transmitting Automatic Information System (AIS) safety messages directly to mariners in two charted pipeline corridors in Port Fourchon, significantly improving their situational awareness by providing immediate alerts for vessels in close proximity to submerged pipelines. These vessel safety messages use existing AIS technology that is already deployed on most commercially operated vessels.

"Pipeline protection is increasingly important, with the typical incident costing an average of at least $1 million to repair, not counting the incalculable costs of injury, death, or environmental impact," said Ed Landgraf, director of CAMO. "This AIS-based safety broadcasting system culminates several years of hard work on a solution that enables vessel and pipeline operators to collaborate on protecting mariners from the risk of pipeline strikes. The system makes it easier for mariners to know where and when to take protective measures as they transit or operate near submerged pipelines, and we look forward to a successful roll-out here and in other ports nationwide."

The first phase of CAMO's AIS-based pipeline damage prevention and awareness program is being launched in partnership with the Greater Lafourche Port Commission (Port Fourchon) and Oceaneering®, a global provider of engineered services and products primarily to the offshore oil and gas industry. Oceaneering's PortVision® AIS-based vessel-tracking service is being used to monitor vessel activities in the two charted pipeline corridors north and south of Port Fourchon that pass under its main navigable channel. When the PortVision service detects a vessel operating at a speed less than 0.5 kts for three minutes or more within one of these corridors, an addressed, one-time AIS Safety Related Message (also known as message 12) is immediately transmitted directly to the vessel's wheelhouse that says, "PIPELINE BELOW."

Depending on the equipment installed on the receiving vessel and its equipment configuration, there may be visual and audible variations in how the AIS safety alert is received. Mariners capable of receiving and displaying the CAMO AIS messages are encouraged to provide feedback and report any anomalies to Oceaneering, Global Data Solutions support at portvision support@oceaneering.com.

TI Geosciences upgrades 10te Roson CPT

TI Geosciences (TIGeo) has recently completed the digital upgrade of its 10te Roson CPT, based on the installation of a pressure compensated Icone system by A P Van den Berg. The system completed successful wet tests at TIGeo marine base in Teesside, UK and is now immediately available to mobilize for projects in water depths up to 750 m.

The full advanced deep push/deep water capability (single push 40 m below mudline, 2000 mWD) will be available in Q4 this year on completion of the redesigned and upgraded launch and recovery system, presently in build at Royal IHC.

TIGeo is a newly established offshore geotechnical survey/site investigation contractor, focusing on deep and ultra-deep water operations. The company is

jointly owned by Tompkins UK (parent Company of Modus Seabed Intervention) and Royal IHC. Using high efficiency, advanced technology, equipment and data management systems, TIGeo will deliver significant quality and cost benefit to clients globally.

For more information, visit www.ti-geo.com.

Shark Marine integrates Ebinger 725K metal detector with Navigator sonar and navigation system

Shark Marine Technologies Inc. announces the integration of the Ebinger 725K Underwater Metal Detector with its own Navigator diver-held imaging sonar and navigation system. This integration provides the diver with another valuable underwater tool whose collected data can now be completely geo-referenced to the location of the diver using it. Sensory data from the metal detector is recorded to the Navigators internal solid-state hard-drive where Shark Marine's Divelog software correlates it to the position data from the systems multiple navigation sensors. The data is provided to the diver both graphically and audibly. Integration with the Navigator also allows the diver to take full advantage of the systems additional features such as the multi-beam imaging sonar which provides him with visual target detection capabilities and guidance even through the murkiest of waters.

The Navigator, diver-held imaging sonar and navigation system has been in use by many of the world's navies since its inception in 2005. Its modular design

allows it to be easily configured for mission specific operations from search and recovery to ship hull inspections to mine-countermeasures and more. Additional options include a proton magnetometer, an HD camera, an underwater head-mounted display, a selection of long and short range sonar heads, a radiation detector, through water communications and various positioning systems dependent on the accuracy required. The Navigator may also be integrated with Shark Marine's MAKO, diver delivery system to give it autonomous operation capabilities.

Shark Marine's Divelog Control software is the program that ties all the different Navigator options including the Ebinger metal detector, together into one easy system, operated entirely through the use of only two thumbsticks. Divelog's capabilities have matured alongside those of the Navigator to the point where it's now the control software for all of Shark Marine's underwater systems including sidescans, pole-mounted sonars, video systems, diver delivery systems and our complete line of remotely operated vehicles. One software to handle all the tools and then, when the mission is complete, to automatically compile a complete report into an easy electronically transferrable format.

For more information, visit www.sharkmarine.com.

Viper Subsea unveils next generation V-Lock stab plate

Viper Subsea has released the next generation of its innovative V-LOCK hydraulic stab plate. At launch in 2011, V-LOCK offered performance significantly in excess of existing products with market leading clamping and separation forces together with excellent misalignment capability on make-up and a proprietary secondary release mechanism. The newly released version offers even greater cost and risk reduction benefits for first tier PCS and umbilical vendors, installers and operators.

The new model is designed such that all the coupler float requirements are built into the flying half of the stab plate, with couplers rigidly mounted within the fixed half of the stab plate. This mitigates assembly risk for the small-bore tubing installation on the Tree and Umbilical Termination Assembly (UTA). The need for long lengths of hydraulic tubing behind the fixed plate couplings in order to maintain coupler compliance is therefore no longer required.

