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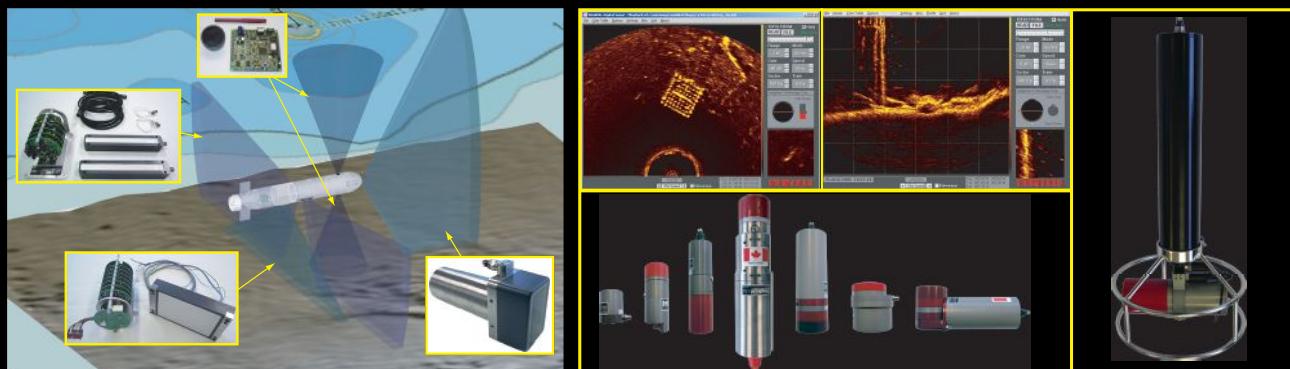
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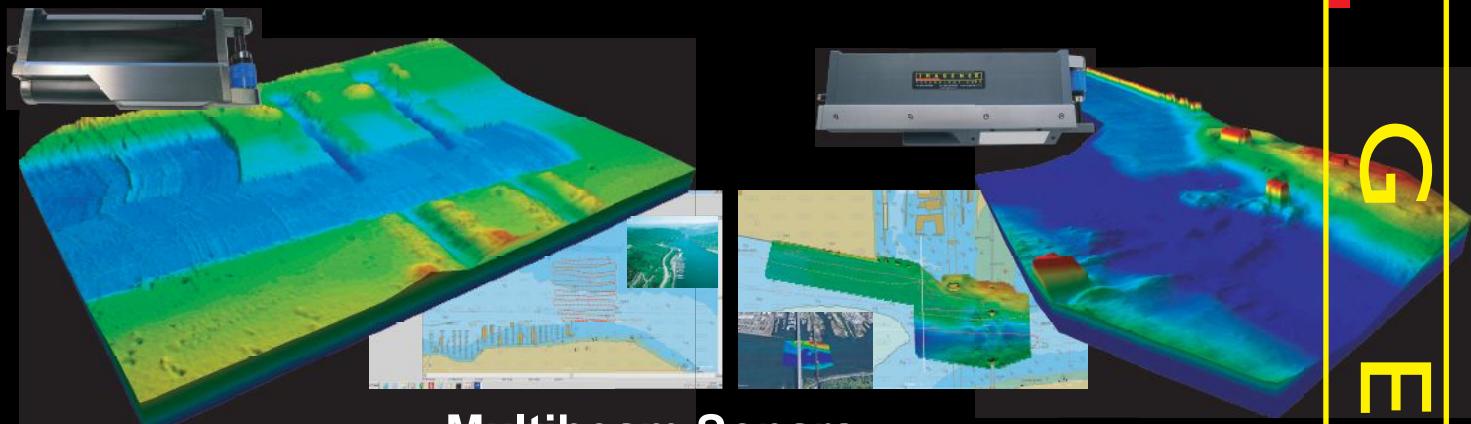
AUGUST 2023

OCEAN OBSERVATION, DATA, & COMMUNICATIONS

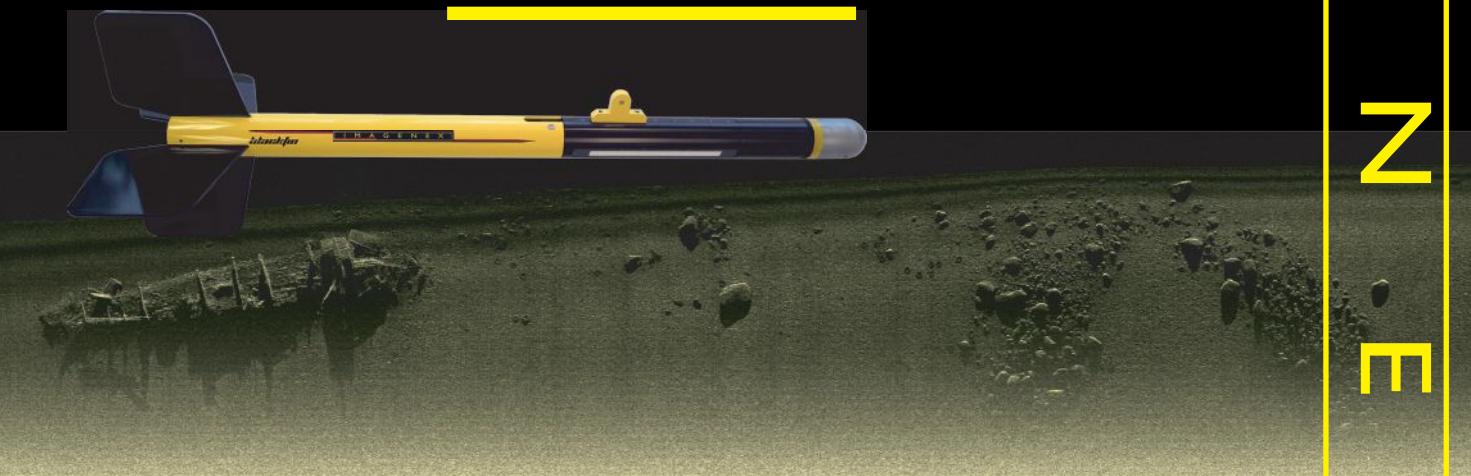
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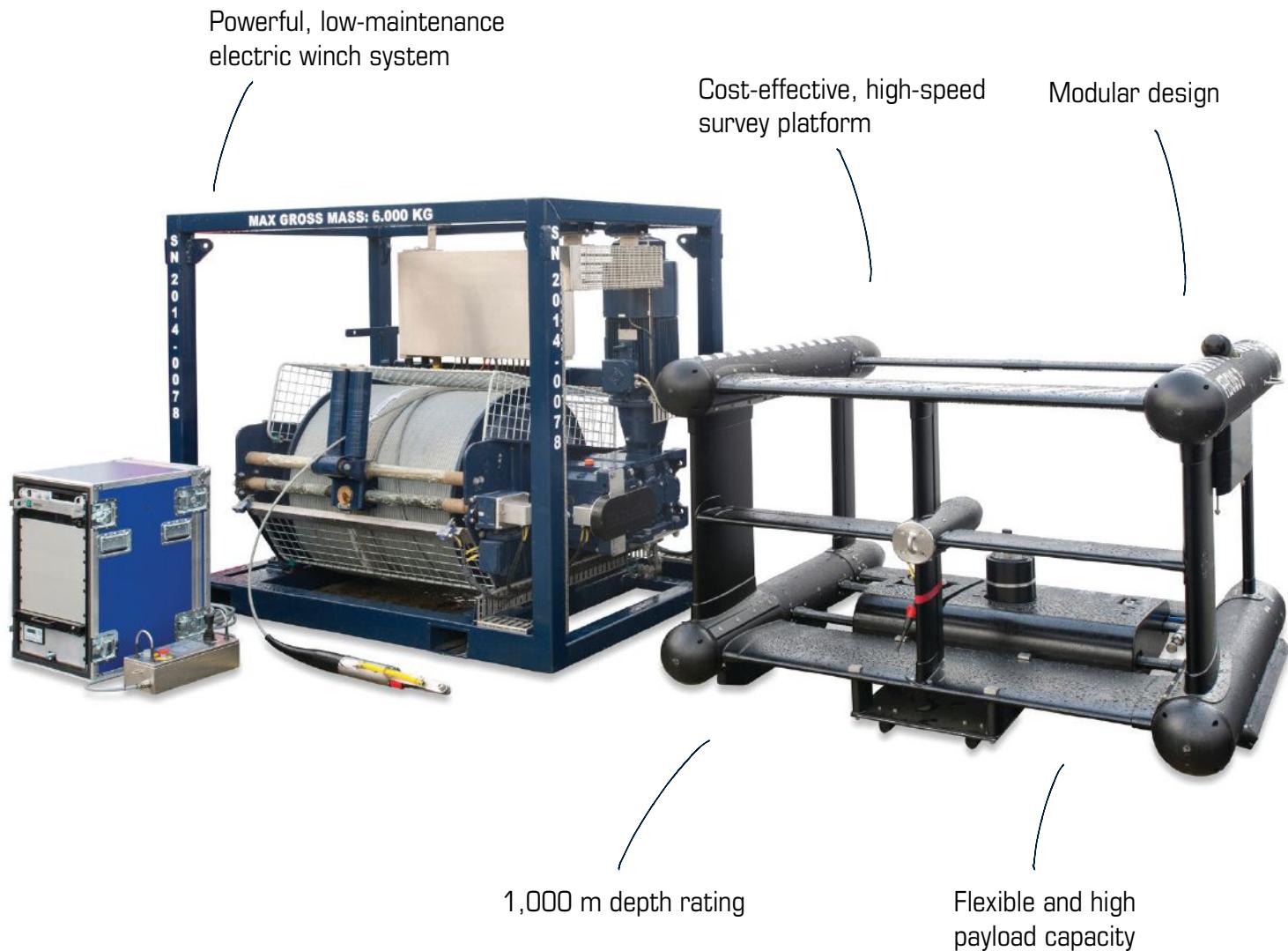
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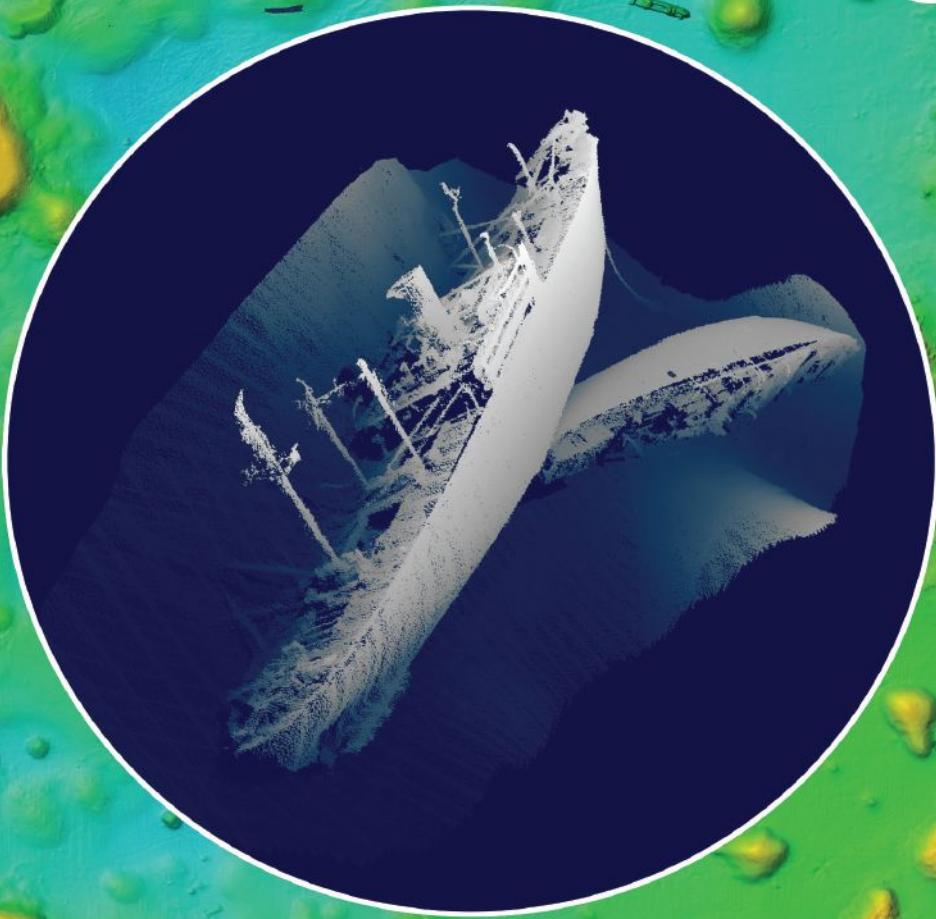
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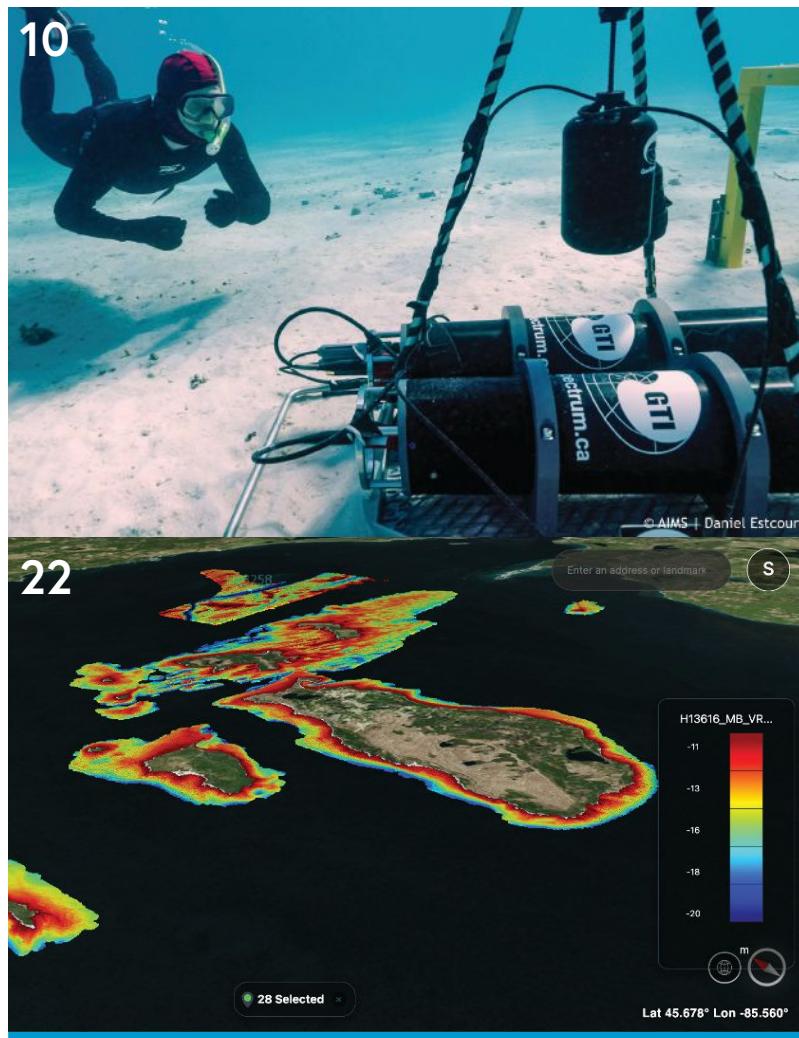
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ON THE COVER:

GeoSpectrum Technologies demonstrated long-range, VLF communications off the shore of Sable Island as part of Canada's 'All Domain Situational Awareness' program in 2019. (Image credit: GeoSpectrum Technologies)

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[WITH THANKS - Ed.]

Investing in a cooperative network of marine observation technologies, data management programs, and effective communication systems must remain a strategic priority for the professional ocean community.

The rate at which we can now gather, process, and ultimately act on statistically robust data empowers us to futureproof the management of ocean resources and the subsequent mitigation of any impacts—be they environmental, economic, or societal—of a burgeoning Blue Economy.

*However, such a global endeavor requires more than technical innovation and the steady integration of upgraded hardware and software—it calls for unprecedented collaboration across an expanding network of commercial entities and public agencies. In August's ON&T, we meet some of the companies and institutions leading the way and bringing meaningful change to **Ocean Observation, Data, and Communications**.*

editor@oceannews.com

Ed Freeman



On 30 June 2022, Mayflower Autonomous Ship arrived in Plymouth, Massachusetts, having crossed the Atlantic Ocean guided by Hexagon | Veripos technology

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Ocean News & Technology ISSN# 1082-6106
 is published 10 times a year in print and digital by Technology Systems Corporation, 8502 SW Kansas Ave, Stuart, FL 34997, telephone 772-221-7720. Copyright ©2023 Technology Systems Corp. All rights to editorial content are reserved. No article, photograph, or illustration may be reproduced in whole or part without the written permission of the publisher. Unless otherwise stated in writing by the contributor, all images submitted to TSC may be used in other promotional materials belonging to TSC without permission. Subscriptions are free to qualified individuals or companies. For all others, call TSC for subscription information.

PRINTED IN THE USA



QUANTIFYING OUR OCEAN THROUGH INNOVATIVE TECHNOLOGY



By Matthew Woody

Director of Business Development



Uncrewed vehicles offer the potential to deliver untold amounts of data from the most inhospitable areas of oceans, unlocking the answers to numerous important questions we have about our planet. Partnerships between the private sector and the international ocean observation community present exciting opportunities to rapidly develop and deploy the innovative technologies required to improve our understanding of the Earth's oceans and climate.

As this issue hits newsstands, the third year of Saildrone's partnership with the National Oceanic and Atmospheric Administration (NOAA) to study the physical processes that drive hurricane rapid intensification is beginning in the Tropical Atlantic and Gulf of Mexico.

A fleet of 10 Saildrone USVs has been deployed to areas identified by NOAA as having the greatest likelihood of intercepting a hurricane. In 2021, battling massive waves and winds over 100 mph, one Saildrone vehicle not only survived Hurricane Sam intact but also collected important data about the physical interactions between the ocean and atmosphere that revealed new insights about hurricane intensification.

BEYOND HURRICANE RESEARCH

This hurricane mission is just one of many demonstrating the need for autonomous uncrewed platforms to dramatically increase our ability to observe our oceans. In the Pacific, NOAA is using the Saildrone platform as part of the Tropical Pacific Observation System, developed to improve early predictions of major weather events like El Niño and La Niña and, ultimately, long-term weather forecasting. In the Arctic, Saildrone has sailed into sea ice to provide in situ observations to NASA to improve satellite algorithms for ice prediction and sea surface temperature, and in the Antarctic, Saildrone observations of CO₂ fluxes helped to transform scientists' views of how much carbon is absorbed by the Southern Ocean.

Saildrone has already spent over 25,000 days at sea—autonomously sailing nearly one million nautical miles—collecting vital data that is invaluable to the metocean sciences, sustainable fisheries management, ocean mapping, and maritime security initiatives. But not all platforms are fit for every mission. That is why Saildrone developed three sizes of USV with a variety of payload options to meet every challenge with the right vehicle.

Uncrewed platforms are uniquely suited to reach the most remote and inhospitable areas of the ocean while being environmentally friendly with a lower carbon footprint. Without onboard operators, there is no risk to crews nor the need to frequently return to port. This enables sustained data collection for months at a time, which is a transformational capability for science and security.

ORCHESTRA OF UNCREWED ASSETS

During the hurricane mission, NOAA orchestrates coordinated sampling by aerial, surface, and sub-surface assets to create a complete picture of a storm, from 30,000 feet above the surface, to several thousand feet below. This method of teaming uncrewed assets can be applied not only to science, but to homeland security and defense as well.

Parallel to technological advances, the industry is also creating more innovative and cost-effective business models that reduce the risk of investment and enable quicker adoption of autonomous platforms.

Whether monitoring coastal waters or plotting offshore wind farms, government and private industry should accelerate the use of uncrewed systems to better understand and leverage our ocean environment. Only then can we more fully unlock the potential of our planet's largest resource for a more secure and sustainable future.



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PARTICLE MOTION SENSORS: BEYOND THE MOTION IN THE OCEAN



By Megan Andrus

Marketing & Communications Manager



Researchers have long studied the creatures that inhabit our oceans, from vibrant coral reefs in Australia to the icy cold waters of the Arctic.

The size of these organisms covers a wide spectrum: from micro-organisms, too small to see with the human eye, to extremely large mammals. In more recent years, scientists have increasingly studied the impacts of human activities affecting the underwater environment and how those activities impact the inhabitants of our oceans. The ocean is surprisingly loud when you have the right tools to listen, and sound is an important factor in determining the overall health of these complex soundscapes.

Ocean technology companies, like Geo-Spectrum Technologies Inc., are key players in designing underwater acoustic equipment to aid in a variety of scientific experiments including the measurements of pressure and motion—two major components to underwater sound.

Working hand-in-hand with underwater sound pressure and motion are the instruments used to detect and analyze it. There are two broad classes of hydrophones: those that respond to sound pressure, and those that respond to the differences in pressure. Although not as widely understood, hydrophones that respond to a difference in pressure play an important role in observing low-frequency sounds in complicated environments and when you need

to identify not only what the sound is, but where the sound is coming from. Further, while a difference in sound pressure may not impact a large organism in a dramatic way, the movement of the molecules that make up the underwater environment: water, salt, nutrients, etc., could have a huge impact on fish and invertebrates.

PARTICLE MOTION SENSORS

Let's take a trip down memory lane to 1985 when Dr. Bruce Armstrong, Founder and VP of Technology Advancement at GeoSpectrum, began designing vector hydrophones. Two generations of hydrophones were born from his dedicated research and understanding of acoustics; the second gen is still in production as of 2023.

Commercially sold as the M20 Particle Motion Sensor, Armstrong's design has proven time and again to be quieter than its competitors, which speaks volumes (no pun intended) considering this type of sensor is incredibly sensitive to mechanical inputs.

