

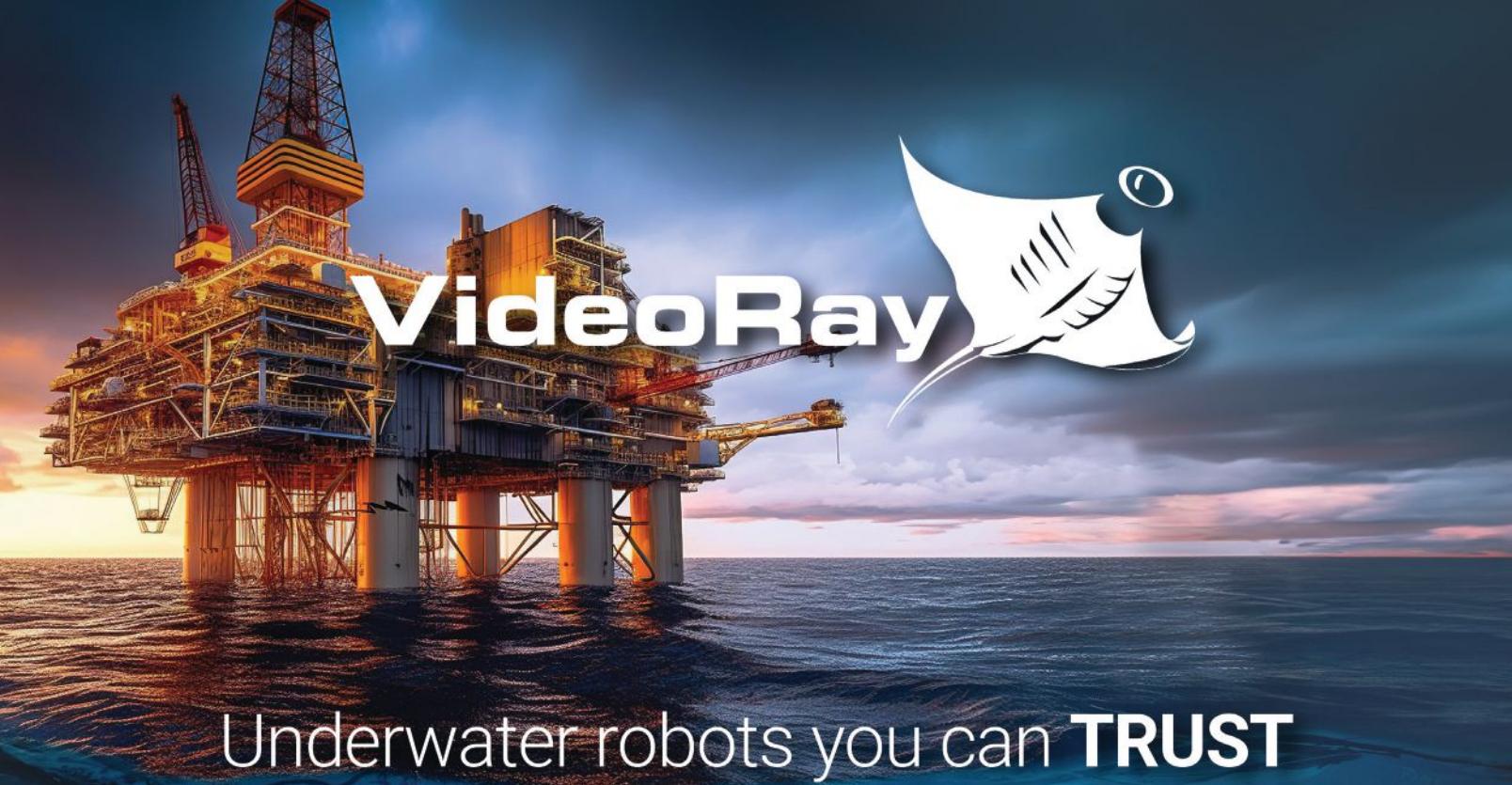
# ON&T

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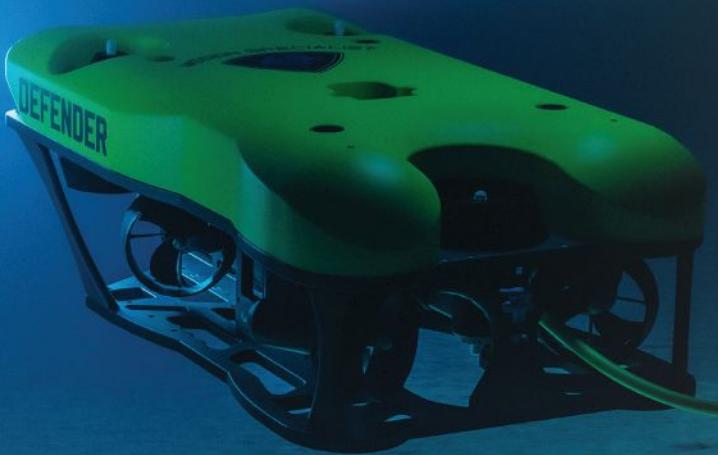
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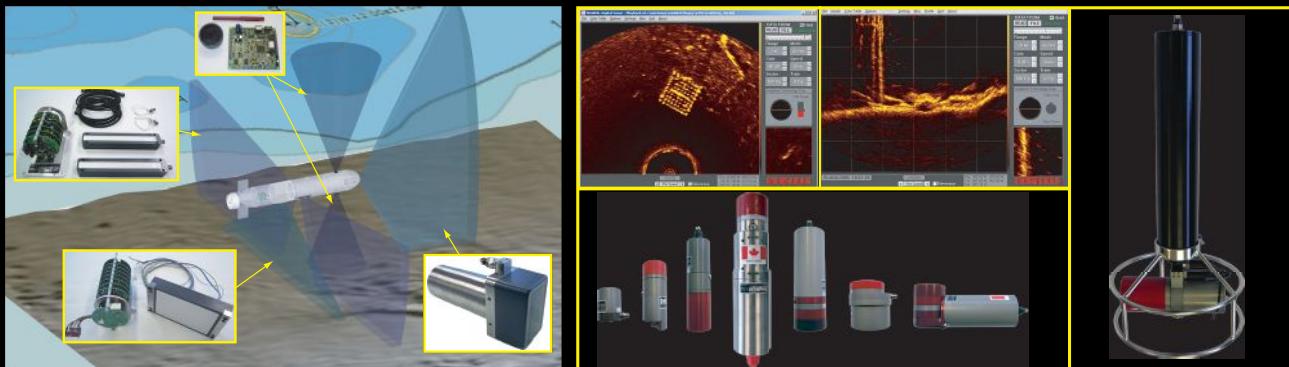
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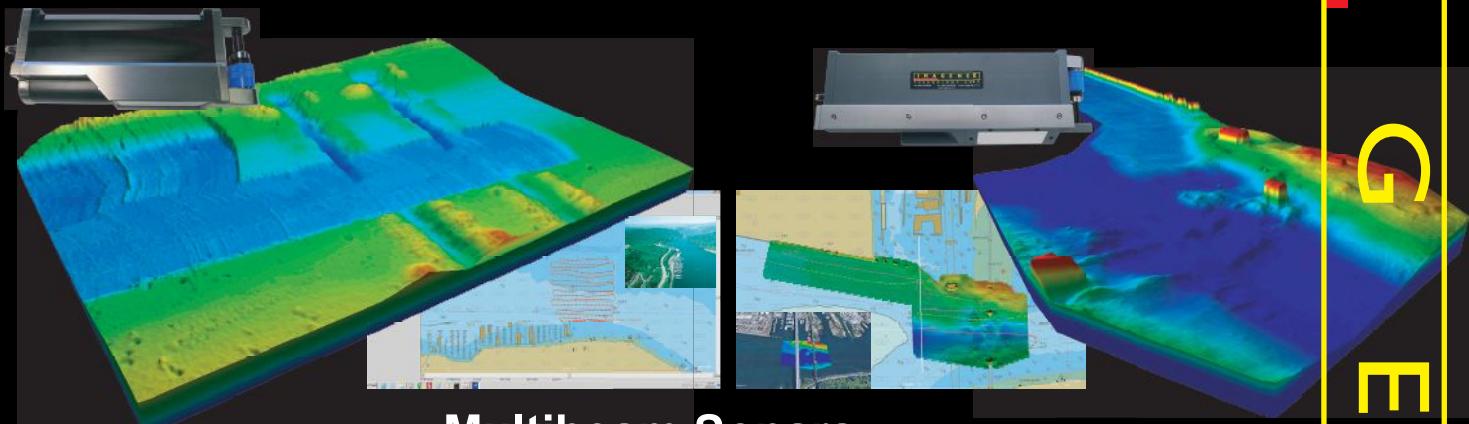
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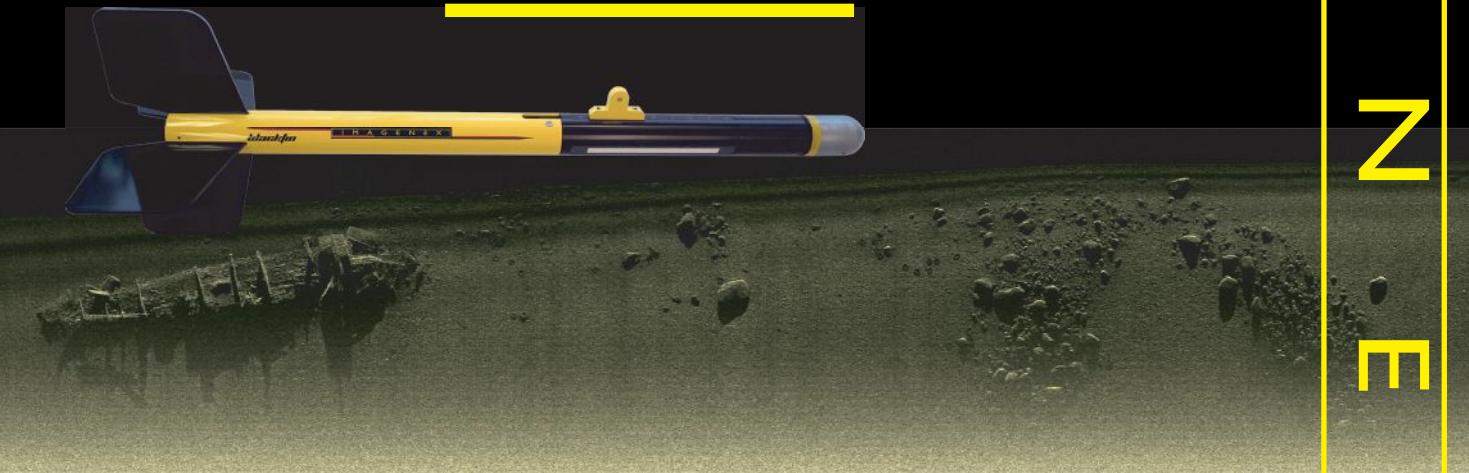
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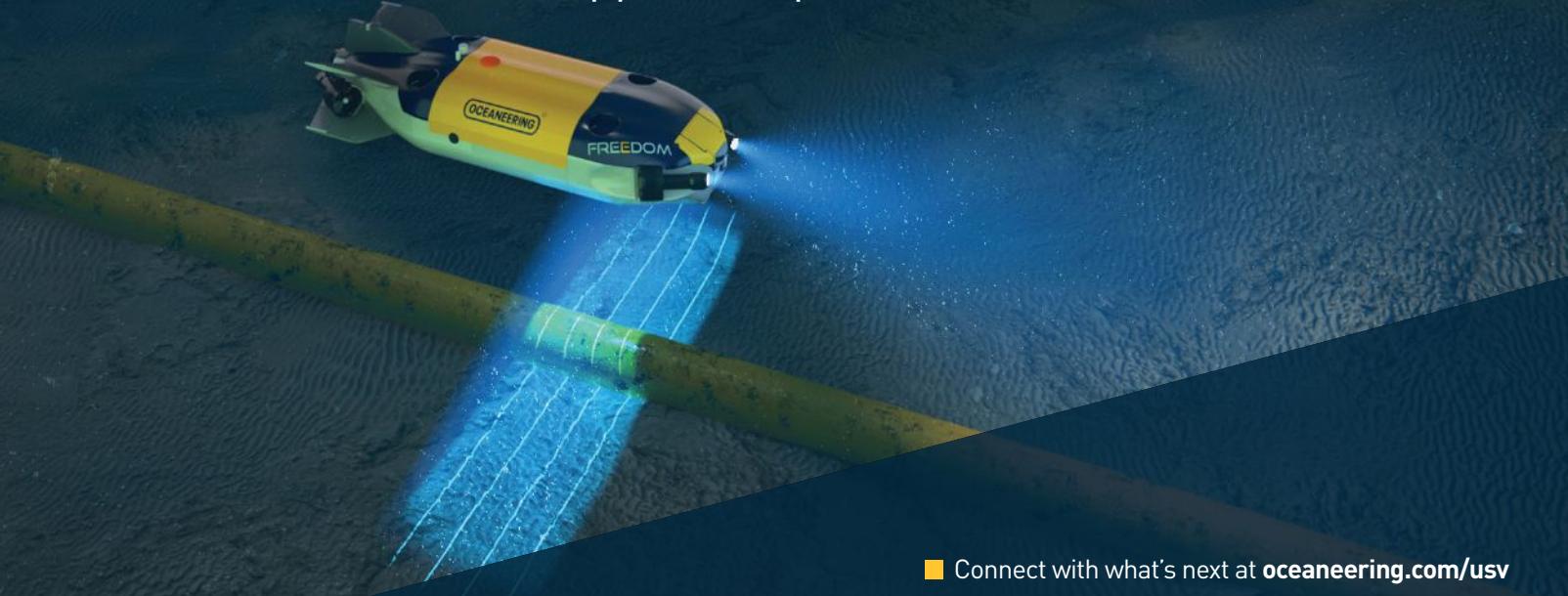
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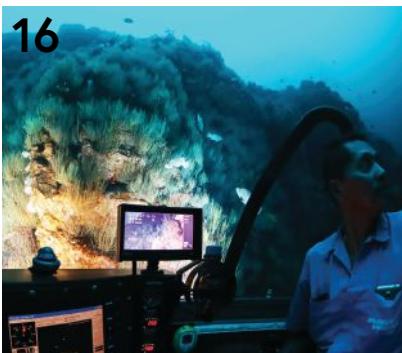


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**ON THE COVER:**  
C-Kore's full range of subsea testing tools has been designed to bring safety, efficiency, and reliability to the offshore oil and gas industry.  
(Image credit: C-Kore)

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## [WITH THANKS - Ed.]

The safe, cost-effective, and sustainable exploration of challenging offshore environments relies not only on the shared ambitions and ingenuity of ocean professionals but also on the availability of the right tools, in the right place, at the right time, and at the right price.

In this month's ON&T we take a closer look at some of the technologies, systems, and programs bringing innovation and change to the **Offshore Developer's Toolkit**.

Our thanks go to C-Kore, SubCtech, Hydrospace Group, CSA Ocean Sciences, Reach Robotics, and Bluefield Geoservices.

Next up, in December, is **The Future of Ocean Technology, Vol. 4**.

[editor@oceannews.com](mailto:editor@oceannews.com)

*Ed Freeman*



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# ENHANCING SUBSEA INFRASTRUCTURE WITH INNOVATIVE TECHNOLOGY AND SYSTEMS

**Dan Shropshire**Vice President Business Development,  
Marine Vehicles

The Nord Stream pipeline events of September 2022 in the North Sea forever changed the way our community thinks about critical undersea infrastructure (CUI) and asset integrity. The disruption of this gas line demonstrates the vulnerability we all share to the over 800,000 miles of cable and pipe carrying power, natural gas, crude oil, and data throughout the world. Likewise, cables and pipes supporting our offshore energy markets, both traditional and renewable, present an equal need for subsea inspection and monitoring.

Although tools and capabilities to perform these inspections have existed for years, the need to vastly expand these capabilities and reduce operational expense has jump-started another surge in innovation to address this need. This month, ON&T is focused on spotlighting some of the technologies and systems transforming the planning, monitoring, and intervention tasks associated with the ongoing operation of critical offshore infrastructure.

## THE OFFSHORE DEVELOPER'S TOOLKIT

Proactively equipping developers with the tools—both hardware and software—to advance asset integrity monitoring, harness autonomous control systems, and capitalize on IoT-driven digital twin capabilities is key to the next chapter of sustainable and responsible offshore development.

Each of these topics, and many others, are pieces of a larger puzzle needed to help address the CUI issue. Unprecedented demand for connectivity via trans-oceanic communication cables is driving the need for deep-rated inspection services in remote locations. To address this, a new fleet of deep-rated autonomous underwater vehicles is emerging with high-resolution synthetic aperture and multi-beam sonars; electromagnetic pipe and cable trackers; sub bottom profilers; and other sensors built for the task.

On the software side, new methods of inspection are being developed, which include

autonomous target recognition, autonomous change detection, and edge processing to allow vast amounts of data to be quickly analyzed. Offshore Oil and Gas has not only driven vast improvements in data bandwidth with wet-mateable subsea optical connectors but also, through the IoT, found better and more efficient ways of monitoring assets remotely via distributed subsea networks.

## INDUSTRY DRIVING INNOVATION

Commercial ventures are leading the push on engineering technologies to handle large datasets and are developing tools to quickly process, visualize, and image this data. Digital twin technology—the ability to virtually see what is occurring in real time in subsea environments—is yet another tool to better understand our underwater world.

With the advent of offshore wind in the United States and the development of new deepwater wind platforms worldwide, the need for autonomous inspection services is increasing, not just for critical asset integrity monitoring but also for important wildlife protection and management. In addition, the continuing war in Ukraine has shown that modern warfare will rely on, and require, autonomous robotic systems, including air, surface, and subsea. Here again, critical undersea infrastructure is a major focus.

So, even though demand is currently outpacing supply, the good news is that we are catching up. Innovation is not just occurring in the defense sector but is being aided significantly by developments in the commercial and academic sectors as well. Not only can we now autonomously identify and monitor subsea pipes and cables, but we also have the ability to do so permanently via subsea residency and even go so far as to remotely monitor and repair cables from shore via electric healing methods. Clearly, we live in a changing world and uncertain times, but it's comforting to know that ocean technology companies are hard at work to help address these critical needs.

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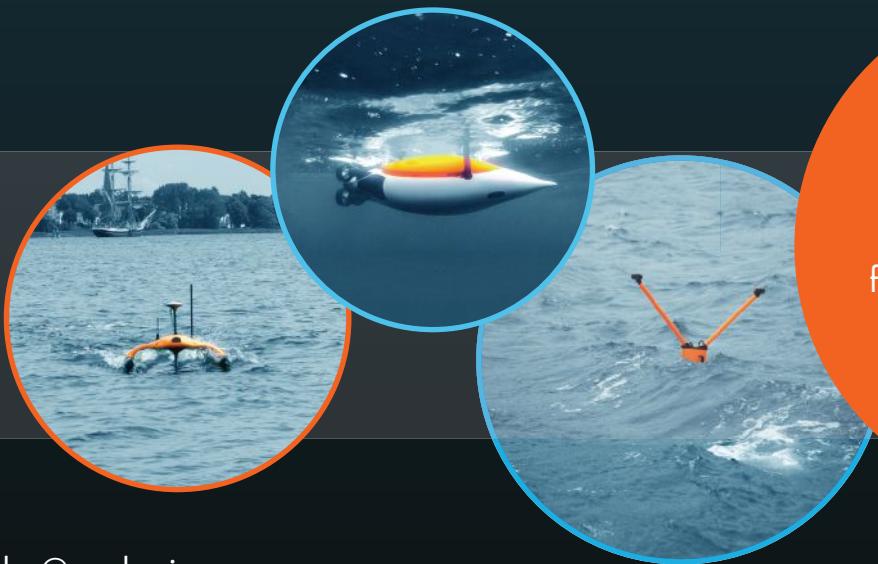
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# HELPING OPERATORS EXECUTE DECOMMISSIONING CAMPAIGNS SAFELY AND EFFICIENTLY



**Greg Smith**  
Operations Director

**C-Kore**  
Simplify Subsea Testing



**Cynthia Pikaar**  
Sales & Marketing Director

**C-Kore**  
Simplify Subsea Testing

**W**ith so many offshore oil and gas rigs approaching the end of their production cycle over the next decade, the planning of decommissioning projects among ocean energy developers is a long-term operational priority.

While the practical lifespan of oil and gas platforms var-

ies, generally speaking, such infrastructure is designed to operate 24 hours a day 7 days a week, all year round, for between 25–35 years.

At the turn of the century, we saw a planned and accelerated expansion of the offshore oil and gas industry, with E&P activities increasing seeking to access untapped resources found in ultra-deep waters across the globe.

Fast-forward two decades, and well abandonment technologies and services represent a burgeoning decommissioning industry.

The end-to-end process and scope of work associated with such subsea decommissioning efforts, especially in deeper waters, is nothing short of complex and challenging. As decreed by the Petroleum Act 1998, wells must be plugged

and, eventually, the physical infrastructure must be dismantled and removed to allow the surrounding marine environment to return to its natural, pre-lease state.

Timing is, therefore, critical to planning, and hinges on thorough monitoring, inspection, and testing campaigns supported by a range of subsea technologies deployed to provide accurate data and feedback on an active asset's current operating capacity.

## MODERNIZING SUBSEA TOOLS

Simplifying subsea testing is what we do at C-Kore Systems. Founded in 2012 in the UK, our goal has always been to bring modern testing technology to the offshore oil and gas industry.