The consequence of removing the need for fixed plate coupling compliance is a reduction in the size of the UTA structure which thus facilitates compliance with the Umbilical Termination Size Reduction (UMSIRE) Joint Industry Project (API TR 17TR9 Subsea Umbilical Termination (SUT) Selection and Sizing Recommendations). The aim of this JIP is to reduce the size of the UTAs and therefore reduce the installation time and costs. The fact that, by design, the fixed plate couplings are rigidly mounted also means that they are less susceptible to the effects of cementation from calcareous growth.

Speaking about the new launch, Neil Douglas, Managing Director of Viper Subsea said "Due to its superior technical performance, the original V-LOCK quickly established itself in the market with a rapid uptake and a significant number of projects and clients deploying the hardware. However, at Viper Subsea we are continually looking for ways to further improve on our designs as well as develop new innovations. We put a great deal of resource into research and development and this new and improved V-LOCK is a result of that ongoing process. We are confident that it will further establish the reputation of the V-LOCK family and the significant benefits it delivers will continue to be appreciated by customers. The 'zero float' version will become our standard offering with its inherent benefits to both OEMs and the Operators.

The 'zero float' V-LOCK completed qualification early in 2015 and the first commercial deliveries have now been made.

For more information, visit www.vipersubsea.com.

Macro Sensors offshore LVDT linear position sensors support FEA of pipelines on rigs

Due to its high accuracy and long-term reliability when operating in water, Macro Sensors Offshore LVDT linear position sensors are quickly becoming the preferred technology in marine and offshore applications, especially for elongation measurement as part of long-term finite element analysis of pipelines, derricks, moorings and other critical high-stress members on offshore oil platforms that must be constantly monitored to ensure ongoing drilling platform stability.

In addition to providing measurement from micro inches to two feet with excellent repeatability and precision, Macro Sensors Offshore LVDT Linear Position Sensors are built to operate for at least twenty years, even if the sensor is fully exposed to seawater. Because the cost associated with replacing underwater hardware is extremely high, reliability is of critically importance in offshore applications.

Macro Sensors Offshore LVDTs are hermetically sealed, constructed with a

subsea connector and gold-plated pins, and rated up to 7,500 psi to survive and perform accurately when submerged in the ocean for indefinite time periods. Dependent upon ocean temperature and depth levels, the LVDT casing is typically composed of special alloy that supports long-term operation.

As sensor housings and core carriers made from stainless steel do not survive well in shallow warm waters, Macro Sensors designs its Offshore LVDTs with exotic material such as Inconel, titanium and hastelloy for pressure and corrosion resistance, enhancing the already high-reliability required of this sensor for longer term operation.

For more information, visit www.macrosensors.com.

New HYPACK Marine Search

HYPACK, the US-based industry leader in hydrographic survey software, is now offering a package dedicated to marine search and recovery operations.

HYPACK Marine Search allows for real-time mosaicking and targeting of side scan data from almost all side scan sonars. With an Internet connection, users can download the latest electronic navigation charts from NOAA and the USACE, free of charge. The survey program reads input from GPS (NMEA via RS-232 or network) and side scan sonars (USB and network).

With HYPACK® Marine Search users can mark targets and generate mosaics either in real time or in HYSCAN, the HYPACK Side Scan Targeting and Mosaicking program. HYSCAN allows you to smooth tracklines and heading and to determine the correct bottom track before generating mosaics or marking targets. The mosaics are saved as GeoTIF files that can be viewed in the Marine Search map window or exported directly to Google Earth™.

For more information, visit www.hypack.com.