Particle motion sensors, or vector hydrophones, are specialized acoustic devices designed to sense and respond to the difference in pressure—not just the pressure itself. Like GeoSpectrum's M20, accelerometer-based vector hydrophones also sense the particle motion created by a sound wave and can determine the bearing (direction) of the incoming sound. Vector hydrophones are designed to measure nanometers—a metric unit of length equal to one trillionth of a meter. Armstrong states,

» GeoSpectrum's M20 Particle Motion system.
(Image credit: GeoSpectrum Technologies)





"Acoustic pressures are typically small... but at low frequencies, the pressure differences can be 1,000 times smaller."

Designing vector hydrophones, and getting them right, is not for the faint of heart. In order to achieve accurate measurements, two of the three channels in the sensor need to behave identically over a wide frequency band. Regarding the number of things that need to be "just so" in this piece of equipment, Armstrong jokes, "It cannot be said that I didn't warn you."

So why bother with the hassle of designing, and then trying to figure out how to accurately use a vector hydrophone? Pressure waves create motion of water molecules themselves. Researchers believe this particle velocity influences marine life, like fish and invertebrates, more than pressure.

The vast majority of research has been conducted on the effects sound pressure has on marine life, but all fish and most invertebrates use particle motion to gather information about their surroundings which would necessitate vector hydrophones to measure accurately.

THE MEANING BEHIND THE MOTION

In Coral Bay, Australia, researchers at the Australian Institute of Marine Science

(AIMS) are using underwater acoustics to learn more about the attributes of healthy coral reefs—specifically their sounds—and what attracts larval fish to these areas.

Dr. Miles Parsons, a research scientist with AIMS, is recording both particle motion and pressure waves as part of the 'Reef Song' project. The project aims to capture the sounds of a healthy reef for the purpose of playing it back in areas where there has been a degradation.

Parsons explains, "Our study is concerned with coral reef fishes and invertebrates... we regularly use pressure to quantify the sound field in terms of monitoring, when we want to understand what the fishes and invertebrates are hearing, we need to measure particle motion."

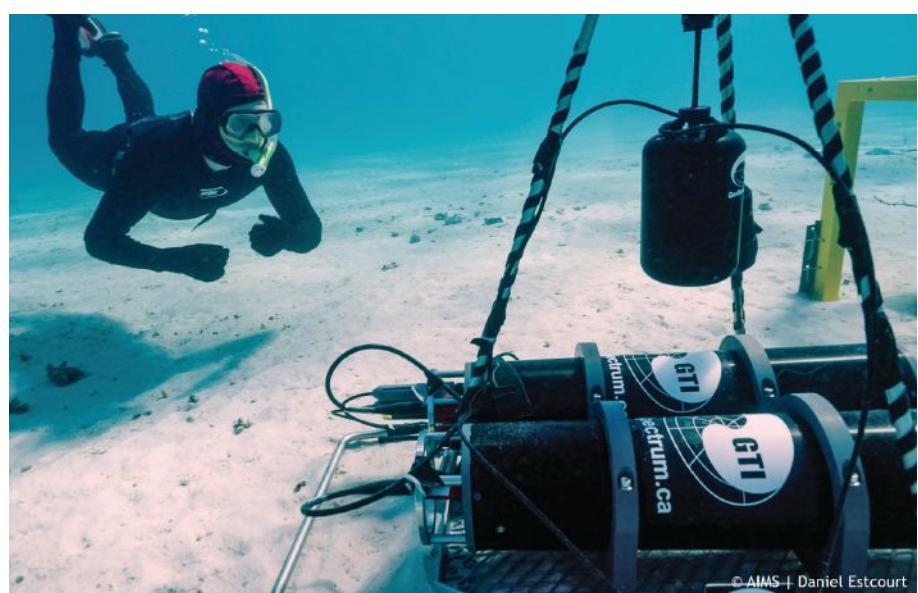
Among the list of field equipment used in this project is GeoSpectrum's M20. By ana-

lyzing the particle motion data collected, scientists like Parsons can then assess potential disruptions that may be contributing to the decline of the coral reefs and in turn, causing the larval fish to find alternate breeding grounds.

Monitoring the underwater environment is vital in assessing the overall health of a marine ecosystem health and the potential impact of human activities on surrounding areas.

Studies like 'Reef Song' help give us a better understanding of the underwater soundscape and by using technological advancements and acoustic equipment, like the M20, we can aid in the preservation and future health of these vital underwater communities.

For more information, visit: www.geospectrum.ca.



» M20 system in Australia for the 'Reef Song' project. (Image credit: AIMS|Daniel Estcourt)

OCEAN EXPLORATION TRUST EXPLORES THE DEPTHS NEAR JOHNSTON ATOLL

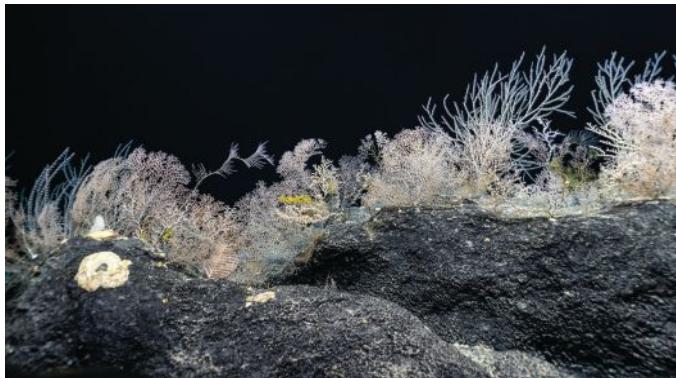


» The expedition will deploy ROVs from E/V Nautilus. (Image credit: OET)

In early August, Ocean Exploration Trust's Exploration Vessel (E/V) *Nautilus* set sail on an expedition to explore deep-sea environments of ancient seamounts around Johnston Atoll.

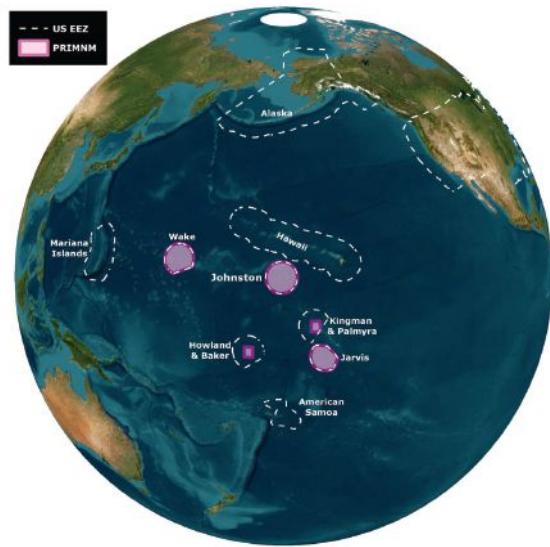
Located ~800 miles south of Hawai'i in the Pacific Remote Islands Marine National Monument (PRIMNM), this region contains some of the most pristine marine ecosystems on Earth, although large seafloor areas remain completely unexplored. The expedition is supported by E/V *Nautilus*' remotely operated vehicles (ROVs) and mapping capabilities to survey unexplored deep-sea habitats around Johnston Atoll, diving as deep as 4,000 meters. The expedition is funded by NOAA Ocean Exploration via the Ocean Exploration Cooperative Institute (OEI).

While recent expeditions have increased our baseline knowledge of the deep-water resources of this remote region, large areas remain completely unexplored. Data associated with the region's deepwater natural and cultural resources are particularly important now, as a monument management plan is under development, and the region is being considered as a new national marine sanctuary. If established, this new sanctuary would augment existing protections for PRIMNM, which host some of the most pristine ecosystems on Earth.



PRIMNM was established in 2009 and later expanded in 2014, encompassing US territories in the Central Pacific, including seven islands and atolls and numerous seamounts, guyots, banks, and ridges across its five units. The Johnston Atoll unit of the monument contains four islands and over 160,000 sq miles of open ocean—an area larger than the state of California.

Last summer Ocean Exploration Trust led a highly successful 23-day expedition to the same region, completing 13 ROV dives at depths ranging from 40 to 3,878 m. Dives explored a wide diversity of habitats and geological features, including the flanks of Johnston Atoll and many offshore seamounts. The team documented high-density and high-diversity animal communities, fossilized whale bones, a fossilized Megalodon shark tooth, and the first Pacific sighting of the six-foot-tall seepen *Solumbellula*. Hundreds of species were documented, including several potentially undescribed species and range extensions.



» Large areas of the seafloor in the Pacific Remote Islands Marine National Monument remain unexplored. (Image credit: Ocean Exploration Trust)

"To date, just over half of all the United States' underwater territories have been mapped with modern precision; and most areas have not been systematically studied or explored," said Dr. Aurora Elmore, the Cooperative Institute Manager for NOAA Ocean Exploration. "By working closely with partners like the OEI and OET, we are working to fully explore the deep sea in support of national priorities."

OET aims to provide a rich foundation of publicly-accessible data to enable follow-on exploration, research, and management activities to better understand and care for the ocean.

» Dives in the area last year revealed a wide diversity of habitats and geological features. (Image credit: Ocean Exploration Trust)

EXAIL AND UNIVERSITY OF NEW HAMPSHIRE OPEN NEW MARITIME AUTONOMY INNOVATION HUB

Exail, a global innovator in the field of maritime autonomy, has opened a new innovation hub that will engage in all aspects of marine autonomous operations to help meet the challenges of the growing blue economy.

Exail will be using the new center to deliver increased operational advantage to US civil and government customers. This includes the US production of its uncrewed surface vessel (USV), DriX, the housing of a remote operation center to conduct worldwide remote autonomous operations, establishing local operations, maintenance, and training facilities, as well as providing expertise on maritime autonomy while also training future generations on the use of autonomous vessels.

The new hub will be located at the University of New Hampshire (UNH), a recognized leader in the field of ocean mapping research and located within UNH's Olson Advanced Manufacturing Center in Durham, to facilitate collaborative work with UNH's Center for Coastal and Ocean Mapping (CCOM).

"We've been working together with UNH for the past six years pioneering uncrewed technologies, and we are now capitalizing on our common achievements with the opening of this new innovation hub," said Marine Slingue, President at Exail, Inc. "We're very proud and excited to take this next step in our US adventure, and we

would like to thank UNH, CCOM and NOAA, for their great support, leadership, and vision on the use of uncrewed technologies that took us where we are today. We look forward to our continuous partnership with them and all the great work we achieve together to keep advancing maritime autonomy in the US."



» The opening was celebrated in the presence of UNH President Jim Dean, US Senator Maggie Hassan, and Assistant Administrator of the National Oceanic and Atmospheric Administration (NOAA), Nicole LeBoeuf.

RS AQUA WINS FUNDING TO DEVELOP AI TO SAFEGUARD MARINE MAMMALS

Ocean science technology innovator RS Aqua has won funding to develop a new system to monitor the underwater environment. Collaborating with the University of Southampton and funded by Innovate UK, the UK's innovation agency, the MARLIN project will develop an underwater sensor that uses machine learning to identify harmful environmental activities and transmits information in real time to a web app. For the first time, this will allow stakeholders to remotely monitor the underwater environment and make decisions in real time.

MARLIN will develop several new technologies: new machine learning techniques to distinguish between ambient and unusual environmental noise (such as marine mammals), new real-time data connections suitable for the remote ocean, and a new user-friendly interface.

Ultimately, this system will enable the remote monitoring of animal, human, and environmental activity anywhere in the ocean. It will enable better conservation of marine mammals (whales and dolphins) during offshore wind farm construction. It will also detect illegal fishing activities, leading to better protection of our fishing grounds and marine protected areas, safeguarding these for generations to come.

Dr. Ryan Mowat, Research Director at RS Aqua, said: "This technology will revolutionize how we scientifically monitor our ocean environment. Currently we have to leave instruments underwater for months at a time and recover them before accessing their data. MARLIN will get that data to the internet in real time, and its implications are huge. It will help ensure that offshore construction is sensitive to marine mammal activity and will enable the monitoring of marine protected areas through the real time recognition of illegal fishing activity."

Professor of Statistical Signal Processing Paul White, from the University of Southampton, added: "Using the power of artificial intelligence to monitor sound in the underwater world, combined with the ability to rapidly relay information ashore, will enable us to provide tools to protect fragile marine ecosystems and detect a range of illegal activities."

MARLIN will provide a sustainable and cost-effective method of ocean monitoring, which could play an important role in growing the blue ocean economy. Currently, large marine vessels often need to be used for ocean monitoring missions. Remote real-time monitoring systems like MARLIN will reduce the need for ship time at sea, potentially reducing vessel CO₂ emissions by up to 75%.



» John P. Tully, Dr. Michael Riedel, Wiebke Schäfer (GEOMAR) and Tom Carson (GSC). (Image credit: Michelle Côté, GSC)

Where an oceanic plate dips below a continental one, the risk of the planet's most severe earthquakes and associated tsunamis is high. Such a subduction zone is located off the west coast of North Amer-

ESTIMATING EARTHQUAKE RISK USING PACIFIC SEABED DATA

ica: Cascadia Subduction Zone is a 1,000 km long dipping fault off the Pacific shore, where the oceanic Juan de Fuca Plate slides under the continental North American Plate. The fault stretches from Canada's Vancouver Island to northern California. Currently the subduction zone is locked due to friction but at some point, the strain will be released in earthquakes.

To better assess the future behavior of the tectonic plates involved and the risk of major earthquakes, scientists led by GEOMAR Helmholtz Centre for Ocean Research in Kiel have been collecting data in the northern Cascadia region since September 2022 as part of expedition SO294 "CLOCKS" (Northern Cascadia: Extent of locked zone, prism deformation, slip-to-toe, and the edge of subduction).

"We wanted to find out more about location and size of the zone where future large earthquakes may nucleate," said the cruise leader, Dr. Michael Riedel, geophysicist at

GEOMAR. To obtain these data, 26 long-term ocean-bottom seismometers (OBS) had been deployed off Vancouver Island from the research vessel SONNE. These instruments not only record earthquake signals, but by analyzing the data, information on what temperatures prevail at the plate boundary, the amount of liquid contained in the rocks, and how the seabed has already been deformed by former earthquakes can be extracted.

All 26 OBS have now been successfully recovered and data were retrieved from the instruments as part of a follow-up international expedition in collaboration with the Canadian and Japanese research agencies Geological Survey of Canada (GSC) and Japan Agency for Marine-Earth Science and Technology (JAMSTEC). "Evaluation of the results will provide a clearer picture of the state of locking and the seismic activity of the fault, helping to better understand large subduction zone earthquakes and their associated tsunamis," added Riedel.

SSOOP RELEASES PRIORITIES FOR UK OCEAN OBSERVATIONS

The UK Sustained Scientific Ocean Observation Priorities (SSOOP) report was recently released. In 2022, the National Oceanography Centre (NOC) led a consultation on prioritizing ocean observations, following a request from the Natural Environment Research Council (NERC).

To ensure objectivity, impartiality, and to capture a broad spectrum of views from across the UK marine science community, NOC ran an open consultation, coupled with a reliance on documented evidence and best practice from across the UK and the international community.

The consultation consisted of three mechanisms to gather data, evidence, and opinion:

- Individual Consultation—open to all
- Best Practice—international strategies
- Ideas and Opinions—existing organizations and forums

Following collation of the evidence, NOC assembled a workshop to discuss the results and identify the key priority observations and the report from this community-based consultation has now been published at <https://ocean-observations.uk>.



FET SUPPLIES ELECTRIC OBSERVATION CLASS ROV TO THE MEMORIAL UNIVERSITY OF NEWFOUNDLAND

Forum Energy Technologies (FET) recently secured a contract from the Memorial University of Newfoundland to supply an electric ROV to its Fisheries and Marine Institute (MI), School of Ocean Technology.

The primary function of the Sub-Atlantic Mohican ROV system will be to support ocean research, while it will also be used for pilot technician training. For ocean research operations, the ROV will be required to carry a payload skid for navigation, equipment and sensors, as well as be capable of manipulation and intervention.

The Mohican is equipped for inspection tasks, non-destructive testing (NDT), light intervention, pipeline/cable/seabed survey, diver assist/safety, harbor and port security, scientific survey and data collection, renewable energy projects, civil engineering, long tunnel excursion and for inland waterways.

The ROV was manufactured at FET's UK facility at Kirkbymoorside, North Yorkshire.

The Mohican ROV has a 2,000 m depth rating and with TMS Garage system, is suited to inspection, survey repair, oceanographic research, and subsea maintenance tasks. Ancillary tools and sensors can also be added to the vehicle for survey and light intervention work. The Mohican is equipped to a high specification with a four-function manipulator arm for complex underwater procedures.

The ROV supplied also has precision measurement and navigation systems, HD and SD cameras, LED lighting and sonar for low visibility operations. Emergency location systems fitted include VHF beacon, combined with flasher.

The system was supplied complete with a 20' control container, Launch and Recov-

ery System and comprehensive spares package.



» The 2,000 m depth-rated Mohican ROV.
(Image credit: FET)

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UCO DELIVERS QUICK FIX FOR FISH FARM NETTING DAMAGE

Underwater Contracting (UCO), a leading provider of underwater services to the offshore energy, inspection, construction, and aquaculture markets has developed a unique ROV-deployed system to repair small holes in fish farm nets.

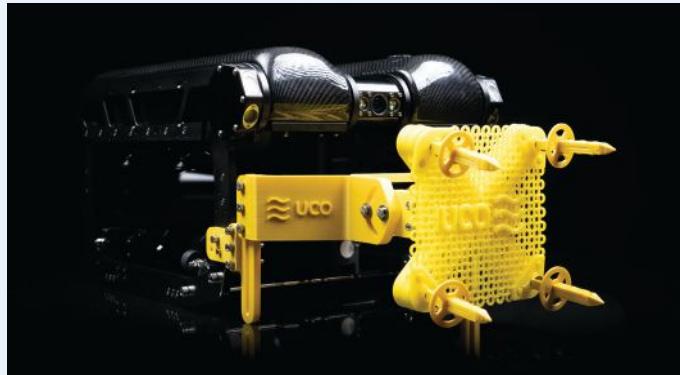
The UCO NetFix repair system places plastic patches over holes in cage netting. Held firmly in position by pegs, the patches remain in place until the hole is permanently repaired by a dive team or when the nets are lifted to the surface.

Small holes, which can be made by predators or if equipment becomes snagged during operations, are identified during routine containment checks by ROV or during net washing. Until now, these would require calling out a dive team at short notice to carry out repairs, a time consuming and expensive process. NetFix uses the onsite ROV to carry out an immediate repair, ensuring containment of all stock.

Deployed using a frame attached to the inspection class ROV, the semi-permanent repair is compatible with on-going net washing activity as the patch sits flush with the inside of the net. Planned permanent repairs by the dive team can then be scheduled. The patches and plugs, which are easily removed by a diver, are reusable.

The deployment frame can be made to fit any regular inspection ROV. Patch size is 200 mm x 200 mm with peg size dependent on netting size.

The Scottish Government's recently published Vision for Sustainable Aquaculture, which sets out its long-term aspirations for the sector, highlights that innovation across a wide range of disciplines has driven the development of Scottish aquaculture.



» NetFix repair system. (Image credit: UCO)

NEW CONTRACTS FOR MIROS TO EXPAND USE OF WAVESYSTEM



» Cable lay vessel offshore Brazil. (Image credit: Miros)

Miros, the Ocean Insights experts, continues to grow its sea state as a service offering after securing numerous contracts with new clients during the first half of this year.

The new as a service (aaS) contracts span the global offshore vessel market, with particular emphasis on the key markets of UKCS, Norway and Brazil.

The projects will see the Miros WaveSystem deployed across vessels, providing real-time sea state data, helping to monitor

vessel stability during heading sensitive operations for increased operational safety and facilitating operability improvements. WaveSystem will support offshore work, including cable and pipe lay, offshore installations, new floating production storage and offloading (FPSO) projects and drillship activities during well decommissioning.

The IoT-enabled WaveSystem combines the directional sea state measurements from Miros Wavex® and motion-compensated wave measurements as well as draught data from Miros RangeFinder.

WaveSystem consistently provides precise ocean insights exactly when and where operators require them, ensuring all stakeholders involved benefit from heightened operational awareness.

The real-time data that has been gathered and tailored to the requirements of the operator by WaveSystem allows for enhanced decision-making through an understanding of the environment and weather windows. The flexible and scalable approach makes this aaS solution incredibly user-friendly, easy to handle and integrate with other systems.

With an aaS subscription, equipment remains Miros-owned, meaning that the client does not need to take on the risk of owning, operating, and maintaining the kit throughout the duration of the project.

ECO WAVE POWER IS OFFICIALLY CONNECTED TO ISRAELI ELECTRICAL GRID

Eco Wave Power Global AB, a leading wave energy developer, recently announced that its station at the Port of Jaffa in Tel Aviv, EWP-EDF One, has officially connected to Israel's national electrical grid.

The EWP-EDF One power station we built in collaboration with and co-funding from EDF Renewables IL and the Israeli Energy Ministry. The Israeli Energy Ministry has recognized the Eco Wave Power technology as a "pioneering technology". The EWP-EDF One power station has an installed capacity of 100 KW, enough energy to power approximately 100 homes at peak efficiency.

The wave energy system installed at the Port of Jaffa is comprised of ten floaters along the Port of Jaffa's pre-existing breakwater. Each floater connects directly to Eco Wave Power's land-based energy conversion unit, which enables easy access for operational maintenance and upgrades.