The company began as part of Zetechtics, designers and manufacturers of the award winning Jupiter subsea control systems, before C-Kore was launched as a standalone business with a mission to eliminate downlines



» C-Kore's full range of subsea testing tools has been designed to bring safety, efficiency, and reliability to the offshore oil and gas industry. (Image credit: C-Kore)

and platform-led testing in the name of efficiency, safety, and significant OPEX reductions.

Recognizing that offshore testing has, for too long, been overly reliant on error-prone manual intervention and measurement services, C-Kore's early focus was to develop a Cable Monitor tool capable of measuring insulation resistance and continuity using low-voltage testing technology. As a result of two generations of successful field-trials with key customers, we introduced our third generation, commercial design.

Following widespread adoption of the C-Kore Cable Monitor—and the clear benefits it presented in terms of cost savings and measurement improvements, we applied our expertise and experience to broadening our portfolio by developing new tools for the subsea industry, such as our Subsea TDR and Pressure Monitor.

## BETTER DATA FASTER

C-Kore's products have been engineered to provide operators with more control and access to better data, faster. Our testing units, which are not much bigger than a dummy plug and can be fitted on deck or by a remotely operated vehicle (ROV), allow any asset testing to be completed much faster by automating the entire process and minimizing vessel time.

Today, C-Kore Systems has a range of subsea testing tools used globally by operators and contractors on decommissioning, fault-finding operations and new installation campaigns. The tools are easy to deploy and operate—without the need for C-Kore personnel to be present—ensuring their rapid integration and accurate feedback.



» C-Kore's Sensor Monitor allows operators to read subsea sensors by plugging directly into the x-mas trees. (Image credit: C-Kore)

## "C-KORE'S PRODUCTS HAVE BEEN ENGINEERED TO PROVIDE OPERATORS WITH MORE CONTROL AND ACCESS TO BETTER DATA, FASTER."

Further, they are safe for use on all subsea infrastructure, including electrical cables (umbilicals, power cables, flying leads, jumpers) subsea sensors and instruments, hydraulic and fluid lines; subsea control modules (SCM), distribution units (SDU) and manifolds; and down-hole sensors and cables (DHPT).

### SENSOR MONITOR

C-Kore's Sensor Monitor unit allows operators to read subsea sensors by plugging directly into the x-mas trees, giving data that is otherwise unobtainable without cumbersome and expensive workover tooling. With this capability, operators can easily verify the state of subsea x-mas trees,

ensure safe working conditions and the avoidance of any accidental release of hydrocarbons.

Originally designed for a North Sea decommissioning campaign to ensure the safety of subsea divers, C-Kore's Sensor Monitor unit is versatile but easy to use. It supports an extensive range of pressure, temperature, positional and other sensors. The Sensor Monitor ensures a safe working environment for decommissioning campaigns without requiring the presence of the Subsea Control Module.

The Sensor Monitor, like all our testing tools, has been designed to be intuitive and operator friendly. Our underlying goal is to introduce a degree

of automation that grants our customers fast and reliable access to the data they need to make informed and critical maintenance decisions, without the need to deploy down-lines or take extra personnel offshore. The Sensor Monitor's defining product attributes of simplicity, accuracy, and reliability signals a new era of operational savings for subsea testing campaigns in the age of offshore decommissioning.

Don't just take our word for it; during a recent decommissioning assignment in an undisclosed location, a Subsea Engineer from one of our operator partners summed up the scale of return on investment available: "Using the C-Kore Sensor Monitor unit simplified our whole testing campaign. We were able to quickly confirm the pressure/temperature transducer was still operational without having to pull the SCM, saving us over AU\$1 million!"

Testimonials like this have always been what has driven us at C-Kore to keep innovating and striving towards modernization of testing in the offshore subsea environment. This commitment to challenging the status quo has helped us establish an exemplary track record of partnering with operators around the globe looking to raise operating standards while slashing costs. Expanding our capabilities into the decommissioning market was a natural next step for the team at C-Kore, and the highly positive feedback received to date from our customers has confirmed the utility of our tools on time-critical decommissioning campaigns. Not only for the cost efficiencies they bring, but also ensuring a safe working environment.

For more information, visit: [www.c-kore.com](http://www.c-kore.com).

# COMMERCIAL LICENSING EXPANDS ACCESS TO INNOVATIVE MBARI TECHNOLOGY



» The LRAUV represents a decade of R&D work. (Image credit: MBARI)

Monitoring ocean health is increasingly urgent, but logically challenging. Scientists need nimble research tools that can scale our observations of the ocean and its inhabitants. Autonomous robots are essential to the future of marine science, engineering, and exploration.

The Monterey Bay Aquarium Research Institute (MBARI) long-range autonomous vehicle (LRAUV) is an innovative robot developed by MBARI engineers to meet the growing demand for technology that can safely and efficiently explore, map, and monitor ocean health. After a decade of extensive testing at sea by MBARI researchers, the LRAUV is now available to a global market for the first time, thanks to a commercial licensing agreement with Saab, Inc. The MBARI LRAUV will be available commercially as the Saab Tethys.

The MBARI LRAUV has an ultra-low power transit mode enables shore-based operations with a range of more than 1,000 kilometers (620 miles) making it the ideal scalable solution for ocean-based data collection.

MBARI's fleet of 10 LRAUVs has more than 40,000 hours of sea time, including operations with most of the standard AUV payloads, as well as MBARI's custom payloads that include environmental DNA (eDNA) sampling, plankton imaging, scientific echosounders, and more. This robust platform has demonstrated some remarkable mission capabilities, from sampling the genetic

fingerprints of marine life to monitoring harmful algal blooms in the Great Lakes to detecting and mapping oil spills.

Under its Autonomous and Undersea Systems Division, Saab will transition the MBARI LRAUV to commercial production offering this product for global sales for the oceanographic research, commercial, and military markets.

About two meters long, 30 centimeters in diameter, and weighing 110 kilograms, the LRAUV can dive to depths as great as 1,500 meters and is easy for small teams to operate anywhere in the world. The LRAUV's

unique low-power transit mode and over-the-horizon, internet-based remote control allow users to launch the vehicles from shore and conduct sophisticated missions at remote locations, without a ship.

It is capable of larger, more powerful payloads and can operate in higher currents than oceanographic buoyancy-driven gliders. The LRAUV can be outfitted with a variety of payloads, including microbial sampling, bioluminescence, active bio-acoustic imaging, water sampling, plankton imaging, and multibeam mapping.

MBARI engineers envision a future where robotic platforms can monitor ocean health 24 hours a day, 365 days a year. Licensing the LRAUV technology to Saab, Inc. for commercial production brings us closer to this vision for an autonomous future for ocean exploration.

"The ocean is at a critical crossroads and we urgently need to grow our ability to autonomously collect physical, chemical, and biological data about the largest living space on our planet," said MBARI President and CEO Chris Scholin.

"Our partnership with Saab, Inc. will make MBARI's marine technology broadly accessible and offer an important pathway to quickly scale global ocean observing efforts."



» MBARI's fleet of LRAUVs. (Image credit: MBARI)

# KONGSBERG DISCOVERY LAUNCHES NEW MULTIBEAM ECHOSOUNDER

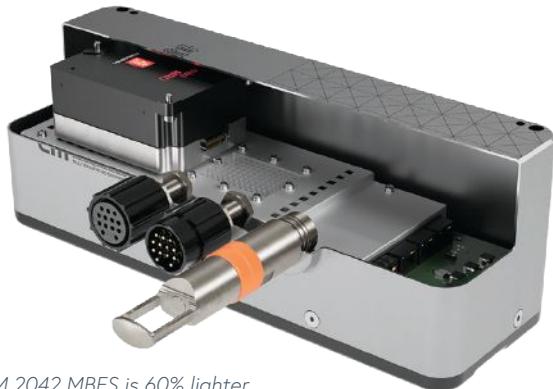
Kongsberg Discovery has announced the launch of EM 2042—a Multibeam Echo Sounder (MBES) capable of extending operational weather windows, offering unique flexibility, and delivering high quality data for customers seeking to understand, protect and utilize the ocean floor. The EM 2042 is light, easy to install, robust, and provides users the ability to collect optimal seabed data in remote, challenging environments.

Stene Førsund, EVP Sales and Marketing, Kongsberg Discovery, says the product is an embodiment of the company's mission to support the sustainable management, monitoring and development of the ocean space.

"The challenges facing those seeking to map the seafloor, especially in remote areas, are immense. They face narrow weather windows—with conditions where it can be difficult to acquire clean, accurate data, especially on first runs—a constant fear of damaging costly equipment, the challenge of configuring that equipment optimally, and the extreme demands of clients with regards to data density and resolution.

"In short, they have a vital role to play in our ocean space, especially concerning sustainable development of infrastructure such as windfarms and undersea cables, but one that must be performed under immense pressure. The EM 2042 has been custom made to help our customers meet those complex challenges."

The EM 2042 is 60% lighter than its EM 2040 predecessor, has less power consumption and is engineered to ensure easy con-



» The EM 2042 MBES is 60% lighter than its EM2040 predecessor.  
(Image credit: Kongsberg Discovery)

figuration and deployment on a range of vessel sizes, including unmanned surface vehicles (USVs). It can be easily mounted both within a vessel hull and over the side, with a customized mount from Kongsberg Discovery, needing only one cable connecting it to the topside.

Should misfortune strike, the EM 2042 has been designed to reduce repair time should the unit be damaged during operation—traditionally a costly and time-consuming task.

The EM 2042 also offers embedded, export licence free Kongsberg Seapath™ motion sensor technology, true multifrequency back-scatter, and true real time stabilization of all axes.

## OSIL BUOY INSTALLED IN DUBLIN BAY AS PART OF MULTIDISCIPLINARY PROJECT

A multidisciplinary data buoy platform manufactured by Ocean Scientific International Ltd (OSIL) has been installed in Dublin Bay as part of the PRE-DICT multidisciplinary project.

This project will provide a co-ordinated program of coastal ocean observations that will be used to validate, calibrate and extract as much information as possible from satellite earth observation data as an experimental proof of concept with the aim of generating AI models that can be used to predict environmental change in a range of environments.

The 1.9 m OSIL Fulmar buoy is recording and transmitting a variety of environmental parameters including salinity, temperature, pH, partial pressure of CO<sub>2</sub>, turbidity, dissolved oxygen and chlorophyll, in addition to a full suite of meteorological measurements.

Data from the buoy is relayed via GSM, with an Iridium satellite Short Burst Data back-up.

The intention is to predict and assess coastal vulnerability by systematic and sustained monitoring of physical, chemical and biological processes occurring

in coastal zones, by integrating mathematical modeling, remote and in-situ sensing, physical and chemical oceanography and seabed mapping from various sources including the Dublin Bay buoy.

These models will then contribute to future planning in a diversity of areas such as coastal mapping, flooding prediction, marine habitats and fisheries, climate change, environmental protection and policy.



» Fulmar buoy. (Image credit: OSIL)

## NORTEK NUCLEUS1000 NAVIGATION SUITE ENHANCED WITH FULL INS



» The Nucleus1000 is a preconfigured navigation package. (Image credit: Nortek)

The Nucleus1000 navigation sensor suite from Nortek is now available with full INS (inertial navigation system) capabilities, enabling absolute position outputs obtained using the Nucleus's on-board inertial and acoustic sensor package.

Equipping the sensor package with a full INS enables true navigation (latitude/longitude or X/Y output) for small AUVs, ROVs and USVs.

With these new capabilities, people working in the subsea industry now have access to the most compact, most affordable and most accurate complete inertial/acoustic navigation system of its class available on the market.

Users can now add a convenient source of basic positioning to their vehicle without substantial time, cost and payload demands. The Nucleus1000 only needs to

be provided with a GPS position to begin navigating using absolute positioning.

Providing earth-referenced position to a vehicle control system means that users who need to know where they are, where they've been and where they're going now have a preconfigured, pre-synchronized navigation package.

Prior to this, users would have to fuse data from multiple different sensors to obtain a reliable position output, either through their own software or additional third-party packages.

With a heading sensor that measures relative to magnetic north, as well as integrated pressure and temperature sensors, the Nucleus with INS introduces the most compact, most affordable and most accurate complete inertial/acoustic navigation system of its class available on the market.

## SONARDYNE APPOINTS AQUATIC SENSORS AS RESELLERS IN EXPANDING US MARKET

Sonardyne has announced the appointment of Aquatic Sensors as resellers as part of their growth in the US marine technology market.

Having worked with Sonardyne sister company Chelsea Technologies for over 20 years, Aquatic Sensors brings a wealth of industry knowledge and experience of the environmental water monitoring community across the US and Canada. The initial focus will be on the Origin 600 and providing the latest intelligent ADCP technology to the North American market.

Commenting on the appointment, Sonardyne Vice President Simon Reeves said: "We're thrilled to welcome Aquatic Sensors onboard as our North American resellers. Having worked with Chelsea Technologies for so many years, their knowledge of the industry is second to none, as is their experience of the North American market. We are confident that they will provide our customers with the best possible support and service."

"Aquatic Sensors is excited to partner with Sonardyne and to offer their cutting-edge environmental monitoring technologies to our customers in the US and Canada," added Andrea Zappe, Sales and Marketing Director - Aquatic Sensors. "Having partnered with their sister company, Chelsea Technologies, over the past twenty

years; we have had a strong awareness and appreciation of the level of quality that Sonardyne brings to the industry. From next-generation ADCPs and acoustic releases, to high-quality USBLs and DVLs, we are excited to assist our marine, coastal, and freshwater customers in new and innovative ways."



» (L-R) Sonardyne Sales Manager Kim Swords with Aquatic Sensors' Sales and Marketing Director, Andrea Zappe at OCEANS 2023 in Biloxi. (Image credit: Sonardyne)

# CROWLEY AND ABS TEAM UP TO ADVANCE AUGMENTED REALITY TECHNOLOGY

Crowley and ABS have entered an agreement to jointly explore how to advance the use of augmented and virtual reality technologies for vessels and other marine environments.

The ABS partnership agreement builds on Crowley's new service network using augmented reality on select vessels. Crew wear goggle technology to provide real-time visuals of ship equipment to remote technicians to collaborate on solutions. The technology, developed by Kognitiv Spark, allows mariners and shoreside crew to more quickly complete maintenance, updates, and upgrades on board with digital collaboration.

ABS and Crowley will collaborate in a joint pilot project for classification-related survey support activities, such as aspects of annual and special surveys including task crediting. In addition, the project

will include a variety of activities involving surveyors, engineers, and back-office survey support, virtual walkthroughs and livestreaming using fully remote and hybrid survey techniques. Successful class surveys are important to operate vessels.

"Augmented reality technology is a field technology, so in collaborating with forward-looking companies like Crowley, we can explore what's possible for future survey operations as well as for safety in use. ABS class services are leading the industry and finding ways to enrich the data used to both streamline the class process and also keep mariners and our surveyors safe," said Patrick Ryan, ABS SVP and CTO.

Crowley owns and operates a diverse US and foreign flag fleet that includes, container, roll on/roll off (RoRo), tug, dry cargo and offshore wind development and service operation vessels. The collaboration with

ABS will leverage its ongoing innovation efforts to bring more efficient and sustainable operations through technology.



» A crew member wearing goggle technology to provide real-time visuals of ship equipment to remote technicians. (Image credit: Crowley)

The graphic illustrates the cross-sections of two different types of submarine cables against a blue ocean background. On the left, a large orange cable is labeled with 'FIBER OPTICS' at the top and 'ARMOR' and 'DURABILITY' at the bottom. It features a central black core surrounded by multiple colored fiber optic strands and a thick orange outer jacket. On the right, a smaller red cable is labeled with 'LOW-NOISE' at the top and 'WEIGHT' at the bottom. It has a central black core with fewer colored strands and a red outer jacket. The labels are placed around the respective cables.

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In late June 2023, manned submersibles dominated the mainstream headlines, and not for the right reasons. This month's esteemed guest, Will Kohnen, President & CEO of Hydrospace Group and the current Chair of MTS' Submarine Committee, joined us to set the record straight on the unrecognized safety record of submarines.



with William Kohnen  
President & CEO



### 1 ON&T: The OceanGate incident has been a stress test for the submersible industry. What can we learn from the episode?

**WK:** The loss of OceanGate's submersible, *Titan*, and its tragic loss of passengers serves as a stark reminder of the critical need to uphold responsible safety standards, comply with industry regulations, and carry out thorough third-party testing and validation.

Prior to this disaster, most people were relatively oblivious to the world of manned submersibles and probably unaware of the industry's stellar safety record. Many observers of June's frenzied media cycle were learning about modern, non-military submersibles for the first time—and the news was bleak, with international headlines citing catastrophic mechanical failure and diminishing hope for the passengers aboard.

Within days, more profound questions began to emerge: What defines a "tourist" submersible? What are the required

safety and rescue protocols for a mission like this? Who is responsible for the certification and regulation of submersible crafts of this nature? Seeking answers, the media reached out to several experts in the field.

As the Co-Founder of SEAmagine Hydro-space Corp, a world leader in the design and manufacture of modern submersible vehicles since 1995, I was one of the sub experts. I also established the Hydrospace Group in 2010 to answer a more general call for high-reliability systems specialized in pressure vessels for human occupancy, which extends from deep ocean submersibles to medical and space capsules—so I welcomed the discussion.

### 2 ON&T: So, you became something of a spokesperson for the submersible industry?

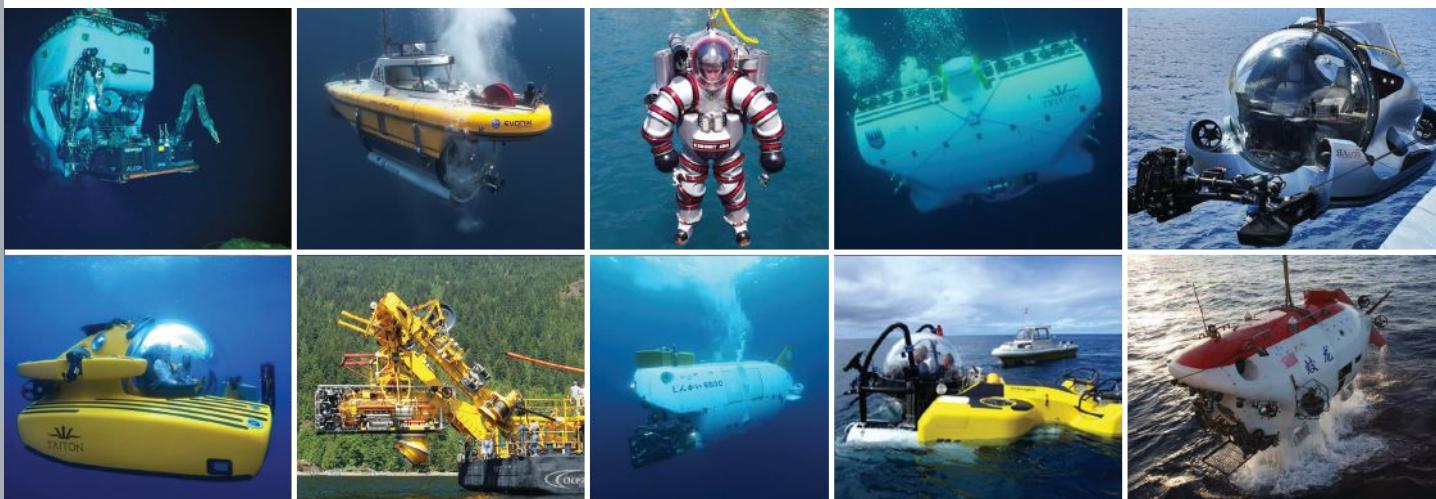
**WK:** Well, I have chaired the Submarine Committee, previously the Manned Underwater Vehicles (MUV) Committee, of the Marine Technology Society (MTS) since 2003, and so for the last two decades have enjoyed a front-row seat to the significant

growth of the industry and the huge technological advancements made in submarine engineering.

However, my professional experience was not what garnered initial media attention. Instead, investigative journalists sought to authenticate a letter leaked to the *New York Times* that was sent to OceanGate outlining the catastrophic consequences that the *Titan* submersible risked if it did not adhere to certain production and safety standards. It was a private correspondence I authored in 2018 on behalf of dozens of industry members worldwide, sharing a deep concern with the company's approach.

But as we now know, despite these concerns, OceanGate's CEO, Stockton Rush, agreed to disagree on the raised technical concerns and pressed forward with his submersible concept without soliciting further input, review, or certification by any third-party agency. There are many classification agencies around the world that specialize in this type of third-party review, after which a submersible is considered "Classed".

» Submersible designs around the world vary widely according to applications, while maintaining a consistent rigorous adherence to industry standards and safety protocols. (Image credit: Hydrospace Group)





» Human occupied submersibles provide a unique in-situ observation capability at all depths providing an unequaled perspective for learning and discovering. (Image credit: SEAmagine Hydrospace Corp.)

The design and build were 100% proprietary and undisclosed. In fact, as the crisis unfolded, only the crew and OceanGate employees knew the technical specifications of the *Titan*.

Today, there are nine submersibles capable of diving to the depths of the RMS *Titanic* (3,800 m). *Titan* was number 10 and the only vehicle not officially classed. The OceanGate craft was an outlier, best described as an experimental, deep ocean exploration submersible and not representative of the broader submersible industry. It is also worth noting that due to the weight per volume of a traditionally fabricated pressure hull, no other submersible built to operate at these hostile and challenging depths has ever been designed to accommodate five occupants, with three being the certified maximum to date.