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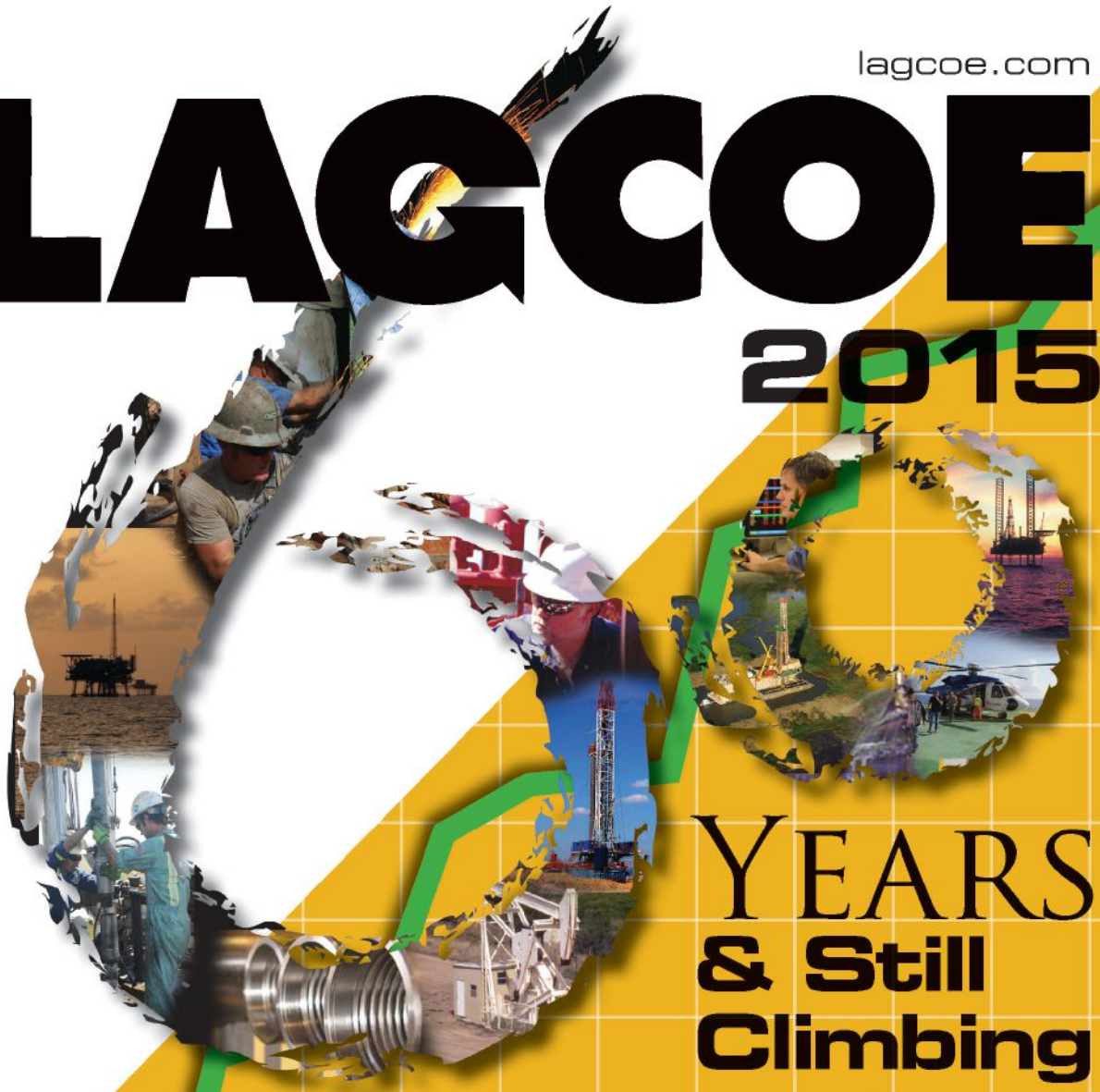

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Oceaneering International, Inc. appointed **Steve Barrett** senior vice president, subsea products, with worldwide responsibility for Oceaneering's subsea products segment. In his new role, he will report to senior vice president Clyde Hewlett. Barrett started his career in the oil and gas industry in 1980. In 1982 he joined FMC Technologies, Inc., where he progressed from design engineer to his most recent role as global subsea services director. Barrett holds a bachelor's degree in mechanical engineering from Texas A&M University and a master's degree in finance and entrepreneurship from Rice University.

NorSea Group (UK) has appointed **Karen Russell** as its first UK Finance director. She becomes the third addition to the group's executive team as the company continues to grow its activity across Scotland in both the decommissioning and subsea support sectors. Russell joins MD **Walter Robertson** and operations director **Mike Munro** in the new team leading the company's expansion in the UK. She has more than 13 years' experience in the oil and gas industry. She began her accountancy training with Deloitte and Touche, then worked in financial roles with both Qserv and Weatherford before most recently spending almost eight years with Asco as finance manager. In her new role with NorSea Group (UK), she will be responsible for overseeing all of the company's financial functions, as well as supporting the business as it increasingly grows its decommissioning capabilities as an integral part of its future growth strategy. "It is a growing company in the UK with huge potential for future development as it diversifies from its traditional role as a logistics and base services company into the expanding decommissioning sector," Russell said.


Russell

The American Association of Professional Landmen named **Melanie Bell**, CPL executive vice president as part of an organizational restructuring that will help AAPL to meet the needs of its more than 20,000 members across the United States and in Canada. A 32-year veteran in the land industry, Bell previously served as director of U.S. Onshore Land for BP America Production Co. Her role began on August 3. Additionally, AAPL appointed long-time AAPL staff leaders **Le'Ann Callihan** and **Christopher Halaszynski** to directly report to Bell and jointly oversee all AAPL initiatives and programs. As director of communications and NAPE, Callihan oversees three annual NAPE expositions as well as all of AAPL's publishing, marketing and public relations efforts. As director of education and member services, Halaszynski oversees AAPL's education and certification programs, partnerships with accredited universities, government affairs efforts and membership benefits and services.

2H Offshore appointed **Prahlad Enuganti** as technical manager in its Aberdeen Scotland, office, to strengthen its management team and drive business growth. Enuganti holds a master's degree in electrical and computer engineering from The University of Texas in Austin, and joined 2H's Houston office in 2006 as an engineer. He worked on subsea structural monitoring projects in the Gulf of Mexico and was responsible for a variety of 2H's offshore riser engineering and integrity assessments. He was also the integrity team lead for BP's Holstein, Horn Mountain, Mad Dog and Thunder Horse assets in the U.S. Gulf.