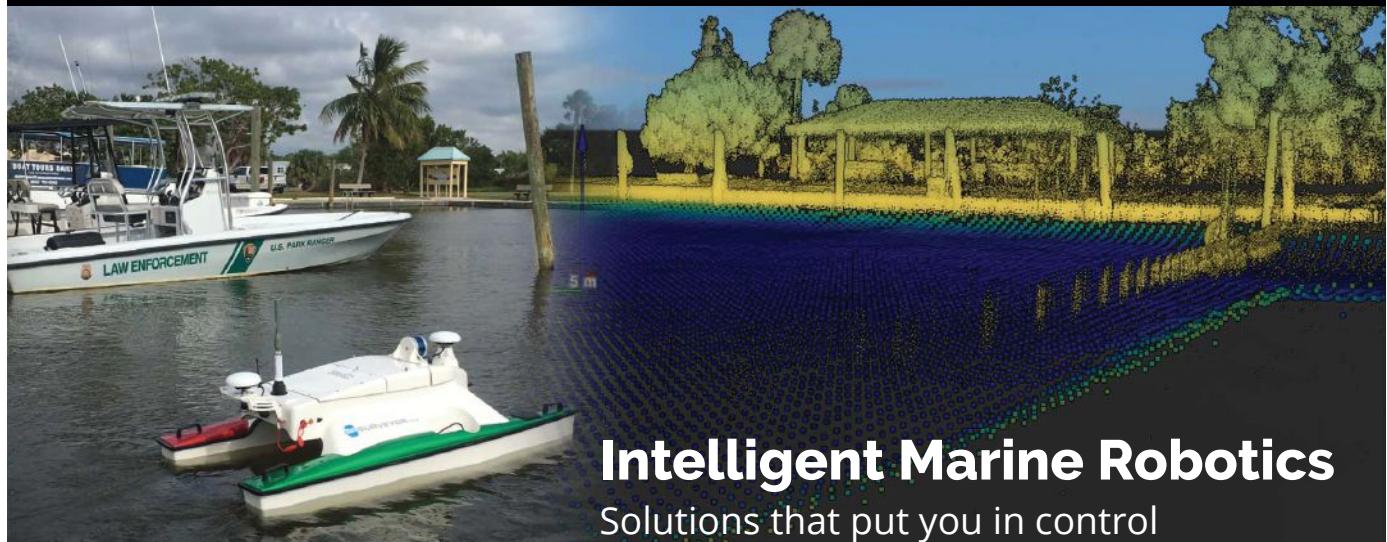
The land-based conversion unit and utilization of pre-existing structures demonstrate Eco Wave Power's ability and commitment to sustainably build clean energy power stations at nearly any location. The adaptability is further shown by its EWP-EDF One power station at the Port of Jaffa—one of the world's oldest ports—and the upcoming pilot station at the Port of Los Angeles—

one of the world's busiest seaports and leading gateway for international trade in the Western Hemisphere.

In addition to providing clean energy to Israel's electrical grid, the EWP-EDF One power station will also serve as a public education center. Eco Wave Power recently announced that it received the GREENinMED grant by the European Union, which will fund the creation and installation of a unique educational experience at the Port of Jaffa station.



» The wave energy system installed at the Port of Jaffa is comprised of ten floaters. (Image credit: Eco Wave Power)



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NEW HURRICANE FORECAST MODEL TO IMPROVE TRACK PREDICTIONS

NOAA's National Hurricane Center has a new model to help produce hurricane forecasts this season. The Hurricane Analysis and Forecast System (HAFS) was put into operations on June 27 and will run alongside existing models for the 2023 season before replacing them as NOAA's premier hurricane forecasting model.

"The quick deployment of HAFS marks a milestone in NOAA's commitment to advancing our hurricane forecasting capabilities, and ensuring continued improvement of services to the American public," said NOAA Administrator Rick Spinrad, Ph.D.

Running the experimental version of HAFS from 2019 to 2022 showed a 10–15% improvement in track predictions compared to NOAA's existing hurricane models. HAFS is expected to continue increasing forecast accuracy, therefore reducing storm impacts to lives and property.

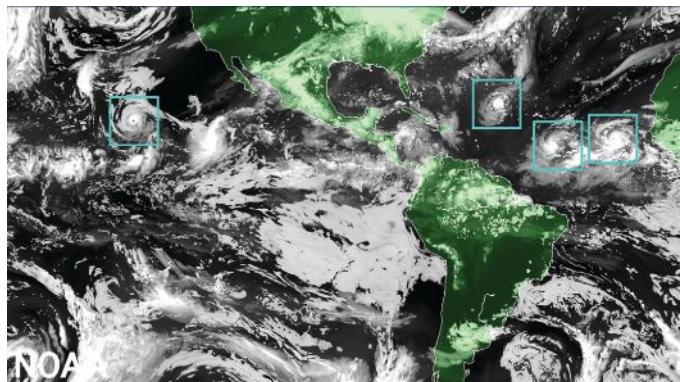
HAFS is as good as NOAA's existing hurricane models when forecasting storm intensity—but is better at predicting rapid intensification. HAFS was the first model last year to accurately predict that Hurricane Ian would undergo secondary rapid intensification as the storm moved off the coast of Cuba and barreled toward southwest Florida.

Over the next four years, HAFS will undergo several major upgrades, ultimately leading to even more increased accuracy of forecasts, warnings, and life-saving information.

HAFS provides more accurate, higher-resolution forecast information both over land and ocean and is comprised of five major components: a high-resolution moving nest; high-resolution physics; multi-scale data assimilation that allows for vortex initialization and vortex cycling; 3-D ocean coupling; and improved assimilation

techniques that allow for the assimilation of novel observations. The foundational component is the moving nest, which allows the model to zoom in with a resolution of 1.2 miles on areas of a hurricane that are key to improving wind intensity and rain forecasts.

NOAA developed HAFS as a requirement of the Weather Research and Forecasting Innovation Act of 2017, which directed the agency to conduct ongoing research and development to improve hurricane prediction and warning under the Hurricane Forecast Improvement Program offsite link. Specifically, the Act called for NOAA to improve prediction capability for rapid intensification and storm track. HAFS development was also enabled by fiscal year 2018 and 2019 hurricane and disaster supplemental funding, and continued acceleration with support from the 2022 Disaster Relief Supplemental Appropriations Act.



» Global map showcasing land mass in green and water in black, clouds in white and tropical storms outlined in green boxes representing the moving nest model. (Image credit: NOAA)

CGG, PGS AND TGS INTRODUCE NEW TIERED OFFERINGS FOR VERSAL

CGG, PGS and TGS, industry leaders of multi-client geoscience data, have announced the launch of new tiered offerings for Versal, the groundbreaking multi-client data ecosystem.

This update gives the entire industry free access to Versal, representing the world's most comprehensive multi-client data coverage—all in one centralized location. Industry professionals can also benefit from a more personalized solution, with a focus on enhanced accessibility, flexibility, and value.

The latest updates to the Versal platform are designed to offer even more convenience and scalability for E&P, data man-



agement and procurement team members through the introduction of Versal Pro and Premium tiers.

Versal users now gain unlimited access to the essential data from CGG, PGS and TGS, representing the majority of the world's marine multi-client data available within a single platform. This consolidation elimi-

nates the need to visit multiple vendor websites, streamlining workflows and saving valuable time.

With the free Versal version, users can view data coverage, download coverage shapefiles and import their map layers and shapefiles.

By upgrading to Versal Pro, clients unlock additional benefits, including viewing entitlements, accessing vendor contracts, and downloading acquisition and processing documents.

By selecting Versal Premium, clients gain access to enhanced data management capabilities such as seismic visualization and downloading entitled traces.

SALUS TECHNICAL LAUNCHES HAZOP AI FOR HAZARD AND OPERABILITY STUDIES

Aberdeen-based process safety firm, Salus Technical, has successfully launched a working prototype of its artificial intelligence (AI) tool, HAZOP AI, which is designed for Hazard and Operability Studies (HAZOP).

The revolutionary software, which is applicable to all major hazard industries, will prompt users to consider risks they may have missed, assist in answering questions, and provide guidance on good practice as well as past incidents with relevant learnings.

One of the main aims of the tool will be to reduce the time taken to complete a HAZOP by 50%, whilst increasing quality and consistency.

Following a successful product demonstration involving over 30 companies globally, the company set about completing a working prototype of HAZOP AI in the space of a week as part of a Hackathon.

Founder and MD of Salus Technical, David Jamieson, said: "Saving lives in hazardous environments is at the very core of all that we do, and that is why it was crucial for us to complete HAZOP AI and have the working version ready for use in this short timeframe."

The team at Salus Technical has invested heavily in AI in the pro-



» The North Sea has potential to lead the way on process safety due to new AI tool. (Image credit: Salus Technical)

cess safety space and is currently working with several clients to develop bespoke tools that can be used to manage risks by using data from previous risk assessments and incidents.

The IChemE has invited Salus Technical to host a webinar on HAZOP AI on Friday, September 29, and has accepted a paper from the company on the topic of AI in HAZOPs.

This will form part of the institution's Hazards 33 Process Safety Conference in November.



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CHARTING A COURSE FOR SUCCESS

COVE'S OCEAN SCALE-UP ACCELERATOR PROGRAM



COVE partnered with Innovate UK for the Global Incubator Program, which provides the opportunity for eight innovative, high-growth and scaling businesses to build long-term relationships with a world-leading innovation hub in Canada.

Earlier this year, COVE welcomed these eight technology companies from the UK to COVE for the initial launch of the Ocean Scale-Up Accelerator Program.

SHOWCASING OPPORTUNITY

The five-month program allowed businesses to scale in Canada, secure opportunities, and receive assistance with finding and recruiting local skilled workers. Being a part of COVE gave the cohort access to potential partnerships and amenities, and to Canada's premier marine technology focused event, H2O Conference and COVE Demo Day. Over 700 service providers, business leaders and government officials from around the world visit Halifax, Nova Scotia for the annual event.

"The COVE accelerator program connected us with the right people to help navigate the Canadian market as we assess the costs and benefits of growing our footprint to include Canada. Through the program, I spoke with various agencies and partners to understand opportunities," said Lucas Wissmann, Co-Founder of HonuWorx Ltd., a company developing software technology to drive down the costs and environmental impact of deploying and operating robotic systems offshore.



» COVE welcomed eight UK-based tech firms for the launch of the Ocean Scale-Up Accelerator Program. (Image credit: COVE)

MAKING CONNECTIONS

During the cohort's week-long visit, they had the opportunity to give a presentation about their company and their business aspirations to the COVE community and attend workshops to better understand market potential, while also goal setting as part of the program.

The eight participating companies were HonuWorx, Max Nicholas Renewables™, Pure Marine Gen, PicSea, Hexsor Scientific, AquaTec, D-RisQ, and Chelsea Technologies. Each company developed their own distinctive goals to build and expand their business. Across the cohort, there was enthusiasm to meet potential business partners and explore the idea of bringing projects to North America.

"It's super exciting for us," said Andrew Durrant, Founder of PicSea. "We already have some projects started in Canada from previous support that COVE and Innovate UK have given us. I'm excited to be back in the next few months and expect to build business success in Canada." PicSea is a company that helps businesses and science access and understand seafloor data. Their ground-breaking technology has dramatically reduced the cost and complexity of creating autonomous underwater vehicles.

COVE plans to extend the program to other interested countries to propel marine innovation and accelerate commercialization. If you're interested in learning more about the bespoke program that accelerates business growth in Canada's marine sector or how to partner with COVE for an accelerator program, contact accelerator@coveocean.com.



» The COVE accelerator initiative offers exclusive access to sector-leading tech developers. (Image credit: COVE)

ADVANCED NAVIGATION EXPANDS DFOG RANGE WITH NEW A SERIES



» The Boreas range features Advanced Navigation's sensor fusion algorithm. (Image credit: Advanced Navigation)

Advanced Navigation has announced the expansion of its revolutionary Boreas digital fiber-optic gyroscope (DFOG) range, with the new A Series.

The Boreas A90 and A70 are strategic-grade inertial measurement units (IMU) that deliver acceleration and orientation with superior accuracy, stability, and reliability under all conditions with no reliance on GNSS. They also feature automatic gyrocompassing with industry-leading reductions in size, weight, power, and cost (SWaP-C) compared to competing systems on the market.

"Our world-first Boreas DFOG technology represented a step-change for fiber-optic gyroscopes. The addition of the A Series ensures we have greater ability to meet the rapidly growing demand for ultra-high accuracy solutions, even in the most demanding conditions.

The A Series is an embodiment of industry-leading performance and cost-effectiveness. We look forward to seeing this technology unlock new possibilities across an expanse of fields, from autonomous vehicles and land surveying to subsea navigation and mining," said Xavier Orr, CEO and Co-Founder of Advanced Navigation.

The Boreas A90 and A70 are IMUs that contain ultra-high accuracy DFOG and high performance closed-loop accelerometers. Boreas A90 offers ultra-high performance, while the A70 offers high performance. Featuring ultra-fast gyrocompassing, both systems can acquire and maintain an accurate heading under all conditions with no reliance on GNSS, making them well-suited for surveying, mapping, and navigation across subsea, marine, land and air applications.

The Boreas A90 and A70 also offer an optional license to add INS capabilities and enable integration with external GNSS receivers using Advanced Navigation's comprehensive range of interfaces and communication protocols.

The Boreas lineup is targeted at applications requiring always available, ultra-high accuracy orientation and navigation scenarios including marine, surveying, subsea, aerospace, robotics, and space.

The Boreas range contains Advanced Navigation's revolutionary sensor fusion algorithm. This algorithm is more intelligent than the typical extended Kalman filter and is able to extract significantly more information from the data by making use of human-inspired artificial intelligence. It was designed for control applications, with a high level of health monitoring and instability prevention to ensure stable and reliable data.

Advanced Navigation has designed the Boreas range from the ground up for reliability and availability. Both the hardware and software are designed and tested to safety standards and have been environmentally tested to MIL standards.

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OCEAN DATA AT YOUR FINGERTIPS



By Joe Wolfel
CEO



Texas-based Terradepth was founded by Joe Wolfel and Judson Kauffman in 2018 around two strategic pillars: 1) massively scale ocean data acquisition capability; and 2) radically improve the user experience with the data. Terradepth's goal is to collect and deliver data faster, cheaper, and greener for better decision-making about the ocean. Terradepth designs and builds subsea robots at scale, deploys them, and delivers data through a first-of-its-kind data management solution to a wide base of commercial and government customers.



» Absolute Ocean's API allows users to upload and visualize data in near real time. (Image credit: Terradepth)

DATA MANAGEMENT SOLUTION

In late 2022, Terradepth launched Absolute Ocean (AO), which is Terradepth's easy-to-use, cloud-native, geospatial data management solution, providing ocean data visualization, analysis, and collaboration to internal and external stakeholders. AO can be leveraged to concurrently manage existing customer-owned datasets while accessing data provided by Terradepth or other third parties.

With AO already fully integrated into the operations of several early adopters, the solution is currently being used on a number of high-profile projects ranging from environmental monitoring and construction engineering to offshore energy production and telecommunications infrastructure inspection.

AO was developed in direct response to customer demand. We listened to our customers and recognized the persistent concerns surrounding the safe and reliable delivery and sharing of data and collaboration across teams and geographies.

This compelled us to create an intuitive solution that allows complex marine data sets to be managed by multiple users all in one place, hence shattering data silos and prioritizing global, enterprise-wide access to vital ocean information.

EASY DATA MANAGEMENT

AO users can easily and securely upload data into the secure cloud database and, from there, can then visualize the data and perform various geospatial analyses.

To facilitate collaboration and information sharing, users are able to generate and share views or hyperlinks to exact views within 2D and 3D data sets, which can be viewed from a variety of perspectives, scales, and viewing angles, including the option of overlaying third-party maps, such as NOAA's Electronic Nautical Charts (ENCs).

Terradepth has populated AO with thousands of publicly available data sets, including side scan sonar, synthetic aperture sonar, magnetometer grids, multibeam bathymetry, LiDAR, and satellite imagery.

Access to pre-loaded data from NOAA, EMODnet and TCarta and advanced functionality is made available through a subscription pricing.

IN THE FIELD: ORANGE FORCE MARINE

Orange Force Marine Ltd. is a specialized commercial marine services company, providing capable, safe, flexible, and reliable vessels; experienced and highly professional mariners; and results-focused project management to ensure outstanding service delivery for their clients. These capabilities and characteristics highlight our unwavering ability to safely, efficiently and cost effectively deliver on our client's marine requirements and truly deliver "Excellence at Sea."

THE MISSION

With approximately 23% of the world's oceans and only 15% of the Great Lakes surveyed using high resolution bathymetric survey technology, Orange Force Marine is at the forefront of conducting survey efforts using both traditional survey means and via crowdsourced bathymetry solutions.

Leveraging technology and their survey operations expertise, Orange Force Marine (OFM) deploys their crowdsourced bathymetry (CSB) kits (called the "Mussel") across multiple vessels in order to contribute to survey efforts under the Lakebed 2030 and Seabed 2030 initiatives. These CSB kits are installed on vessels worldwide to collect bathymetric data incrementally and automatically as their client vessels conduct their day-to-day sailings.

THE CHALLENGE

OFM's own vessels and "Mussel" CSB equipped vessels are routinely plying the lakes and oceans conducting bathymetric surveys or gathering other marine data. Traditionally, data collected onboard requires manual upload and processing after the

vessel has returned alongside following its voyage. Given the longer collection cycles and large amounts of data, there can be substantial delays in uploading, storing, and analyzing collected survey data. This results in long time lags between data collection and data visualization. Coupled with challenges in data transmission and data storage, these time lags can negatively impact decision making regarding vessel operations and tasking, resulting in duplication of efforts, inefficient survey routing and wasted ship time.

THE SOLUTION

Absolute Ocean (AO) is Terradepth's intuitive cloud-native geospatial ocean data management solution providing secure on-demand access, visualization and analysis tools to internal and external stakeholders.

Using AO's application programming interface (API) and Orange Force Marine's Mussel crowdsourced bathymetry kit, OFM can automatically upload and visualize data in near real time, instead of waiting for data to be uploaded manually from vessels. Through this near real-time collection, transmission and visualization, Orange

Force Marine is able to quickly validate the data, confirm quality and coverage and provide real-time feedback to survey clients and collecting vessels.

Absolute Ocean's collaboration feature also allows OFM to communicate collected data coverage, provide updates to surveying progress, and express levels of data contribution over a date range or on a per ship or per survey basis. Through the visualization tools in AO, OFM is able to clearly demonstrate the value of crowdsourced bathymetry efforts and highlight areas of good coverage or areas requiring further survey sea time.

THE RESULT

Through automated uploading of data that is quickly categorized and easily accessed, OFM and clients can efficiently visualize, validate, and interpret what data has been collected in a given area and immediately communicate with vessel captains. This allows them to adjust operations to cover more area or optimize their sea time. OFM's use of AO results in significant time and fuel savings, along with an opportunity for additional data collection made possible through efficiency and optimization.

"We are thrilled with how effectively Absolute Ocean helps us in collecting, transmitting, storing, categorizing, and visualizing bathymetric data in near real time.

By incorporating Absolute Ocean into our data pipeline, we're better able to achieve our vision of "Ping to Cloud" by visualizing the depth data collected almost immediately following the vessel passing over a location on the seabed.

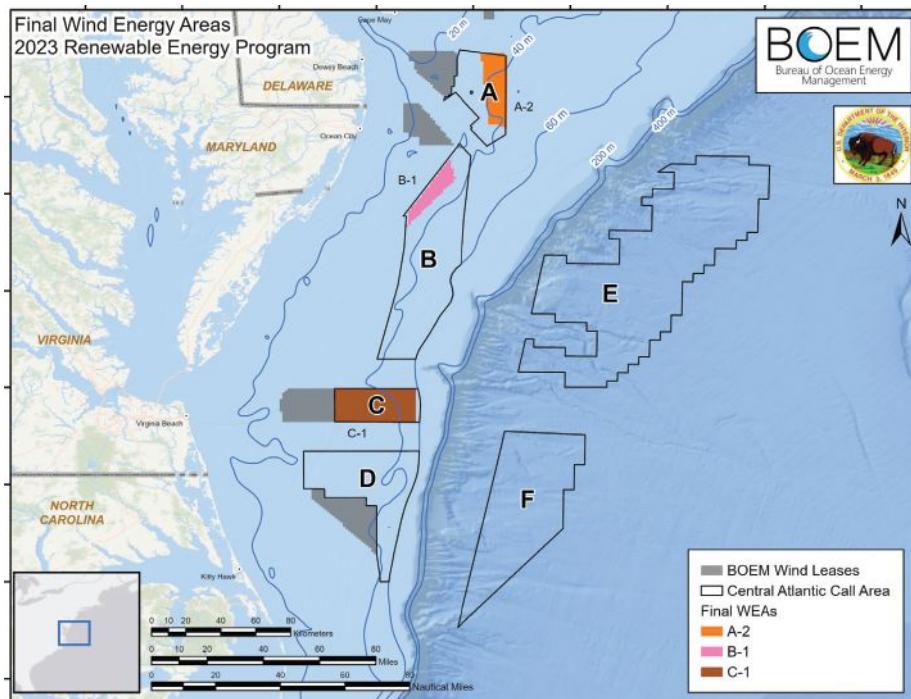
Absolute Ocean is a key component of our crowdsourced bathymetry initiative and we're very pleased with Terradepth's ability to meet our data management and visualization needs."

Derek Niles, President and Founder
Orange Force Marine



» Data collected by Orange Force Marine: Users can provide feedback and input on survey operations and where appropriate suggest reroutes to ensure mission optimization. (Image credit: Orange Force Marine)

BOEM FINALIZES WIND ENERGY AREAS IN THE CENTRAL ATLANTIC



» The three final Wind Energy Areas offshore Delaware, Maryland, and Virginia. (Image credit: BOEM)

The Bureau of Ocean Energy Management (BOEM) has announced three final Wind Energy Areas (WEAs) offshore Delaware, Maryland, and Virginia, which were developed following extensive engagement and feedback from states, Tribes, residents, ocean users, federal government partners, and other members of the public. If fully developed, the final WEAs could support between four and eight gigawatts of energy production.

The three WEAs total approximately 356,550 acres. The first WEA (A-2) is 101,767 acres and located 26 nautical miles (nm) from Delaware Bay. The second WEA (B-1) is 78,285 acres and about 23.5 nm offshore Ocean City, Md. The third WEA (C-1) is 176,506 acres and located about 35 nm from the mouth of the Chesapeake Bay, offshore Virginia. A map of the final WEAs can be found on BOEM's website.

"BOEM values a robust and transparent offshore wind planning process, which requires early and frequent engagement with Tribal governments, the Department of Defense, NASA, other government agencies, and ocean users," said BOEM Director Liz Klein. "We will continue to work closely with them, and all interested stakeholders, as we move forward with our environmental review."