Theoretically, if the vessel had been certified by an outside party, we would have had access to important details relating to the sub's build, its components, and the safety and redundancy options. The lack of information about any form of emergency response plan, which is an essential ele-

ment of any deep-sea operation, left confusion in the wake.

### 3 ON&T: What would be the correct form of an emergency plan for an incident of this nature?

**WK:** It is an industry standard to have a clearly defined chain of command, with detailed delineation of who is called, and when, after a loss of communication with the submarine. If a second vehicle—e.g., another submarine or a remotely operated vehicle (ROV)—is not available on deck, then there is a third-party operator on-call and ready to respond.

Over the decades, the submarine industry has successfully incorporated such safety protocols, covering technological, engineering, and material innovations, as well as at-sea operations, to better safeguard against accidents like this.

Numerous national and international authorities and organizations, such as the US Coast Guard and the International Marine Organization (IMO), have published easy-to-access guidelines for the design,

construction, and operation of passenger submersible craft. These guidelines—which really came into focus during the 1980s and 1990s at a time when engineering breakthroughs triggered an expansion of the commercial submersible industry—are translated into practice by Classification Societies, professional organizations that oversee every phase of development, from concept to sea trials.

There are several class agencies around the world, such as the American Bureau of Shipping (ABS), DNV, Lloyd's Register, and NAVSEA, to name a few, and the International Association of Classification Societies (IACS), a non-governmental organization, provides a forum within which the member societies can discuss, research, and adopt technical criteria that enhance maritime activities.

The *Titan* incident was avoidable, and it should not overshadow the submersible industry's extraordinary safety record. Out of 326 submersibles built worldwide since 1960, approximately 160–180 are currently active, with depth ratings varying from 30–11,000 m, or full ocean depth. Some-

where between 30,000–50,000 dives are logged every year. The industry had maintained a flawless safety record since the mid-1970s—zero fatalities, even with the number of dives having increased tenfold over the last five decades—until that ill-fated dive on June 18.

These credentials speak not only to the subsea engineering might of a community that puts safety above all else but also to the cooperation and conformity among operators to a validated system of safety rules, regulations, and protocols that are continuously subject to review and improvement.

#### 4 ON&T: Tell us more about the Marine Technology Society's Submarine Committee and its mission...

**WK:** Established in 1968, the Submarine Committee (previously the Manned Underwater Vehicles (MUV) Committee) of MTS has always been dedicated to safe and responsible ocean exploration and so has played no small role in establishing a unique sense of shared ownership among members for ensuring that meticulous engineer-

ing practices and unwavering adherence to national and international safety standards are the hallmarks of this close-knit industry.

This year, we will be celebrating the 20th anniversary of the Submarine Symposium at the International Workboat Show where the global submarine community—manufacturers, owners, operators, pilots, regulators, and support service providers alike—comes together to share insights and discuss the future of our industry.

The agenda is full, with researchers operating deep ocean exploration submersibles from the United States, France, Japan, China, and India on hand to discuss their missions. This year's event will have an added focus on international submarine operation safety standards through a workshop led by the US Coast Guard and multiple jurisdictional agencies around the world. Representatives from the US, Canada, France, UK, Japan, India, US Navy, NOAA, ISMERLO, IMO, ABS, and DNV, plus industry members of all different sectors of the submarine world will be present. The objective is to explore ways to enhance the robustness of jurisdictional coverage of our recognized safety standards for submarine

operations in national and international waters.

#### 5 ON&T: So, what does the future hold for the manned submersible industry in 2024 and beyond?

**WK:** There is much to be excited about. We will continue to see submarine design cater for varied deployments, from marine scientific research expeditions and offshore infrastructure services in the deep to leisure and tourism excursions in the shallows. It is hard to overstate just how much progress the industry has made to broaden the appeal and utility of manned submersibles in recent years. Technical progress across the whole supply chain, from build materials to components to updated safety features, points to a new age of underwater exploration—for all—with risk mitigation front and center.

Ocean technologists will continue to invest time in both crewed and uncrewed solutions. The magic is in the imagination of young men and women and their capacity to innovate that will continue to accelerate our learning and caring for our blue planet in the future.

» The International Workboat Show hosts the 20th Annual Submarine Symposium and Underwater Intervention, supported by MTS Submarine Committee members from around the world. (Image credit: Hydrospace Group—2022 Submarine Symposium)



# EVERCLEAN GOES BIG ON DATA TO OPTIMIZE HULL PERFORMANCE

EverClean's innovative "Always Clean" hull management service is designed to deliver maximum hull performance for commercial vessel owners, and Greensea IQ recently announced another major advancement in maintaining that performance with the launch of EverClean IQ.

EverClean IQ provides EverClean customers with unparalleled insights into their vessels' condition below the waterline by harnessing data collected during the cleaning operations. Using multiple sensors and cameras the cutting-edge robot accumulates a wealth of valuable data on the ships while they are being serviced. The robots also have a system for recording brush pressure feedback, which the EverClean IQ system can cross reference with prior readings on the same area of the hull, which

is confirmed by the robot's highly accurate hull relative navigation system.

EverClean IQ not only manages the data, but it then processes it into clear and concise reports for the customers allowing users to see how their hull is changing over time by reporting on the condition of their hull in a single, easy to use interface.

EverClean IQ has set out to build the world's most comprehensive data set on ship hull fouling, instigating a worldwide transition towards a universally embraced standard of always clean, and environmentally safe hulls. This includes establishing the framework for a digital validation process of clean hulls, enabling vessel owners to make more accurate and informed decisions about maintenance and performance.



» Hull cleaning robots use sensors and cameras to accumulate data as they service the hulls.  
(Image credit: Greensea IQ)

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# COLLABORATIVE MISSION TO TEST TECHNOLOGY FOR OCEAN SCIENCE AND EXPLORATION

On October 1, Ocean Exploration Trust (OET) and partners set sail from Honolulu aboard E/V *Nautilus* for a technological collaboration expedition in Hawai'i waters. OET will host three different autonomous and remotely operated platforms on the ship to keep bounding ahead strategies for deploying multiple underwater vehicles in tandem to advance efficiencies and force multipliers in ocean exploration.

The technologies included in this year's collaboration expedition are the University of New Hampshire's uncrewed surface vehicle (USV) *DriX*, the University of Rhode Island's Deep Autonomous Profiler (DAP) Lander, and Woods Hole Oceanographic Institution's hybrid remotely operated vehicle (HROV) *Mesobot*, as well as new autonomous environmental DNA (eDNA) samplers with in situ filtration that will be mounted on the DAP and *Mesobot*. This expedition is funded by NOAA Ocean Exploration via the Ocean Exploration Cooperative Institute (OEI).

Over the last three years, OET and OEI have integrated emerging exploration technologies to enhance ocean exploration. This third annual iteration of technology demonstrations

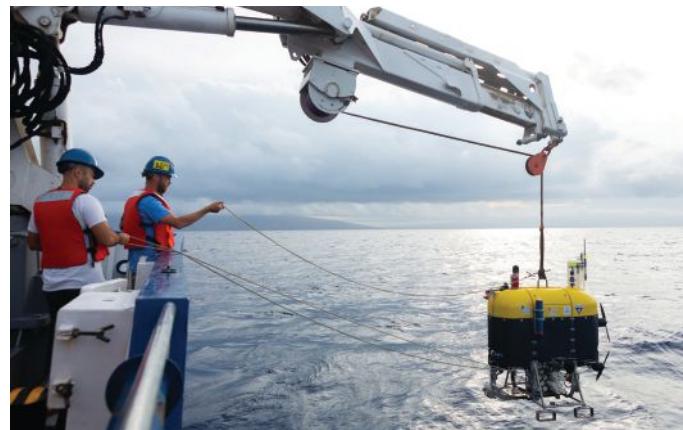
will be an 18-day telepresence-enabled expedition that combines deployments of USV *DriX*, HROV *Mesobot*, and DAP Lander, each of which offers complementary capabilities to explore the ocean from the seafloor through the entire water column.

"Fifty percent of the US's exclusive economic zone is not yet mapped, and while progress is being made to both map and characterize these waters- the pace of this exploration remains somewhat slow," said Dr. Aurora Elmore, NOAA Ocean Exploration. "We need to expand our use of new technologies, especially those that can work together to increase the pace of exploration so that we can better understand and protect the deep sea."

Returning from last year's technology collaboration is the Center for Coastal and Ocean Mapping/Joint Hydrographic Center at the University of New Hampshire's USV *DriX*. *DriX* is a 7.7 meter-long USV outfitted with multibeam sonars capable of mapping seafloor and imaging the midwater, topside sensors for situational awareness, and various communication systems to act as a relay shuttling data to surface ships and vehicles below the sea surface.



» Exail's *DriX* USV in action. (Image credit: OET)



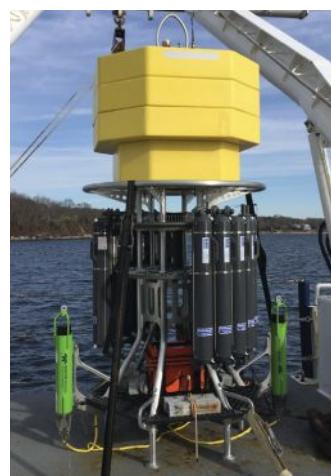
» Launching *Mesobot*. (Image credit: OET)

E/V *Nautilus* will also again host Woods Hole Oceanographic Institution's HROV *Mesobot*—a vehicle designed to study poorly understood midwater environments. The team will use *Mesobot*'s systems to observe and sample portions of the water column with the highest abundances of pelagic biota, also known as deep scattering layers, to characterize the region with cameras and an eDNA sampler.

A particular focus of this expedition will be to use *DriX*'s EK80 sonar to understand better the midwater environment above seamounts, which are difficult to explore and host high abundances of pelagic organisms. Ideally, *DriX*'s communication tools will direct HROV *Mesobot*

and the DAP Lander for targeted sampling in these areas.

New to the technology line-up this year is the University of Rhode Island's (DAP) Lander, a vehicle designed to deploy to the seafloor and gather long-duration data, up to 24 hours. The team will use the Lander to collect visual and environmental information, as well as eDNA samples on the summits of the seamounts below *Mesobot* and *DriX*. Using acoustic data collected by *DriX*, the DAP Lander will be directed to the highest-priority areas for sampling.



» DAP Lander 1. (Image Credit: University of Rhode Island's Graduate School of Oceanography)

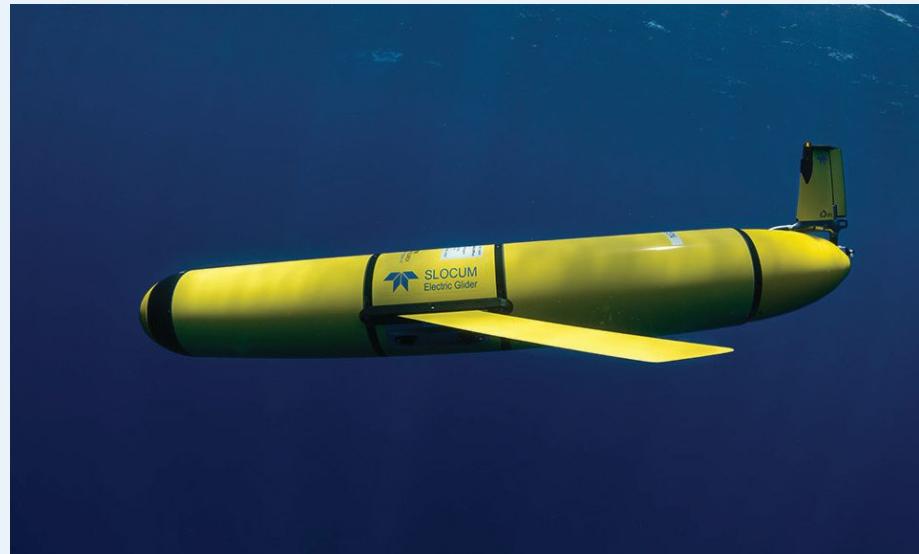
# TELEDYNE GLIDERS ADVANCE HURRICANE RESEARCH AND FORECASTING MODELS

Teledyne Marine continues to make waves in hurricane research and forecasting through the long-endurance deployment of its Slocum gliders. Teledyne Marine has a longstanding reputation for delivering reliable and high-performance AUVs that serve many applications, including oceanographic research and environmental monitoring.

Teledyne Slocum gliders have been at the forefront of oceanographic research for over two decades, providing scientists, researchers, and organizations with dependable and efficient platforms for collecting vital data from the world's oceans.

In early October, the company announced a major AUV milestone: over 1,100 Slocum gliders have been delivered and deployed worldwide, supporting diverse scientific and commercial endeavors. These applications span oceanography, climate research, oil and gas exploration, and environmental monitoring.

Teledyne's Slocum Storm gliders have garnered attention for their instrumental role in hurricane forecasting. Teaming up with NOAA, the US Navy, and academic researchers, these gliders form picket lines in front of advancing storms measuring the subsurface water temperatures along the storm path to help determine whether the ocean heat energy content will either feed or starve a tropical cyclone. This groundbreaking approach significantly enhances



» Over 1,100 Teledyne Slocum gliders have now been delivered and deployed on oceanographic missions around the world. (Image credit: Teledyne Marine)

storm intensity model predictions. Understanding their behavior is paramount, given the destructive nature of hurricanes and their profound impact on both coastal and inland communities.

Teledyne Slocum gliders' contributions to hurricane research include real-time data collection and measurement of various ocean parameters that significantly improve hurricane forecasting models—over the past five years, these gliders have collected and integrated more than 500,000 data profiles into hurricane models, enhancing forecast accuracy.

Clayton Jones, Senior Director of Technology at Teledyne Marine, expressed his pleasure in the company's contribution to hurricane research, stating: "Our team is very proud of the role that our gliders play in hurricane research. These autonomous underwater vehicles are making it possible to gather critical sub-surface ocean data in the most extreme conditions, which, in turn, contributes to saving lives and protecting both our coastal and inland communities. Our technology is a testament to the power of innovation and partner collaboration in addressing some of the planet's most pressing challenges."

Saab Seaeye

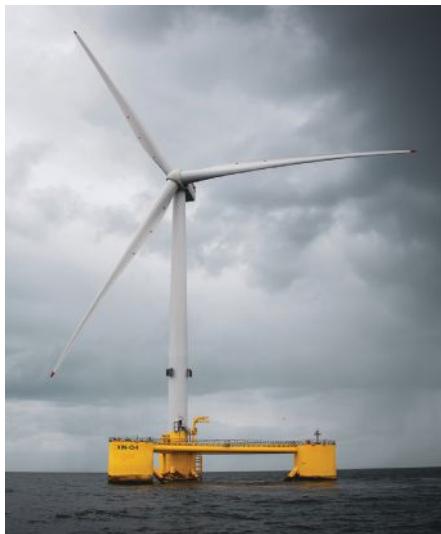
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**SAAB**

# WHITE CROSS OFFSHORE WINDFARM SUBMITS ONSHORE PLANNING APPLICATION



» The development will consist of 6 to 8 state-of-the-art floating wind turbines.  
(Image credit: White Cross Offshore Windfarm)

White Cross Offshore Windfarm Limited, which is a joint venture between Cobra and Flotation Energy, has taken a significant step in the project's development by submitting its onshore planning application to North Devon Council.

The proposed 100 MW White Cross floating offshore windfarm, located 52 km off the North Devon coast will consist of 6 to 8 state-of-the-art floating wind turbines and when operational, generate enough clean electricity to power around 135,000 local homes.

The associated cable route has been selected based on extensive consultation and feedback. It's proposed to make landfall at Saunton Sands, connecting to the electricity grid at East Yelland substation. Ensuring the efficient transfer of energy to the grid, a new onshore substation unit is also being proposed, close to the existing East Yelland substation.

The opportunity presented by the commercial scaling of floating offshore wind for the UK and specifically the Southwest is extensive and well documented. White Cross forms part of the Crown Estate's Test and Demonstration leasing opportunity, which aims to develop and commercialize innovative, floating energy technologies within the Celtic Sea.

The project will play a key role in supporting the growth of a regional supply chain in the Southwest of England, whilst also developing new jobs and skills for local communities. Acting as a key stepping-stone, the White Cross floating wind project will also support the scale-up of subsequent offshore wind developments in the Celtic Sea region and beyond.

Al Rayner Projects Director, Flotation Energy said: "White Cross will play an essential role in testing new and innovative technologies to support the burgeoning floating offshore wind industry in the UK. We have been developing this site since 2020 and this consent application is a huge milestone."

"On track to start generating energy in 2027, the success of White Cross and similar projects provides significant opportunities for the UK to reap the associated economic benefits whilst also tackling climate change. It also helps secure the UK's continued position as a world leader in offshore wind development."

A spokesperson from Cobra said: "We are delighted to take the next step in the

development of White Cross, project that aims to provide secure supply and providing sustainable energy for the UK and beyond.

"Our partnership with Flotation Energy is founded on previous floating wind success, and utilizing our shared knowledge and understanding will provide significant advantage as we build an efficient and high-quality pipeline of developments."

The project supports the UK Government's target to deliver 5 GW of energy from floating offshore wind by 2035, alongside wider decarbonization and energy security targets. This application follows the project's offshore consent application which was submitted to the Marine Management Organization (MMO) earlier this year. The formal consultation process is now live for both applications. If you would like to comment on either of the applications, you should do so formally via the appropriate authority's application portal. Comments on the onshore application should be made to North Devon Council and comments on the offshore application should be made to the MMO.



» Saunton Sands, the proposed landing point. (Image credit: White Cross Offshore Windfarm)

# BAKER HUGHES AWARDED MAJOR CONTRACT TO PROVIDE GAS TECHNOLOGY EQUIPMENT

Baker Hughes recently announced that it has been awarded a major contract, to be booked in the third quarter of 2023, to provide a modularized liquefied natural gas (LNG) system and power island.

The contract was awarded under a master equipment supply agreement between Venture Global LNG and Baker Hughes for more than 100 million tons per annum (MTPA) of production capacity, which was expanded from 70 MTPA and recently announced during Gastech in Singapore.

The award builds on previous ones from Venture Global to Baker Hughes to provide comprehensive LNG technology solutions for the Calcasieu Pass and Plaquemines LNG projects in Louisiana.

"We are excited to add another milestone in our successful collaboration with Baker Hughes as a strategic LNG technology supplier, building on the expansion of our agreement," said Mike Sabel, CEO of Venture Global.

"To enable a successful transition to more secure and sustainable economies, it is critical that we continue to further our mission of delivering low-cost LNG at a larger scale. We are grateful for our continued partnership with Baker Hughes, a world leader in energy technology, and look forward to building on our successful collaboration in our upcoming projects."

"We have been a trusted partner in natural gas operations for more than 30 years and have been able to bring that depth of experience into the recent LNG market upturn. This further expansion of our collaboration with Venture Global reaffirms that Baker Hughes technologies are advancing the efficient use of natural gas, and we are honored to continue to support their projects," said Lorenzo Simonelli, Chairman and CEO of Baker Hughes.

"The continuing demand for LNG emphasizes the pivotal role that natural gas will play in the energy transition, helping to secure supply and to reach net-zero emissions."

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# SUBSEA BATTERY SOLUTIONS FOR LARGE ENERGY STORAGE FOR OFFSHORE DEVELOPERS



By Stefan Marx

CEO



**O**ver the last ten years, SubCtech has earned a reputation for responding to the shifting demands for power and increasing capacity within the subsea sector. The company's latest response is a new series of Li-Ion batteries designed specifically for large subsea energy storage facilities, vehicle propulsion and, last but not least, for the electrification of oil and gas production locations, hence playing an instrumental role in the transition from electro-hydraulic to all-electric systems.

The overarching goal is to make the global energy supply more reliable while, at the same time, minimizing the down time of production by providing sufficient uninterruptible power supplies (UPSs), and thus enabling the use of all-electric systems. This allows for very deep as well as extremely remote production facilities as it simplifies the challenges associated with long-distance tiebacks significantly.



» The 5t Output Power Module (OPM) with skid for up to 6 x 1 MWh batteries generates 3 phases 580 VAC, here in the qualification test.  
(Image credit: SubCtech)

## FIRST ENERGY STORAGE SYSTEM OF ITS KIND

In full support of this sector-wide mission, SubCtech is proud to release the first fully qualified (TRL5 with SIT) subsea Energy Storage System (ESS) of its kind! The SubCtech team has fully completed the production of the ESS and is in the process of completing the E/FAT, followed directly by the final SIT (system integration test).