Veripos, the leading supplier of high-precision GNSS positioning services to the world offshore and associated industries, has appointed **John MacLeod** as general manager of its Europe, Africa and Middle East (EAME) region. Based at the Company's Aberdeen headquarters, he will responsible for continuing development of the region's growing activities in response to increased demand for its facilities. Until recently vice-president regional operations with Forum Energy Technology, Mr. MacLeod has over 25 years' experience within the global subsea oil and gas industries, working predominantly in the ROV, offshore survey and diving sectors in a senior capacity with other prominent organisations supplying both manufactured products and services.

MacLeod

Bruno Faure, group senior vice president subsea projects and operations at Technip, a world leader in project management, engineering and construction for the energy industry, has taken over the role of president of the International Marine Contractors Association (IMCA), the association representing the interests of over a thousand offshore, marine and underwater engineering companies in more than 60 countries. In addition to becoming president of IMCA, having served as vice president of IMCA since September 2014, he also becomes chairman of the association's overall management committee.

Seatronics Ltd, an Acteon company and part of its geophysical survey, monitoring and data business, has appointed **Joanne Keilloh** as its new group QHSE co-ordinator based in Aberdeen. Keilloh will lead the QHSE function within the Seatronics Group and Acteon sister company, J2 Subsea. She will support the companies' global bases in driving QHSE strategy and culture alongside local QHSE representatives. Keilloh gained extensive experience in QHSE during previous roles with Bibby Offshore and DOF Subsea.

Keilloh

Seabed survey company Bibby HydroMap has appointed **Mick Slater** as their new operations director. With an MBE to his name and over 40 years of industry experience including more than 30 years in the Royal Navy, Slater will hold overall responsibility for HSE, IT, HR and Compliance.

BMT Cordah, a subsidiary of BMT Group, the leading international maritime design, engineering and risk management consultancy, has announced the appointment of **Andrew Glass** as managing director. He will be responsible for leading the business in implementing strategy, direction and policy, ensuring the company continues to provide an extensive range of specialist services to its UK and international offshore oil and gas customers.

Oceaneering International Services Ltd has acquired a minority equity interest in **Viper Subsea Technology**.

Aqueos Corporation and **Bibby Subsea ROV, LLC** have entered into a strategic alliance to jointly market their combined services to pursue subsea related projects in the Gulf of Mexico and other targeted regions.

ENL Group and **FURUNO Electric Co. Ltd of Japan** have announced that FURUNO has increased its investment into the New Zealand company to a total of 29.5%. The new level of investment is an increase from the initial 10% announced in July 2014.

CALENDAR & EVENTS

September 8-11, 2015
Offshore Europe O&G
Aberdeen, UK
www.offshore-europe.co.uk

September 28-29, 2015
AWEA Offshore Windpower
Baltimore, MD
www.offshorewindexpo.org

September 28-30, 2015
SPE ATCE
Houston, TX
www.spe.org

October 13-14, 2015
MTS Dynamic Positioning
Houston, TX
www.dynamic-positioning.com

October 13-15, 2015
Deep Offshore Technology
Houston, TX
www.deepoffshoretechnology.com

October 18-23, 2015
SEG Annual Meeting
New Orleans, LA
www.seg.org

October 19-22, 2015
Oceans MTS/IEEE
Washington, DC
www.oceans15mtsieeewashington.org

October 27-29, 2015
LAGCOE
Lafayette, LA
www.lagcoe.com

October 27-29, 2015
OTC Brasil
Rio de Janeiro, Brasil
www.otcbrasil.org

November 1-4, 2015
Geological Society of America
Baltimore, MD
www.geosociety.org

November 2-4, 2015
WJTA-IMCA
New Orleans, LA
www.wjtaimca2015.com

November 4-6, 2015
OilComm
Houston, TX
www.oilcomm.com

November 10-12, 2015
Clean Gulf
New Orleans, LA
www.cleangulf.org

November 17-20, 2015
EWEA 2015
Paris, France
www.ewea.org/annual2015

December 1-3, 2015
International Workboat
New Olreans, LA
www.workboatshow.com

February 23-25, 2016
ICOE
Edinburgh, UK
www.icoe-conference.com

February 23-25, 2016
Underwater Intervention
New Orleans, LA
www.underwaterintervention.com

March 15-17, 2016
Oceanology International
London, UK
www.oceanologyinternational.com

OCEAN NEWS & TECHNOLOGY 2015 EDITORIAL CALENDAR

www.oceannews.com

JANUARY
Editorial: Forecast: 2015 and Beyond; Underwater Navigation; Manned Submersibles
Distribution: Euromaritime; Naval Future Forces; Deepwater Decommissioning Workshop; GOM Oil Spill & Ecosystem
Product & Services Focus: Multibeam & Side Scan Sonars; Research & Development Services

FEBRUARY
Editorial: Subsea Fiber Optic Networks; Decom & Abandonment
Distribution: IEEE/Current,Waves,Turbulence Measurement Wkshp; NACE Corrosion; Decommissioning and Abandonment Summit; U.S. Hydro
Product & Services Focus: Connectors, Cables & Umbilicals; Diver Detection Systems