BOEM partnered with the National Oceanic and Atmospheric Administration's National Centers for Coastal Ocean Science (NCCOS) to develop a comprehensive, ecosystem-based ocean planning model that assisted in the selection of the final WEAs.

This model leveraged best available data on natural resources, ocean industries like fisheries and energy production, and areas of national security activities to identify areas with high wind energy

resource potential while reducing potential impacts to other ocean users and sensitive environmental resources. This comprehensive approach not only provided valuable insights about the seascape and uses of the ocean region, but also facilitated greater transparency and positive coordination with government partners and ocean stakeholders through direct engagement and incorporation of their feedback into the NCCOS model.

On November 16, 2022, BOEM announced and requested public comment on eight draft WEAs on the US Outer Continental Shelf offshore North Carolina, Virginia, Maryland, and Delaware, covering approximately 1.7 million acres. The draft WEAs represented a subset of the original 3.9 million acres that the Department of the Interior identified for public comment in April 2022.

The final WEAs are in comparatively shallow water. BOEM may identify additional WEAs in deepwater areas offshore the US Central Atlantic coast for future leasing once further study of those areas has been done.

As part of BOEM's ongoing coordination with the Department of Defense and NASA, an in-depth review of WEA B-1 will continue to determine if their activities could co-exist with wind energy development. The results of the final in-depth assessment from DoD and NASA will be used to inform whether WEA B-1 should be included in a possible lease sale, which would be the next step in the wind energy process.

For more information on the final WEAs and BOEM's notice to prepare an environmental assessment, go to www.boem.gov.

HEAVY LIFTING EXPERTISE TO ACCELERATE TAIWAN'S AMBITIOUS OFFSHORE WIND PROJECTS



» Mammoet's PTC200-DS ring crane was deployed at the Greater Changhua 1 and 2a offshore wind farms in 2022. (Image credit: Mammoet)

Ørsted Taiwan, part of the world's largest offshore wind company Ørsted, has selected Mammoet-Giant Taiwan, a joint venture between Mammoet, the engineered heavy lifting and transport specialist, and Taiwanese Giant Heavy Machinery Services to provide essential support for the 920 MW Greater Changhua 2b and 4 offshore wind farms in Taiwan.

This remarkable offshore wind farm development is playing a crucial role in Taiwan's

green energy targets, as it aims to achieve 5.7 GW of offshore wind power capacity by 2025.

This significant award builds upon Mammoet-Giant's success in Taiwan, and the company's pivotal roles in local offshore wind farm projects since 2017. The JV has been entrusted with the marshalling and lifting activities for 66 suction bucket jackets.

Mammoet-Giant will deliver a comprehensive turnkey service for the project, from initial planning to execution, ensuring the jackets get into the water faster. By managing the complete quayside scope with meticulous planning and execution, the company will reduce interfaces, minimize project risks, and ensure high levels of utilization with minimal disruption to port facilities.

To handle the quayside operations, Mammoet has selected its 5,000t capacity SK 350 ring crane. Renowned for its exceptional lifting capabilities with a great reach, this powerful crane will be instrumental in achieving the project's objectives.

Operating from a single location, the SK350 will lift the 2,500t suction bucket jackets directly from deck carriers to the quayside and after temporary storage on site, onto deck carriers ferrying the jackets to the installation vessel in the field.

The crane's design enables it to operate in the region's high wind speeds, mitigating schedule risks and optimizing loading speeds. This reduces vessel turnaround times at the port to a minimum, resulting in multiple cost reductions and further schedule optimization.

NEW HYDROGEN FUEL CELL SYSTEM TO DECARBONIZE MARITIME INDUSTRY

Yanmar Power Technology, a subsidiary of Yanmar Holdings, has successfully commercialized a maritime hydrogen fuel cell system towards decarbonization of the maritime industry. The company plans to propose the installation of this system into various ships, including passenger ships, work ships, and cargo ships operating in coastal areas where hydrogen refueling is relatively accessible.

In line with the International Maritime Organization's (IMO) revised target of achieving zero net greenhouse gas (GHG) emissions by 2050, the maritime sector is pursuing decarbonization efforts. Yanmar has engaged in multiple initiatives, including navigational tests of demonstration ships equipped with hydrogen fuel cells and conducting high-pressure hydrogen refueling tests for ships.

Yanmar aims to provide total solutions for decarbonization and digitalization of ships with comprehensive designs covering the

entire powertrain of fuel cell ships, encompassing power storage, power management, propulsion, hydrogen storage systems and more. This comprehensive system will support the decarbonization and digitalization of the entire ship.

» The maritime hydrogen fuel cell system is designed to integrate into a broad range of vessels. (Image credit: Yanmar Power Technology)



FLOATING POWER PLANT SELECTED FOR FLAGSHIP PROJECT IN SPAIN



» The Floating Power Plant platform, equipped with electrolyzers, hydrogen storage, and fuel cells. (Image credit: Floating Power Plant)

Danish technology developer and integrator Floating Power Plant A/S has been selected to negotiate a significant grant by the European Commission to support its pioneering project at the PLOCAN test site in Spain, SEAWORTHY. This grant can propel the advancement of sustainable dispatchable energy enabled by the world's first wind-wave floating offshore platform with integrated hydrogen.

SEAWORTHY (Sustainable dispatchable Energy enabled by wAve-Wind OffshoRe plAtforms with onboard Hydrogen) marks a groundbreaking initiative aimed at revolutionizing the renewable energy landscape. By combining wave and wind resources to generate electricity while using excess power to produce and store hydrogen, the project represents a critical breakthrough in the pursuit of truly dispatchable renewable power offshore.

The SEAWORTHY project will be executed off the coast of Las Palmas in the Canary Islands in Spain at the PLOCAN test site, where it will provide renewable energy from wind, wave, and hydrogen.

"We are humbled by the European Commission's recognition of and allocated support for our project," said Anders Køhler, CEO of Floating Power Plant A/S. "This funding allocation serves as a testament to the maturity, potential, and viability of our technology. With SEAWORTHY, we aim to demonstrate the commercial feasibility and environmental benefits of integrating wave and wind energy with hydrogen production and storage."

Floating Power Plant A/S is developing offshore floating solutions for traditionally hard-to-abate areas such as off-grid platforms

and remote islands, and its combination of technologies creates game-changing dispatchable, reliable, renewable energy. As its combination of technologies matures, Floating Power Plant's solutions will also be able to deliver large scale cost-effective green hydrogen as an export product.

The goal of the SEAWORTHY project is to advance Floating Power Plant A/S's proprietary technology from Technology Readiness Level 6 (TRL6) to TRL8. This will be accomplished through the construction, testing, and operation of a commercial-scale demonstration platform. The platform is expected to have a 4.3 MW wind turbine, 0.8 MW wave energy converters, and electrolyzers with hydrogen storage and a fuel cell. The grant selection can expedite the deployment of the technology, enabling Floating Power Plant to further validate its innovative approach.

The project is expected to validate the technology's immense potential and readiness for wider adoption. Anders Køhler states: "By delivering green dispatchable power, we firmly believe this project has the potential to reshape how we generate and utilize renewable energy and support the European Union's commitment to fostering clean and sustainable energy solutions, recognizing the pivotal role of innovative companies in driving the global energy transition."

AKER, SLB, & SUBSEA7 JV APPROVED

Following recent clearance by antitrust authorities in Brazil, all regulatory approvals/clearances required for Subsea7 to form a subsea joint venture with SLB and Aker Solutions have been obtained, including required clearances in Angola, Mozambique, Australia, Norway, the UK, and the US. All approvals/clearances obtained are unconditional.

The parties will continue to work to satisfy the remaining conditions for closing and aim to close as early as practicably possible in the fourth quarter of 2023.

The joint venture is planned as a milestone in subsea production economics, helping customers unlock reserves, reduce time to first oil, lower development costs, and achieve decarbonization goals.

The three companies will bring together deep reservoir domain and engineering design expertise, extensive field-proven subsea production and processing technology portfolios, world-class manufacturing scale and capabilities, and a comprehensive suite of life-of-field solutions to customers around the world.

LIDAR BUOY DEPLOYED OFF THE BRINDISI COAST FOR OFFSHORE WIND STUDY

A floating LiDAR buoy and other sensors has been positioned in waters off the coast of Brindisi to conduct necessary surveys and preparations for the construction of the Kailia Energia and Lupiae Maris floating offshore wind farms.

Kailia Energia is a floating offshore wind farm jointly promoted by Renantis and Blue-Float Energy off the coast between Brindisi and Lecce consisting of 78 turbines, which will have the capacity to produce 3.5 TWh of clean energy per year, equivalent to the consumption of approximately one million households.

Lupiae Maris is a joint venture between Galileo and Gruppo Hope. The planned offshore wind farm has a capacity of 525 MW—35 wind turbines with a capacity of 15 MW—and is positioned in the Otranto Channel between Brindisi and Lecce.

Equipped with fully autonomous remote sensing devices, the buoy will remain at sea for a minimum of 12 months to obtain detailed information on the characteristics of the surrounding waters where the two floating wind farms are to be located. More specifically, the buoy will collect data on wind, weather conditions, and wave motion.

The waters in the Puglia region have significant potential for the development of new floating offshore wind technology and the hope is that these partnerships will help accelerate Italy's energy transition and contribute to identifying renewable solutions to reduce dependence on foreign energy supplies.

Ksenia Balandra, Managing Director of the Renantis-BlueFloat Energy partnership in Italy, said: "The deployment of this buoy at sea represents the first activity that we are

developing in collaboration with the joint venture promoting the Lupiae Maris wind farm. We are confident that creating synergies with other operators and pooling different experiences can only benefit the development of such an innovative sector."



» LiDAR buoy deployed off the Brindisi coast.
(Image credit: Renantis-BlueFloat)

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SEAVOLT TO LAUNCH FLOATING SOLAR ENERGY TEST PLATFORM IN NORTH SEA

SeaVolt, a collaboration between Tractebel, DEME, and Jan De Nul, is preparing for its first floating solar energy test platform to be installed offshore. The platform floatation system is currently located in the port of Ostend, on the Belgian North Sea coast, where main contractor Equans is finalizing assembly.

The test platform will be the first installation in the Belgian North Sea aimed at the large-scale development of offshore solar energy and is scheduled to be towed offshore, anchored, and put into operation to gather data for at least a year starting in August.

Unlike existing floating solar installations on lakes, SeaVolt has developed a concept specifically tailored to the conditions of rough seas. With its modular design, this technology is highly suitable for installation as a complement to offshore wind farms.

Under the framework of the Blue Cluster funded research project MPVAQUA and additional support from the federal government via BELSPO, the partners within SeaVolt together with Ghent University (UGENT) are ready to conduct a year-round open-sea testing inside the POM-West Vlaanderen owned 'Blue Accelerator offshore test zone'.

This proof-of-concept installation will gather crucial data on the impact of waves, rain, and salt sprays on various solar panels with different PV panel configurations. In addition, the impact of varying inclinations, caused by waves and wind, on the energy output will be closely monitored. The test aims to determine the level of protection required to shield the solar panels from seawater and bird droppings.

SeaVolt has chosen to use novel light-weight carbon fiber material in this test installation. This material presents potential benefits for offshore use however is not often used in such harsh marine conditions yet.

Optical embedded fibers and sensors attached to the structure will assess if the structural integrity (vibrations/fatigue) of the material is in line with the numerical models and results obtained from the ocean wave tank and wind tunnel tests. Since the floating structure and solar panels are driving the cost, these measurements are indispensable for further financial assessment.

SeaVolt test installation will also address ecological aspects. Various materials will be evaluated based on prevention of adverse effects on the marine environment.

The test results will determine the selection of materials for further development. It is important not only to minimize the attachment of excessive marine growth to the floater to maintain its buoyancy. Lastly, specific tests will be conducted to assess combining the floater systems with mussel cultivation and oyster farming, which present specific challenges.

This crucial test, targeting all aspects of SeaVolt technology to develop a reliable, cost-efficient, and sustainable solution, will be the first installation in the Belgian North Sea aimed at the large-scale development of offshore solar energy.



» Belgian Deputy Prime Minister and Minister for Justice and Northsea Vincent Van Quickenborne, Secretary of State for Science Policy Thomas Dermine and Mayor of Oostende Bart Tommelein alongside the partners, contractors, port officials. (Image credit: SeaVolt)

OCCIDENTAL AND ADNOC JOIN FORCES TO EVALUATE CARBON MANAGEMENT PROJECTS

Occidental and ADNOC will evaluate investment opportunities in Direct Air Capture (DAC) facilities and CO₂ sequestration hubs in the US and the United Arab Emirates (UAE) as a pathway toward the development of carbon management platforms to accelerate the net-zero goals of both companies.

Under the terms of the Memorandum of Understanding (MOU), ADNOC may evaluate participation in DAC plants and CO₂ sequestration hubs under development in the US by Occidental subsidiary, 1PointFive. Occidental and ADNOC and may also evaluate jointly developing one or more UAE-located CO₂ sequestration hubs and consider commencing feasibility and pre-front-end engineering and design studies for a 1 million tonne-per-year DAC plant, which together would provide emissions reduction solutions for carbon-intensive industrial emitters and other hard-to-abate sectors within the UAE, including aviation and maritime operations.

Through the collaboration, the companies will also consider opportunities to incorporate innovative CO₂-based technologies into the UAE. This includes technologies in which Occidental has made investments, such as emissions-free power and sustainable fuels.

"We look forward to building on our longstanding partnership with ADNOC as we advance our plans to globally deploy DAC technology and engage partners who are committed to developing carbon solutions at climate-relevant scale," said Vicki Hollub, Occidental President and CEO.

"Partnerships like this one are essential to helping the world reach its climate goals and ensure it has the resources it needs to thrive through the energy transition. We look forward to working with ADNOC on our shared vision of establishing a global net-zero ecosystem."

KEY MILESTONE FOR FLOATING WIND DEVELOPMENT IN SPANISH WATERS



» DemoSATH installation. (Image credit: Saitec)

The DemoSATH project recently achieved a significant milestone with the successful installation of its 2 MW floating wind platform demonstrator in open waters. The operation, carried out by the Windstaller Alliance, used their anchor handling vessel, the Normand Sapphire, along with local tugboats, to tow DemoSATH from the construction site in the Port of Bilbao to the BiMEP test site, two miles offshore in the Cantabrian Sea.

Works in the BiMEP area are ongoing to finalize the connection of dynamic and static cable and pull-in to the DemoSATH's turret which will enable the energy export to the onshore electrical

grid. DemoSATH is expected to generate the equivalent electricity needs of 2,000 Spanish households a year.

The installation milestone follows the recent news announcing Japan's Kansai Electric Power Corporation (KEPCO) as a DemoSATH strategic partner and co-investor.

Beyond KEPCO's vast utility experience and Saitec Offshore Technologies'—the developers of the SATH technology—engineering might, the DemoSATH project also benefits from RWE's extensive expertise in the offshore wind industry, as well the valuable contributions from several other companies involved and the institutional support from the Spanish Centre for the Development of Industrial Technology (CDTI).

With the installation of the unit now complete, the DemoSATH project will enter a period of commissioning, which will be followed by the operational phase when electricity generation will commence. The floating wind platform has been designed and equipped to harness the power of the wind in deep coastal waters and convert it into clean, renewable energy. This pioneering technology holds immense promise for reducing carbon emissions and contributing to the renewable energy goals of Spain and other countries around the world.

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COMMODITY HEADWINDS ARE BECOMING TAILWINDS



By G. Allen Brooks

*Expert Offshore Energy Analyst
& ON&T Contributor*

CRUDE OIL:

July ended with crude oil futures above \$80 a barrel, their highest price since April. During the month, oil prices climbed nearly 16 percent, the sharpest monthly advance since January 2022. As our accompanying chart shows, the march higher was very consistent throughout the month. In early August, prices continued rising. Why are oil prices rising, and so strongly? Because oil demand is growing, and supply constraints are tightening the global oil market.

In the first half of this year, oil prices struggled, and experienced periods of downward pressure whenever traders became convinced global oil demand would be weak. Traders would sell oil futures short and cut their holdings. Recently, they scrambled to cover their short positions and begin buying contracts as they sensed global oil market dynamics becoming more favorable. This is part of the reason why oil prices have strengthened.

The earlier oil price struggle was because China's economic reopening after COVID-19 proved weaker and bumpier than expected. Now, China is aggressively stimulating its economy. Oil imports are up as well as inventories. China used the earlier price weakness to purchase cheap oil that can be used to dampen inflationary pressures arising from today's higher prices.



» Consumers can expect high gasoline prices over coming months.

Higher oil prices also have foiled the Biden administration's efforts to restock the Strategic Petroleum Reserve drained last year to keep gasoline and heating oil prices down. In June, the administration sought to buy six million barrels for the SPR when prices were below \$70. With higher prices, the government canceled its bid request.

What can we expect from the oil market as we end summer and enter fall? First, we are fast approaching the peak in the hurricane season that can disrupt Gulf of Mexico oil production and tankers bringing in petroleum cargo. Secondly, US drilling activity fell as oil prices weakened. Thus, fewer barrels of new oil reserves have been discovered, limiting our ability to meet future demand. Thus, we can expect upward pressure on oil prices.

Other oil market dynamics include Saudi Arabia's announcement it will continue through September its one-million-barrel-a-day production cutback. Fellow OPEC+ member Russia is also keeping its 500,000 b/d output cut in place. Finally, a consensus is emerging that the US will avoid a recession in 2023 and maybe in 2024, thereby reducing the possibility of weaker oil demand from lower economic activity.

Support for higher oil prices is shown by the price activity around the \$72 line in our accompanying chart. Oil prices remain steadfast at that level. As history shows, when oil prices fall to that support level, they then tend to rise. Hold on to your wallets because you will be facing higher gasoline and diesel prices.

NATURAL GAS:

The story of natural gas is about heat and liquefied natural gas exports. The heat dome that descended over the southern half of the US generated days and weeks of record-high temperatures. Hot temperatures challenged electricity grids, increasing dependence on natural gas plants for their output. Numerous regional grid operators warned customers to cut electricity use to prevent blackouts. Fortunately, the warnings were heeded, and blackouts were avoided.

LNG exports in July rebounded by nine percent over June volumes as the industry completed its maintenance work on termi-

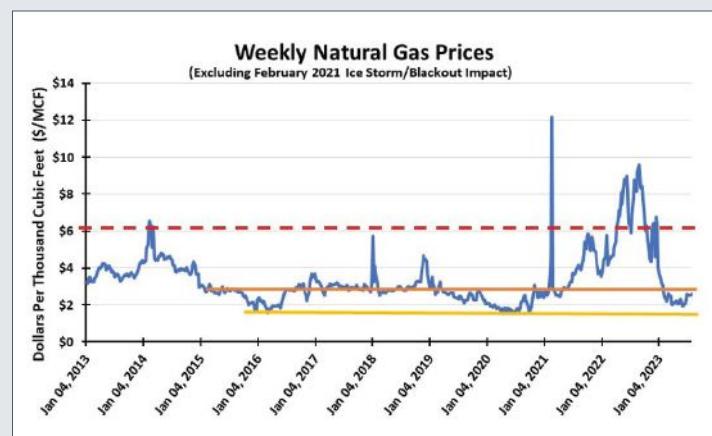
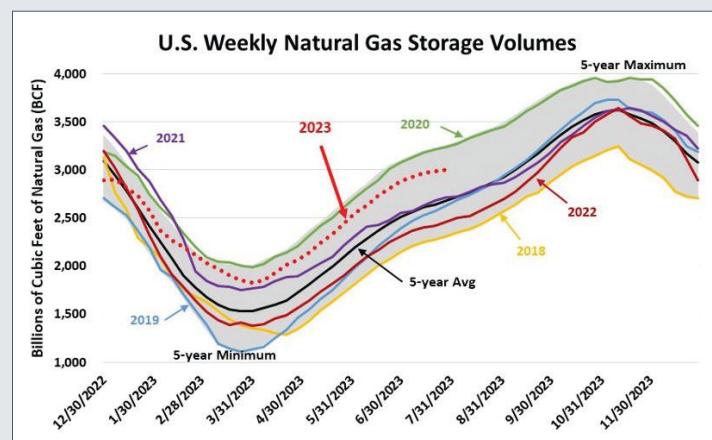
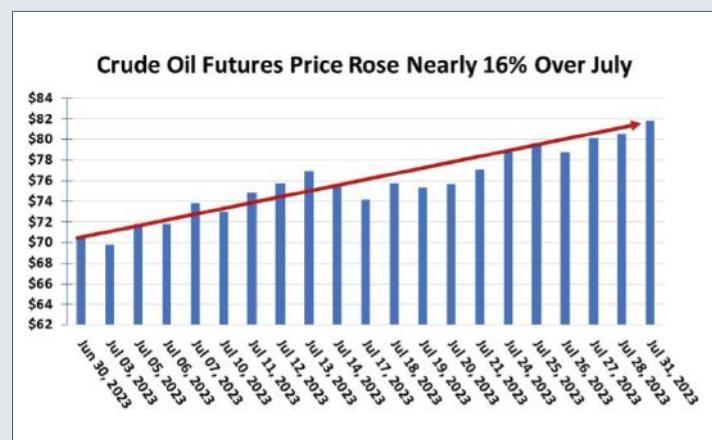
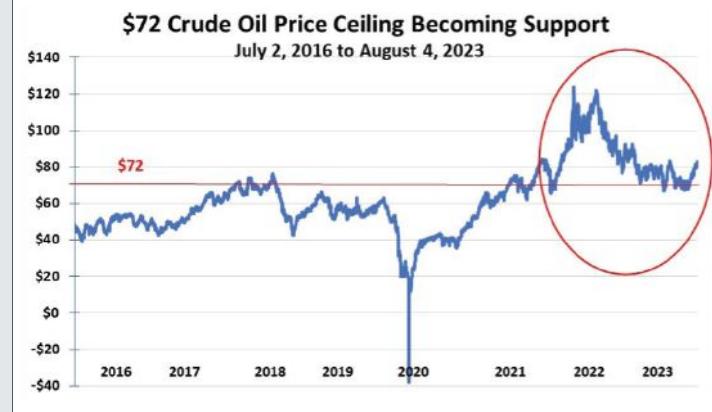


» According to S&P Global Commodity, the race is on between the US and Qatar to be the world's number one exporter.

nals. During July, the US exported 7.44 million tons (380 million cubic feet per day) of LNG, of which 43 percent went to Europe, 36 percent to Asia, 10 percent to Latin America, and two percent to the Middle East, according to Refinitiv data. The latest data showed that while Europe was the primary recipient of LNG exports, its share of total exports fell from 52 to 43 percent between June and July, while Asia's share rose from 20 to 36 percent. These trends demonstrate how Europe's current high gas storage volumes reduced buyer interest in LNG. On the other hand, Asia's increased economic activity supported increased LNG purchases.