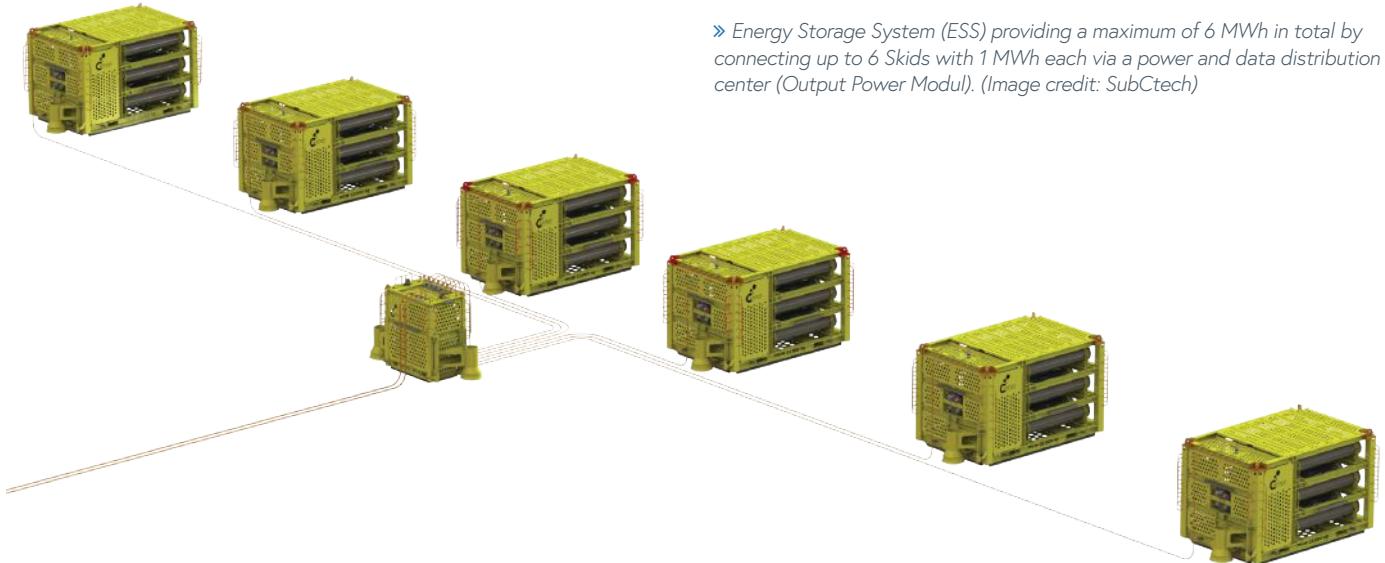
Following the testing phase, the next milestone will be to see the full subsea operation of the approved system, with a total energy storage capacity of 2 MWh!

The growing demand for custom solutions from the offshore oil and gas industry has triggered the development of extremely reliable batteries with an expected lifetime of 25 years. With the UN T38.3, DNV or API17F and MIL-STD standards and qualifications, and depending on the target market, batteries need to be able to operate in and withstand extreme conditions, and so are subject to a series of stress tests, including response to rapid temperature change, extreme vibrations, and extensive shock. Such technical assurances are essential for successful and failproof operational reliability in both shallow and deep waters. If compromised in any way, additional service interventions—or worse still, system failures—commonly incur considerable costs, both in terms of direct cost and downtime.

The new 1 MWh battery systems (2 of them being deployed to provide the total of the above mentioned 2MWh) are based on the well-established 100 kWh vehicle batteries, which are qualified according to different standards, e.g., MIL-STD. The Battery Control Module is based on our NetDI® Control technology. The 1 MWh battery systems can also be used as XXL AUV vehicle batteries.

The energy of the batteries is easily scalable by stacking our SmartPowerBlock™ (SPB) battery modules. Power Distribution Units (PDU), voltage conversions, as well as data interfaces, can be added into e.g. titanium or duplex steel housings as required, completing the battery system.

Our proven Li-Ion cell technology offers enormous advantages in terms of safety, energy, and power density at moderate APEX and



» Energy Storage System (ESS) providing a maximum of 6 MWh in total by connecting up to 6 Skids with 1 MWh each via a power and data distribution center (Output Power Modul). (Image credit: SubCtech)

lowest possible OPEX costs. Due to the flexible design, the charger can be external/topside or can be integrated into the pressure housing, e.g., for AUV/ROV docking stations or subsea storage/UPS—both already with TRL 7. SubCtech uses high power DC and AC converters that enable short charging times without the need for complex cooling systems.

## VALUE PROPOSITION

As new technologies thrust developers further offshore and into deeper waters to responsibly leverage ocean resources, never has there been more urgency to prioritize the safe and sustainable operating procedures designed to protect and preserve the oceans in the long run.

**"OUR PROVEN Li-ION CELL TECHNOLOGY OFFERS ENORMOUS ADVANTAGES IN TERMS OF SAFETY, ENERGY, AND POWER DENSITY AT MODERATE APEX AND LOWEST POSSIBLE OPEX COSTS."**

With our standardized, safe, and reliable Li-ion batteries—guaranteed to deliver the longest possible design life—SubCtech's solutions continue to make underwater energy reliable and cost-effective. With maintenance measures effectively minimized, so is OPEX. Further, unlike relying on duplex or 316L steel canisters, SubCtech specializes in titanium. As a result, coating and corrosion protection (CP) is not required and this reduces the risk of pollutants escaping and contaminating the surrounding water. Since titanium housings do not require any specific servicing during their entire design life, the expense associated with regular ROV inspections can be avoided.

Our Li-ion batteries have a typical service life of 15–25 years, depending on the cell chemistry. Again, this not only reduces the need for unforeseen subsea interventions, but this extended time-frame helps with future planning and budgeting.

The fact that SubCtech manufactures the pressure housings means that battery systems can be easily scaled up to meet any special water depth and form-factor requirements.

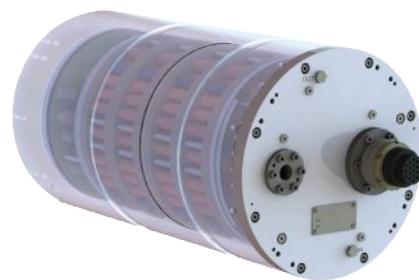
The ability to adjust the system's operating parameters remotely, without the need to retrieve the batteries for servicing, further reduces costs. Of course, cybersecurity has been considered and measures have been taken.

## THE FUTURE

The benefit of SubCtech's All-Electric Systems technology is globally available, not only for the offshore oil and gas industry but also to fuel subsea monitoring and inspection activities, namely the autonomous underwater vehicles and their respective docking stations. The All-Electric Systems offer cost advantages compared to conventional systems, simplify service and maintenance. As an industrial standard, that would add significant value to oil and gas production facilities especially when including long-distance tie-backs or CCS applications.

For the future global market, the team at SubCtech not only see huge opportunities to expand underwater energy generation but also in the steady integration of autonomous vehicles being used to protect, preserve, and exploit our assets (ranging from critical underwater infrastructure to energy production and nature). This is, ultimately, a safer way for the ocean community to meet future challenges whilst also ensuring that we collectively curb any associated costs, be them financial or societal.

To learn more, visit [www.subctech.com](http://www.subctech.com).



» Typical 400V subsea UPS in 300 bar SEM canister, fully API17F approved. (Image credit: SubCtech)

# GLOBAL ENERGY GROUP TO SUPPLY SUPPORT TO MORAY WEST OFFSHORE WIND FARM

Global Energy Group (GEG) has been selected by Moray West Offshore Wind Farm to provide preassembly support services for the marshalling of 62 transition pieces (TPs) at the Port of Nigg. The major contract encompasses a broad range of critical onsite ser-

vices including craneage, logistics, mounting ancillary equipment, and inspection and repair support, which will be completed prior to installation of the TPs. Ocean Winds, the 50:50 joint venture between ENGIE and EDP Renewables, is developing the Moray West project.



» Moray East Cranes and Logistics at Port of Nigg. (Image credit: GEG)

The TPs will start to arrive at the Port of Nigg later in 2023 with installation starting shortly afterwards and due for completion in 2024.

This latest project award follows the recent announcements that the Port of Nigg will be used by Siemens Gamesa for the marshalling and pre-assembly of Moray West's wind turbine generators, as well as GEG's Fabrication Division securing the production of two J-tube frames as key elements of the foundation structures.

GEG has built a successful track record in the offshore renewables industry over recent years, having managed more than 2.6 GW of offshore wind assets through the Port of Nigg. The group has grown its preassembly capabilities and expertise to service the comprehensive requirements of the offshore wind sector, cementing the company's position as the partner of choice for offshore wind operations in the UK.

## HISTORIC WAVE ENERGY MILESTONE IN THE STATE OF CALIFORNIA

California Governor Gavin Newsom recently signed California Senate Bill 605, into law—a historic moment for wave energy in America. The legislation directs the California Energy Commission to evaluate the feasibility of wave and tidal energy in California, including the costs and benefits of implementing the technology across the state's coastline.

The California Energy Commission will work with various state agencies and stakeholders to identify suitable locations for wave energy and tidal energy projects in both Californian and federal waters. This comes after California's State Legislature set 2045 as its target for a 100 percent renewable and zero-carbon power grid, with its first benchmark target being 90 percent by 2035. As of 2022, net zero carbon and renewable energy made up 54.23 percent of California's total energy supply.

The primary sponsor of SB 605 is AltaSea at the Port of Los Angeles, a 35-acre ocean technology campus. AltaSea will soon be home to Eco Wave Power's first US pilot station—believed to be the first onshore wave energy station in the United States. This pilot station comes after Eco Wave Power has officially connected its EWP-EDF One power station at the Port of Jaffa in Israel to the country's energy grid. Eco Wave Power will soon officially "flip the switch" to commence operations at its landmark station.

"California leads the way on climate initiatives, and SB 605 further demonstrates the state's leadership across the world," said Eco

Wave Power Founder & CEO Inna Braverman. "We believe that wave energy has massive potential, and we will soon be demonstrating our pioneering technology at the Port of Los Angeles and showcasing that wave energy can be a significant force in combating climate change and powering our communities with clean, reliable energy sourced from the endless power of the ocean."



» Inna Braverman, Terry Tamminen, and Arnold Schwarzenegger visiting Eco Wave Power's wave energy array at AltaSea in the Port of LA. (Image credit: Eco Wave Power)

# NEW SENSOR TECHNOLOGY FOR REMOTE SPILL MONITORING

A new partnership between PhotonTec and LDI Innovation will provide North American customers access to LDI Innovation's patented LED-based fluorometric oil and fuel sensing technology and regional customer and technical support through PhotonTec, located in Atlanta, Georgia.

"The customers we work with have increasingly demanding needs for real-time detection of oil and fuel spills on water and land where conventional sensors are often ineffective," said Juha Saily, Business Development Manager for PhotonTec. "Our new sensors outperform competitors in virtually every category providing higher reliability and sensitivity with no false alarms, longest available sensor-to-surface scan range, and detection of all types of hydrocarbons from very light to heavy oils including jet fuels and gasoline. They also install and work in the most challenging environments such

as rough waters with high waves, areas with large tidal variations, explosive atmospheres, and many battery and solar-powered applications."

The new BlueHawk™ and TinyHawk™ fluorosensors can be used in various environments such as ports, airports, marinas, terminals, tank farms, industrial facilities, vessels, oil rigs, refineries, military installations, water intakes, waterways, and all water bodies.

Advanced and distinctive capabilities include: Unique patented coaxial optical design; Industry-leading extra-long sensing distance range (33+ ft/10+ meters) and widest scan/installation angle range (up to  $\pm 45$  degrees from vertical); UV-A/UV-B ultraviolet wavelength bands; Highest available scan rates (up to 10 Hz); Smallest size, lightest weight, lowest power con-

sumption and highest NEMA (IP) rating on the market (NEMA 6P/IP68); and remote access for sensor configuration.

Options include ATEX certified enclosures for explosive environments; wired or wireless alarms; standalone or networked operation; and Chlorophyll-a detection in algae.



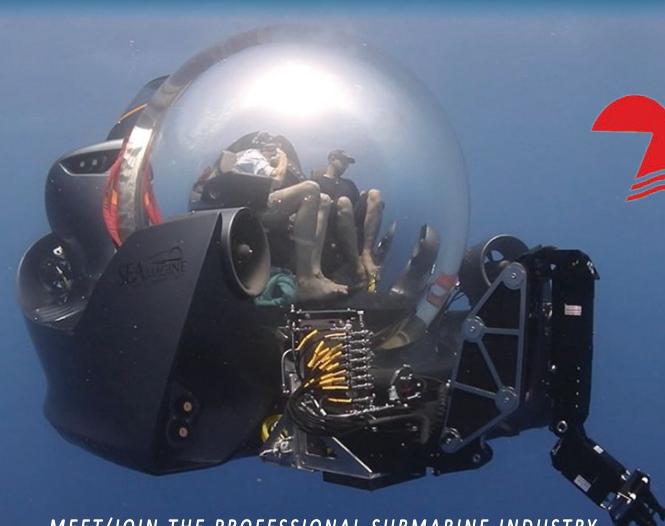
» The new fluorosensors can be used in various environments and all water bodies.  
(Image credit: PhotoTec)

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## PART 2

# REACH ROBOTICS MANIPULATORS CONDUCT CLEANING AND CP MEASUREMENTS



If you read the last edition of ON&T (September, 2023), you may have read about DSMC's (Diving Survey and Marine Contracting) success with a sensor removal project using Reach Robotics manipulators.

Following the flawless retrieval of this telemetry equipment, we realized there were a lot more subsea tasks that we could execute with Reach Robotics technology. Another client asked if we could investigate alternative methods to take CP readings from calcite-covered riser pipes in 30 m of water. This is a mission we would normally undertake annually, with divers. The pipelines have an impressed current system which causes a hard calcite shell to form. A diver is normally required to remove the calcite exterior with a chipping hammer.

## DIVER-LESS SOLUTION

Aiming for a compact ROV solution, we purchased a Reach Bravo-3 with Stainless Steel 'Mega' jaws that looked like the perfect tool to grasp the riser pipes. We also selected several tools to trial removing the hard calcite: an electric rotary brush, a pneumatic needle gun and some serrated

teeth for bolting to the jaws of the 1kN grip-force, Bravo-3 manipulator.

We fabricated a mounting bracket that connected to the Bravo-5's Payload Interface accessory. The primary plan was for the Bravo-3 to grip the riser pipe, stabilizing the ROV in the tide, while the Bravo-5 cleaned the calcite off a localized area and captured CP readings without requiring tool changes.

## GAME-CHANGING RESULTS

The result of the trial was surprising. Rather than removing the calcite, the rotary wire-brush polished it to a smooth finish. Next, we trialed the pneumatic needle gun, but it couldn't achieve the required pressure to operate properly. Finally, the serrated teeth on the 'Mega' jaws combined with the Bravo's high grip force worked fantastically to crack and scratch the calcite shell off to expose clean steel.

Having established a successful cleaning method, we removed the calcite and took readings from all eight risers in one tidal window. We are extremely impressed by the result, especially with this class of ROV being enabled to provide such a solution. The Reach Bravo manipulator has fundamentally changed how we operate and the future of our work.

## REACH BRAVO HUB

With our Reach Robotics tooling increasing, we purchased the Bravo Hub to allow us to easily power, add, and remove items with minimal reconfiguration time. Our Saab Seaeye Falcon is limited to one ethernet port on the multiplexer and very little space in the VJB to accommodate additional devices.

The Bravo Hub contains a subsea switch allowing us to run multiple ethernet devices on the machine simultaneously.



» Successful solution: Removing calcite with Bravo-3 and capturing CP readings with Bravo-5. (Image credit: DSMC)



» The Falcon ROV with Reach Robotics manipulators ready for trials.  
(Image credit: DSMC)

We also own a Hydro-300 photogrammetry system for underwater 3D modeling requiring gigabit speed, and a 24V 'Orphie' low-visibility IP camera. The team at Reach Robotics made some custom modifications to our Bravo Hub, increasing the speed of the switch to Gigabit and giving us both 24V and 48V outputs; this sort of collaboration has certainly set Reach Robotics apart as a supplier.

With the Bravo Hub and tooling skid we now run our Blueview sonar, Orphie camera, Hydro-300 Photogrammetry camera, the Bravo-3, Bravo-5, and its accompanying IP wrist camera simultaneously up to gigabit speed.

To learn more about Reach Robotics, visit: [www.reachrobotics.com](http://www.reachrobotics.com).

For more information about DSMC, visit: [www.dsmc.uk](http://www.dsmc.uk).

# PRINCIPLE POWER LAUNCHES PONTOON-BASED WINDFLOAT F

Principle Power has expanded its WindFloat® product portfolio to two fully industrialized products: the existing WindFloat tubular design—now called WindFloat T—and the new flat panel, pontoon-based solution, known as the WindFloat F.

Leveraging 12 years of operational experience, both WindFloat products are market ready, suitable for the next generation of offshore wind turbines, and will play an integral role in the company's wider industrialization vision for floating wind.

"This is a major milestone in the history of Principle Power. We have taken the bankable, proven, and reliable WindFloat tubular design and leveraged many of its characteristics to develop a patented new design, the WindFloat F," said Principle Power CEO, Julian Arrillaga Costa. "Whether it's the WindFloat T or the new WindFloat F, we will work with customers to select the right WindFloat for their projects."

The launch of the WindFloat F comes as Principle Power spurs the floating wind industry toward global expansion, where GW-scale projects in diverse geographies place new demands on the supply chain, including more restrictive port infrastructure, the need for serial production, and a need for greater flexibility to incorporate local supply chains into project execution plans.

More specifically, the WindFloat F is designed for ultra-shallow wind turbine integration in ports as shallow as 9 meters. The additional buoyancy of the pontoons also minimizes column diameter and footprint, creating more options within supply chains.

Combining flat panel architecture, widely used in shipbuilding and oil and gas, with proven technology from the WindFloat T, the new design includes the same 3-column architecture and an improved hull trim system.

The WindFloat F offers project developers a standardized, robust, and simple design that allows for automated subcomponent



» WindFloat F. (Image credit: Principle Power)

manufacturing at existing Tier 1 and Tier 2 fabrication facilities.

"We've taken proven flat panel architecture, the 550 GWh WindFloat operational track record, and our state-of-the-art numerical models, and extended all of it to the WindFloat F," said Principle Power Vice President of Technology, Seth Price. "This means we can offer project developers patented products that are bankable from the beginning."

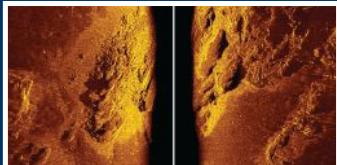
The expanding WindFloat product portfolio will play a key role in Principle Power's industrialization vision, known as "300x30"—the company's global strategy to enable the delivery of 300 floating wind turbines by 2030, propelling the industry into the gigawatt scale era.

"Taking our two WindFloat products into the '300x30' industrialization program streamlines fabrication and accelerates assembly in a way that accommodates local supply chains around the world," said Principle Power Chief Commercial Officer, Aaron Smith. "The new product portfolio, together with our industrialization strategy, is an entirely new way of thinking about efficiency and scale. It's our vision for a planet powered by floating wind."

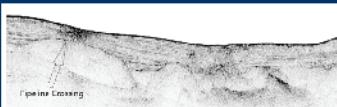
With 75 MW of capacity in operation and 30 MW currently under construction, Principle Power is the market leader in floating wind technology. The company has secured exclusivity to supply WindFloat technology to commercial-scale projects totaling 10 GW of projects under design contact and is supporting customers to deliver a multi-GW portfolio of cost-competitive floating wind projects worldwide.

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# OIL LEADS THE WAY BUT NATURAL GAS IS READY TO FOLLOW



**By G. Allen Brooks**

*Expert Offshore Energy Analyst  
& ON&T Contributor*

## CRUDE OIL

September was a good month for crude oil. WTI futures prices rose nearly 10 percent during the month, going from \$83 a barrel to \$91. But a few days before the month's end, WTI touched \$94. At the beginning of September, Saudi Arabia and Russia announced they would extend their respective one million and half a million barrels per day cuts through the end of 2023. The trading community had expected another one-month extension as these producers had been doing since summer, but it was surprised by a four-month extension.

Recently, Russia added to the market's woes by instituting an embargo on one million barrels a day of diesel fuel and 500,000 barrels a day of gasoline exports. Ostensibly, Russia's move was to help its domestic market by ensuring greater supplies to keep prices from flying up as crude oil prices soared.

Diesel is the workhorse of the global transportation industry powering heavy-duty trucks, trains, and maritime vessels. Everything we make, grow, process, and consume is touched by trucks, trains, and boats. Already, long-haul trucks moving food products to grocery stores across the nation are adding fuel surcharges to their bills to offset the high cost of diesel. We will experience greater inflation and it will be across the board.

The unified strategy of OPEC+ to constrain global oil supplies has resulted in shrinking crude oil and refined product inventories. Lower inventories are helped by Western oil company's strict adherence to capital discipline. As oil prices have climbed, the US drilling rig count has fallen. Despite being pressured to step up drilling to capitalize on high oil prices, producers understand that one twist of the valve in Saudi Arabia and oil prices could drop, turning profitable plans into losing projects.

Saudi Arabia has concentrated its production cuts on the oil that makes the most diesel fuel. Thus, they are ensuring distillate stocks will struggle to grow heading into winter when cold weather pushes up demand. Over the past two years, the refining industry has shut down or transitioned to producing sustainable aviation fuel the industry's small, unprofitable refineries. New refineries are due to start up at the end of the year and during 2024, which will boost crude oil demand next year. Expanded refinery capacity will enable petroleum product supply to grow next year, which should ease product prices but support high crude oil prices. The direction of oil prices—above \$100 a barrel, flat around \$90, or falling into the \$70s and \$80s—will depend on economic activity and winter weather. Remember, we remain a geopolitical event, supply accident, or demand shock away from a volatile move for oil prices.

## NATURAL GAS

Natural gas prices continue to strengthen as hot weather has just begun to moderate, while liquefied natural gas (LNG) exports continue to climb. We will be reaching a point soon when the air conditioning load ends, yet heating demand has not materialized. Demand slumps for a brief period. That condition could be extended if we experience another warm winter. Some weather forecasts suggest that the arrival of El Niño conditions may cause a warmer winter. However, many weather forecasts are calling for a colder and wetter winter. We have already seen early snow and cold weather. Betting with or against Mother Nature is dangerous.