MARCH
Editorial: Oceanology & Meteorology; Maritime Security
Distribution: Ocean Business; Offshore Well Intervention Conf. North Sea;
Product & Services Focus: Buoys & Monitoring Instrumentation; Environmental Monitoring/Testing Services

APRIL
Editorial: Offshore Technology; Ocean Mapping & Survey
Distribution: OTC; AUVSI; Oceans '15 MTS/IEEE Genova, Italy
Product & Services Focus: Subsea Tools & Manipulators; Offshore Risk Assessment; Training/Safety

MAY
Editorial: UW Imaging & Processing; Marine Salvage/UW Archeology
Distribution: OMAE – Ocean/Offsh/Arctic Eng; Seawork Intl; UDT; Well Integrity and Lifecycle Digitalization Conference
Product & Services Focus: Magnetometers; Water Dredges & Airlifts; Diving Services

JUNE
Editorial: Autonomous Unmanned Vehicles; Defense & Naval Systems;
Distribution: Clean Pacific
Product & Services Focus: Tracking & Positioning Systems; Seismic Monitoring; Equipment Leasing/Rental Services

JULY
Editorial: Ocean Engineering; Marine Construction; Special Focus Section: Products & Services Case Studies
Distribution: TBA
Product & Services Focus: Navigation, Mapping & Signal Processing; Data Processing Services

AUGUST
Editorial: Workclass ROVs; Deepwater Pipeline/Repair/Maintenance
Distribution: Offshore Europe
Product & Services Focus: Cameras, Lights & Imaging Sonars; Oil Spill Clean-Up Services

SEPTEMBER
Editorial: Ocean Observing Systems; Subsea Telecom; Offshore Wind Installation & Maintenance
Distribution: SPE ATCE; AWEA Offshore Windpower; Oceans '15 MTS/IEEE Washington DC; Offshore Well Intervention Conf., GOM
Product & Services Focus: Water Sampling Equipment; Cable Installation Services

OCTOBER
Editorial: Offshore Communications; Subsea Inspection, Monitoring, Repair and Maintenance
Distribution: LAGCOE; OilComm; Clean Gulf; Offshore Asset Retirement Conference
Product & Services Focus: Acoustic Modems, Releases & Transponders; Marine Communications; Survey & Exploration Services

NOVEMBER
Editorial: Offshore Support, Supply & Emergency Vessels; Deep Sea Mining
Distribution: International Workboat, EWEA 2015 Paris
Product & Services Focus: Ship Protection Systems; Cranes, Winches & Control Systems; Vessel Charter/Leasing Services

DECEMBER
Editorial: Light Workclass ROVs; Commercial Diving; Year in Review
Distribution: TBA
Product & Services Focus: Diving Equipment & Services; Buoyancy Materials; Construction & Repair Services

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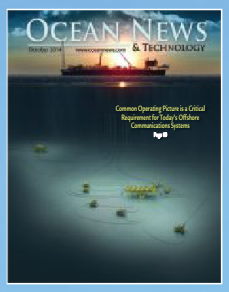

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ADVERTISING

North America
Lisa Chilik
574-261-4215
Lchilik@tscpublishing.com

International
Mimi Shipman
+44 (0) 777 601 7564
mshipman@tscpublishing.com

Editorial
Ladd Borne
772-285-8308
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Houma, LA 70363
Tel: 985-346-4666
Fax: 985-346-8444
Email: Bleblanc@okeanus.com
Website: www.okeanus.com
Contact: Benton LeBlanc

Okeanus is the premier rental provider for oceanographic and marine scientific research equipment utilized in nearshore and offshore projects around the world. Focused on providing industry-leading customer service, Okeanus offers advanced, high-quality technology coupled with knowledgeable and experienced staff that can deliver dedicated support regardless of a project's location.

FIBER OPTIC PRODUCT/SERVICES

BGB Technology Inc.
1060 Port Walthall Drive
Colonial Heights, VA 23834
Tel: +1 804 451 5211
E-mail: sales@bgbtechnology.com
Website: www.bgbtechnology.com
and www.bgbengineering.com

BGB is a manufacturer of fiber optic rotary joints (FORJ), media converters and wave division multiplexers used in the transmission of high speed data and video signals. The Optilinc FORJ is available with either ST or Deutsch RSC TM connectors. BGB can also supply integrated slip ring/FORJ assemblies if required.

Focal Technologies Corporation, Moog Inc.
77 Frazee Avenue
Dartmouth, Nova Scotia
Canada B3B 1Z4
Tel: +1 902 468 2263
Fax: +1 902 468 2249
Email: focal@moog.com
Website: www.moog.com/marine
Contact: Shawn Taylor

Focal, A Moog Inc. Company, specializes in providing electrical slip rings, fiber optic rotary joints, hydraulic utility swivels and fiber optic multiplexer solutions for the worldwide marine industry including ROV, seismic, FPSO turret and oceanographic applications. Product features include hybrid packages that combine fiber, electrical and fluid rotary joints for harsh environments.