The first half of 2023 saw three new US export terminal approvals with a combined 5.1 billion cubic feet per day of output. This is the largest annual approval since 2014 when the industry approved three terminals with a combined 4.9 bcf/d capacity. The current industry export capacity is 13.8 bcf/d, so the expansions will add substantial volumes. These terminal approvals come on top of the four currently under construction with a combined output of 8.6 bcf/d. The industry is optimistic another two terminals will be approved for construction before the end of 2023, adding 1.4 bcf/d of additional export capacity. With projections for 2035 global LNG demand reaching 627 million tons, up from 399 million tons in 2022, according to S&P Global Commodity, the race is on between the US and Qatar to be the world's number one exporter. The clear beneficiaries of this race will be the suppliers of LNG equipment and services, as well as the construction companies needed to build them.

A big question is whether the US natural gas industry can satisfy the growing demand from electricity and LNG customers. The E&P industry is confident it has the technology and capital needed and that the nation has the resource potential to meet future demand. Even in our current weak gas price phase, production continues growing. At the end of July, year-over-year gas production grew three percent to 102.5 bcf/d. Combined with the 6.1 bcf/d from Canada, the gas supply met LNG and Mexican pipeline export requirements, while also adding to domestic storage for the upcoming winter. These dynamics suggest gas prices should strengthen, but not soar as we move into fall.



OFFSHORE WIND PROGRAM EXPANDS INTO SOUTH AMERICA

BUSINESS NETWORK for
OFFSHORE WIND

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ADMINISTRATION

The Business Network for Offshore Wind, the leading organization working to accelerate offshore wind energy deployment and build a dedicated supply chain, will bring its Global Gateway export program to South America for the first time this fall.

The Network will lead a US delegation to Brazil from September 10–15, 2023, to help US companies understand the country's emerging offshore wind market and meet with key players in the region, forming business connections that enable them to export their products and services abroad.

The Global Gateway export program, established in 2021, directly connects US-based companies to the international offshore wind marketplace and supply chain through organized delegation trips to key markets in Europe, and now, South America.

Over the past two years, the Network has led four delegation trips to Europe where delegates met with key industry stakeholders, visited offshore wind sites, and participated in renewable energy conferences. To date, the Network has tracked more than \$30 million in exports through the Global Gateway program, and with the expansion into a new market, the Network expects to see a large uptick in global exports for US businesses.

"The Network is excited to expand the Global Gateway program to South America," said Liz Burdock, President and CEO of the Business Network for Offshore Wind. "We developed this export program to facilitate global connections and regional market knowledge, and we look forward to helping US companies tap into Brazil's fast-growing offshore wind market. Through

Global Gateway, we can foster connections that not only benefit US businesses but also accelerate the adoption of offshore wind both domestically and abroad."

The Global Gateway: Brazil trip will include an offshore wind educational tour and attendance at Brazil Windpower. During the week, the delegates will gain in-depth knowledge of Brazil's supply chain by attending key meetings with local suppliers, developers, and government officials, including Servtec Energia, State of Ceará Government Officials, and Petrobras.

Additionally, participants will attend the Brazil Windpower Show, where they will exhibit their businesses within the US Offshore Wind Pavilion and take B2B meetings facilitated by the Network with ABBEólica, EPE, MME, ANEEL, and more.

BREAKTHROUGH IN INSTALLATION OF OFFSHORE WIND TURBINE COMPONENTS

The Heave Chief 1100 from the Dutch company Seaqualize is a breakthrough in the quick and safe installation of the heaviest offshore wind turbine components. With this compact lifting tool, objects weighing up to 1,100 tonnes can be lifted from aboard a vessel and installed.

Iv-Consult in Papendrecht was commissioned to design all the mechanical components of this innovative steel lifting tool, which hangs in the hook of an existing offshore crane and compensates for the motions of the supply vessel transporting the vulnerable wind turbine components.

The HC1100 can hold a suspended load of 1,100 tonnes (equivalent to twenty HGVs) still against the vessel's motions, thus enabling the largest wind farm components to be lifted and installed from a vessel. The heave compensator, which has been extensively tested, compensates for the vessel's motions at sea due to swell, making installation safer, faster, and more straightforward. In addition to the operation requiring relatively little force, the process is controlled, without the occurrence of large shock loads or unintentional lifts causing the load to land on the vessel multiple times.

The HC1100 is entirely wireless, and the battery only requires a recharge after completing 15 lifts.



» The HC1100 has been developed to bring speed and efficiency to offshore wind construction. (Image credit: Seaqualize)

OSIL OIL SPILL BUOYS PROTECTING DESALINIZATION PLANTS



» The OSIL buoys provide an early warning system for the presence of hydrocarbons. (Image credits: OSIL)

Multiple Ocean Scientific International Ltd (OSIL) oil spill buoy systems are now installed in multiple locations and being used to protect the water intake systems of desalination plants.

If hydrocarbons enter a desalination plant's intakes the filters are rendered ineffective, and it can lead to the closure of the

entire plant while the complete filter stack is washed. The lengthy and costly cleaning process also causes additional complications related to the disposal of the wastewater.

The OSIL buoys provide an early warning system for the presence of hydrocarbons, providing data and alarms from the installed sensors directly to internet-enabled devices.

Alerts to issues with data collection, battery charging, etc. can also be incorporated into the notifications. These alarms ensure that preventative measures such as the deployment of oil containment booms, or the shut-down of the abstraction pumps, can be implemented in a timely manner, preventing negative impacts on the facility.

The optical oil spill monitoring systems can be networked together to cover multiple locations and can detect a variety of hydrocarbon-based substances, even under harsh weather conditions. The buoy systems can also be equipped with additional sensors, for monitoring water quality parameters, currents, meteorological conditions, etc.

OSIL has a worldwide install base to protect a variety of sensitive assets including the intakes for sea water abstraction facilities, nuclear power plant cooling systems and industrial manufacturing facilities.

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JAN DE NUL'S INSTALLATION VESSEL BEGINS CONSTRUCTION WORK FOR ØRSTED

Jan De Nul Group's newest crane vessel, *Les Alizés*, has kicked off her maiden assignment by installing the first of 107 monopile foundations for the construction of Ørsted's Gode Wind 3 and Borkum Riffgrund 3 wind farms in Germany. Delivered early 2023, *Les Alizés* arrived in the Dutch Eemshaven at the end of June, where the first monopiles were loaded before departing to the installation location in the German North Sea.

In total *Les Alizés* will transport and install 106 wind turbine monopile foundations and one offshore substation foundation, including associated topside for the offshore wind farms Gode Wind 3 (253 MW) and Borkum Riffgrund 3 (913 MW) in the German North Sea, developed by the Danish leader in offshore renewables Ørsted.

Both wind farms will use 11 MW Siemens Gamesa turbines. The Borkum Riffgrund 3 more particularly will be located adjacent to Ørsted's existing offshore wind farms Borkum Riffgrund 1 and Borkum Riffgrund 2. Gode Wind 3 will be close to Ørsted's Gode Wind 1 and 2.

Ørsted will use monopiles without transition piece. Before installation, scour protection will be installed at all 107 locations.



» *Les Alizés* vessel has a lifting capacity of 5,000 tonnes. (Image credit: Jan De Nul)

Once completed, these wind farms will generate enough electricity to power approximately 1.2 million German households every year.

Jörg Kubitz, Managing Director for Ørsted in Germany, said: "With the installation of the foundations for our two new projects this year, we are laying the groundwork for additional, large-scale renewable energy at sea. And thus further establish offshore wind power as a pillar of the energy transition. I am pleased that we have now reached the next milestone. In addition to the required capacities that will have

to be installed in the coming decades, our projects also exemplify how offshore wind power can be built out in a value-creating and competitive manner in Germany—if the right framework conditions are in place."

Peter De Pooter, Manager Offshore Renewables at Jan De Nul Group, added: "This contract is an important milestone for us, as it is the maiden project for our new Next-Gen heavy lift vessel *Les Alizés*. We are looking forward to install and complete both wind farms in close collaboration with our client Ørsted. Together with Voltaire's first mission and other projects, we are proud to contribute to construct the global transition to renewable energy by installing these offshore wind turbines in the most efficient and environmentally friendly way possible."

Thanks to her dimensions and impressive lifting and loading capacities, *Les Alizés* is able to load out, transport, and install multiple units of the largest and heaviest wind turbine foundations in deeper waters and in more challenging seabed conditions.

The vessel is fitted with a highly advanced exhaust filtering system by means of a Selective Catalytic Reduction system and a Diesel Particulate Filter, making it the first seagoing installation vessel of its kind to be an Ultra-Low Emission vessel (ULEv), moreover Stage V-certified.

» Installation of first monopile foundation at Borkum Riffgrund 2 and Gode Wind 3. (Image credit: Jan De Nul)



ROTECH SUBSEA COMPLETES IRM OPS IN NORTH SEA

Subsea trenching and excavation innovator Rotech Subsea has completed key IRM operations at a major Dutch offshore wind farm in the North Sea. The leading provider of Controlled Flow Excavation and specialist IRM tools delivered the cable de-burial, grab, cut, recovery, and post-lay trenching for a Netherlands-headquartered global subsea solutions provider.

Deploying its TRS2 CFE/RS2-3 hybrid Jet Trenching tool and RSG-C Integrated grab, cut and recovery tool, Aberdeen-based Rotech Subsea completed the de-burial of the 0.4 km of 118 mm cable in two passes at water depths of between 35–40 m. Operating at just 45–60% power—and progressing at 3 m/min—the TRS2 easily excavated down to the top of cable on the first pass with good visibility most of the way. A second pass was made to ensure good cable recovery. The cable was successfully de-buried from 1.3–1.8 m below the seabed which consisted of very soft to firm clay. Currents were two knots maximum and sea state reported at 0.5–3 m Hs.

To recover the faulty cable Rotech's RSG-C was deployed using the ship's crane. Good visibility was observed on the tool-mounted RSG-C camera and the de-burial trench



» RS2-3 Hybrid jet trenching system in action.
(Image credit: Rotech Subsea)

stayed open and clear for the grab and cut operations. Cutting operations took 10–15 minutes with the good end of the umbilical recovered to deck, sealed then laid back down on the seabed.

When grabbing the faulty end, it was discovered that the original damage to the umbilical severed it so there was a section between that, and the first cut point, that was subsequently grabbed and recovered to deck. With the umbilical connected through a cable tensioner and carousel, 125 m of cable was pulled in until the second fault location was found. The cable jointing crew completed the final cut on deck then completed the jointing operations.

For burial operations, Rotech's customizable TRS2 CFE tool was reconfigured, on deck, to the RS2-3 Jet Trencher setup for maximum cutting ability. Two passes were conducted over the new cable route and second joint at 75–95% power at approx. 5 m/min as instructed by the client with the requested higher speed in hard seabed conditions mitigated by later rock dumping along the route.

Speaking about the IRM works, Rotech Subsea Director of Subsea, Stephen Cochrane, commented:

"This was another safe, efficient, and successful mobilization for Rotech Subsea with the client extremely satisfied with how our project team responded to the discovery of additional damage to the subsea cable. It's another success for our suite of configurable CFE and hybrid jet trencher tools which were used here for both de-burial and to conduct post-lay trenching without the need for additional and costly spreads of equipment for each job."

Rotech Subsea's research, development and engineering team has created a suite of 18 sector-leading non-contact CFE, Suspended Jet Trenching tools in-house at its Aberdeen HQ. With enhanced capabilities, Rotech Subsea's CFE suite of tools is firmly established as the method of choice for offshore wind farm cable trenching and excavation in Europe and beyond.

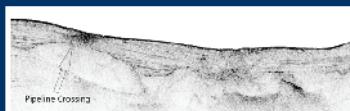


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JBS GROUP WINS CONTRACTS FOR SEA AXE TECHNOLOGY



» Sea Axe can be used for a range of projects, including seabed infrastructure planning and inspection, maintenance, and repair (IMR) work. (Image credits: JBS Group)

Award-winning JBS Group, the innovative multi-disciplined engineering firm, is executing a series of contract wins worth £2.6 million for its Sea Axe technology.

The company, based in Peterhead, is undertaking—or has already completed—several projects in the UK and internationally with the patented solution which enables fast, large-scale mass flow excavation (MFE).

The programs of work include recent support for a global engineering contractor performing reburial work as part of a decommissioning project in the North Sea.

For another global firm, based in Australia, Sea Axe is providing a means of access for cut and recovery to be made as part of a broader decommissioning project.

JBS is also using Sea Axe in the provision of excavation support for two significant European interconnector projects, where cables connect to the electricity grid between countries. For both projects, JBS is working a shift system to provide 24-hour support and delivery.

Another client, with whom JBS has worked previously, brought in the Sea Axe and the JBS team for an excavation project at a Scottish port. All contracts have been secured in the past three months.

Sea Axe is the most environmentally friendly system of its type on the market, and its comparatively small spread minimizes deck space requirements. It can also be safely deployed from a vessel's A-frame or crane.

Jo McIntosh, Sales and Marketing Director at JBS, said: "There has been rapid market recognition of the Sea Axe—a cutting-edge solution that has many advantages in terms of efficiency, cost-effectiveness and environmental sustainability."

"We are on track for substantial year-on-year growth as our relationships with clients develop and they gain a deeper understanding of how we can help to optimize their operations."

Sea Axe can be used for a range of scopes, including pipe/cable projects, seabed preparation, salvage and recovery, inspection, maintenance, and repair (IMR), decommissioning, power plant outlet pipes, unexploded ordnance clearing, harbor clearance, and subsea and offshore wind structure projects.

Previously, JBS supplied a Sea Axe MFE system complete with operational team for a pipeline burial project offshore Bangladesh. This version of the system included an electric HPU (hydraulic power unit).

SUCCESSFUL DECOMMISSIONING CAMPAIGN OFF WESTERN AUSTRALIA BY C-KORE

C-Kore Systems has successfully completed a decommissioning campaign offshore Australia, using C-Kore Sensor Monitor units to interrogate the wellhead pressure and temperature sensors on the subsea oilfield. With their automated test routine, the C-Kore Sensor Monitor units quickly and repeatedly tested and data-logged the information allowing the operator to complete their offshore campaign swiftly and safely.

C-Kore Systems subsea testing tools are easy to deploy and are operated without the need for C-Kore personnel being present, providing rapid and accurate feedback.

This combination of simplicity, accuracy and reliability introduces significant operational savings to testing campaigns.

Cynthia Pikaar, Sales & Marketing Manager of C-Kore, commented: "It is fantastic to be working on this project in Australia. With an increasing number of orders for our Sensor Monitor tools, operators understand the value our testing tools offer, automating and datalogging the results. The units are so simple to use so no extra personnel are needed offshore."

» C-Kore's Sensor Monitor units provide rapid feedback on wellhead pressure and temperature. (Image credit: C-Kore)



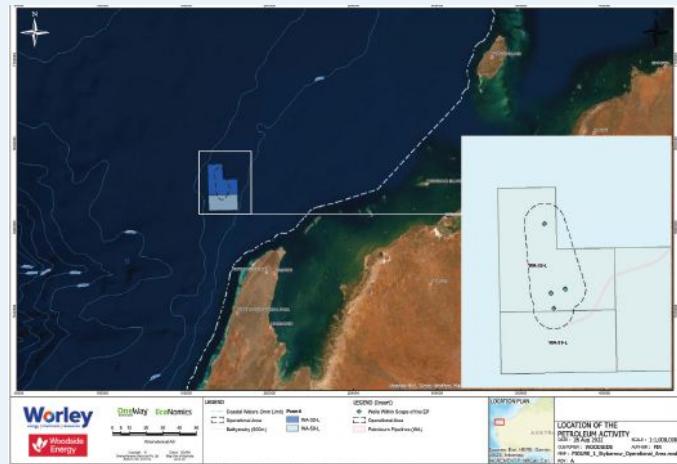
WOODSIDE ENERGY AWARDS McDERMOTT DECOMMISSIONING CONTRACT

McDermott has been awarded an engineering, procurement, and removal contract for offshore decommissioning work by Woodside Energy. The award is for the full removal of the Stybarrow disconnectable turret mooring (DTM) buoy, as part of the decommissioning of the Stybarrow field located in the northwest Cape of Western Australia.

Under the contract scope, McDermott will provide project management and engineering services for the recovery, transportation and offloading of the DTM buoy to a suitable onshore yard facility for dismantling and disposal.

"This award not only demonstrates McDermott's proven track record in undertaking deepwater projects of diverse scopes, but it also highlights the critical importance of decommissioning in the offshore industry," said Mahesh Swaminathan, McDermott's Senior Vice President, Subsea and Floating Facilities. "With our seamless integration of engineering, fabrication, and offshore mobilization expertise, we believe we are well-equipped to execute this project efficiently and responsibly, ensuring the safe recovery and removal of the Stybarrow DTM buoy."

McDermott's Perth-based team will oversee project management, while engineering and fabrication support will be provided by the



» Stybarrow Location Map. (Image credit: Woodside Energy)

team in Kuala Lumpur, Malaysia, and Batam, Indonesia. The DTM buoy will be lifted and removed utilizing McDermott's DLV2000 vessel, ensuring safe and efficient operations throughout the decommissioning process.

NEXANS TO BUILD THIRD CABLE LAYING VESSEL TO SUPPORT OFFSHORE WIND FOCUS

Nexans has announced an expansion in its presence in the offshore wind and interconnection market, by adding a third cable laying vessel to its fleet.

This strategic decision will allow the Group to meet the increasing demand for electrification, especially in the American and European markets, driven by a record project backlog and recently strengthened by the historic €1.7 billion contract with TenneT, and €1.43 billion contract for EuroAsia Interconnector project.

This new strategic asset will also directly and indirectly create hundreds of jobs worldwide during its construction and operational period.



» Nexans' flagship CLV, the Nexans Aurora. (Image credit: Nexans)

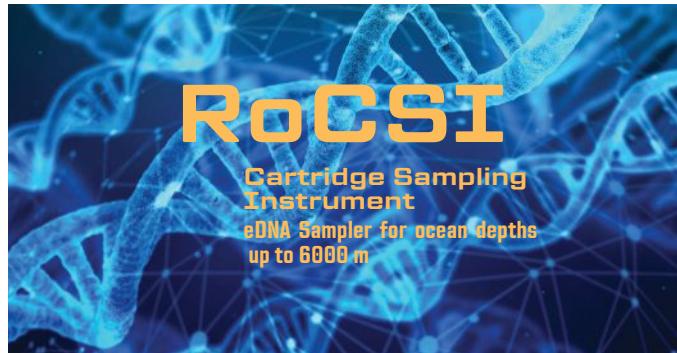
Building upon the cutting-edge technology featured on Nexans' flagship vessel, the 'Nexans Aurora', this new ship goes further with improved design, comfort and capabilities. Equipped with three turntables, offering a 13,500-tonne loading capacity, and hosting a large range of subsea tooling including jetting and ploughing tools, this vessel will be capable of laying up to four cables simultaneously to meet specific customer requirements, especially on large-scale projects. This vessel will be delivered in 2026.

By adding this vessel to its fleet, Nexans is also enhancing its versatility and flexibility covering a widening geographical footprint.

From an environmental standpoint, the new vessel with its increased load capacity, an advanced hybrid power system and capable of running on biodiesel mix, will offer a significant reduced footprint, reflecting the Group's strategic environmental vision.

"This new vessel will be the most technologically advanced cable layer ever deployed. Fitted with a range of high-tech cable installation and burial equipment, it will enhance the capabilities of our subsea cable operations to tackle projects on an unprecedented scale. This new strategic asset will support the Group's long-term growth, consolidating its leadership in the interconnection and offshore markets. It perfectly embodies Nexans' strategy to electrify the future, and its innovative features illustrate our ever-increasing commitment to meeting our partners' needs," said Vincent Dessale, Nexans Chief Operations Officer and Senior EVP.

BRINGING eDNA SAMPLING TECHNOLOGY TO MARKET



Anew automated technology, the Robotic Cartridge Sampling Instrument (RoCSI) performs autonomous, high-count, *in situ* sample collection up to 6,000 m that allows resulting environmental DNA (eDNA) studies to characterize biological communities with high sensitivity and species-level accuracy without disturbing organisms in the environment.

RoCSI is designed for high capacity, fine porosity sampling with the ability to continuously sample, depending on space in the vehicle. Specimens are preserved *in situ* in Sterivex™ filters with porosity ranging from 0.22 to 0.45 µm. Water samples are collected and then biologically preserved with a user-specified fixative. Optional in-line bleach flushing cleans the sample intake, reducing cross contamination.

BROADENING BIODIVERSITY STUDIES

eDNA has rapidly become a critical component of marine biodiversity studies. Using eDNA samples, biologists, and oceanographers are increasing the scope of biodiversity studies and acquiring more data about the structure and dynamics of marine ecosystems and their ecological processes.

With automated eDNA collection instruments such as the RoCSI, factors that characterize biological communities can be examined. These factors encompass geographic conditions, seasons, climate responses, and collection depth. Facilitating genetic observations in varying conditions has great potential to improve baseline data, especially in environments like the deep-sea.