» Long-haul trucks are adding fuel surcharges to their bills to offset the high cost of diesel—across the board inflation is expected because of the cost rise in logistics.





» What could the possible arrival of El Niño conditions mean for winter demand for natural gas?

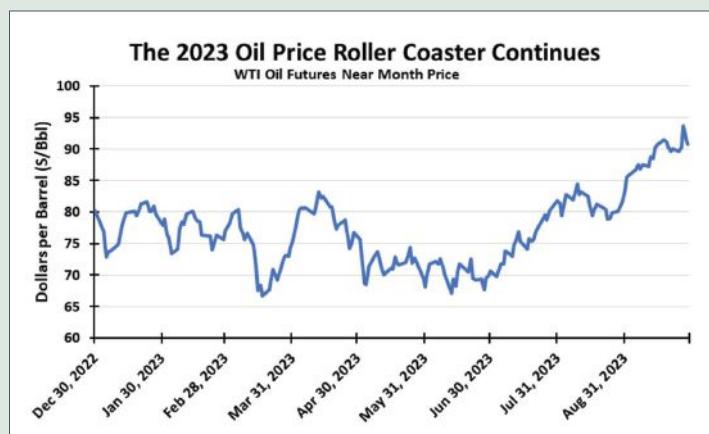
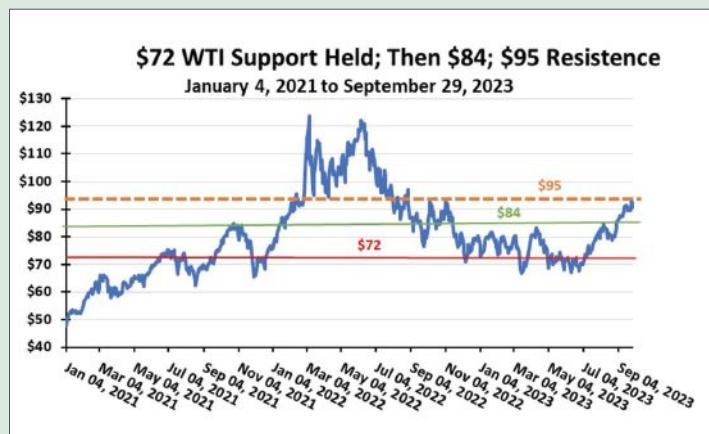
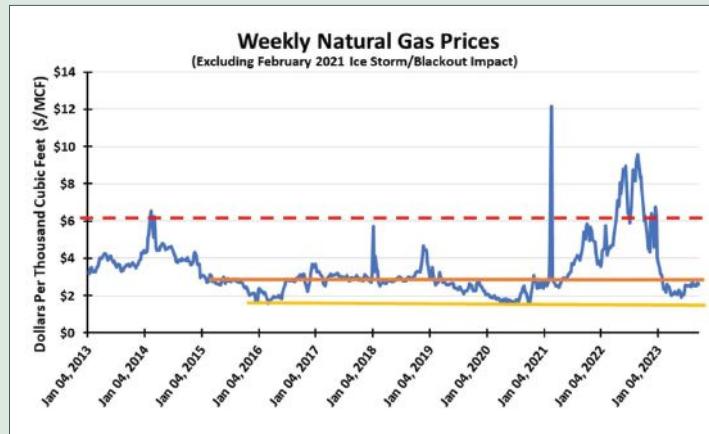
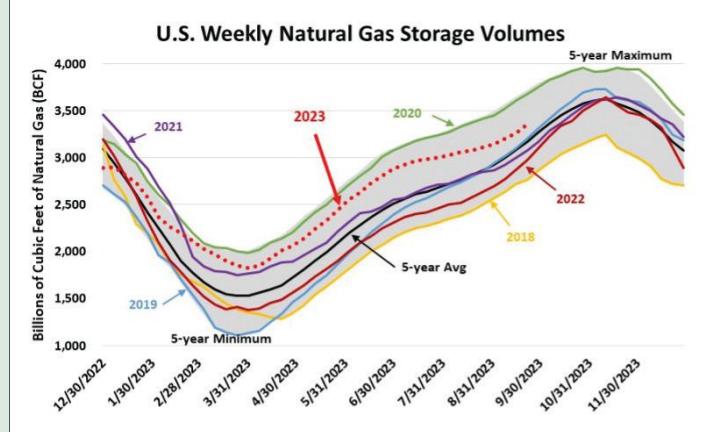
LNG is the key driver for natural gas demand and price. European gas storage is nearly full, well ahead of the start of winter. As a result, European gas prices have dropped. LNG exporters will not be making the outsized profits they did last year when they were buying \$2 gas and selling it for \$12–\$14 a thousand cubic feet to bail out Europe from its energy crisis created by the Russia/Ukraine war.

Currently, Dutch TTF gas futures prices are a fraction of what they averaged during 2022, but when winter arrives, the continent's storage is insufficient to meet the entirety of winter gas needs. Therefore, the recently constructed LNG import terminals will become busier, and one suspects the gas crossing those terminals will be higher priced than current TTF prices.

Natural gas production continues to climb as many Permian Basin oil wells become gassier. That naturally occurs when an oil well's output declines. Then high-pressure gas dissolved in the reservoir's oil is released by the lower pressure. The surge in Permian gas output is forcing the industry to build new pipelines to move produced gas either to the Gulf Coast for LNG exports or to Mexico. Additionally, more gas processing plants are being built to extract the natural gas liquids from the gas output streams to meet growing petrochemical and other uses.

While the Energy Information Administration (EIA) has trimmed its natural gas growth projection forecast for 2023 from 4.9 percent to 4.7 percent. It has doubled its 2024 growth estimate from 1.1 percent to 2.2 percent, pushing estimated daily output to a record 105 million cubic feet per day. There is little concern within the producer industry that it can meet the nation's growing gas needs.

Absent any surprise event, natural gas prices are likely rangebound until deeper into winter when traders begin focusing on what it will take to rebuild storage volumes for the 2024–2025 winter. So far, gas storage volumes are moving closer to the middle of the historical range, which has been accompanied by higher gas prices to entice more storage volumes. Expect this to be the norm for the next few weeks or possibly months before prices strengthen in early 2024.



# CHARTWELL MARINE AND VARD PARTNER TO DEVELOP OFFSHORE WIND CRAFT

Chartwell Marine has announced its partnership with VARD to introduce the Midi-SOV: a 55-meter offshore wind craft. Coming to both the US and European markets in 2024, the vessel brings a brand-new solution to the ongoing challenge of expanding wind power across the globe. The vessel is designed Jones Act Compliant, Americanized, ready for production in US Shipyards.

The Midi-SOV has been designed to prioritize stability and operability, and to be a cost-effective solution as the offshore wind industry tackles high inflation and increasing costs in its development pipeline.

Perfectly proportioned for offshore wind, the vessel incorporates a low waterplane shape that broadens above waterline, effectively minimizing and dampening roll motion. This allows the vessel to remain stable during operations, facilitating walk-to-work capabilities that were previously challenging for smaller scaled traditional SOV forms.

Workability and comfort are bolstered by a spacious superstructure, boasting a capacity of 36 single bunk cabins for SPS crew, 20 crew cabins, and extensive crew facilities, which include a gym, auditorium, meeting rooms, and spacious day rooms.

With a strong focus on energy efficiency, this vessel can be equipped with Methanol-Diesel Dual-Fuel engines, electric propulsion, and a supporting energy storage system. Its innovative design, balanced displacement, and advanced features position

the Midi-SOV as a versatile and forward-thinking solution for offshore wind, marrying crew well-being and environmental responsibility with resolutely high performance.

To prove the Midi-SOV's suitability, extensive simulation and model testing was conducted in collaboration with Seaspeed Marine Consulting.

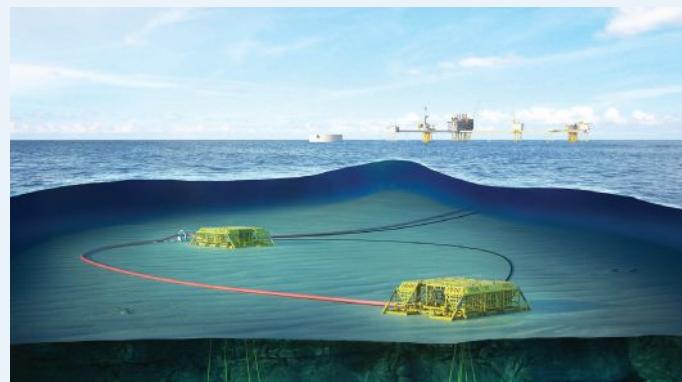
Throughout the development phase, Chartwell received invaluable support from leading marine firms, including Clarksons, North Star, Seaspeed and Voith. VARD, after conducting due diligence on the vessel design in Summer 2023, recognized its potential as a game-changing solution and committed to developing the design to market.



» Midi-SOV will be ready for production in 2024. (Image credit: VARD)

## CONOCO PHILLIPS GETS GO AHEAD FOR TOMMELITEN A FIELD IN THE NORTH SEA

Authorities have granted consent for the start-up of the Tommeliten A field in the North Sea. Operator Conoco Phillips estimates that around 24 million standard cubic meters (150 million barrels) of oil equivalent can be recovered from Tommeliten A and expects the field to come on stream by the end of October 2023. The plan for development and operation (PDO) was approved in 2022, and the discovery was made as early as 1977.



» Illustration of Tommeliten A. (Image credit: Conoco Phillips)

The field, which mainly contains gas and condensate, is located in production license 044. It is a transboundary field, with a marginal share on the UK shelf. Tommeliten A is a development with two subsea templates, with enough space to accommodate a total of twelve wells. The wellstream will be routed to the Ekofisk field for further processing and export. The gas will be exported to Emden in Germany, while oil and wet gas will be routed via pipeline to Teesside in the UK.

Tommeliten A will include eleven development wells, seven of which will be completed as of start-up. The operator expects to complete the four remaining wells during the first quarter of 2024. The twelfth well slot will be reserved as a potential future replacement well.

"The Tommeliten A development is a good example of sound utilization of existing infrastructure in the area," said Tomas Mørch, Assistant Director of License Management in the Norwegian Petroleum Directorate. "It's gratifying to see that an older discovery from 1977 has now been matured into a profitable and robust field development that's ready to come on stream. It's also gratifying that the project has been completed ahead of schedule and within the cost framework."

# ENCOMARA UNVEILS NEW SOLUTIONS TO ADVANCE FLOATING OFFSHORE WIND

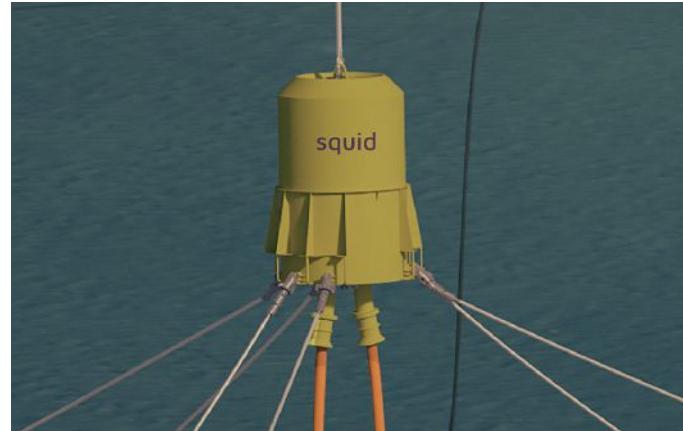
Encomara, a visionary newcomer to the global renewables sector, is poised for rapid growth following the launch of its ground-breaking solutions for floating offshore wind installation.

The Scottish firm's unique approach and patented turbine installation technology introduces a new era of full life-cycle efficiency, safety, sustainability, and reliability to floating offshore wind operations globally, irrespective of water depth.

Its pioneering Strategic Wind InFrasTructure (SWIFT) system integrates new and established technologies in a holistic and life-cycle cost approach for floating wind which significantly reduces the levelized cost of electricity.

Significant R&D investment has resulted in the company's first patented product, SQUID; a quick connector for power cables, mooring lines and anchor interfaces, which provides a rapid and simplified 'plug-to-power' capability.

It allows for the pre-installation and pre-commissioning of all marine hardware, reducing cost and risk by enabling rapid deployment of multiple Floating Offshore Wind Turbines (FOWTs) in higher sea states and in extended weather windows.



» SQUID is an integrated connect and disconnect system for FOWT moorings and power cables. (Image credit: Encomara)

Additionally, by enabling a viable 'tow-to-port' methodology, SQUID delivers similar cost and duration reductions during the operational, re-power and decommissioning phases.

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# ENHANCING MARINE ENVIRONMENTAL MONITORING IN THE US GULF OF MEXICO: A SHARED EQUIPMENT PROGRAM FOR THE OFFSHORE OIL AND GAS INDUSTRY



**Dr. Jodi Harney**  
Vice President, Energy



**A**s scientists and operations specialists working on offshore energy projects, we recognize the importance of the US Gulf of Mexico (GOM) from environmental, social, and economic perspectives. According to the Bureau of Ocean Energy Management (BOEM), the offshore oil and gas industry in the US GOM generates 97% of Outer Continental Shelf (OCS) oil and gas production in the US.

Average daily GOM production of crude oil alone in recent years has been 1.5–2.0 million barrels per day, accounting for 15% of total US crude oil production (Energy Information Administration, 2023). According to a report published by BOEM in September 2021, 4.65 billion barrels of oil and 6.1 trillion cubic feet of gas remain discoverable, recoverable, and commercially viable. The long-term role for the offshore oil and gas industry in the US GOM is evident.

Beyond energy supplies, coastal and marine environments of the GOM are vitally important, supporting populations of marine mammals, turtles, birds, fish, and pelagic and benthic organisms from the shoreline

to the deep ocean. Thousands of residents and businesses rely on the GOM's ecosystem services for tourism, fisheries, marine resources, and more. Thus, future ambitions to build, maintain, and decommission a growing network of interdependent subsea structures for offshore oil, gas, and wind projects hinge on multi-stakeholder commitments to proactively plan and monitor responsible and sustainable exploration and production activities.

## MARINE SAMPLING & MONITORING

Offshore operators in the GOM have policies and procedures for environmental stewardship and regulatory compliance. These operating practices include conducting Environmental Impact Assessments during early project planning, sampling and monitoring of permitted effluents, and planning for rapid response in the event of an accidental discharge.

The ability to view and analyze environmental information in real time is crucial to timely and data-led decision-making. The successful execution of sampling campaigns relies on the interplay of three

fundamental components: 1) a toolkit of the latest technologies and instrumentation to collect and process essential environmental data; 2) extensive in-the-field working knowledge of the target survey site; 3) proven scientific subject matter expertise to not only interpret the data but also provide a series of recommendations and future considerations to mitigate potential harmful impacts from the marine environment.

"SECURING QUICK ACCESS TO THE APPROPRIATE EQUIPMENT AND SPECIALIST SERVICES TO EFFICIENTLY AND SYSTEMATICALLY RESPOND TO THESE NEEDS FOLLOWING AN OIL SPILL IS ONE OF THE KEY CHALLENGES FOR GOM OPERATORS."



» The LISST-Holo2 is one instrument being used to examine the size distribution and origin of suspended droplets and particles in the marine environment. (Image credit: Sequoia)

These are the fundamentals around which CSA Ocean Sciences Inc. (CSA) was established in 1970. For more than five decades, CSA has worked with offshore energy developers and government agencies in the GOM to establish a programmatic approach to multidisciplinary marine survey projects to better understand baseline marine environmental characteristics, identify spilled contaminants, and assess damage following an accidental discharge.



» The SME program's DNV- and ABS-rated Control Van and command center. (Image credit: CSA)

## SURFACE MONITORING EQUIPMENT

Securing access to the appropriate equipment and specialized services to efficiently and systematically respond to these needs following an oil spill is one of the key challenges for GOM operators. Too often, sampling equipment is not purpose-built, readily available, or rugged enough for the marine environment, or its improperly maintained.

A reliable and robust response toolkit requires the integration of instrumentation, software, communication systems, and launch and recovery systems well in advance of an actual incident. If the correct equipment for the job needs to be sourced from disparate suppliers at short notice, the assurances of availability, maintenance history, and general suitability are in question.

One obvious solution is to pool resources—sharing maintained and tested, customized environmental sampling equipment which allows teams to take a more proactive approach to assembling the right tools for the right response in advance of an incident. Pooling resources allows the costs to be evenly distributed among dozens of companies. Further, in the event of an accidental discharge or spill, shared equipment that is containerized, set aside, and response-ready facilitates a rapid and concerted deployment. Deepwater operators in the GOM already share monitoring equipment designed for responding to a subsea blowout in deep water through industry consortia like HWCG and Marine Well Containment Company.

A team of marine scientists and field operations experts from CSA recently joined forces with HWCG to design and build a Surface Monitoring Equipment (SME) program to supplement the deepwater

monitoring equipment, to respond to new regulatory requirements, and to offer other operators on the OCS the opportunity to have access to specialized environmental equipment and services.

When responding to oil discharges, as governed by the US Code of Federal Regulations (CFR) Title 40, Part 300: National Oil and Hazardous Substances Pollution Contingency Plan, Subpart J (40 CFR 300.913), the use of surface dispersants for more than 96 hours or in response to a discharge of more than 100,000 gallons in 24 hours, calls for the collection of water samples and data near the ocean surface, including droplet size, temperature, salinity, dissolved oxygen, methane, pH, and in-situ fluorescence.

The SME program, built by CSA with support from HWCG, allows the instrumentation to be deployed on a towed sled or in vertical cast mode. An Okeanus LARS (Launch and Recovery System) with a winch, skid-mounted A-frame, and custom cable for power and real-time communications was selected for safe and reliable deck handling. The equipment package also includes a custom Control Van certified by Det Norske Veritas and the American Bureaus of Shipping which serves as a climate-controlled workspace during both onshore standby and offshore deployment.

The selection of individual elements of the SME toolkit—both hardware and software—was based not only on the regulatory requirements and the US Coast Guard's Special Monitoring of Applied

Response Technologies (SMART) Protocol but also on CSA's vast experience with the integration and deployment of commercial marine sampling and monitoring equipment in challenging offshore environments. The SME program is now operational, and HWCG and CSA are offering participation in all offshore infrastructure projects in the GOM to improve accessibility to crucial environmental monitoring assets.

## LOOKING TO THE FUTURE

Beyond enabling quick and cost-effective access to sampling and monitoring equipment, the SME program will help customers update their specific Oil Spill Response Plans; provide them with access to scientific and operational support; allow participants to run surface ocean monitoring and deepwater monitoring equipment simultaneously, on different vessels, for a maximum tactical response in the event of a significant oil spill; and improve the likelihood that dispersant use can be authorized and implemented rapidly, ultimately reducing potential impacts to the environment and to human health and safety by reducing oil on the sea surface and oil coming ashore.

Perhaps more than anything, as the global energy industry seeks to make offshore exploration and production safer and more sustainable, initiatives such as this—which encourage shared learning and collective intervention—will further promote cross-sector guardianship of the GOM.

For more information about CSA Ocean Sciences, visit: [www.csaocean.com](http://www.csaocean.com).



» An Okeanus LARS was selected for all deck handling requirements. (Image credit: Okeanus)

# VOYIS' DISCOVERY CAMERA TO BE INTEGRATED WITH DEEP TREKKER'S REVOLUTION ROV



» REVOLUTION ROV equipped with Discovery Cameras is a complete package for underwater inspection. (Image credit: Voyis/Deep Trekker)

Voyis and Deep Trekker have joined forces to achieve an exceptional integration: the successful fusion of Voyis' cutting-edge Discovery camera with Deep Trekker's REVOLUTION ROV. This landmark collaboration showcases the prowess of Canadian innovation and ingenuity, propelling the field of underwater surveys and inspections into an unprecedented era of advancement.

Deep Trekker's REVOLUTION ROV is designed to conquer the most unforgiving aquatic conditions and boasts unparalleled stability and maneuverability. With a unique rotating head facilitating optimal positioning of attachments such as imaging sonar and grabbers, the REVOLUTION ROV is capable of descending to depths of up to 305 meters. The ROV employs six powerful thrusters for precise control in both vertical and lateral movements, even in challenging currents. This adaptable thruster configuration not only ensures stability but also fine-tuned adjustments during inspections and surveys. Its rugged construction, featuring a carbon fiber shell, anodized aluminum, stainless steel body, and sapphire lens cover, underscores its durability and reliability.

Voyis' Discovery Cameras, enhanced by the Nova Mini Lights, bring a new dimension to underwater exploration. These cutting-edge cameras capture 4K video with minimal latency while simultaneously generating high-resolution still images and IMU data. The resulting assets can be processed through edge computing to produce intricate 3D models. These capabilities find applications in intelligent ROV piloting and comprehensive inspections. The cameras produce clear stills suitable for advanced machine vision and 3D modeling, complemented by real-time image enhancement, an ultra-wide field of view (130°x130°), and distortion correction for comprehensive situational awareness. Designed with compactness in mind and incorporating integrated lights, along with DDS data architecture and ROS2 support, the cameras streamline vehicle integration, particularly for autonomy-driven applications.

The collaboration between Voyis and Deep Trekker was tested and proven successful during trials in Tobermory, Ontario. Both teams worked together to achieve this success and test the ROV capabilities for piloting and inspection, with the Discovery Camera.