Ocean Specialists Inc.
8502 SW Kansas Ave
Stuart, FL 34997
Tel: +1 772 219 3033
Fax: +1 772 219 3010
Email: jbyous@oceanspecialists.com
Website: www.oceanspecialists.com
Contact: Jim Byous

Ocean Specialists, Inc (OSI) is a submarine fiber optic network development company with global project capabilities. OSI works with clients during all project phases of subsea network development, from planning and design to procurement and implementation. Our customers, primarily representing Oil and Gas, Telecommunications and Ocean Observing, recognize the value of fiber optic networks to their field and services solutions, and look to OSI to deliver the skills and experience that developing these networks require.

SeaView Systems
7275 Joy Road., Suite A
Dexter, MI 48130, USA
Tel/Fax: +1 734 426 8978
E-mail: info@seaviewsystems.com
Website: www.seaviewsystems.com
Contact: Matthew Cook

SeaView Systems produces optical fiber data transmission devices designed for subsea equipment. Products include the SVS-109 Video/Data mux, SVS-209 Gbit Ethernet Converter, SVS-309 2 channel HD-SDI converter and the SVS-509 OmniData stack. SeaView also offers a wide selection of supporting OEM components and custom ROV design, integration and refurbishment services.

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1 Blackmoor Lane
Croxley Business Park
Watford, Hertfordshire WD18 8GA
Tel: +44 (0) 1923 216020
Fax: +44 (0) 1923 216061
E-mail: tsssales@teledyne.com
Website: www.teledyne-tss.com
Contact: Carolyn Jones

USA Office: 7701 West Little York, Suite 300
Houston, TX 77040, Contact: Keith Pope
Tel: +1 713 461 3030, Fax: +1 713 461 3099

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New Orleans, LA 70119
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Aero Tec Laboratories, Inc. (ATL)
45 Spear Road Industrial Park,
Ramsey, NJ 07446 USA
Tel: +1 201 825 1400
Fax: +1 201 825 1962
E-mail: atl@atlinc.com
Website: www.atlinc.com
Contact: David Dack

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MAGNETOMETERS

Bartington Instruments Ltd
Unit 5, Thorney Leys Business Park
Witney, Oxon OX28 4GE
United Kingdom
Tel: +44 (0)1993 706565
E-mail: sales@bartington.com
Website: www.bartington.com

Bartington Instruments' products include high precision, low noise fluxgate magnetometers, gradiometers and data acquisition units for marine applications. With a reputation for performance, reliability and durability, our instruments are used for detection of magnetic anomalies such as underwater UXO, pipe and cable location, magnetic signature analysis, and oil and mineral exploration.

Geometrics, Inc.
2190 Fortune Drive
San Jose, CA 95131
Tel: +1 408 954 0522
Fax: +1 408 954 0902
E-mail: sales@geometrics.com
Website: www.geometrics.com
Contact: Ross Johnson

Geometrics, a member of OYO Corporation, manufactures, sells, and services portable geophysical instruments for land, marine, and air investigations of the subsurface. Geometrics' product line includes proton precession and cesium magnetometers, high-resolution seismographs, and electrical conductivity imaging and resistivity systems. Geometrics' instruments are used around the world for natural resource exploration, geotechnical and environmental assessments, ordnance detection, locating archeological and treasure sites, teaching and research.

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8502 SW Kansas Avenue
Stuart, FL 34997
Tel: +1 772-219 3000
Fax: +1 772-219 3010
E-mail: gstevens@conshelf.com
Website: www.csaocean.com
Contact: Gordon Stevens

CSA Ocean Sciences Inc. (CSA) is a marine environmental consulting firm specializing in multidisciplinary projects concerning potential environmental impacts of activities throughout the world. With extensive experience in environmental sciences and technical field operations, CSA is staffed and equipped to offer a complete range of services for projects in offshore, nearshore, estuarine, wetland, and freshwater environments.

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Kongsberg Seatex AS
Pirsenteret
N-7462 Trondheim, Norway
Tel: +47 73 54 55 00
Fax: +47 73 51 50 20
E-mail: km.seatex@kongsberg.com
Website: www.km.kongsberg.com/seatex
Contact: Finn Otto Sanne at finn.otto.sanne@kongsberg.com

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Teledyne TSS Ltd.
UK Office: 1 Blackmoor Lane
Croxley Business Park
Watford, Hertfordshire WD18 8GA
Tel: +44 (0) 1923 216020
Fax: +44 (0) 1923 216061
E-mail: tsssales@teledyne.com
Website: www.teledyne-tss.com
Contact: Carolyn Jones

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Ackerstrasse 76
13355 Berlin, Germany
Tel: +49 (0) 30 4679 862-0
Fax: +49 (0) 30 4679 862-01
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OCEANOGRAPHIC INSTRUMENTS/SERVICES

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#1-6703 Rajpur Place, Victoria
BC, Canada V8M 1Z5
Phone: +1 250 656 0177
Fax: +1 250 656 2162
E-mail: asl@aslenv.com
Web: www.aslenv.com

ASL provides physical oceanographic consulting services and instruments. Services: flow measurement, ice studies, wave measurement and analysis, numerical modeling, and remote sensing. Products: Ice Profiler- measures ice-keel depths; Acoustic Zooplankton Fish Profiler- monitors the presence and location of zooplankton, fish or sediments; and the WERA NorthernRadar – measures surface currents and waves from shore up to 200km. ASL has a large lease pool of oceanographic instruments.