SUCCESS IN THE FIELD

While the RoCSI is compact in size (15.5 kg (air); 10 kg (seawater)) the instrument is designed to operate as deep as 6,000 m and has been successfully deployed at over 4,900 m on the National Oceanography Centre (NOC) ROV Isis on the SMARTEX JC241 cruise as well as at 3,400 m on AutoSub6000 during the iMirabilis expedition for EU Horizon 2020 project. RoCSI can be adapted to vehicle integration, long-term mooring systems, buoy mounts, bottom landers, and shipboard applications.

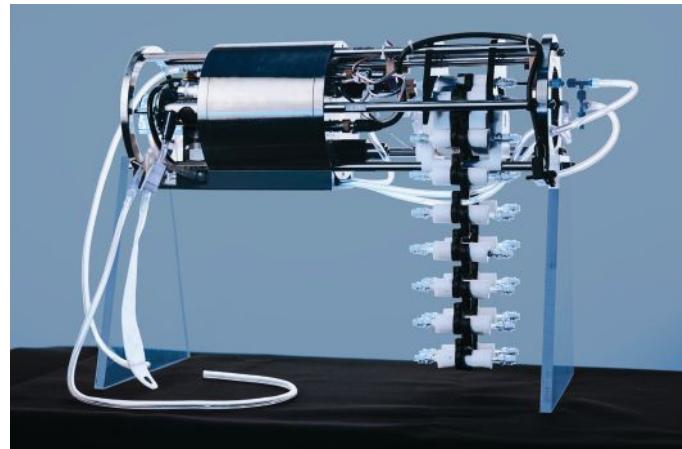
The field-proven RoCSI was developed by the NOC Innovations team in Southampton, UK. As part of a 2023 technology transfer partnership with McLane Research Laboratories, this innovative eDNA sampler is now being commercially manufactured and made available to the eDNA sampling community worldwide. McLane officially launches the RoCSI at OCEANS Gulf Coast this September 25–28 in Biloxi, MS.

"We are delighted to be working with McLane to ensure that RoCSI is made available to all in the field of eDNA sampling. I'm looking forward to seeing the impact that this technology development has in what is a truly exciting new area of environmental monitoring," said Philip Bishop, Head of Commercial Development, NOC.

"The RoCSI is an ideal complement to our sampler product line adding fine-porosity, high-resolution sampling to our capabilities," added McLane Research Laboratories CEO Yuki Honjo. "This innovative instrument will support researchers in the wide-ranging field of ocean eDNA."

McLane Research Laboratories manufactures time-series *in situ* oceanographic instrumentation for scientific deployments in the open ocean, and freshwater environments. For more information, visit: www.mclanelabs.com.

NOC Innovations Ltd is the trading subsidiary of the National Oceanography Centre and acts to build bridges between science and business. Their capabilities enable the transferring of cutting-edge technology and research to industry with the revenue generated being used to support their charitable mission. For more information, visit: www.noc-innovations.com.



» RoCSI is designed to operate to depths of 6,000 m and can be integrated into vehicles, long-term mooring systems, buoy mounts, and bottom landers. (Image credit: National Oceanography Centre)

BEDROCK RAISES FUNDING TO ACCELERATE COMPANY EXPANSION

Bedrock, a leading vertically integrated seafloor data acquisition and distribution platform, has secured \$25.5 million in its Series A funding round, bringing its total funding to date to \$33.5 million. The funds will be utilized to bring its unique data offering to the offshore wind market this year and grow the company's proprietary unmanned autonomous underwater vehicle (AUV) acquisition system.

Bedrock has the potential to accelerate and reduce risks for the development of offshore wind energy projects, a key strategic interest supported by the Biden administration with significant support from the IRA (The Inflation Reduction Act).

The investment round was co-led by global VC firm Northzone and Primary Venture Partners, with significant participation from Valor Equity Partners, and existing investors Eniac, Quiet Capital, and R7. Bedrock continues to garner support from individual investors in the space and prolific angels.

Founded in 2020 by Anthony DiMare and Charles Chiau, Bedrock is a public benefit corporation committed to transforming

how geophysical seafloor data is acquired and distributed. Its AUV technology and cloud data platform aim to reduce the time, environmental impact, and costs associated with seafloor exploration and mapping, speeding up the development of offshore wind energy. Over time, Bedrock will build the largest library of seafloor data that can be licensed to many at a dramatically reduced cost to surveys today.

Today's offshore wind energy sector faces substantial challenges due to the lack of detailed, rapidly available, up-to-date seafloor data. This lack of data upfront in turn hinders project planning, increases construction and site risks, and slows the pace of renewable energy development.

Bedrock suite of data acquisition and services encompasses a broad range of survey types, including: bathymetry (shape of the seafloor), backscatter (hardness of the seafloor substrate), side scan sonar imagery (object & geological identification), magnetic (for detecting ferrous material), and coming in 2024, sub-bottom profiling data (layers beneath seafloor).

"Bedrock's mission is to accelerate ocean exploration by developing the technology needed to build the most accessible and complete ocean dataset. Our goal is to provide accelerated innovations at sea to rapidly advance the collective understanding of oceans, remove bottlenecks in critical infrastructure projects, and provide valuable data insights necessary for stakeholders to make lower-risk, and impactful decisions," said Anthony DiMare, Bedrock Co-Founder and CEO.



» Funding will allow Bedrock to expand the company's AUV development plans.
(Image credit: Bedrock)

HUGHES SUBSEA ESTABLISHES DIVE SUPPORT SERVICES IN TAIWAN



» Equipment will be available for mobilization from an ops base in Taichung. (Image credit: Hughes Subsea)

Hughes Subsea, an OEG Group company, has announced its expansion into Taiwan marking a significant milestone for the company.

The move includes the delivery of an IMCA compliant offshore air diving system, in response to the continued growth of the Taiwanese offshore wind market and expected increase in demand for support services during the construction phase of offshore wind farms.

The equipment spread which includes a diving and nitrox compressor container, decompression chamber container, Launch and Recovery System (LARS), and a dive control container will be available for mobilization from OEG Renewable's recently expanded operations base in Taichung.

Ian Hughes, Managing Director at Hughes Subsea said: "This expansion is a strategic and proactive response to the projected increase in demand for specialist subsea services in the region, positioning Hughes Subsea at the forefront of Taiwan's clean energy sector."

FUGRO TO SURVEY WATERS OFFSHORE CURAÇAO FOR FUTURE OFFSHORE WIND DEVELOPMENT



» Fugro Brasiliis. (Image credit: Fugro)

The Government of Curaçao has asked Fugro to map the seabed of the island's surrounding waters for future development of floating offshore wind farms. The Curaçao Government's target is to realize 6 GW in renewable energy capacity by 2035, which is more than the domestic need for energy, ultimately enabling the production and export of green hydrogen.

This development is a hugely important step for Curaçao in its efforts to accelerate the transition to green energy and strengthen the local economy. The survey work by Fugro follows on a feasi-

bility assessment by research organization TNO, which concluded that Curaçao's territorial waters are some of the best in the world for large scale deployment of floating offshore wind.

Coordinated by Fugro's Americas team, the *Fugro Brasiliis* will survey the area to improve the understanding of the local seabed, subsurface and marine environment. This geophysical reconnaissance survey will be used to create a comprehensive report on local conditions. This information empowers the Government of Curaçao in making first steps in determining best locations for floating offshore wind farms and preservation of the marine ecosystem.

Curaçao's ambition is to deploy the resources of the island in partnership with strategic alliances, gaining and maintaining a competitive edge through the production and export of hydrogen and other green carriers. The mega-project is developed in alliance with the Netherlands, providing the opportunity for Curaçao to position itself as a regional forerunner and potential supplier of sustainable energy to the Netherlands and other countries.

"For island economies, climate change is already an existential reality. We are particularly happy to work closely with the Government of Curaçao to support their vision to lead in the production and export of green energy. Their ambition aligns strongly with our mission to contribute to a safe and livable world," said Fugro CEO Mark Heine.

SAIPEM AWARDED MAJOR CONTRACTS IN THE MIDDLE EAST AND BRAZIL

Saipem has been awarded two new contracts, one for EPCI offshore activities in the Middle East and the other for the development of underwater drones in Brazil. The overall amount of these new acquisitions is approximately \$1 billion.

Under the existing Long-Term Agreement (LTA) with Saudi Aramco, Saipem has been selected to be awarded a new offshore project. The scope of work involves the engineering, procurement, construction, and installation of five platforms and associated subsea pipelines, flowlines, and cables in the Marjan field, offshore Saudi Arabia, featuring an entirely in-Kingdom fabrication scheme. The effectiveness of the contract is subject to the fulfilment of the customary conditions precedent.

With this important award, Saipem further strengthens its long-standing relationship with Saudi Aramco and its strategic positioning in the Middle East.

Furthermore, Saipem has been awarded a contract by Petrobras for the development and testing of an autonomous subsea inspection robotic solution, which will be based on Saipem's fleet of underwater drones, starting from the Flatfish AUV, as well as the qualification of related autonomous drone-based services, enabling future inspection contract options offshore Brazil.

This contract marks a fundamental milestone for Saipem's innovative underwater robotics program and for the global scale utilization of subsea drones in offshore projects throughout the entire value chain, and it allows to extend to the new features to the Technology Readiness Level 8 (TRL8) achieved on Saipem's fleet of subsea drones. The potential of these subsea technologies within the offshore domain is vast, both for oil and gas developments as well as for the renewables market segment.



» Saipem's Flatfish AUV. (Image credit: Saipem)

BENTHIC COMPLETES CPT SITE INVESTIGATION FOR EQUINOR'S OFFSHORE WINDFARMS

Earlier this year, Benthic, a Geo-services brand in Acteon's Data and Robotics division, completed a site investigation comprising cone penetration tests (CPTs) using its portable remotely operated drill (PROD) that has enabled the design of foundations for about 100 wind turbines and two offshore substations for the Baltyk II and III wind farms offshore Poland in the Baltic Sea. The work for the developments, which are 50–50 joint venture between Norwegian energy company Equinor and Polish power utility company Polenergia, was performed at 16 locations in 40–55 m water depths.

The PROD unit, supported by the survey services of Acteon Geo-services brand UTEC, was deployed from the Ocean Zephyr offshore supply vessel. The geotechnical work began in December 2022 and the three-month project was completed in March 2023. Wind farm construction is expected to start in early 2024, and the first power export is anticipated in 2026.

"We wish to thank Equinor and Polenergia for entrusting us with their Baltyk II and III wind farm development plans," said Jonathan Watt, Benthic Managing Director. "Our PROD unit encountered some of the most challenging soil conditions we have seen to date, including layers of dense sands and medium-dense silty sands,

and the project showcased PROD's capability to perform in varying subsurface conditions. A huge congratulations must be extended to all the project participants and stakeholders for a safely executed project and one which supports Poland's energy transition."



» PROD being deployed from Ocean Zephyr. (Image credit: Acteon)

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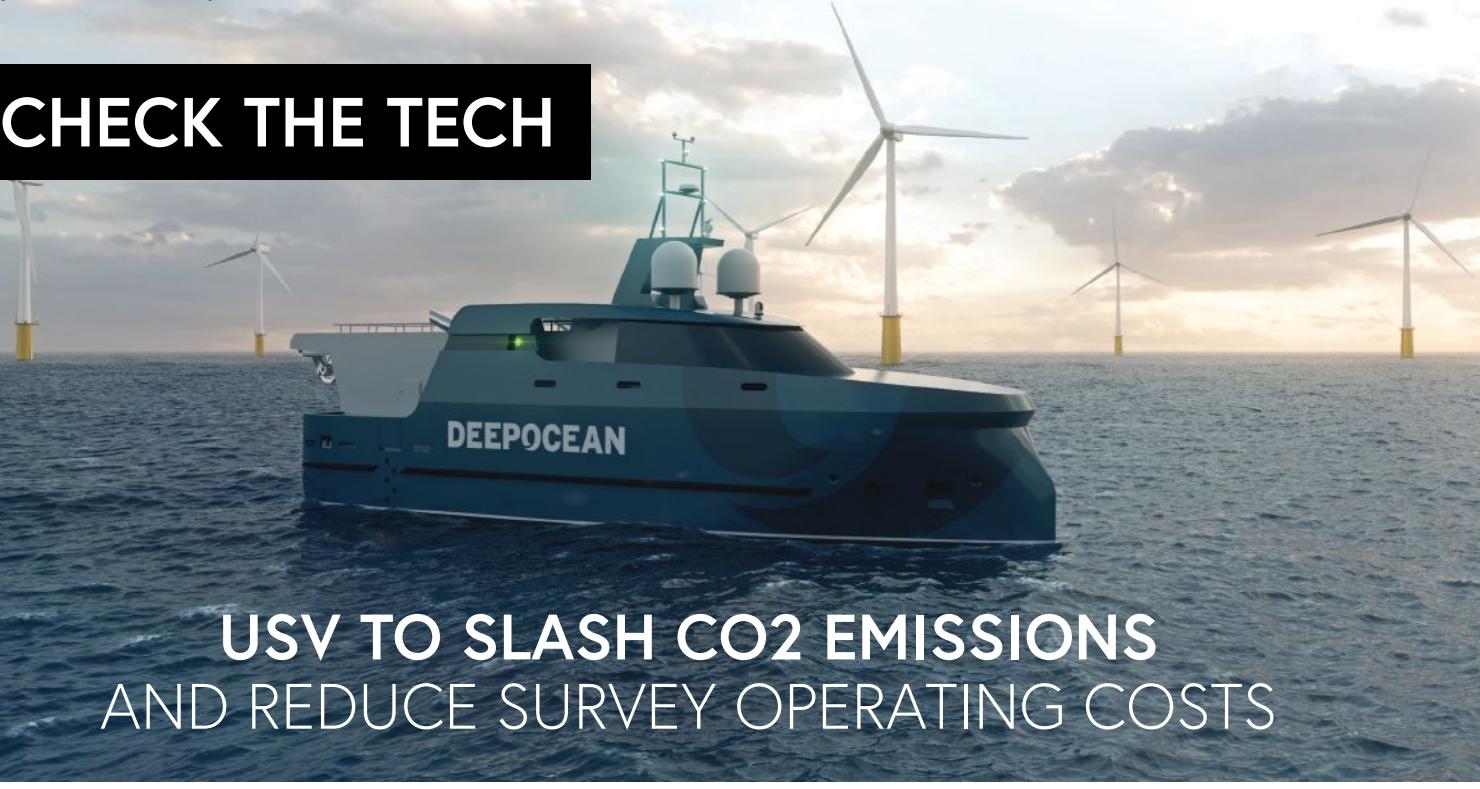
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CHECK THE TECH



USV TO SLASH CO2 EMISSIONS AND REDUCE SURVEY OPERATING COSTS

» The 24 m USV will be capable of 30-day missions and controlled from a shore-based command. (Image credit: DeepOcean)

The steady integration of uncrewed surface vessels (USVs) into offshore operations promises to flip the script on how ocean professionals perform more complex and often dangerous at-sea missions.

Routine subsea inspection, maintenance, and repair (IMR) tasks certainly represent some of the more challenging—and costly—deployments and traditionally rely on support vessels from which to deploy and recover the necessary equipment and technologies.

With the ongoing expansion of the offshore energy sector, and in particular, the accelerating and concerted efforts to plug offshore wind into the global energy mix, the growing appeal and subsequent adoption of uncrewed vessels for critical survey work is likely to prove instrumental in identifying—and sticking to—a sensible path to a more carbon-conscious future.

TECHNOLOGY TRIUMVIRATE

This is certainly the view of USV AS, a joint venture between DeepOcean, Sønstad Offshore, and Østensjø that recently contracted Astilleros Gondán shipyard to build a USV capable of slashing the carbon footprint of subsea IMR campaigns by more than 90 percent when compared to top-

side-heavy conventional approaches.

The 24 m x 7.5 m hybrid diesel-electric USV will be supported by an exclusive battery package developed by Seam, capable of powering remote offshore operations for up to 30 days without needing to recharge or refuel.

For closer underwater inspection and intervention measures, the USV will be supported by a 1,500-m depth-rated Work Class remotely operated vehicle (ROV).

REMOTE SUBSEA CAPABILITIES

While designed to perform several autonomous functions, the USV will be monitored and controlled by a shore-based command—a team of skilled USV and ROV operators.

To maximize the USV's workable weather window, it will be outfitted with an innovative launch and recovery system (LARS) that is able to fully protect the integrity of the ROV and its tooling in a way that a conventional moonpool or A-frame system cannot.

This, according to DeepOcean CEO Øyvind Mikaelson, is the key to guaranteeing safe and reliable remote offshore operations.

Speaking exclusively to ON&T about this

collaborative approach to engineering fit-for-purpose uncrewed platforms, Mikaelson said: "This project is about channeling the extensive collective expertise of three prominent commercial partners, all with vast experience of managing ISR campaigns in some of the harshest marine environments on the planet—the North Sea."

The capacity to remotely control an ROV with such comprehensive tooling capabilities while being hosted from an uncrewed marine asset marks a true step change in bringing real-world solutions that harness cutting-edge technology in the name of driving meaningful efficiency gains.

Håvard Framnes, Investment Director at Østensjø, added: "In the age of remote operations, we believe our USV allows operators to prioritize personnel safety while guaranteeing operational efficiency."

"Once again, this demonstrates how the Norwegian offshore cluster is driving innovation across the ocean industry and ultimately leading the way in terms of developing future-proof products to help propel the energy transition."

Delivery of the USV is expected by the end of 2024. The plan is that the USV, following offshore testing, will be ready for operations in 2025.

OPTIME SUBSEA SUCCESSFULLY TESTS HIGH-SPEED WIRELESS COMMUNICATION SYSTEM



» From L-R: Jan Fredrik Carlsen, CEO, Trond Løkka, Chief Innovation Officer, Torfinn Kristensen, Director of Services.
(Image credit: Optime Subsea)

The wireless communication system, part of Optime Subsea's Remotely Operated Controls Systems (ROCS), was successfully tested at the Wintershall Dea-operated Nova field, which is located about 120 kilometers northwest of Bergen, Norway, in 370 meters water depth.

"This is a game-changer for the oil and gas industry, which for 20 years has tried to solve this challenge. For the very first time, the complete wireless installation of the tubing hanger on the subsea tree was accomplished without relying on a wired drill pipe," said Trond Løkka, Chief Innovation Officer at Norway-based Optime Subsea.

When completing subsea wells, the tubing hanger is placed on top of the wellhead, as a seal towards the rest of the subsea well. Normally the tubing hanger is controlled through a dedicated hydraulic umbilical that runs from the topside to seabed and adds a large 20–30 feet control container topside. However, Optime Subsea's ROCS has permanently removed the need for both the umbilical and the topside hydraulic unit, with the obvious cost and environmental benefits this provides.

For instantaneous data transfer from down-hole to surface—and back—Optime Subsea has until now relied on a wired drill pipe. Optime Subsea has for many years had an ambition of replacing this data transfer method with wireless communication, further reducing capex investments and operating costs for operators.

"Think Wi-Fi from topside to seabed, to control well completion operations. We have proven that this is both possible and reliable. In our view, this way of installing tubing hangers on subsea trees will become the new industry standard for subsea well completion operations worldwide because of its substantial cost and environmental savings versus competing methods," adds Trond Løkka.

Optime Subsea's subsea wireless telemetry system has performed excellently with high-speed data communication and low power consumption.

While the first operation was performed on Wintershall Dea's Nova field, another operator—Aker BP—has been instrumental in the development of the wireless communication system.

"This project has been driven by Aker BP, with Wintershall Dea graciously participating in the testing. We are extremely grateful to both operators for their continuous dedication to chasing cost, environmental and health and safety benefits associated with remote subsea operations," added Løkka.

TRENDSETTER COMPLETES WELL INTERVENTION CAMPAIGNS IN GULF OF MEXICO

Trendsetter Engineering, Inc. recently completed two deepwater well stimulation campaigns for major operators in the US Gulf of Mexico. These two campaigns resulted in the successful acid treatments of a combined six wells. The wells ranged in water depth from 6,500 – 7,200'. These campaigns come on the heels of a contract agreement to deliver hydraulic intervention and technical services via the Subsea Tree Injection Manifold (STIM) for a Hydrate Remediation and Flowline Flush Project in the Gulf of Mexico.

The Trendsetter STIM offers a 15,000 psi rated subsea safety system designed to provide hydraulic well access for both vertical and horizontal tree types in up to 10,000' water depth. In addition to hydraulic well stimulation, the STIM unit has been used and is capable of supporting various other hydraulic intervention operations including hydrate remediation, bull heading of kill weight fluid and cement as well as flowline flushing and testing operations for both pre and decommissioning.

» STIM deployment. (Image credit: Trendsetter)



HWCG AND CSA OCEAN SCIENCES DEVELOP SDM EQUIPMENT PROGRAM

The US Gulf of Mexico (GOM) is crucial to domestic offshore energy production, protecting people and the environment is of principal importance to the oil and gas industry. In an effort to enhance monitoring capabilities and comply with new regulations, HWCG LLC (HWCG), a consortium of deepwater operators in the GOM, is leading the development of a Surface Dispersant Monitoring (SDM) Program.

HWCG collaborated with CSA Ocean Sciences Inc. (CSA), a marine environmental consulting firm and key Response Provider for HWCG's deepwater containment organization, in the development of the SDM Equipment Program. CSA's scientists and operations specialists selected equipment for the SDM Program to meet regulatory requirements for the use of dispersants 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).

When proposing to use surface dispersants for more than 96 hours or in response to a discharge of more than 100,000 gallons in 24 hours, the regulation requires collection

of water samples and data near the ocean surface, including droplet size distribution, dissolved oxygen concentration, methane, pH, in situ fluorescence, temperature, and salinity.

While the industry's primary focus is prevention and containment, being prepared to respond to an accidental discharge is essential. HWCG's operating members are now capable of deploying simultaneous deepwater monitoring and surface monitoring at different locations to effectively use dispersants as a response tool, to optimize response time, and to comply with current regulations.