"We are excited to achieve this successful integration with Deep Trekker's REVOLUTION ROV, representing a significant stride in Canadian technology collaboration," said Chris Gilson, CEO at Voyis. "Together, we are pushing the limits of imaging technology and creating solutions that empower professionals to navigate and explore the underwater world with unmatched clarity."

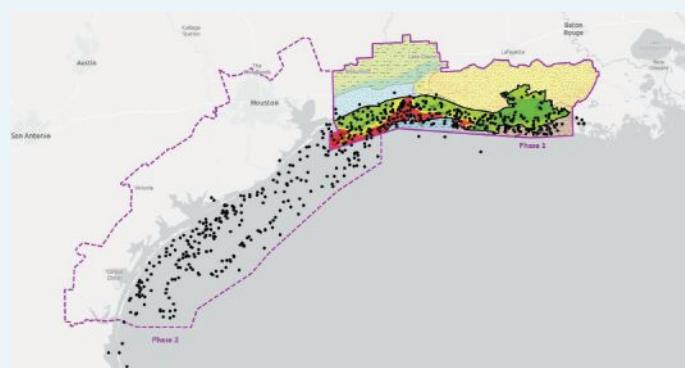
Sam Macdonald, Managing Director at Deep Trekker, added: "The seamless integration of Voyis' Discovery camera with our REVOLUTION ROV signifies a new chapter in underwater exploration. This harmonious blend of leading-edge technologies will reshape how professionals navigate and inspect underwater environments."

## CGG RELEASES CARBON STORAGE STUDY FOR THE GULF OF MEXICO

CGG has announced the delivery of the eastern phase of its GeoVerse™ Carbon Storage Gulf of Mexico Study and commencement of the westward extension of the study. Both phases of the project, supported by industry funding, are available for license now with final products for the westward expansion phase available in Q1, 2024.

These studies provide an accurate, unique, and independent map-based assessment of carbon storage opportunities coupled with a desktop-ready well database and web-based visualization dashboards for informed and rapid decision making.

Dechun Lin, EVP Earth Data, CGG, said: "CGG continues to expand its GeoVerse portfolio of expert-driven and data-rich screening studies. This newly released study that spans the Texas and Louisiana gulf coast provides critical subsurface information to accelerate exploration for suitable carbon storage sites in this promising region."



» A snapshot of GeoVerse Carbon Storage Gulf of Mexico database coverage and single-factor screening map sample for one of the plays covered in the study area. (Image credit: CGG Earth Data)

# DEEPOCEAN SUCCESSFULLY COMPLETES DUNLIN ALPHA DECOMMISSIONING PROJECT

DeepOcean has successfully completed a significant decommissioning project on Fairfield Energy's Dunlin Alpha platform on the UK continental shelf.

As part of its scope, subsea specialist DeepOcean removed 6 sub-sea conductors and 4 vertical supports at varying water depths and removed the upper conductor guideframes with an estimated weight of 400 tonnes, together with the design and installation of bespoke clamps.

The entire project was completed within 12–16 weeks from contract award to offshore execution. DeepOcean's expedited engineering solutions ensured a safe project with zero lost time incidents (LTIs), to the satisfaction of Fairfield Energy.



» The recovery of subsea infrastructure was complete within 12–16 weeks from aboard CSV Edda Freya. (Image credits: DeepOcean)

DeepOcean's robust engineering, tooling, rigging design, engineered contingency options and spares packages, allowed DeepOcean to ensure weather downtime on the project was negligible throughout. This provided Fairfield Energy with necessary comfort that the scope would be completed within the summer of 2023, thereby avoiding the risk of loose conductors experiencing another winter period in field.

DeepOcean's Aberdeen office was responsible for engineering and project management, with support from the company's Haugesund and Stavanger offices in Norway. The offshore work was conducted from the hybrid-battery powered CSV *Edda Freya*.

Key subcontractors who assisted in delivering the scope of work include Claxton, Machtech and Global Energy Group.

The Dunlin Alpha installation, located approximately 137 km northeast of Shetland and in a water depth of 151 m, produced its first oil in 1978. In the 37 years that followed, more than 522 MMbbl of oil were recovered from the Greater Dunlin Area, comprising the Dunlin, Dunlin S/W, Osprey and Merlin fields. Fairfield Energy acquired the assets in 2008 and took over full operatorship in 2014, maximizing production during its late-life stage and then progressing its subsequent decommissioning programs.

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# CHECK THE TECH

## INNOVATE CANADA 2023: CANADA'S GROWING OCEAN SECTOR



» Cailin Burnmaster breaks down Open Ocean Robotics XploreView™ data portal. (Image credit: Ben Johnson)



» SEAMORE Marine's President Robin Li and CEO Inja Ma with an ROV. (Image credit: Ben Johnson)



**T**he number of Canadian ocean technology startup companies has increased by 70%—a firm representation and outcome of Canada's ongoing investment in a burgeoning Blue Economy. With borders on both the Atlantic and Pacific Oceans, Canada's Ocean Sector has leveraged its coast-to-coast strengths to bring about advancements in ocean robotics, alternative energy technology, artificial intelligence, and more.

Innovate Canada 2023 – Oceans united global industry leaders in Victoria, British Columbia from September 11 to 14, 2023 to showcase Canada's unique tech-inspired marine and ocean business ecosystem and the various systems and solutions being brought to market by its entrepreneurial leadership. ON&T's editorial team was delighted to participate in this year's event and here, in this exclusive *Check the Tech* showpiece, spotlights some the innovative technologies, tools, and thinking at the foundation of Canada's prosperous ocean sector.

### THE HARDWARE

**SEAMORE Marine** manufactures and produces observation-class remotely operated vehicles (ROVs). This ocean tech company is expanding the operational limits of work and exploration into some of the ocean's most complex and challenging regions. Catering for a broadening range of applications, from subsea monitoring and intervention tasks to search and rescue missions, SEAMORE Marine's ROVs provide a reliable and versatile platform to carry out offshore and nearshore operations.

Founded in 2018, **Open Ocean Robotics** blazed a trail from row-boats to robotics. As the first uncrewed surface vehicle (USV) company in Canada, Open Ocean Robotics operates both as a USV manufacturer and a data-as-a-service provider. The robotics innovator's signature self-righting hull has proven successful among operators from the defense and ocean observation industries. The company is planning further expansion of its USV portfolio to include a next generation self-righting wing design and upgrades to thermal imagery.

Trusted autonomy. That's what **Cellula Robotics** delivers with their turnkey subsea robotic systems. With a team of highly skilled engineers, Cellula is developing uncrewed solutions with newfound defense applications. Some of the world's most formidable environments exist in the polar, remote regions of the world's oceans. New uncrewed developments by Cellula are breaking down barriers beneath the ice and are improving the community's knowledge of real-world, subsea operating conditions.

» *Ocean Diagnostics' Ascension eDNA Sampler is supported by scientific laboratory analysis. (Image credit: Ben Johnson)*

## GENERATING THE DATA

The new age use of environmental DNA (eDNA) for biodiversity survey and environmental impact assessments has driven a need for viable and efficient eDNA sampling solutions. **Ocean Diagnostics**, an ocean science sensor and sampling developer, has designed technology for sampling microplastics and eDNA. Through additional scientific laboratory analysis services, Ocean Diagnostics offers a unique and novel solution for researchers, industry scientists, and decision makers.

With over 50 years of experience in the development, deployment, and maintenance of offshore systems, **AXYS Technologies Inc.** offers an extensive product line for ocean monitoring and observation. With applications in coastal development, MetOcean observing, and oil and gas monitoring, AXYS provides accurate, reliable, and complete ocean data measurements solutions.

An expert in the measurement of turbulent flow, **Rockland Scientific Inc.** offers a wide array of products including profiling, modular, and moored systems. With sensor and software solutions for the oceanographic community, Rockland Scientific prides itself on assisting and consulting on measurement campaigns, experimental instrumentation, and data collection and processing.

## OCEAN SIMULATION

Ocean and coastal environments are quick changing and temperamental regions. **DSA Ocean** provides consulting services focused on moorings, anchoring, hydrodynamics, and more. From aquaculture to defense to offshore infrastructure and more, DSA Ocean software systems allow for the simulation and consideration of marine variables like wind, waves, and currents.

## DATA PROCESSING

The influx of marine data generated by marine operations allows for better forecasting, monitoring, and data-backed decision making, but it isn't without its challenges. Data ingestion and analysis can be complicated when the coming from multiple sources. **BRNKL**, an IoT hub, provides a solution for data collection and capture. This system provides an innovative solution to quickly and efficiently analyze incoming data that is foundational to making quick intervention.

## CREATING MARKET VALUE

Partnered with coastal First Nations, **Cascadia Seaweed** is committed to building a profitable and scalable business centered around the cultivation of seaweed. Cascadia Seaweed sees a world where there is value market for seaweed for whole food, animal and livestock feed, pharmaceuticals, and more. Through this new venture business global and local solutions are presented for mitigating climate change, increasing food production, and improving ocean habitats.

» Top: Open Ocean Robotics' hull design make the USV capable of self-righting. Bottom: Ocean Diagnostics' microplastics imaging system, Saturna. (Image credits: Ben Johnson)



# TECHNIPFMC AWARDED MAJOR CONTRACT BY EQUINOR FOR ROSEBANK DEVELOPMENT

TechnipFMC has been awarded a large integrated Engineering, Procurement, Construction, and Installation (iEPCI™) contract by Equinor for its Rosebank project, west of the Shetland Isles in the United Kingdom.

The contract covers the manufacture and installation of subsea production systems, flexible and rigid pipe, and umbilicals, as well



» TechnipFMC has collaborated with Equinor on Rosebank since the concept stage in 2019. (Image credit: TechnipFMC)

as connection to the host facility. The project will use pre-qualified equipment, which will accelerate the delivery schedule.

Jonathan Landes, President, Subsea at TechnipFMC, commented: "We have collaborated with Equinor on Rosebank since the concept stage in 2019. Using a single interface, we tied together all the work scopes, leveraging our iEPCI™ model to reduce project complexity. We are proud that our track record and proven technology have earned Equinor's confidence that we will deliver this significant project."

Umbilicals, rigid pipe, and the majority of the subsea production systems will be designed, engineered and manufactured in-country using TechnipFMC's facilities and network of trusted local suppliers, then installed by TechnipFMC. Together, these activities will contribute significantly to value and job creation across the UK, which was an important factor in Equinor's selection of the Company for this award. TechnipFMC has committed approximately \$500 million of the total award to local value creation.

## JAN DE NUL EXPANDS FLEET WITH XL CABLE-LAYING VESSEL

Jan De Nul Group has ordered an extra-large cable-laying vessel, the *Fleeming Jenkin*, at the CMHI Haimen shipyard. With an unrivaled cable-carrying capacity of 28,000 tonnes, the vessel will serve the renewable energy and subsea cable industry in installing cables over longer distances and in deeper waters. The vessel will be delivered in 2026.

Jan De Nul's offshore installation fleet will count four powerful and diverse cable-laying vessels, next to two offshore jack-up installation vessels, three floating crane installation vessels, five rock installation vessels and two multipurpose vessels.

*Fleeming Jenkin* will be equipped with three cable carousels and a large hold for fiber optic cables, capable of laying up to four cables simultaneously. Two carousels are mounted on deck, with a third below deck. The combined cable-carrying capacity amounts to 28,000 tonnes, which is double the capacity of any other cable-laying vessel on the market.

The vessel is designed to install longer and heavier cables, into ultra-deep waters up to 3,000 meters.

On the aft deck, the vessel is equipped with a chute and a cable-laying wheel. In combination with the tensioners, the chute allows installation of cables in shallow waters, while the cable-laying wheel makes installation at great depths more efficient. The tensioners enable the vessel to handle and control cable tensions up to

150 tonnes—the weight of the Statue of Liberty.

The vessel is equipped with a powerful DP2 system, enabling her to operate steadily in deep, but also in shallow waters, thanks to an additional third bow thruster.



» *Fleeming Jenkin* will be delivered in 2026. (Image credit: Jan De Nul)

# FUGRO SUPPORTS COASTAL RESILIENCE IN FLORIDA WITH NEW SEAFLOOR MAPPING CONTRACT

Fugro has been selected by the Florida Department of Environmental Protection (FDEP) to map the Atlantic coastal waters of Florida, spanning from Georgia to Miami. The contract was awarded as part of FDEP's Florida Seafloor Mapping Initiative (FSMI), a multiyear program to bolster coastal resilience in the state. Geodata developed under the FSMI will help inform critical climate adaptation strategies, including infrastructure development and maintenance, habitat mapping, environmental restoration, emergency response, coastal hazard studies and more.

While the FSMI will eventually require a mix of airborne and vessel-based mapping methodologies, Fugro's current task order is focused on bathymetry using airborne lidar technology. Data acquisition for the project is underway and will continue through autumn using the company's Rapid Airborne Multibeam Mapping System (RAMMS). The compact and lightweight system is unique in its ability to meet international accuracy and quality standards while reducing carbon emissions by up to 80% compared to legacy airborne lidar bathymetry systems.

Céline Gerson, Fugro's Group Director in the Americas and President of Fugro USA, expressed enthusiasm for the project, stating: "We understand the importance of seafloor mapping to Florida's

future and are well prepared to deliver on the state's pressing Geodata needs. As a leader in coastal resilience solutions, we offer FDEP not only cutting-edge technology, but also robust capacity and demonstrated experience to ensure any task order assigned to us will be completed safely, efficiently and sustainably."



» The scope of work includes mapping Atlantic coastal waters from Georgia to Miami. (Image credit: Fugro)

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# THE DEFINITIVE TOOLKIT TO REDEFINE GEOSCIENTIFIC FRONTIERS



**Jim Edmunds**  
Managing Director  
**Bluefield** Geoservices



**Mike Fearn**  
VP – Global Sales & Business Development  
**Bluefield** Geoservices

**A**s nations grapple with their latest net zero ambitions, questions linger about the current rate of progress of the fabled energy transition. What is clear, though, is that futureproofing the global energy mix will depend heavily on the safe and responsible exploration of offshore energy resources.

Not only does this mean prioritizing an increasingly sustainable approach to conventional offshore oil and gas E&P activities, but also seizing on new opportunities, such as those presented by relatively untapped renewable energy sources, in particular offshore wind.

Curbing CO<sub>2</sub> emissions in the short-term context of any net zero target does not, in practicality, mean eliminating them. Rather, it places a growing emphasis on adjusting

standard operating procedures to minimize the carbon footprint of planned offshore development, which includes decommissioning works. It also calls for governments and industry to rally around relatively new tech-inspired routes to carbon neutrality, such as carbon capture and storage as a decarbonization tool.

All this, beyond a long-binding sense of partnership between public and private sectors, is contingent on unprecedented levels of capital investment in the build out and maintenance of ocean-based infrastructure. Some assets will tower above the waterline (massive nacelles, power substations, etc.) while others will remain out of sight (a network of seabed pipelines and submarine cabling), but all will be needed to plug offshore energy into the shore-based national grids. Some installations will require us to go deeper still, such as emerging carbon dioxide removal (CDR) proposals that advocate for the deep-sea storage of CO<sub>2</sub> in either seafloor containment facilities or under the bedrock itself.

Notwithstanding the sociopolitical will and huge budgetary requirements needed to action change of this magnitude, there is another common denominator here that threads these ambitions: the availability of subsea geotechnical data.

Offshore assets are subject to far greater environmental lateral loads than their land-based counterparts, as well as unpredictable geohazards, so it is paramount for developers to study and scrutinize the seafloor characterization of target sites. This baseline understanding allows scientists to model how shifting environmental conditions and natural forces may accentuate an asset's volatility.



» Since 2019, Bluefield has both acquired tried-and-tested geotechnologies, like the Datem Neptune 5000 CPT pictured here, and developed a series of exclusive and proprietary systems. (Image credit: Bluefield Geoservices)

## RIGHT TOOLS FOR THE RIGHT DATA

This is why subsea geotechnical proficiency, within a multidisciplinary marine survey framework, is in such high demand right now. As nations look to harness new energy frontiers, acquiring the necessary data calls for two indispensable inputs: subsea geotechnical subject matter experts (SMEs) and the right tools for the job.

"OUR ABILITY TO RESPOND TO CLIENT NEEDS QUICKLY AND WITH COST-EFFECTIVE PROPOSALS RELIES ON US ALWAYS HAVING THE RIGHT KIT AND THE RIGHT PERSONNEL IN THE RIGHT LOCATION."

Successful seabed site investigation campaigns hinge on three fundamental aspects: first, the safe deployment of highly innovative and engineered systems to systematically collect soils data and other geospatial data; second, strict adherence to scientifically robust soil testing methods; and third, the scrutiny of seasoned in-field experts with proven experience of delivering complex projects worldwide.

These are the three pillars around which Bluefield Geoservices was founded in the UK back in 2018 when a select team of geoengineers set about disrupting the time-honored order of subsea geotechnical service providers.

The mission, as true today as it was five years ago, remains to redefine the offshore industries' geoscientific frontiers by developing and fielding best-in-class geo-

technologies that deliver gold-standard geodata.

In 2023, now with several locations established both in the UK and the US, we continue to invest in new ways to rewrite the offshore survey playbook.

The last five years have been busy, to say the least. Bluefield's approach has always been project-specific, and this has given us the opportunity to develop and field, in collaboration with key customers and strategic partners, several highly custom-

ized and proprietary systems. Further, our third-party license agreements with other subsea tech developers, such as Aratellus, have positioned Bluefield as a unique 'one-stop-shop' for cost-effective subsea geotechnical survey packages.

### SOME OF THE HEADLINE ACTS IN BLUEFIELD'S CURRENT OFFSHORE GEOTECHNICS TOOLKIT



**BOXcone** is a specialized *in situ* testing tool designed to interface with a box core sample box. BOXcone delivers precision-controlled push force and can be deployed on any box core with a removable box. The system is designed for *in situ* testing, including CPT, T-bar, ball cone penetrometer, lab vane, and plate load testing, as well as push-in sub-sampling. Other probes can also be supplied, such as thermal conductivity.



**ROVcone** delivers 1,000 kg push force for *in situ* soil testing or sampling and can be deployed in a standalone frame as a crane or an A-frame-deployed, or paired with a Work Class ROV. The ROVcone not only allows for precision positioning, but also the ability to fly the ROV to the next survey point without the need to retrieve the equipment between each test, resulting in significant operational efficiency.



**SWORD** incorporates sonic drilling technology into a sea-floor sampling tool. The drill rig is powered by a Sonic-Sample-Drill (SSD) compact rotosonic drilling drive, and fully integrated with an A.P. van den Berg (APB) *in situ* CPT testing system and NGI-designed push and piston samplers. The SWORD unit is remotely operated and deployed directly on the seabed in ocean depths up to 3,000 meters.



**ROSON 100**, manufactured by A.P. van den Berg, is CPT system rated to 3,000 meters and capable of a CPT depth of 20–30 meters. Deployable via an A-frame, over the side, or through a moon pool, the system facilitates "over the horizon" operations and, therefore, the down-manning of at-sea support and the reduction of associated carbon emissions. Bluefield also offers 100 kN conventional and ST (single-twist) units.

### RIGHT KIT, LOCATION, AND PRICE POINT

Our ability to respond to client needs quickly and with cost-effective proposals relies on us always having the right kit and the right personnel in the right location. With so much offshore energy expansion taking place on both sides of the Atlantic—especially in the North Sea and in waters off the US northeastern states—this means staying one step ahead of demand and allocating resources accordingly. To this end, in 2019, we opened an office in Providence, Rhode Island, to better serve US offshore wind interests, relocating both team members and equipment to ensure we are able to respond to a brief and mobilize rapidly.

This also coincided with the forging of several strategic alliances in the US to serve a broader range of customers operating in US waters, in particular in and around the Gulf of Mexico. In partnership with CSA Ocean Sciences, a renowned provider of marine environmental consultancy with a 50+ year track record of working with off-

shore energy, coastal infrastructure, and government customers across the globe, we opened an office in Stuart, Florida, to better formulate our combined offering of complementary marine survey services supported by pioneering technologies.

Back in the UK, in 2023, we also opened a new state-of-the-art facility near the Port of Blyth to support growing demand for

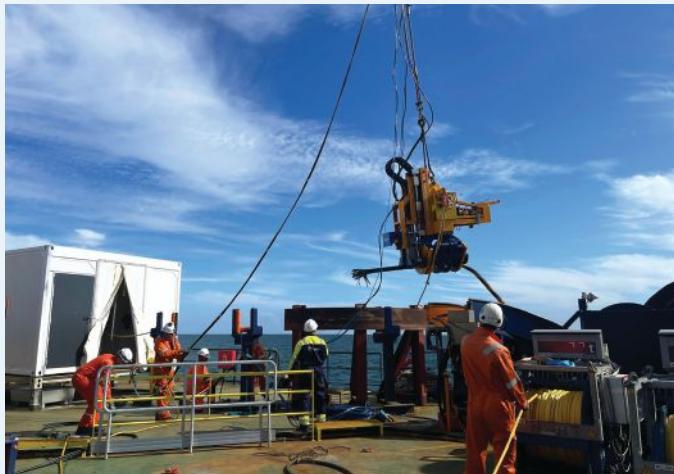
operators in the North Sea and position Bluefield Geoservices as a highly integrated and streamlined contracting solution for multidisciplinary survey, including geophysical, seafloor, and water column sampling services in both shallow and deep-water environments.

Learn more about Bluefield Geoservices: <https://bluefieldgeo.com>.