CONTROS Systems & Solutions GmbH
Wischhofstraße 1-3, Bld. 2
24148 Kiel, Germany
Tel: +49 (0) 431 260 959 00
Fax: +49 (0) 431 260 95 901
E-mail: contact@contros.eu
Website: contros.eu

CONTROS Systems & Solutions GmbH develops, produces and markets in-situ underwater sensor systems to detect hydrocarbons, pCO_2, dissolved oxygen, Total Alkalinity, and fully integrated systems down to full ocean depth to gather the most efficient and reliable data in any condition and in combination with data logging and software solutions.

Falmouth Scientific, Inc.
1400 Route 28A, PO Box 315
Cataumet, MA 02534-0315 USA
Tel: +1 508 564 7640
E-mail: fsi@falmouth.com
Website: www.falmouth.com

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rue Gutenberg
56700 Hennebont, France
Tel: +33 2 97 36 41 31
Fax: +33 2 97 36 10 12
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Contact : Valérie Le Pen - vlepen@nke.fr or Goulven Prud'homme - gprudhomme@nke.fr
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Contact: Patrice Brault - pbrault@nke.fr

Nortek AS
Vangkroken 2
1351 Rud, Norway
Tel: +47 67 17 45 00
E-mail: inquiry@nortek.no
Website: www.nortek-as.com

Scientific instrumentation company developing and distributing Acoustic Doppler Current Profilers (ADCP), wave systems and current meters for use in oceans, rivers, lakes and laboratories. Products feature deployment planning software, real-time data collection and support from our technical team and provide technological solutions to offshore industries, engineers, research and renewable energy.

RBR
95 Hines Road, Ottawa
Ontario Canada K2K 2M5
Tel: +1 613 599 8900
Fax: +1 613 599 8929
E-mail: info@rbr-global.com
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ROMOR Ocean Solutions
41 Martha Avenue
Mount Uniacke, NS Canada
B0N 1Z0
Tel. +1 (902) 466-7000
Fax. +1 (902) 466-4880
Email: Sales@romor.ca
Website: www.romor.ca
Contact: Darrin Verge, President & CEO

ROMOR Ocean Solutions provides instrumentation solutions for the geophysical, oceanographic, defense, security, oil & gas, and renewable energy industries. By partnering with world renowned manufacturers, ROMOR is able to offer technical knowledge, value added services, logistics expertise, and the most reliable instrumentation on the market.

Sea and Land Technologies Pte Ltd
65 Tuas Avenue 1
Singapore 639508
Tel: +65 65180777
Fax:+65 65630366
E-mail: enquiry@sea-landtech.com
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13431 NE 20th St.
Bellevue, WA 98005
Tel: +1 425 643 9866
Fax: +1 425 643 9954
E-mail: info@sea-birdscientific.com
Website: www.sea-birdscientific.com
Contact: Calvin Lwin, Sales

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Star-Oddi
Skeidaras 12, 210
Gardabaer, Iceland
Tel: +354 533 6060
Fax: +354 533 6069
E-mail: baldur@star-oddi.com
Website: www.star-oddi.com
Contact: Baldur Sigurgeirsson

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SubCtech GmbH
Wellseedamm 3,
24145, Kiel, Germany
Tel: +49 (0) 431/22039880
Fax: +49 (0) 431/22039881
E-Mail: sales@subctech.com
Website: www.subctech.com
Contact: Stefan Marx

SubCtech GmbH develops, produces and sells professional environmental and conditional monitoring equipment as well as Li-Ion based power solutions. Core products are pCO_2 analyzer, Li-Ion rechargeable batteries, subsea data logger and control equipment for different platforms. We provide reliable customized solutions for ships, buoys and ROVs/AUVs for full ocean depth.

Turner Designs
845 W Maude Avenue
Sunnyvale, CA 94085
Phone: +1 408 749 0994 x146
Toll Free: +1 877 316 8049 x146
Fax: +1 408 749 0998
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Tel: +1 603 893 6131
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Email: Klein.Mail@L-3com.com
Web: www.L-3Klein.com
Contact: Deborah Durgin, Supervisor, Marketing & Sales

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Marine Sonic Technology
120 Newsome Dr. Suite H, PO Box 1309
Yorktown VA 23692-1309
Toll Free: +1 800 447 4804
E-mail: jdemille@marinesonic.com
Website: www.marinesonic.us

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Laksevag, Norway
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Website: www.saivas.no
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New Industries
6032 Railroad Avenue
Morgan City, LA 70380
Tel: +1 985 385 6789
E-mail: bill.new@newindustries.com
Website: www.newindustries.com
Contact: Bill New

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SUBSEA TOOLING

Seanic Ocean Systems
8860 Fallbrook Drive
Houston, TX 77064
Tel: +1 713 934 3100
E-mail: info@seanicusa.com
Website: www.seanicusa.com
Contact: Karen North

Seanic was formed to address the growing demand for simple, rugged and reliable subsea tooling for remote intervention. Along with engineered solutions, Seanic also offers experience in the design, manufacturing, storage, repair & maintenance of subsea products. Seanic provides a worldwide standard product line of ROV tooling such as torque tools, FLOT's, hot stabs, manifolds, buckets and ROV interface panels.