HWCG's Managing Director, Craig T. Castillo, said: "HWCG's operating members working in the US GOM have access to one of the most technologically advanced and comprehensive response systems in the world. This system is capable of capping wells with up to 20,000 psi shut-in pressure, and water depths up to 10,000 ft.

"HWCG's response plan integrates key Response Providers and Member Mutual Aid to provide an effective and efficient source control solution, meeting the



» Offshore control room. (Image credit: CSA)

National Response Priorities stipulated in 40CFR300.317: 1) Safety of human life, 2) Securing the source, and 3) Using all necessary containment and removal tactics. These capabilities are complemented by having access to CSA's monitoring equipment, scientists, and operations personnel to monitor and protect the environment and response workers."

HWCG offers other operators in the GOM the opportunity to join the SDM Program and strengthen the industry's ability to respond rapidly to accidental discharges that could potentially affect surface waters of the GOM and its shoreline.

ROVCO WINS OFFSHORE SURVEY CONTRACT FOR CENOS FLOATING WIND FARM IN NORTH SEA



» DP2 Glomar Supporter. (Image credit: Rovco)

Rovco has been contracted by Flotation Energy to carry out a geoenvironmental

survey at its planned Cenos floating offshore windfarm, 200 kilometers off the northeast coast of Scotland.

Located in the Central North Sea, the 1.4 GW Cenos floating wind development will cover approximately 333 km². Rovco, having recently launched a dedicated marine site characterization business line, will deploy its multi-purpose, custom-reconfigured DP2 survey vessel, the *Glomar Supporter*, to carry out the work.

It is expected that the project will comprise subsea studies of the floating wind turbine generators, mooring line anchor locations, inter-array cables, fixed foundation substa-

tion areas, and the portion of export cables that fall within these locations.

Rovco's scope of work involves the acquisition of geophysical and benthic information to provide detailed data to inform environmental impact assessment (EIA) consents and the engineering processes from engineering to early front-end engineering and design (FEED) study.

The geophysical element of the workscope requires the acquisition of multi-beam echo sounder, side scan sonar, magnetometer, sub-bottom profiler, and multi-channel seismic data along with associated analysis, processing, interpretation, and reporting.

TDI-BROOKS INCREASES VESSEL CAPACITY WITH R/V NAUTILUS

TDI-Brooks has increased its vessel capacity by adding a 75-meter DP2 vessel, R/V *NAUTILUS* (formerly *Nautical Geo*), to its fleet. The vessel can potentially offer a variety of offshore assistance with sub-sea services, construction aid, exploration, production, ROV and diving support, and scientific marine research and survey mapping, along with military support.

This vessel will finish its retrofit period in late September and then transit to Trinidad for several geotechnical coring projects. One of these programs will involve spud can analyses utilizing the recently delivered Manta-200, deployed through the *NAUTILUS* mid-ship moonpool.

As well as a North American MCK-1240 upper forecastle deck STBD side SWL 7.1-ton crane and large accommodation capac-

ity (46 berths), the vessel will be outfitted with TDI-Brooks' complete geotechnical tool kit, including a suite of innovative geotechnical tools for soil sampling and measurement. These include 0.5- and 1-meter box corers (BC), 6 and 9 meter piston corers (PC), 20 meter jumbo piston corers (JPC), cyclic t-bar instrument (TBAR), piezo-cone penetrometers including a 40 meter CPT-Stinger and 10 meter Gravity CPT tool (gCPT), newly acquired Geomil Manta-200 CPT, Neptune 3K & 5K vibracorers and TDI-Brooks' designed pneumatic vibracorer.

The *NAUTILUS* will also be equipped with a Teledyne RESON full ocean depth multibeam echosounder (MBES) for surveys to ~2,500 m water depth for performing hydrographic marine, surface geochemical "seep-hunting" (SGE) and seabed heatflow surveys (HF).

The *NAUTILUS* will be operated within a robust Safety Management System whereas all of TDI's vessels are regularly vetted by client marine assurance groups and are a part of the OCIMF Offshore Vessel Inspection Database (OVID).



» R/V NAUTILUS. (Image credit: TDI-Brooks)

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USSOCOM DECLARES OPERATIONAL CAPABILITY FOR DRY COMBAT SUBMERSIBLE

US Special Operations Command (USSOCOM) has declared Initial Operational Capability for Lockheed Martin's Dry Combat Submersible (DCS). This milestone represents a transformational capability for USSOCOM forces in Maritime and Undersea Systems.

"The Dry Combat Submersible has the potential to transform undersea warfare for special operators," said Gregg Bauer, C6ISR VP and General Manager at Lockheed Martin. "DCS provides safe, clandestine delivery for occupants over long distances in a completely dry environment and features a lock-in and lock-out chamber. Occupants arrive at the mission warm, rested, hydrated and ready, making this vessel a key advantage in mission success."

With this capability, US Special Operations Forces traveling extended distances below the surface of the ocean will be safe to do so without a wetsuit and without exposure to the elements. Due to the DCS's lock-in/lock-out technology, special operators can get in and out of the vehicle while entirely submerged and undetected.

DCS is designed to transport a special operations team to their destination and enables personnel to arrive discretely to their desired exit point.



» A DCS departs from Lockheed Martin's Palm Beach facility.
(Image credit: Lockheed Martin)

SAAB OFFERS EXPEDITIONARY SUBMARINES TO DUTCH DEFENSE FORCES

Supported by Sweden and the UK, Saab has submitted its proposal for the replacement of the Netherlands' current submarines. The proposal comprises four advanced Expeditionary Submarines with the latest innovations and technologies and includes a cooperation with Dutch shipbuilder Damen Shipyards Group.

Saab's offered solution is based on a successful, proven and future-proof design. It will incorporate the latest capabilities and technologies, whilst its truly modular design will allow for new technologies as they evolve to ensure relevance for many years to come.

Saab and Dutch shipbuilder Damen Shipyards Group have cooperated since 2015 and the offer to build submarines to replace

the Dutch Walrus-class is a balanced cooperation between the Netherlands and Sweden.

"The outstanding capabilities of the Expeditionary Submarine C718 meets and exceeds the Dutch needs and requirements long-term. Our offer constitutes a substantial contribution to the operational capability of the Dutch Defense Forces. Cooperation with local industry throughout the program secures strategic autonomy for the Netherlands. These are Dutch submarines for the Royal Netherlands Navy," said Mats Wicksell, Senior Vice President of Saab's business area Kockums.

The C718 is an advanced Expeditionary Submarine that offers an unsurpassed level of endurance and exceeds the Royal Netherlands Navy needs for long-distance operations, sufficient accommodation, crew comfort and increased weapon payload capability.

As part of the proposal, Saab offers a proven and integrated weapon launching system and one of the best sensor systems in the world. Saab's innovative design features signature solutions to minimize detection by active sonars, all combined in an undetectable and extremely capable submarine.

The offer includes knowledge transfer to the Netherlands. Once delivered, the submarines will be fully maintainable by the Royal Netherlands Navy including upgrades throughout their lifespans.



» Saab's proposal will incorporate the latest modular capabilities and technologies. (Image credit: Saab)

NAVAL GROUP ROLLS OUT THIRD BARRACUDA CLASS NUCLEAR ATTACK SUBMARINE



» Barracuda class submarine in construction. (Image credit: Naval Group)

In late July, the third submarine of the Barracuda class left its construction hall in order to be transferred to the DME floating platform-type shiplift. It is part of a series of six SSNs that will gradually replace the submarines of the Rubis class currently in service within the French Navy.

This submarine is the third in the Barracuda class. Its rollout is a key step in the program's progress which will lead to the beginning

for its sea trials in 2024. Prior to this, completion work and initial tests will be carried out at quayside.

"A real series dynamic has been created," said Pierre Eric Pommellet, CEO of Naval Group. "The rollout of the third Barracuda submarine is a major milestone for Naval Group and all its partners, in particular TechnicAtome and the CEA (French Atomic Energy and Alternative Energy Commission). We are fully committed to this major program, which we are proud to lead on behalf of the DGA and the French Navy, and which will provide France with an unrivaled defense tool. This event is a reminder that French industry is proudly at the service of our armed forces. I salute the commitment of all the men and women involved in making this program a success."

Naval Group is in charge of the production of these submarines, from their design to their construction, as well as the manufacture of the main components of the nuclear boilers which are developed and produced with TechnicAtome. Naval Group is also in charge of providing logistical support and maintaining the submarines in Toulon.

SUCCESSFUL AUV LAUNCH AND RECOVERY FROM AN UNDERWAY SUBMARINE

L3Harris, along with industry partners, has developed and integrated a homing and docking solution that enabled launch and recovery of an autonomous underwater vehicle (AUV) from an underway submarine, referred to as Torpedo Tube Launch and Recovery (TTL&R).

L3Harris is the first company to accomplish a fully autonomous launch and recovery of an AUV from an underway submarine, leveraging its proven Iver4 AUV technology. L3Harris is eager to enable the TTL&R capability for real-world missions.

The ability to recover AUVs into an underway submarine enables the host platform to remain covert in safe waters while the AUV is launched to perform surveys and missions in areas that the host platform can't go. AUVs return with high-fidelity data to be used for tactical and navigational planning and decision-making, delivering manned-unmanned teaming to the fleet.

L3Harris' autonomous capabilities are designed to operate across multiple domains delivering relevant operational

advantage in contested environments where manned operations could put sailors and submarines at risk. Its autonomous vehicles and vessels integrate state-of-the-art payloads to detect, track and hold the most challenging threats at risk. L3Harris' proven capabilities and real-world maritime mission experience demonstrate autono-

my's value to fill today's operational maritime gaps.

The L3Harris team worked very closely with the US Navy to demonstrate AUV launch and recovery through a challenging test program aboard submarines and Navy support vessels.



» Torpedo Tube Launch and Recovery. (Image credit: L3Harris)

THE US NAVY'S DESIGNS ON A HYBRID FLEET



By Captain George Galdorisi
USN – retired



» The Devil Ray T38 is able to transport and deploy the more compact MANTAS T12. (Image credit: MARTAC)

The US Navy stands at the precipice of a new era of technology advancement. In an address at a major military-industry conference, the US Chief of Naval Operations, Admiral Michael Gilday, revealed the Navy's goal to grow its fleet to 500 ships, comprising 350 crewed vessels and 150 uncrewed maritime vehicles. This plan has been dubbed the hybrid fleet.

The reason for this commitment to uncrewed maritime vehicles is clear. During the 1980s, the US Navy significantly expanded its fleet, reaching 594 ships in 1987. That number has declined steadily over time, to less than half of what it was at its peak. However, advances of uncrewed surface vehicle technology have provided the Navy with a new way to put more hulls in the water.

UNCREWED EXPANSION PLANS

Juxtaposed against this aspiration is the fact that the US Congress has been reluctant to authorize the Navy's planned multi-billion-dollar-investment in USVs without a robust concept of operations (CONOPS) for using them. Congress has a point. The Navy has announced plans to procure large numbers of uncrewed systems—especially large and medium USVs—but an official CONOPS is yet to emerge. Additionally, while the composition of the future Navy's crewed vessels is relatively well understood, what those uncrewed assets will look like, let alone what they will do, has yet to be fully determined.

That said, the Navy has taken several actions to define what the newly incorpo-

rated uncrewed maritime vessels will do, including the publishing of an UNCREWED Campaign Framework, standing up an Uncrewed Task Force; establishing Surface Development Squadron One in San Diego and Uncrewed Surface Vessel Division One in Port Hueneme, CA; and conducting a large number of exercises, experiments and demonstrations where operators have had the opportunity to evaluate uncrewed maritime vessels.

TACKLING LOGISTICS

All these initiatives will help inform a convincing CONOPS, which will need to include comprehensive logistics plans explaining how assets will get to a target operating area (for example, the Western Pacific), as well as details of the missions that they will perform once deployed.



» Textron's Common Unmanned Surface Vehicle (CUSV), AKA MCM-USV. (Image credit: Textron)

The answer to the first question is that the Navy has committed to obtaining seven large uncrewed surface vehicles (LUSVs)—between 200–300 feet in length and with a displacement of 1,000–2,000 tons over the next five years.

An emerging concept of operations is to marry various size uncrewed surface, subsurface, and aerial uncrewed vehicles to perform missions that the US Navy has—and will continue to have—as the Navy-After-Next evolves.

Simply put, the Navy can use the LUSVs as transportation for smaller USVs, UUVs, and UAVs into the battle space to perform critical missions such as intelligence, surveillance, and reconnaissance (ISR) and mine-countermeasures (MCM).

While there are a wide range of medium uncrewed surface vehicles (MUSVs) that can potentially meet the US Navy's needs, there are three USVs that are furthest along in the development cycle. All are currently in production and fully operational. They are:

- The Vigor Industrial Sea Hunter is the largest of the three, launched in 2016 and built at a cost of \$20 million.
- The Textron monohull Common Uncrewed Surface Vessel (CUSV), now referred to as the MCM-USV, which features a modular, open architecture design.
- The Maritime Tactical Systems Inc. (MARTAC), catamaran hull, USV line, which includes the MANTAS T12 and the Devil Ray T24, and T38 craft.

While all three of these MUSVs are viable options for an integrated uncrewed vessel CONOPS, the MANTAS T12 and Devil Ray USVs, which although different sizes share the same hull, mechanical, and electrical (HME) attributes, present practical advantages. The Sea Hunter is simply too large to fit into the LUSVs the Navy is considering and the CUSV is the MUSV of choice for the Littoral Combat Ship (LCS) Mine-Countermeasures Mission Package, and so all scheduled CUSVs are committed to this program.

Depending on the size that is ultimately procured, the LUSV could carry multiple T38 Devil Ray USVs and deliver them to a target deployment point. From there, the T38 can independently execute the ISR mission, or alternatively, would be able to launch one or more T12 MANTAS USVs to carry out required tasks. Building on work conducted by the Navy laboratory community and sponsored by the Office of Naval Research, the T38 or T12 will have the ability to launch UAVs to conduct overhead ISR campaigns.

For MCM work, the LUSV can deliver several T38s equipped with mine-hunting and mine-clearing systems. These vessels can then undertake the dull, dirty, and dangerous work previously conducted by humans. Given the large mine inventory of peer and near-peer adversaries, this uncrewed approach may well be the only way to clear mines safely.

INTEGRATING INDUSTRY

While the full details of how this CONOPS plays out is beyond the scope of this article, if the US Navy wants to keep its multi-billion-dollar capital ships out of harm's way, it will need to integrate USVs into the battlefield while its manned ships stay out of range of adversary A2/AD systems, sensors, and weapons.

To be clear, this is not a platform-specific solution, but rather a concept. When fleet operators see a capability with different size uncrewed COTS (commercial-off-the-shelf) systems in the water working together and successfully performing the missions presented in this article, they will likely press industry to produce even more-capable platforms.

While evolutionary in nature, this disruptive capability, delivered using emerging technologies, will provide the US Navy with near-term solutions to vexing operational challenges, while demonstrating to a skeptical Congress that the Navy does have a concept-of-operations to employ the uncrewed vehicles it aims to procure.



» Sea Hunter, launched in 2016. (Image credit: US Navy)

KRAKEN TECHNOLOGY GROUP AND COSWORTH TO DEVELOP ADVANCED BATTERY SOLUTIONS

Kraken Technology Group has announced a strategic partnership with Cosworth around the development of advanced battery solutions for its littoral defense and security range.

Cosworth, a British high-performance engineering company, is renowned for powertrain development, electronics, and alternative propulsion solutions for the automotive, marine and aerospace sectors.

Initial focus is around the Kraken MANTA platform, a range of autonomous uncrewed surface subsurface vessels designed specifically to address a growing range of ISR mission and deployment capability requirements. As acknowledged experts in electric technology, Cosworth will work closely with Kraken on the development of advanced battery systems, capable of powering Kraken maritime platforms in faster, more efficient, and disruptive ways.

Kraken's electric propulsion expertise was pioneered in 2018 when it successfully broke the UIM OutrightMaritime Electric Speed World Record delivering an average speed of 88.61 mph in a globally publicized event at Coniston. This milestone success provided the foundations for development and adaptation of racing technology for defense and security applications.

Mal Crease, Founder and CEO of Kraken Technology Group, commented: "In Cosworth we have identified a similar progressive approach coupled with a disruptive mindset and both are vital to the development of Kraken's electric powertrain aspirations. Today, we again embark on a journey to further challenge the limits of maritime electric propulsion, above and below the surface."



» Kraken MANTA platform. (Image credit: Kraken Technology Group)

US NUCLEAR-POWERED SUBMARINE VISITS WESTERN AUSTRALIA

In mid-August, USS *North Carolina* (SSN 777) docked at HMAS Stirling, a naval base in Western Australia, following participation in Talisman Sabre 2023.

This marks the first visit by a Virginia-class submarine to the country since the leaders' announcement of the Australia, United Kingdom, and United States (AUKUS) Optimal Pathway.

Initially announced in September 2021, the AUKUS partnership is designed to bolster the security and defense capabilities of the three nations and promote security in the Indo-Pacific region.

"*North Carolina*'s presence in HMAS Stirling is an example of the US' full commitment to the AUKUS partnership starting with a promised increase in SSN port visits to Australia in 2023," said Mr. Abe Denmark, Senior Advisor for AUKUS to the Secretary of Defense. "These port visits are an essential step for Australia to build the necessary operational capabilities and skills to steward and operate its own fleet of nuclear-powered attack submarines."

The Optimal Pathway is a phased approach that represents an ambitious plan to provide Australia with a conventionally armed, nuclear-powered submarine capability at the earliest possible date while ensuring Australia's capacity to safely operate, maintain and regulate this technology, and setting the highest standards for nuclear non-proliferation.

- Phase One includes increased SSN port visits aimed to expand Australia's knowledge of SSNs ahead of establishing Submarine Rotational Force-West (SRF-W) as early as 2027.
- Phase Two begins in the early 2030s, pending approval from the US Congress, with the US selling Australia three Virginia class submarines, with the potential to sell up to two more if needed.
- Phase Three sees the combination of a base British submarine design and advanced US technology to deliver SSN-AUKUS, the future attack submarine for both Australia and the UK.



» USS *North Carolina* docked at HMAS Stirling. (Image credit: US Navy)

FORCYS AUSTRALIA EXPANDS WITH NEW SYDNEY OFFICE

The release of Australia's Defence Strategic Review pivots national defense interests toward the Indo-Pacific and places increased interest in the underwater domain. It calls out for new autonomous underwater vehicles to support their mission by highlighting the AUKUS Pillar 2 collaboration and seeks to work in close partnership with industry. It serves as validation for the recent expansion by Forcys Australia: new offices and a new team to work with customers that are already developing innovative underwater autonomous systems.

Backed by over fifty years of experience, Forcys offers the global maritime naval sector remote, autonomous, and networked control capabilities delivering integrated situational awareness to customers in the underwater domain.

Covering a range of maritime operations including asset protection, littoral strike,

mine warfare, submarine rescue, and submarine and anti-submarine warfare, Forcys seeks to transform the underwater domain by enabling increasingly distributed and automated operations. This is made possible by integrating and bringing to market world-changing solutions from leading technology partners Chelsea Technologies, EIVA, Sonardyne, Voyis, and Wavefront Systems.

"This feels great," said Sean Leydon, Regional Manager Asia Pacific at Forcys. "Although we are taking a relatively small initial step, this is a major milestone for our operations in Australia," said Sean Leydon, Regional Manager Asia Pacific at Forcys.

"And we are setting up in the right location. We are so grateful to the NSW government who supported us in our search. We also want to thank the University of Technology Sydney for their welcome. Innovation is fuelled by partnerships and the UTS Tech



» Forcys new location at University of Technology Sydney (Image credit: UTS)

Lab enables us to work closer both with our customers and with academia. The lab is turning into a world-class research and development facility. I want our new Australian team to play a part in that."

"We are delighted to welcome Forcys Australia as an Industry Partner to the UTS Tech Lab," said Professor Robert Fitch, (acting) Director UTS Tech Lab.

"It's a clear example of how we are supporting industry partners with the growth and retention of talent. Working alongside innovators in the underwater domain is also a great opportunity for the university to target our research where it is needed such as the AUKUS Pillar 2 Undersea Robotics Autonomous Systems (AURAS) project."

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SMD BOLSTERS COMMERCIAL DIVISION WITH NEW BUSINESS DEVELOPMENT MANAGER

Global subsea technology, engineering and manufacturing company, Soil Machine Dynamics (SMD) recently expanded its services department, welcoming Dr. Lindsay Smith onboard as a Business Development Manager of new technologies. Alongside her Ph.D in engineering, Lindsay also brings over a decade of industry experience, with a strong background in the research and development of new technologies within other roles.

Speaking on the senior hire, SMD's general manager of services, Liam Forbes, said: "At SMD, we are unafraid to push boundaries and explore new ideas. I am confident that in this creative and supportive environment, Lindsay will be encouraged to reach her full potential. Lindsay's primary focus will be on Artemis, an innovative cable and pipeline tracking technology which is revolutionizing the subsea industry."

Speaking on her new role, Dr. Smith added: "Working for a future-focused company with an unrivalled reputation for curating new technologies, the opportunities really are endless. Despite its rapid growth, SMD has maintained a strong, supportive culture in which I feel empowered to learn and grow."

As well as branching more into services to help meet client demand, SMD also has a strong commitment to innovation and recently launched a new division, SMD Innovation. This dedicated team will have a sole focus on R&D, especially within new technologies such as Artemis and electric solutions. According to CEO Mike Jones, this emerging department is a testament to SMD's belief that: "When you approach the problem differently, you will always find a better way."



» Dr. Lindsay Smith (R).