» Bluefield's new Port of Blyth location is fully equipped to support the offshore geotechnical requirements of developers in the North Sea. (Image credit: Bluefield Geoservices)

# ROTECH SUBSEA DELIVERS KEY CABLE GIG AT GERMAN OFFSHORE WIND FARM



»Rotech's patented RSG-C subsea tool was deployed to grab and cut the cable in two locations. (Image credit: Rotech Subsea)

Rotech Subsea has successfully delivered cable de-burial, cut and recovery and cable burial work for a major subsea solutions provider in the North Sea, offshore Germany.

Deploying its TRS2 jet trencher, Aberdeen headquartered Rotech Subsea completed deburial of over 600 m of damaged subsea umbilical buried at 4 m MSBL. Operating in very soft sands which backfilled quickly the TRS2 tool reached a deburial depth of 5 m+ in just one pass, positioned at 2.5–3 m above the seabed progress-

ing at 4 m/min during trenching operations.

Rotech's patented RSG-C subsea tool was deployed to grab and cut the cable in two locations, recovering the cable to deck. Survey positioning of the tool was used to locate the RSG-C tool in the correct location and the tool-mounted sonar and camera were used to confirm the cable had been successfully grabbed and latched within the cutter. The RSG-C completed the cut of the 100 mm cable in <10 minutes with the cable was recovered to deck.

Post-lay trenching operations saw the TRS2 deployed. It completed trenching in two passes—the first at 3 m/min with the second pass completed at 5 m/min. For both passes the TRS2 tool was operating at 2 m above the seabed.

Speaking about yet another European OWF scope delivered on time and on budget, Rotech Subsea Director of Subsea, Stephen Cochrane, said: "This three-part scope is typical of the offshore wind subsea cable remedial and trenching works we have become known for in Europe. We deployed our TRS2 tool for the cable trenching because its sector-leading high flow allows for very large amounts of soil to be displaced quickly."

"Though our range of non-contact CFE, Suspended Jet & Hybrid Jet Trenching tools have been in huge demand in Asia and the US recently, Europe remains a key market for us, and it was great to deliver yet another successful OWF scope for a long-term client in European waters."

## AIS AWARDED CUSTOM COATING PROJECT OFFSHORE BRAZIL IN THE SANTOS BASIN

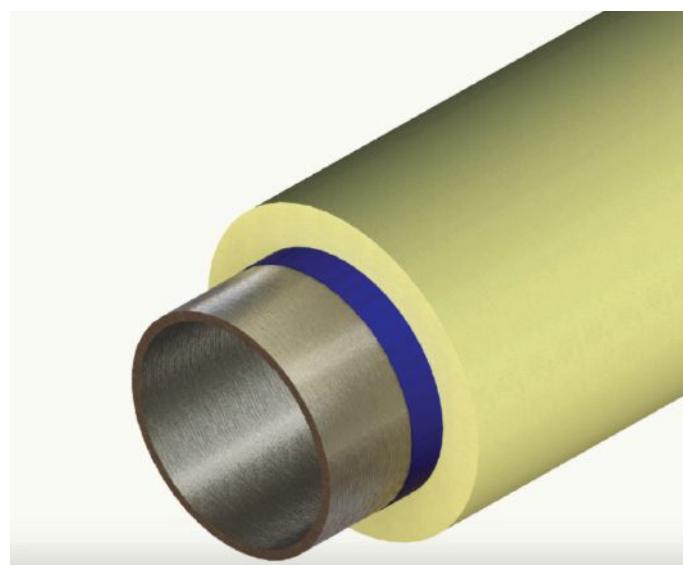
AIS has been awarded a significant offshore contract as part of a SURF development for a pre-salt field in the Santos Basin.

The provision is for ContraTherm® C25 insulation of pipeline end terminations (PLETs), inline anchors (ILAs) and jumpers. Significantly, the scope is the first custom coating project to be managed and run by a full Brazilian crew.

C25 is AIS' flexible subsea solution. It was selected due to its ability to provide flow assurance to complex subsea equipment, even in high-pressure and high-temperature environments. Water depths for this field are around 2,000 meters, making C25 an ideal solution.

Business Development Manager Guilherme Martins said: "This SURF custom coating contract is the third of this kind in Brazil and the second for the same customer. Whilst solidifying the reputation of our high quality, high performance and practical solution, this scope makes C25 even more desirable when it comes to winning similar contracts in a booming market."

Work will be completed throughout several campaigns, and the lead time is planned for May 2024.



»ContraTherm® C25 reduces the formation of hydrate plugs and wax buildups in complex subsea structures. (Image credit: AIS)

# AR GEO AND SHEARWATER GEOSERVICES TO DEVELOP SUBSEA TECH SOLUTIONS

Argeo, a global leader in robotic and digital solutions for the ocean space, and Shearwater GeoServices Holding, a global provider of geophysical marine seismic acquisition and processing services, have entered a strategic alliance for innovating and pioneering new technology and products across the subsea and marine seismic markets.

Argeo and Shearwater aim to jointly transform the subsea and ocean bottom node (OBN) seismic service sectors through the application of state-of-the-art patented technology and continuous operational excellence to accelerate efficiency gains across core markets.

The Memorandum of Agreement (MOA) covers plans to acquire the seismic vessel *SW Bell* (Ulstein SX124 X-BOW) from Shearwater for \$6 million in cash plus 20,123,625 shares in Argeo. The vessel (to be renamed) will be converted from a towed streamer seismic vessel to a full subsea Inspection, Maintenance and Repair (IMR) vessel.

Trond Figenschou Crantz, the CEO of Argeo, said: "We leverage our vessels and equipment to provide greenfield exploration, inspection and maintenance services, and comprehensive ultra-deep-water surveys at a global scale. This alliance with Shear-

water, combined with the previously announced expansion of our Hugin Superior fleet, ensures a substantial increase in capacity and our ability to drive future growth."

Irene Waage Basili, the CEO of Shearwater, added: "We are excited about teaming up with Argeo in this unique alliance between marine seismic and subsea to push the boundaries of the rapidly growing OBN market. Argeo is a strong and respected partner with unique technology and competences which will help accelerate the development of new OBN deployment vehicles and methods."



» *SW Bell*. (Image credit: Shearwater GeoServices)

## Pushing Core Data to New Depths

Bluefield's custom penetrometer system wirelessly pairs with any work class ROV to perform CPT and T-Bar testing for seabed site investigation surveys to 6,000 meters



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# A NATIONAL IMPERATIVE TO PROTECT OFFSHORE ENERGY SOURCES



**Captain George Galdorisi**  
USN – retired

For those who follow energy matters in the media, the often impassioned dialogue regarding generating energy typically breaks people into two camps. There are those who promote fossil fuel production, and those who favor green energy.

As this debate rages, what is often lost in the arguments on both sides is that regardless of the type of energy being extracted or generated, those platforms that are offshore, especially oil rigs, oil and gas pipelines, and wind farms, are incredibly vulnerable to anyone who wants to attack these sources in wartime, or just to make a political statement.

One need look no further than the suspected sabotage of Nord Stream gas pipelines that run from Russia to Europe under the Baltic Sea to understand the vulnerability of sea-based energy sources. Thus, the fossil fuel industry and the green energy industry do have one very real shared interest—the growing need to protect their offshore platforms.

While the exigencies of climate change have led to major strides in the development and fielding of renewable energy sources such as solar, wind, and others, for the foreseeable future, the world's energy needs will continue to be met primarily by oil and natural gas.

It is the offshore oil and gas industry that still provides a huge amount of the United States' energy. According to *Forbes Magazine*,



» A USV running a uncrewed survey of an offshore wind farm.  
(Image credit: Subsea Europe Services)

zine, offshore energy production has been increasing over the past decade and now stands at over two-and-one-half million barrels of oil and almost three trillion cubic feet of gas a day.

However, environmental concerns—impelled by major events such as the 2010 Deepwater Horizon disaster in the Gulf of Mexico—have served as a brake on US offshore drilling. And it is worth noting that the second largest marine oil spill in history, the Ixtoc 1 spill, also occurred in the Gulf of Mexico.

## INSPECTIONS TODAY

Addressing these environmental worries has been a challenge for the oil and gas industry. Using current technology, this is dull, dirty, and dangerous work that impedes comprehensive inspections of these production rigs. Today, platform operators depend on divers and remotely operated vehicles (ROVs) of various types to perform inspections. This methodology is good as far as it goes, but ROVs have a limited field of view, and putting divers in the water always involves substantial risk and increasingly high cost.

What is sorely needed are technology-enabled solutions that can provide faster and more thorough inspections of these enormously expensive platforms and insure against not only catastrophic disasters like Deepwater Horizon, but also more common issues like wear and tear of underwater components.

On the "green" side of the equation, offshore wind farms have seen explosive growth, and predictions of more wind farms in littoral waters point to continued growth for this industry. Several offshore wind farms are in operation now, and many more are planned. Sadly, there has been little dialogue as to how to protect these expensive assets, and like their "old" energy counterparts—oil rigs—they are, and will remain, highly vulnerable.

## USV SENSOR SUITE

Industry has proposed solutions that use unmanned surface vehicles (USVs) to perform both surface and below surface inspections by leveraging USVs that have seen extensive use in military exercises, experiments and demonstrations in both near-shore and open-ocean operations, as well as hundreds of hours of use in a number of civilian missions ranging from canal and dam hydrography, to power plant inspections, to port and harbor security.



» *T38 Devil Ray USV. (Image credit: MARTAC)*

As one example, a medium-sized USV (a Devil Ray T38) has been equipped and tested with a wide variety of surface and below-surface sensors such as the SeaFLIR-240 Gyro-stabilized High Definition EO/IR zoom camera, FLIR M364C-LR EO/thermal camera, Teledyne RESON T20 high resolution multi-beam sonar, Teledyne BlueView M900 echo-sounder and Norbit iWBMS STX multi-beam sonar, among others.

**"THE SAME USV TECHNOLOGY THAT IS POISED TO ASSIST THE OIL AND GAS AND OFFSHORE WIND FARM INDUSTRIES IS ALREADY BEING USED TO INSPECT CRITICAL INFRASTRUCTURE SUCH AS HARBORS, PORTS, INLAND WATERWAYS, DAMS, LEVEES, CANALS, BRIDGES AND OTHER INFRASTRUCTURE THAT CANNOT BE SAFELY OR EFFECTIVELY INSPECTED BY HUMANS."**

This off-the-shelf technology can be used today to effect faster and more complete inspections of offshore oil/gas platforms along with their surrounding bottom mounted pipelines, valves and sensors, as well as offshore wind farms, while dramatically decreasing the need for human divers.

Three primary missions where those responsible for oil rigs, pipelines, or offshore wind farms would utilize this USV inspection concept include:

- For surface investigation, which would include area security, external rig or offshore wind farm structure investigation and surface contact monitoring, a USV could be equipped with a Furuno DRS4D-NXT Doppler Radar and AIS, and could be equipped with a SeaFLIR 280-HDEP Multi-Spectral Surveillance System.
- For underwater imaging, a USV could employ Norbit iWBMS STX multibeam sonar, a forward-looking or side-scan sonar, or any of many other commercial-off-the-shelf underwater sensors.
- Since one of the early indicators of material failure of oil rig components involves oil and other material from the rig seeping into the surrounding water, a USV can be equipped with water-mon-

itoring sensors to include Acoustic Doppler Current Profilers (ADCPs), Current-Temperature Depth (CTD) sensors, fluorometers and others to detect changes in the water quality, or embedded petroleum products in the immediate vicinity of the rig.

Depending on the mission, operators can control a USV remotely and direct its mission manually or use the USV in an autonomous or semi-autonomous mode to search along a pre-determined course through the use of pre-programmed waypoints.

The enormous investment America's energy companies have made—and will continue to make—in offshore oil and gas rigs and offshore wind farms is one that these companies must protect against failure, sabotage, or other hazards. Current means of inspecting these rigs are slow, costly, and hazardous. Employing commercial-off-the-shelf USVs that can be rapidly reconfigured with a diverse range of sensors can enhance the ability to deliver energy to America and the world. This is not just a win-win for the energy industry, but a national security priority.



» *Commercial-off-the-shelf technology can be used for quicker and more complete inspections of offshore energy infrastructure.*

# KRAKEN ROBOTICS PARTICIPATES IN REPMUS 23 ALONGSIDE 15 NATO PARTNERS

Kraken Robotics Inc. recently participated in Exercise REPMUS 23 in Portugal. The Robotic Experimentation and Prototyping with Maritime Unmanned System (REPMUS) is focused on capability development and interoperability, and the 2023 Exercise involved 15 NATO partners, as well as Sweden and Ireland. Kraken's field support team was onsite throughout the exercise, working closely

with three NATO navy teams (the US, UK, and Netherlands) utilizing three generations of HII's REMUS unmanned underwater vehicles (UUVs), all of which were retrofitted with Kraken's Man-Portable Synthetic Aperture Sonar (MP-SAS). The UUVs included MK18 Mod 1, REMUS 100 NGR, and REMUS 300 underwater vehicles, showing the versatility of MP-SAS and its capability to be used across multiple platforms.



Kraken's MP-SAS provided ultra-high resolution real time 3 cm x 3 cm imagery, with swaths of over 200 meters (>100 meters range per side), providing operators with a significantly increased area coverage rate when compared to legacy side-scan sonars (SSS) with typical ranges of <30 meters per side.

Kraken also took part in a historic multi-national collaborative underwater vehicle mission, where the US Navy MK 18 Mod 2 conducted a Search-Classify-Map (SCM) mission including embedded Automated Target Recognition (ATR) identifying contacts of interest and using SeeByte's Neptune automatically re-tasking the Royal Navy REMUS 100 and the Netherlands Navy REMUS 100 with Kraken SAS to perform Reacquire and Identification (RI) missions.

» Kraken MP-SAS on Royal Netherlands Navy REMUS 100 heading out to REPMUS Naval Mine Warfare operating areas off Sesimbra, Portugal.  
(Image credit: Kraken Robotics)

## HII'S INGALLS SHIPBUILDING LAUNCHES BOUGAINVILLE AMPHIBIOUS ASSAULT SHIP

HII's Ingalls Shipbuilding division recently announced the successful launch of the Navy's third America-class amphibious assault ship *Bougainville* (LHA 8) from its floating dock into the Pascagoula River.

"This launch is a significant accomplishment for our entire LHA shipbuilding team, and we are honored to be building such a versatile ship for our Navy and Marine Corps partners," Ingalls Shipbuilding Amphibious Ship Program Manager Gene Miller said. "It is also a testament to the outstanding teamwork we see every day as our shipbuilders continue the critical work of preparing *Bougainville* for delivery."

*Bougainville* is the first ship in the America class to be built with a well deck. The ship will retain aviation capabilities while adding the surface assault capability of a well deck and a larger flight deck configured for F-35B Joint Strike Fighter and MV-22 Osprey aircraft. These large-deck amphibious assault ships also include top-of-the-line medical facilities with full operating suites and triage capabilities.

The America class is a multi-functional and versatile ship that is capable of operating in a high density, multi-threat environment as an integral member of an expeditionary strike group, an amphibious task force or an amphibious ready group.

Ingalls has delivered 15 large-deck amphibious ships to the US Navy. The shipyard delivered the first in the new America class of amphibious assault ships (LHA 6) in 2014. The second ship in the America class, USS *Tripoli* (LHA 7), was delivered to the US Navy in early 2020. In addition to *Bougainville*, *Fallujah* (LHA 9) is also under construction, and the company authenticated the keel during a ceremony in September 2023.



» *Bougainville* was translated from land to the company's floating dry dock using translation railcars to support the ship on September 9.  
(Image credit: HII)

# THYSSENKRUPP BEGINS PRODUCTION OF WORLD'S MOST ADVANCED CONVENTIONAL SUBS

German systems developer thyssenkrupp Marine Systems recently started production of the world's most advanced conventional submarines. These boats belong to the Type 212CD for a joint program with the Norwegian and German navies. The order, placed in July 2021, was the largest in the history of thyssenkrupp Marine Systems to date.

The ceremony to mark the start of construction took place in the presence of Boris Pistorius, Federal Minister of Defense, and Bjørn Arild Gram, Minister of Defense of Norway, at the production facilities recently opened at the Kiel shipyard.

With the 212CD program, the navies of two Northern European nations will for the first time use identical submarines in their fleets and benefit from interoperability and shared resources. The order comprises the delivery of two submarines to the German Navy and four to the Royal Norwegian Navy. Delivery of the first submarine for the Royal Norwegian Navy is expected for 2029, while delivery of the two boats for the German Navy is scheduled for 2032 and 2034.

The six Type 212CD submarines go beyond the 212A as an entirely new generation. With enhanced situational awareness capabilities, expanded networkability with allied units and a reduced signature, the new submarines not only place new demands on production

due to their imposing size, but also require state-of-the-art production lines for the fitting-out with high-tech systems.

In preparation for the order, thyssenkrupp had already initiated investments of around €250 million in 2019. The shipbuilding hall will serve as a new, state-of-the-art production facility at the Kiel shipyard site, where the submarines of the future will be built.



» The 212CD submarine is 74 m long and has a displacement (surfaced) of 2,500 m<sup>3</sup>. (Image credit: thyssenkrupp Marine Systems)

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# BAE SYSTEMS AWARDED SIGNIFICANT FUNDING FOR AUKUS SUBMARINE PROGRAM

The Ministry of Defence has awarded £3.95 billion (\$4.8 billion) of funding to BAE Systems for the next phase of the UK's next-generation nuclear-powered attack submarine program, known as SSN-AUKUS.

SSN-AUKUS will be the largest, most powerful and advanced attack submarines the Royal Navy has ever operated and will eventually replace the Astute class, which BAE Systems builds at its site in Barrow-in-Furness, Cumbria.

The funding follows the AUKUS announcement in March by the leaders of Australia, the UK, and the US. This will eventually see Australia and the UK operate SSN-AUKUS submarines, which will be based on the UK's next generation design, incorporating technology from all three nations, including cutting-edge US submarine technologies.



Having started early design work in 2021, the £3.95 billion funding will cover development work to 2028, enabling BAE Systems to move into the detailed design phase of the program and begin to procure long-lead items. Manufacture will start towards the end of the decade with the first SSN-AUKUS boat due to be delivered in the late 2030s.

The award will also fund significant infrastructure investment at BAE Systems' site in Barrow-in-Furness, investment in its supply chain and recruitment of a more than 5,000 people.

BAE Systems has already delivered five of seven Astute class submarines to the Royal Navy with the remaining two boats at advanced stages of construction. The Company is also designing and building the UK's next-generation nuclear deterrent submarines, Dreadnought, with work underway on three of the four new boats.

Delivery of the UK's submarine programs is a national endeavor between government and industry. BAE Systems' Submarines business plays a vital role in the UK economy, particularly in the northwest of England. By the end of this year, its workforce will grow to 12,500, including around 900 apprentices and graduates.

The business plans to recruit an additional 2,700 people next year, which will include a further 900 apprentices and graduates providing a significant employment boost for the region.

*» Rendering of a planned class of nuclear-powered submarine, SSN-AUKUS, under the AUKUS trilateral security partnership.  
(Image credit: BAE Systems)*

## ASV STARTUP RAISES \$55 MILLION TO SERVICE US DEFENSE MARKETS

Saronic, a naval and maritime autonomous surface vessel (ASV) technology startup, has raised \$55 Million in Series A funding led by Caffeinated Capital. Saronic was launched last year by CEO Dino Mavrookas, a former Navy SEAL, with the goal of building ASVs for the Navy and US defense markets.

Saronic referenced the need to outpace China and aims to improve the ability to produce defense ready autonomous technology at scale. Unlike traditional industrial ship builders, Saronic is uniquely positioned to produce and deliver needed ASV assets. This funding will improve research and development and expand in-house manufacturing capabilities for the scale-up in production.

Saronic's ASV portfolio currently includes two main-stay models: The Spyglass—a 6-foot vessel weighing 40 lbs and capable of speeds up to 15 kts and the Cutlass—a 13-foot vessel weighing 220 lbs and capable speeds of up to 20 kts.

With this additional raised funding, Saronic plans to push development of their third vessel named, the Corsair, which will be

designed to be capable of carrying out urgent and impactful operations. Each of the ASVs features a durable platform that is networked and can be customized with mission-specific payloads or sensors.



*» A prototype Saronic Spyglass vessel undertakes a mission in its first open water exercise with the US Navy, in the Pacific earlier this year.  
(Image credit: Saronic)*

# ZELIM TEAMS UP WITH US COAST GUARD TO TRIAL AI IN SEARCH AND RESCUE

The US Coast Guard Research and Development Center has signed a Cooperative Research and Development Agreement (CRADA) with Zelim, a start-up based in Edinburgh, Scotland, to jointly explore the potential application and effectiveness of AI-enabled detection and tracking technology in search and rescue.

Finding someone in the water is the most fundamental challenge that search and rescue (SAR) organizations face around the world.

Over the last century this task has been undertaken by SAR Units, their pilots and, more recently, drone pilots who often scan the sea surface for hours looking for an object no larger than a football, as much of the human body remains hidden below the surface.

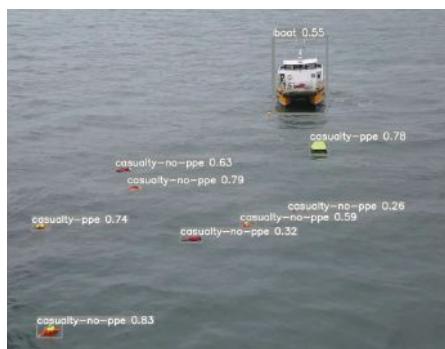
Over the last three years, Zelim has been developing ZOE, a solution that employs AI

to detect and track multiple people, boats or target objects in the water by day or night, storm, or fog. Like the driving aids that reduce driver fatigue, provide hazard alerts and timely information in cars, ZOE aids the search operator by consistently scanning the searched area looking for anomalies and providing visual and audible alerts.