Subsea Americas
3447 Hwy 182
P.O. Box 185
Berwick, LA 70342
Tel: +1 985 714 1767 or 985 518-0055
E-mail: charles@subseaamerica.com
Website: www.subseaamericas.com
Contact: Charles Mayea

Subsea Americas (SSA) is a leading provider of rental ROV tooling equipment on a worldwide basis. SSA is a 24 hr. / 7 days a week service provider of a comprehensive range of standard subsea tooling equipment. From torque tools and flying lead orientation tools to 15k isolated hydraulic intensifiers and wire rope cable cutters - SSA can fully support the client's needs with quality service, and reliable equipment at a most competitive cost.

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1321 Nelius Road
P.O. Box 767
Bellville, TX 77418 USA.
Tel: +1 979 865 8846
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E-mail: sales@seacon-ap.com
Website: www.seacon-ap.com

SEACON Advanced Products, LLC., manufactures a wide variety of versatile and robust switches to suit a number of applications. These include Limit, Positive Action and Proximity switches in a range of materials including Titanium, Plastic and Stainless Steel which can be supplied in varying load capacities up to 7 amps and pressure rated to 10,000 psi. To further aid simplicity, our proven range of Modular Proximity Switches have been integrated with the Micro WET-CON electrical wet-mate connector making this switch a very modular component that is easily installed and replaced in the field, but without compromising reliability.

UNDERWATER VEHICLES/AUVS

Hydroid, Inc.
a subsidiary of Kongsberg Maritime
6 Benjamin Nye Circle
Pocasset, MA 02559-4900 USA
Tel: +1 508 563 6565
Fax: +1 508 563 3445
E-mail: glester@hydroid.com
Website: www.hydroid.com
Contact: Graham Lester

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OceanServer Technology, Inc.
151 Martine Street
Fall River, MA 02723 USA
Tel: +1 508 678 0550
Fax: +1 508 678 0552
E-mail: sales@ocean-server.com
Website: www.iver-auv.com
Contact: Jim Kirk

OceanServer Technology, Inc. is a leading provider of man-portable Autonomous Underwater Vehicles (AUVs) with over 200 AUVs deployed worldwide. The Iver AUV is an affordable, commercial vehicle used for general survey and sub-surface security work, and serves as a research platform for autonomy, behavioral and sensor development studies at universities and navy research facilities.

UNDERWATER VEHICLES/ROVS

Deep Ocean Engineering Inc.
2528 Qume Drive, Suite 11
San Jose, CA 95131 USA
Tel: +1 408 436 1102
Fax: +1 408 436 1108
E-mail: sales@deepocean.com
Website: www.deepocean.com
Contact: Bill Charbonneau

Deep Ocean Engineering, Inc. provides remotely operated and unmanned surface vehicle (ROV / USV) solutions which are used by a broad range of industry applications - security, military, nuclear and hydroelectric power plants, inshore dams and lakes, oil and gas, scientific research, fisheries, salvage, search / recovery, and pipeline inspections.

i-Tech
22330 Merchants Way
Katy, TX 77449
Tel: +1 281 693 9403
E-mail: Katarina.Tehlirian@Subsea7.com
Website: www.interventiontechnology.com
Contact: Katarina Tehlirian

i-Tech is a global division of Subsea 7 delivering world class remotely operated vehicle (ROV) and intervention tooling support services to the offshore energy industry, operating from four regional centers: Europe & Africa, Asia-Pacific the Americas and Brazil.

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Canary Islands & Barcelona, Spain
Tel: + 34 616 604 778 / + 34 928 91 48 13
Fax: +34 928 91 48 13
E-mail: info@qstar.es
Websites: www.qstar.es & www.rovs.eu

QSTAR was established to offer services for industries that require effective solutions for Subsea projects through the use of our ROV fleet and high Qualified personnel. Our World leading ROV Training Division offers High Quality Training for ROV PILOT TECHNICIANS as a World-Wide ROV Training Establishment Member of the IMCA.

Teledyne SeaBotix
2877 Historic Decatur Road, Suite 100
San Diego, CA 92106 USA
Tel: +1 619 450 4000
Fax: +1 619 450 4001
Contact: Alasdair Murrie
E-mail: SeaBotixInfo@Teledyne.com
Website: www.SeaBotix.com

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Pottstown, PA 19464
Tel: +1 610 458 3000
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E-mail: sales@videoray.com
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UNDERWATER VIDEO EQUIPMENT

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Campus 1, Aberdeen Innovation Park
Balgownie Road, Bridge of Don
Aberdeen AB22 8GT UK
Tel: +44 (0) 1224 226500
Fax: +44 (0)1224 226501
Email: km.camsales.uk@kongsberg.com
Website: www.km.kongsberg.com/cameras
Contact: Mark Esslemont

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ROVSCO, Inc.
5263 Barker Cypress Road, Suite 600
Houston, TX 77084
Tel: +1 281 858 6333
Fax: +1 281 858 6363
E-mail: sales@rovsco.com
Website: www.rovsco.com
Contact: Jessica McKenney

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Hawboldt Industries
220 Windsor Road
Chester, Nova Scotia
Canada B0J 1J0
Tel: 902 275 3591
Fax: 902 275 5014
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