The US Coast Guard has identified in its Strategic Plan that rapidly advancing technologies, including those in artificial intelligence (AI), and machine learning (ML) need to be harnessed for possible use in mission execution. The ability to detect, locate, characterize, identify, and track people or objects in the water in near or real-time has the potential to improve mission support to meet the needs of the Coast Guard today and in the foreseeable future.

The overarching objective of the CRADA is to determine methods to evaluate the

effectiveness of AI technology with unclassified optical sensors in various environmental conditions. This will require the Coast Guard and Zelim to scientifically develop an objective method for determining AI technology effectiveness compared to current accepted standards.



» Zelim ZOE detection system demo.  
(Image credit: Zelim)



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# ADVANCED NAVIGATION OPENS HIGH-TECH ROBOTICS MANUFACTURING FACILITY

Advanced Navigation has unveiled a new high-tech robotics facility for autonomous systems based at UTS Tech Lab in Botany, New South Wales (NSW), Australia.

The facility will scale up the manufacturing of Advanced Navigation's world-first AI navigation systems for GPS-denied environments, including its digital fiber-optic gyroscope (DFOG) technology, Boreas.

Advanced Navigation is one of only four companies in the world with the capability to manufacture strategic grade fiber-optic gyroscopes. This technology empowers reliable navigation for marine vessels, space missions, aerospace, defense, autonomous vehicles and flying taxis.

Advanced Navigation CEO and Co-founder Xavier Orr said: "There is a critical need to improve Australia's economic complexity and sovereign capabilities. A key step is to build our industrial capacity in high-tech, as well as drive knowledge exchange and propel collaborative initiatives between government agencies, academic institutions and industry leaders."

There is a seismic shift across the landscape of sovereign manufacturing, driven by advanced technologies like AI, automation, and precision engineering. In the context of autonomous systems, the importance of precision and reliability is non-negotiable.

Adopting a vertical integration framework, the facility houses equipment and processes for automated manufacturing utilizing machine learning. This guarantees the delivery of reliable, durable and high-quality navigation systems.

In addition to the manufacturing capability, the facility will be home to extensive research collaborations between Advanced Navigation and the University of Technology Sydney (UTS). This will expedite the commercialization of several socially impactful technologies.



» The opening ceremony of the new facility in NSW, Australia.  
(Image credits: Advanced Navigation)

## SEABED 2030 AND SEABER PARTNER TO ADVANCE OCEAN EXPLORATION

The Nippon Foundation-GEBCO Seabed 2030 Project has entered into a new partnership with SEABER, a French-based company that designs and manufactures autonomous underwater vehicles (AUVs) for research and commercial oceanographic applications.



» Vidal Texeira launching a YUCO micro-AUV.  
(Image credit: SEABER)

The two parties will work together in support of the global effort to achieve a complete map of the entire ocean floor.

Established in 2020, SEABER is the sole European company entirely dedicated to micro-AUVs capable of navigating depths of up to 300 meters and operating autonomously for eight to ten hours. The YUCO micro-AUV is designed for extensive use across the entire continental shelf and is equipped to carry various scientific instruments.

Thanks to its accessibility, user-friendly interface, and an affordable pricing strategy, the YUCO has swiftly become a favored tool within the oceanographic research community. Specifically, it serves as a complementary resource for ocean observation, extending the capabilities of traditional vessel-based manual measurements and fixed observatories with its micro-AUV technology.

This partnership brings together Seabed 2030's dedication to advancing the comprehensive mapping of the ocean, together with SEABER's technological developments and expertise in underwater exploration.

"Identifying technology gaps in bathymetric mapping and encouraging innovation in these areas is key to Seabed 2030's mission," commented Project Director Jamie McMichael-Phillips. "It's a pleasure to welcome SEABER to our growing network of partners, and their range of AUVs will no doubt be invaluable in supporting our goal as they're deployed on various missions."

"Like Seabed 2030, we believe that everyone has a part to play in this journey of ocean discovery," said Vidal Texeira, Co-founder and CEO of SEABER. "As such, we're committed to building AUVs that are more affordable and accessible, while maintaining their reliability and efficiency."

# VALEPORT CONFIRMS EXPANSION PLANS WITH EXTENSION OF UK PREMISES

Valeport, one of the UK's leading manufacturers of oceanographic and hydrographic instrumentation, is working to meet the demands of a rapidly growing global market by increasing its headcount and investing in the expansion of its south west UK-based premises, which now span over 44,000 ft<sup>2</sup> across three modern waterfront buildings.

The environmental sensors manufacturer has acquired an adjacent riverside building, which has allowed the subsea specialist to respond to the uplift in demand for its precision probes and sensors and to increase production at its modern manufacturing facility.

The new Radcliffe House will accommodate much of Valeport's office-based staff, enabling the entirety of the existing Sandquay Building to be dedicated to Valeport Water and Valeport Service.

Valeport has also added to its 100-strong workforce, by taking on new staff across its Machine Shop, Product Assembly, R&D, and Service departments, as well as investing in a number of apprentices to ensure a long term commitment to skills development to support the company's robust growth plans.

The firm has always had a strong focus on lifelong learning and career development and currently has six apprentices in training with a further ten graduated apprentices fully employed by Valeport.

Valeport's Managing Director, Matt Quartley, said: "The extension to the production facilities and additional space will enable us to support our clients across the world and ensure we continue to be at the forefront of premium, precision sensor technology. The increase in our manufacturing capacity and new staff to support our expansion plans puts us very much on the front foot."



» Members of the Valeport team outside the new Radcliffe House.  
(Image credit: Valeport)

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## AMERICAS

### Floating Wind USA 2023

San Diego, CA » November 29–30, 2023  
<https://events.reutersevents.com/renewable-energy/floating-wind-usa>

### International Workboat Show

New Orleans, LA »  
 November 29– December 1, 2023  
[www.workboatshow.com](http://www.workboatshow.com)

### Underwater Intervention

New Orleans, LA »  
 November 29– December 1, 2023  
[www.workboatshow.com/underwater-intervention](http://www.workboatshow.com/underwater-intervention)

### Floating Wind Solutions

Houston, TX » February 5–7, 2024  
<https://floatingwindsolutions.com>

### Canadian Underwater Conference & Exhibition (CUCE)

Toronto, Canada » March 24–26, 2024  
[www.underwaterconference.ca](http://www.underwaterconference.ca)

### International Offshore Wind Partnering Forum (IPF)

New Orleans, LA » April 22–25, 2024  
[www.offshorewindus.org/2024ipf](http://www.offshorewindus.org/2024ipf)

## EUROPE

### Offshore Energy

Amsterdam, NL » November 28–29, 2023  
[www.offshore-energy.biz/oeec2023](http://www.offshore-energy.biz/oeec2023)

### NCS Exploration Deep Sea Minerals

Bergen, Norway » December 5–7, 2023  
<https://events.geonova.no/event/deepseaminerals>

### Subsea Expo

Aberdeen, Scotland »  
 February 20–22, 2024  
[www.subseaexpo.com](http://www.subseaexpo.com)

### Oceanology International

London, UK » March 12–14, 2024  
[www.oceanologyinternational.com/london/en-gb.html](http://www.oceanologyinternational.com/london/en-gb.html)

### Undersea Defence Technology (UDT)

London, UK » April 9–11, 2024  
[www.udt-global.com](http://www.udt-global.com)

### Floating Wind Europe

Berlin, Germany » March 5–6, 2024  
[www.leadventgrp.com/events/4th-annual-floating-wind-europe/details](http://www.leadventgrp.com/events/4th-annual-floating-wind-europe/details)

## OTHER REGIONS

### Asia-Pacific Deep Sea Mining Summit

Singapore » December 11–12, 2023  
[www.asia.deepsea-mining-summit.com](http://www.asia.deepsea-mining-summit.com)

### SYMPOL 2023

Kerala, India » December 13–15, 2023  
<http://sympol.cusat.ac.in>

### AOG Energy

Perth, Australia » March 13–15, 2024  
<https://aogexpo.com.au/conference>

### MSEAS

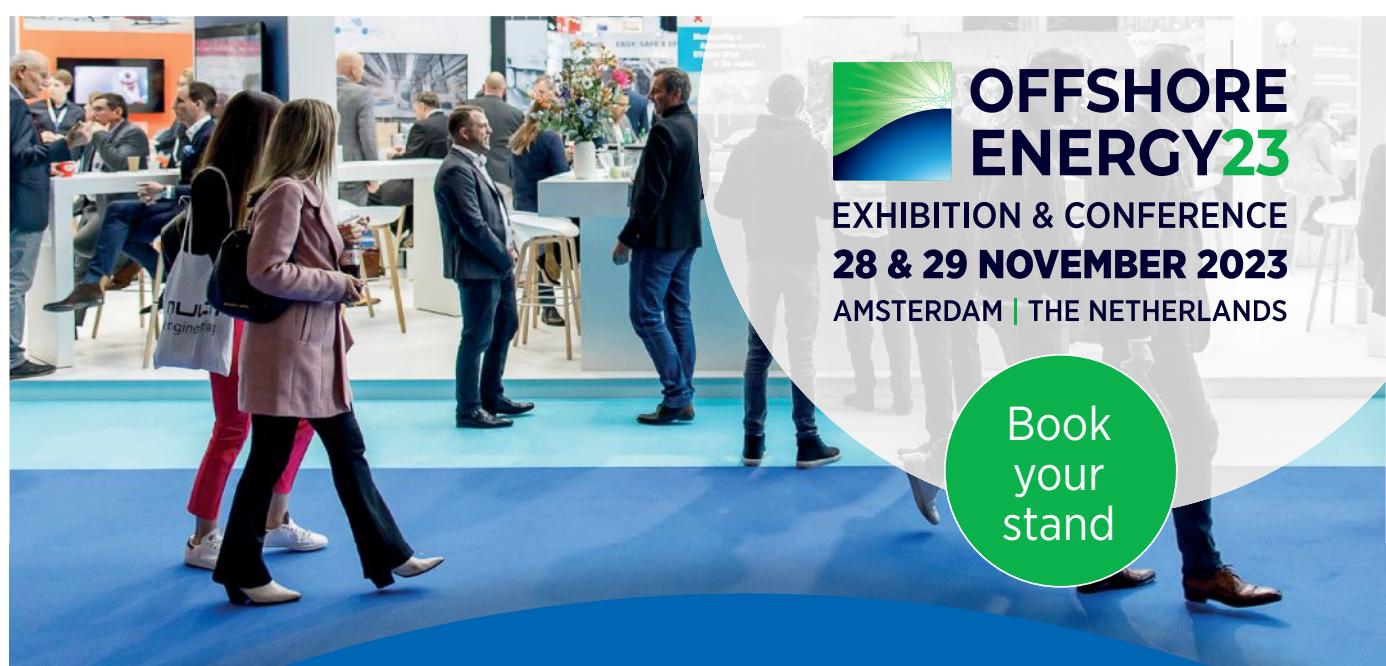
Yokohama, Japan » June 3–7, 2024  
<https://meetings.pices.int/meetings/international/2024/MSEAS/Background>

### ICOE 2024

Melbourne, Australia »  
 September 18–20, 2024  
[www.ocean-energy-systems.org/icoe/conferences/icoe-2024-melbourne/](http://www.ocean-energy-systems.org/icoe/conferences/icoe-2024-melbourne/)

### MAST Australia

Adelaide, Australia »  
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MONTH	DEADLINES	EDITORIAL FOCUS AND SHOW DISTRIBUTION	THEME FOCUS
JANUARY/ FEBRUARY	Editorial: January 17 Ad: February 2	OCEAN SENSORS & DATA MANAGEMENT • Oceanology International   March 12–14 • Canadian Underwater Conference & Exhibition (CUCE)   March 24–26	Ocean observation, multidisciplinary survey, telemetry, communications
MARCH	Editorial: February 12 Ad: March 1	NAVAL DEFENSE & SECURITY	Uncrewed systems, cyber security, marine surveillance systems
APRIL	Editorial: March 11 Ad: March 29	REMOTELY OPERATED VEHICLES (ROVs) IN FOCUS • International Partnering Forum   April 22–25	ROV development, subsea residency, deployment technologies
MAY	Editorial: April 8 Ad: April 26	OFFSHORE ENERGY DEVELOPMENT	Infrastructure development for oil and gas, renewables, subsea power
JUNE	Editorial: May 13 Ad: May 31	UNDERWATER IMAGING	Advances in geophysical survey and subsea imaging capabilities
JULY (DIGITAL ISSUE)	Editorial: June 18 Ad: June 28	UNCREWED VEHICLE BUYERS' GUIDE	<i>Special Edition</i>
AUGUST	Editorial: July 15 Ad: August 2	SUBMERSIBLES & THE DEEP SEA	Subsea vehicles, naval archaeology, bathymetric studies, geotechnics
SEPTEMBER	Editorial: August 12 Ad: August 30	REMOTE MARINE OPERATIONS	Marine autonomy, digital twins, remote monitoring and intervention
OCTOBER/ NOVEMBER	Editorial: September 9 Ad: September 27	UNCREWED VEHICLES & MARINE ROBOTICS	USV R&D, emerging applications, breakthroughs in remote ops
DECEMBER	Editorial: October 17 Ad: October 28	THE FUTURE OF OCEAN TECHNOLOGY	<i>Special Edition</i>

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# EXPRO COMPLETES ACQUISITION OF PRT OFFSHORE



» Michael Jardon,  
Expro CEO

Expro has completed its acquisition of offshore services provider PRT Offshore. PRT Offshore is based in Houston, Texas, and is the only company to provide a complete Hook-to-Hanger™ solution enabling comprehensive well completions, interventions, and decommissioning services from surface to subsea.

Its unique system is designed to allow customers to access the wellbore safely and efficiently, all while reducing personnel on board.

The acquisition will enable Expro to expand its portfolio of cost-effective, technology-enabled services and solutions within the subsea well access sector in the North and Latin America (NLA) region and accelerate the growth of PRT Offshore's surface equipment offering in the Europe and Sub-Saharan Africa (ESSA) and Asia Pacific (APAC) regions.

Michael Jardon, Expro Chief Executive Officer, said: "Our subsea well access portfolio has a well-established global footprint, espe-

cially in the ESSA and APAC regions. We believe this will offer significant growth opportunities for PRT Offshore in these attractive markets. Simultaneously, Expro plans to leverage PRT Offshore's strong position in deepwater offshore well completion and intervention across the NLA region to provide integrated solutions to our customers."

PRT Offshore President Patrick Placer added: "This agreement is an exciting development for PRT Offshore as we integrate our technology, solutions, and expertise with Expro's market-leading subsea well access portfolio."

"We are excited to continue our best-in-class responsiveness and service quality, as well as leverage the resources of a more robust platform. Our employees, vital and valued, are at the forefront of this transaction, and we are committed to fostering their growth and success in this new chapter."

"Building on the foundation we have created, this acquisition will open new opportunities for growth, innovation, and success for our company, customers, and employees."

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# OCEAN KINETICS INVESTS IN MMG OCEAN TO DRIVE MARINE ENGINEERING INNOVATION

Scottish engineering company, Ocean Kinetics, has announced a significant strategic investment in Irish marine engineering company, MMG Ocean, which will lead to an expansion of facilities and jobs at MMG Ocean and a partnership that aims to drive innovation and growth in the marine engineering sector.

Shetland-based Ocean Kinetics' 25 percent investment in the Killybegs-based company follows the two previous collaboration projects, including an innovative clean energy storage system for the aquaculture sector and the construction of marine grade metal frames for deployment in offshore wind developments.

The new partnership is also proving to be mutually beneficial with work being referred, as appropriate, across the two businesses. For example, a contract with US company LDX for specialized high quality cooling filters, which were fitted at the

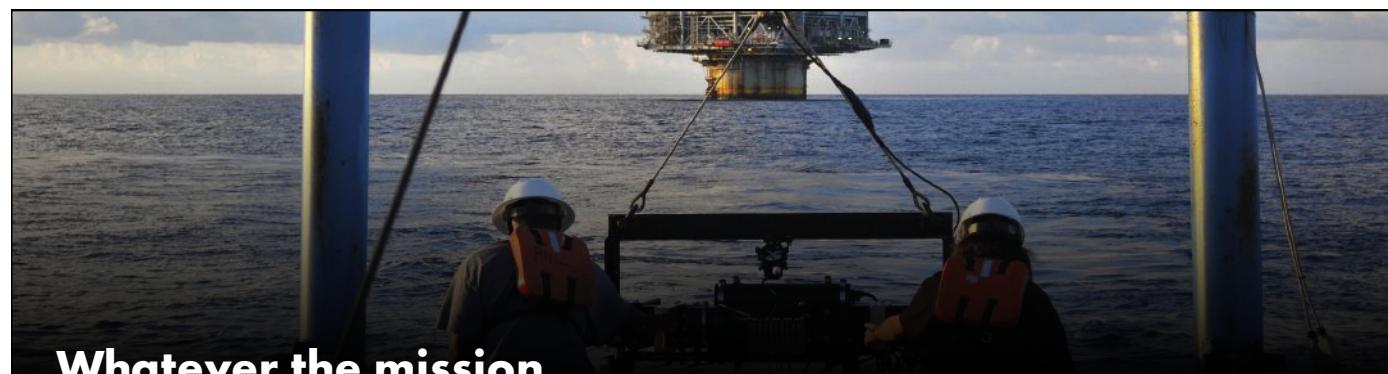
Intel Leixlip semiconductor facility in Ireland, relied on Ocean Kinetics' expertise and facilities for the manufacture of these high spec components, while MMG Ocean's gangways have been installed on the Shetland pelagic fishing fleet vessels *Antares*, *Charisma*, and *Zephyr*, and another will be installed on *Antarctic III* which is currently being built in Astilleros Zamacona, Bilbao, Spain.

Managing director of Ocean Kinetics, John Henderson, said: "We are really excited about our partnership with MMG Ocean, which brings together Ocean Kinetics' extensive industry experience, market reach, and resources with MMG Ocean's innovative product development, expertise, and access to European markets. Building from an established relationship, we now have a solid base from which to expand our reach and create transformative engineering solutions that bring genuine innovation to the marketplace."

MMG Ocean Managing Director Martin McGuiness added: "Fusing the design expertise and production capacity of both companies gives us the ability to fulfil major contracts in renewables, energy, marine, aquaculture and fisheries, decommissioning, power, and utilities sectors across the UK, Ireland, Europe, and beyond."



» Martin McGuiness (left) with John Henderson.  
(Image credit: Ocean Kinetics/MMG Ocean)



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# OPEN OCEAN ROBOTICS WINS CONTRACTS FROM NOAA FOR UNCREWED SYSTEMS

NOAA (National Oceanic and Atmospheric Administration) has chosen Open Ocean Robotics, in collaboration with the 1stMission Team, as one of the awardees for all three Multiple Award IDIQ (Indefinite Delivery, Indefinite Quantity) contracts.

These contracts, through NOAA's Office of Marine and Aviation Operations (OMAO) Uncrewed Systems Operation Center (UxSOC), encompass three critical areas: 1) Meteorological and Oceanographic Observations; 2) Living Marine Resource Surveys and Research; and 3) Ocean Exploration and Characterization.

The contracts mark a significant milestone, enabling Open Ocean Robotics to provide Uncrewed Maritime Systems (UMS) Services to NOAA, enhancing their capacity for efficient and effective coastal and open ocean monitoring. This partnership will allow the simultaneous collection of oceanographic and atmospheric data over vast areas, supporting various initiatives, including research, exploration, maritime domain awareness, environmental protection, and weather forecasting.

The three-year ordering period, commencing on September 1, 2023, and concluding on August 31, 2026, holds the potential to generate millions of dollars in revenue for the Team. These contracts underscore Open Ocean Robotics' commitment to advanc-

ing ocean science and environmental stewardship through innovative UMS solutions.

"Open Ocean Robotics is excited to embark on this collaboration with NOAA," said Andy Ziegwied, Director of Sales at Open Ocean Robotics. "This award reflects NOAA's confidence in Open Ocean Robotics and its strategic partnership with the 1stMission Team. Together, we aim to further NOAA's mission of understanding and conserving the nation's vital marine resources, marking a major milestone in our mission to advance marine technology and contribute to a more sustainable future for our oceans."



» Data Xplorer USV. (Image credit: Open Ocean Robotics)

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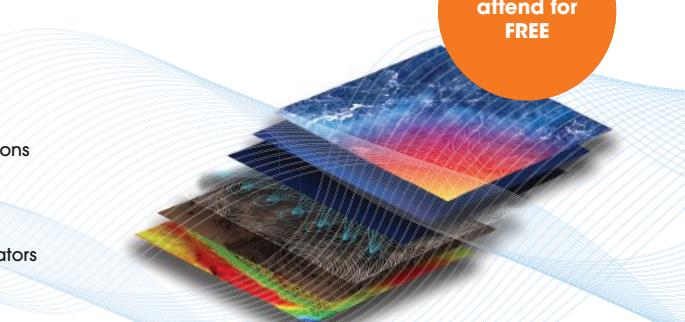
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Photos: Aft deck and control room of CSA's R/V Dolphin

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