THE MARINE INSTITUTE JOINS SEABED 2030 ENDEAVOR TO MAP OCEAN FLOOR

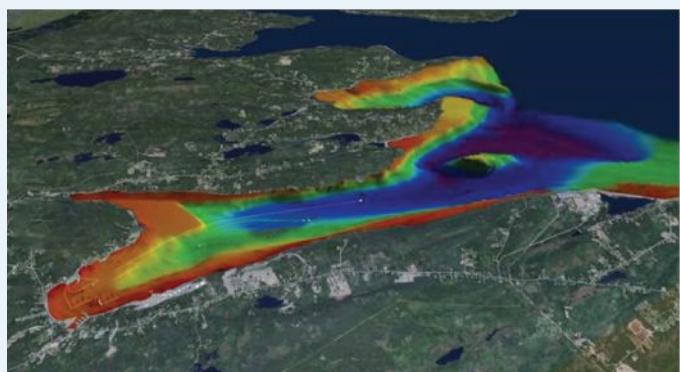
The Nippon Foundation-GEBCO Seabed 2030 Project has announced a new partnership with the Memorial University of Newfoundland's Fisheries and Marine Institute—a leading center of excellence for marine research and education.

Seabed 2030 is a collaborative project between The Nippon Foundation and GEBCO to inspire the complete mapping of the world's ocean by 2030 and to compile all bathymetric data into the freely available GEBCO Ocean.

Memorial University is among Canada's top research universities, with over 40 percent of its research being ocean focused. The university is a partner of the Ocean Frontier Institute—a collaborative research initiative bringing together researchers to tackle complex ocean challenges; and a member of Canada's Ocean Supercluster—an industry-led cooperation accelerating the development of globally-relevant ocean solutions.

"The Marine Institute's world-class expertise and research capabilities will greatly support our mission here at Seabed 2030," commented Project Director Jamie McMichael-Phillips. "We look forward to working collaboratively with colleagues at the Marine Institute towards a more comprehensive understanding of the ocean floor, in order to ensure its sustainable use and management."

Dr. Paul Brett, VP, Memorial University (Marine Institute) and IOC appointed member of GEBCO, said: "We are delighted to partner with Seabed 2030 in this groundbreaking initiative. Our institution has long been dedicated to advancing marine science and technology, and this collaboration aligns perfectly with our vision of fostering a sustainable ocean through knowledge and innovation."



» Bathymetry map of Holyrood, where the Marine Institute's marine living lab is located. (Image credit: Memorial University)

BLUEFIELD GEOSERVICES EXPANDS IN UK TO SUPPORT NORTH SEA OPERATIONS



Bluefield
Geoservices

Bluefield Geoservices Expands
Operations in UK to Support
North Sea Operations

GEOSERVICES GEOTECHNOLOGY GEOENGINEERING

Bluefield Geoservices, a subsea geotechnical services provider with operations in the UK and US, has opened a state-of-the-art facility in Bedlington, England with convenient access to the Port of Blyth. Bluefield's new location will be used both to service existing geotechnical equipment and as an engineering hub for future product development.

"Cutting the ribbon on our latest site, one that offers immediate access to the Port of Blyth, is an exciting step for Bluefield Geoservices and represents another milestone in our ongoing mission to service North Sea operators with best-in-class offshore geotech-

nical support, and to act as the hub for our technology R&D program," commented Bluefield Geoservices' Vice President of Global Sales & Business Development Mike Fearn.

With demand for integrated geotechnical survey solutions in high demand on both sides of the Atlantic and beyond, in recent years the Bluefield management has made a series of significant investments in personnel and equipment to ensure that the firm is resource-ready to serve the offshore energy sector with subsea site investigation proposals that deliver quality data on time and on budget.

To further fuel the company's strategic commercial operations, Bluefield also recently appointed Patrick O'Donnell to the position of Business Development Lead.

"Since its inception, the Bluefield vision has been to challenge the status quo of the offshore geotechnical investigation services industry. For us, that means understanding the shifting requirements of our commercial partners and responding to this demand with the right personnel, the right tools, in the right place, and for the right price. Our new facility in the north of England and our commitment to growing a leading team of commercial specialists serve as validation of this customer-centric pledge."

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THE GULF COAST BLUE ECONOMY IN FOCUS

The OCEANS conference returns to the Mississippi Gulf Coast in 2023 for an in-person experience we all know and expect from OCEANS conferences.

This year's theme, *Blue Economy: Locally Sourced, Globally Driven*, will emphasize the fact that local efforts are integrally linked to the larger world-ocean, and that stakeholders must all work toward sustainability together. The Mississippi coast is home to several US Navy and National Oceanic and Atmospheric Administration (NOAA) offices. It only makes sense that both serve as Federal Honorary Co-Chairs for OCEANS 2023.

OCEANS 2023 will spotlight operational oceanography, which is pivotal to the missions of these organizations and others along the gulf coast—where research is integrated into missions to make them more efficient, accurate, and ultimately safer. This year's agenda also features an Operational Oceanography technical track, along with nine others to reflect the range of activity in the Gulf of Mexico and along the coast.

When the US Gulf Coast is mentioned to most, what comes to mind are sandy beaches,

sunny days, fresh seafood, and Southern charm. What they most likely do not consider is the hi-tech industry that drives the economy of the area. While coastal tourism remains a solid piece of the Blue Economy puzzle in the area, it is the increasing opportunity for growth in

Systems in Shipbuilding technical track takes the long-time Gulf Coast economic engine of shipbuilding to a new level as convention meets innovation, incorporating new systems into legacy vessels. New opportunities also exist in Offshore Renewable Energy realm, with

programs continue to thrive and expand, making this hub of industry an appealing prospect for businesses looking to address existing and future mission needs.

ENGAGING LOCAL PUBLICS

The Naval Meteorology and Oceanography Command and NOAA's National Data Buoy Center are Honorary Co-Chairs for the conference and their work will be featured in the Operational Oceanography technical track, as well as Gulf of Mexico Initiatives.

OCEANS 2023 will also offer more opportunities for public involvement than ever. We feature a Citizen Science Data and Results technical track, which will entice more lay scientists to the event. Additionally, we are holding a Beach Trash Art Contest and Outreach Challenge for K-12 and community college students.

Join us for OCEANS 2023 in Biloxi and learn about the exciting missions, programs, projects, and opportunities in the region.

For more information, visit: <https://gulfcoast23.oceans-conference.org>.



the Blue Economy's technology sectors that makes OCEANS 2023 so exciting.

COMPREHENSIVE AGENDA

The conference committee has selected 10 local area topics, in addition to the 10 traditional OCEANS topics, to highlight the various aspects of the expanding Blue Economy. The Uncrewed and Autonomous

recently identified locations in the Gulf of Mexico suitable for wind- and water-based energy development.

Initiatives such as the State of Mississippi's declaration that the Blue Economy as a key sector for growth and others that seek to attract new commercial ventures to the region abound. Traditional economic drivers in the area, federal agencies, and



EDITORIAL CALENDAR

MONTH & DEADLINES	EDITORIAL FOCUS & CONFERENCES	CONTENT
SEPTEMBER Editorial: Aug. 21 Ad: Sept. 8	» REMOTE MARINE OPERATIONS ACP Offshore WINDPOWER / October 3–4 Ocean Energy Europe / October 25–26 Offshore Energy / November 28–29	Editorial Topics: Subsea Inspection, Maintenance, Repair (IMR), Seabed Residency, Subsea Intervention, Oil Spill Response, Remote Operations Centers, Professional Development & Training Product Focus: Inspection AUVs, ROVs, USVs, Work-Class ROVs, Pipeline Pigs, Ultrasonic Imaging
OCT/NOV Editorial: Sept. 18 Ad: Oct. 6	» THE OFFSHORE DEVELOPER'S TOOLKIT TMA BlueTech Week / November 13–17 Underwater Intervention / November 29–December 1 Workboat / November 29–December 1	Editorial Topics: Offshore IoT, Asset Integrity Monitoring, Autonomous Control Systems, Digital Twin Technology, Decommissioning Services Product Focus: Predictive Maintenance Solutions, Electric Workboats, USVs, Untethered ROVs
DECEMBER Editorial: Oct. 30 Ad: Nov. 10	» THE FUTURE OF OCEAN TECHNOLOGY	Editorial Topics: Special Edition

EVENTS

AMERICAS	EUROPE	OTHER REGIONS
<p>South America Offshore Wind 2023 Rio de Janeiro, Brazil » September 18–20 https://fwssouthamerica.com</p> <p>OCEANS Gulf Coast Biloxi, MS » September 25–28 https://gulfcoast23.oceansconference.org</p> <p>ACP Offshore WINDPOWER Boston, MA » October 3–4 https://cleanpower.org/offshore-windpower</p> <p>OTC Brasil Rio de Janeiro, Brazil » October 24–26 https://otcbrasil.org</p> <p>TMA BlueTech Week San Diego, CA » November 13–16 www.tmabluetech.org/bluetech-week</p> <p>Floating Wind USA 2023 San Diego, CA » November 29–30 https://events.reutersevents.com/renewable-energy/floating-wind-usa</p>	<p>Underwater Minerals Conference (UMC) Rotterdam, NL » October 1–6 www.underwaterminerals.org</p> <p>World Engineers Convention Prague, Czech Republic » October 11–13 www.wec2023.com</p> <p>Ocean Energy Europe (OEE) The Hague, NL » October 25–26 www.oceanenergy-europe.eu/annual-event/oee2023</p> <p>Offshore & Floating Wind Europe London, UK » October 25–26 https://events.reutersevents.com/renewable-energy/offshore-floating-wind-europe</p> <p>Marine Autonomy and Technology Showcase (MATS) Southampton, UK » November 7–9 https://noc-events.co.uk/mats-2023</p> <p>Offshore Energy Amsterdam, NL » November 28–29 www.offshore-energy.biz/oeec2023</p>	<p>Gastech Singapore » September 5–8 www.gastechevent.com</p> <p>Mozambique Gas & Energy Summit Maputo, Mozambique » September 27–28 www.mozambiqueenergysummit.com</p> <p>ADIPEC Abu Dhabi, UAE » October 2–5 www.adippec.com</p> <p>Asia-Pacific Deep Sea Mining Summit Singapore » December 11–12 www.asia.deepsea-mining-summit.com</p> <p>SYMPOL 2023 Kerala, India » December 13–15 http://sympol.cusat.ac.in</p>

BREAKTHROUGHS IN REMOTE OPERATIONS AT THE MARINE INSTITUTE

The Marine Institute recently achieved a pair of key milestones in its collaboration with the Norwegian University of Science and Technology (NTNU) to use new marine technologies for remote operations and autonomous vehicles.

From the Remote Operations Center (ROC) at The Launch in Holyrood, Marine Institute staff piloted underwater vehicles in the waters off Trondheim, Norway—more than 4,000 kilometers away. It was the culmination of six months of planning and hard work on both sides of the North Atlantic.

Corey Roche, an instructor with the School of Ocean Technology, piloted a Work Class remotely operated vehicle (ROV) on April 25 around NTNU's newly installed instrument rig, an underwater platform equipped with cameras and sensors.

The next demonstration, completed on May 26, saw Bethany Randell, a project engineer with the Centre for Applied Ocean Technology, pilot a hybrid autonomous and remotely operated vehicle.

Known as Eelume, this vehicle is a self-propelled autonomous robotic with a slender, flexible body that can transit long distances and operate in confined spaces.

Kelley Santos, Director of The Launch, says advances in remote operations are transforming how ocean industries operate on many levels—from skills development to increased efficiency to greater sustainability.

"One of the most significant opportunities is building a much more diverse and inclusive workforce by creating entry points for people unable to work in the field, but can support offshore operations from remote operation centers like that at The Launch," she said.

"Marine Institute's collaborative partnerships with industry and academia at The Launch provide an ideal testing and demonstration environment for moving these practices from concept to operation. MI's collaboration with NTNU is a prime example of the power of international collaboration and the exchange of knowledge, technology, and resources to successfully demonstrate the remote operations of a variety of technologies in Norway from our remote operations center."

The institute is also working towards developing a maritime autonomous systems testbed (MAST) at The Launch and is in discussions with potential stakeholders about the research program.

Later this year the Marine Institute expects to acquire its first autonomous surface vessel, an eight-meter-long, self-righting vessel designed to operate non-stop for up to 14 days in a variety of sea conditions to collect ocean data.



» Bethany Randell remotely piloting Eelume, a subsea robot designed for IMR campaigns. (Image credits: Eelume/The Marine Institute)

CSIGNUM APPOINTS DAVID LESLIE CHIEF REVENUE OFFICER



» David Leslie, CRO, CSignum

CSignum Ltd has appointed David Leslie as Chief Revenue Officer, responsible for business strategy and development, sales, and go-to-market for CSignum and its new RadiEM Modem™.

An industry expert with over 30 years in IT consulting, networking and telecommunications, Leslie has been advising CSignum on market positioning and possible new use cases for the revolutionary RadiEM technology that will help natural and manmade water industries modernize data networks,

which have lagged networks above the water by 50 years.

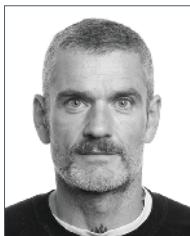
Leslie was most recently Chief Commercial Officer of Gadget Software and served as advisor as The Modern Data Company scaled operations to go to market. He has served as President and CEO of MedicAlert Foundation, as well as co-founded and led companies such as ZippSlip and Intersect Software Corp. He has held executive sales positions at Ericsson, Torrent Networking, Newbridge Networks, and UB Networks.

"David's unique experience and abilities perfectly address where we are and what we need to do at CSignum to develop a new market with our extraordinary break-

through in underwater EM data connectivity," said CSignum CEO Chris Brooks. "He is adept at educating and evangelizing the technical benefits and the resulting positive business impact of this new wireless solution, which will work with and expand the capabilities of existing acoustic and optical deployments."

RadiEM is already successfully deployed in a multitude of use cases from AUV/ASV (HESS and Ocean Aero) and tidal water data recovery, to offshore structural and met ocean data transmission to real-time ADCP data. The EM-1 Modem is designed to work seamlessly with the standard interfaces of sondes, sensors, AUVs, ADCPs and dataloggers.

OCEAN TECHNOLOGIES GROUP HIRES NEW CHIEF PRODUCT OFFICER



» Nicholas Goubert,
OTG's Chief Product
Officer

Ocean Technologies Group, the leading global provider of Human Capital Management solutions for the maritime industry, has further strengthened its executive leadership team with the appointment of Nicholas Goubert as its new Chief Product Officer.

With a wealth of experience in strategy, innovation, teambuilding, and product management, Nicholas is set to drive the company's product vision and strategy to new heights.

Prior to joining Ocean Technologies Group, Nicholas held key leadership roles at renowned companies such as Clark, SoundCloud, Native Instruments, HERE, and Nokia. His tenure at these organizations has enabled him to develop an extensive skill set in driving strategic product initiatives, fostering cross-functional collaboration, and leveraging emerging technologies such as AI, machine learning and big data to meet evolving market demands and drive growth.

"I am thrilled to be joining Ocean Technologies Group as Chief Product Officer," said Nicholas Goubert. "When considering a new

role, I prioritize three aspects. First, I seek sectors with a profound impact on the world, where our work can make a difference. Second, I look for opportunities where I believe I can personally contribute and drive positive change. Finally, I'm attracted to companies that have a significant impact on their industry, shaping their fields. Joining Ocean Technologies Group aligns perfectly with these criteria, and I can't wait to get started."

The appointment of Nicholas Goubert comes at an exciting time for Ocean Technologies Group as the company continues to expand its global footprint and reinforce its commitment to delivering best-in-class maritime human capital SaaS solutions that enable ship operators to maximize the performance of their people and fleet assets.

"Our Industry is undergoing unprecedented change as we decarbonize and digitalize our businesses and unlocking human potential is key to success," said CEO Thomas Zanzinger.

"With Nicholas on board, we are confident that we will continue to drive transformative advancements that maximize that opportunity, shaping the industry and delivering exceptional value to our customers."

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NREL REVEALS NEW TECHNOLOGY ABLE TO IMITATE OCEAN WAVES



» LAMP for short—is like a flight simulator for offshore energy technologies. (Image credit: Bryan Bechtold, NREL)

Researchers at the National Renewable Energy Laboratory (NREL) recently installed a technology that can replicate a notoriously turbulent environment: the ocean. The laboratory's new large-amplitude motion platform—or LAMP for short—is much like a flight simulator for offshore energy technologies. With LAMP, researchers can learn how wave energy devices, as well as offshore wind turbines and floating solar panels, might fare out on the ocean—all from the safety of landlocked Colorado.

Open-ocean trials are a critical step in an offshore technology's journey from concept to commercialization. But trials can be expensive, time consuming, and risky. If the weather shifts or a part malfunctions, tech-

nology developers can lose precious time (and money) sending boats and divers out to rescue the device from extreme waves or to repair damage.

But NREL's LAMP, which was installed in June 2023, with support from the US Department of Energy's Water Power Technologies Office, can help developers identify potential flaws before they take that risky ocean plunge.

The LAMP was made by E2M in the Netherlands and can be used either indoors or outdoors to support devices weighing up to 2,200 pounds (about as much as a small recreational vehicle). With an offshore device mounted on top, the LAMP

mimics ocean movements in six degrees of freedom—meaning it can move in six directions like surges and swirling rolls in the ocean—and vigorous ocean waves up to 8 feet tall. And the technology can shift all those motions in real time to accurately mimic data pulled from actual ocean sites.

Now, with the LAMP, alongside other ocean replicators, including a wave tank and dynamometers, NREL's facilities can test prototypes of all sizes. If a prototype can survive the LAMP, it is far more likely to succeed at sea. And if it cannot, the developer can learn how to improve their design and build a better, more durable version before heading out to sea.

WINNER OF THE 2023 CAPTAIN DON WALSH AWARD FOR OCEAN EXPLORATION ANNOUNCED



» Dr. Peter Girguis

Walsh Award for Ocean Exploration by the Marine Technology Society (MTS) and the Society for Underwater Technology (SUT).

Dr. Peter Girguis, Professor of Organismic and Evolutionary Biology at Harvard University and Adjunct Oceanographer at Woods Hole Oceanographic Institution, has been announced the winner of the 2023 Captain Don

Girguis' prolific career is dedicated to increase understanding of deep-sea animals and microbes and how marine organisms adapt to a changing world. Within his research, his team made groundbreaking discoveries of previously unknown microbe communities that 'eat' methane at unprecedented rates, keeping the greenhouse gas out of our atmosphere.

On receiving news of the award, Dr. Girguis said: "I am deeply honored to be the recipient of this award. I know there are many others who qualify for this recognition, so I view myself as representing all of us, from

all backgrounds and walks of life, who have contributed to ocean exploration."

"To paraphrase Captain Walsh, there's a lot of work left to do in exploring and understanding our ocean, so I will continue to do my part and support as many others as I can on our journey to further understand this ocean world on which we live."

The presentation of the Captain Don Walsh Award for Ocean Exploration, by Don Walsh, is scheduled to take place at Oceanology International 2024 (London's ExCeL 12–14 March).

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DeepWater Buoyancy Inc. is the world's largest producer of subsea buoyancy products for the oceanographic community and has a vast product line of buoyancy solutions for offshore oil & gas, energy and technology companies. This product portfolio has been built over the course of 40 years serving these industries. Though products are offered for shallow water applications, the company specializes in deepwater, providing solutions to depths of 6000 meters and beyond.



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AIRMAR Technology is a leading developer and manufacturer of acoustic and ultrasonic sensing solutions. We push the boundaries of ultrasonic technology to develop advanced products that withstand the harshest ocean environments while reliably facilitating data gathering from surface to full ocean depth. Our comprehensive suites of marine, oceanographic and survey transducers, plus our WeatherStation® instruments, deliver performance that meets the most challenging mission requirements. Ideal applications include shallow and deep-water survey, sub-bottom profiling, navigation, fisheries research, aquatic habitat assessment, underwater scientific applications and more. Customization of transducers for specific marine applications is available.

UNCREWED MARITIME VEHICLES



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EvoLogics provides the world's most advanced spread-spectrum underwater communication systems (S2C) with multi-channel data management, networking capability, built-in tracking and positioning functions with USBL. Data loggers, acoustic wake-up module and releasers optionally included. Deployments in offshore platforms (FPSO, ABS), environmental monitoring, defense systems, ROV and AUV operations and more. Applications include simple positioning and sensor information to transmission of underwater photos.

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General Dynamics Mission Systems' family of Bluefin Robotics products consists of autonomous unmanned underwater vehicles (UUVs) and related technologies for defense, commercial, and scientific customers worldwide. Their core autonomous product line includes Bluefin®-9, Bluefin®-12, Bluefin®-21, and subsea power technologies. General Dynamics offers a full range of modular, free-flooded UUV platforms and products, integrated with over 70 different sensors on more than 100 vehicles. We design, develop, deliver, and provide operations and sustainment support for UUVs worldwide to research institutes and industry, providing UUVs and auxiliary equipment to the United States' and International Navies for various defense applications.



International
 Submarine
 Engineering Ltd.

INTERNATIONAL SUBMARINE ENGINEERING LTD. (ISE)

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 Port Coquitlam, BC, V3C 2M8
 ☎ +1 604 942 5223
 ☐ info@ise.bc.ca
 ☐ https://ise.bc.ca/
 International Submarine Engineering Ltd. (ISE) is a world leader in the design and integration of autonomous and remotely operated robotic vehicles and terrestrial robotics. Over our 40+ years in business, we have accumulated a great deal of expertise in the design, manufacture, and maintenance of: Autonomous Underwater Vehicles (AUVs), Remotely Operated Vehicles (ROVs) for subsea operation, Human Occupied (HO) submersibles, Customized systems for the offshore oil industry, Customized systems for the Military-Naval sector, Hydraulic, pneumatic, and electric robotic manipulators, Teleoperated and autonomous robotic systems, Robotic systems for nuclear Industry applications, Communications and real-time control system.



L3HARRIS

L3HARRIS TECHNOLOGIES, INC.

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 ☐ IVER.Sales@L3Harris.com
 ☐ www.L3Harris.com
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L3Harris Technologies is an agile global aerospace and defense technology innovator, delivering end-to-end solutions that meet customers' mission-critical needs. The company provides advanced defense and commercial technologies across air, land, sea, space and cyber domains. L3Harris develops autonomous, lightweight Unmanned Undersea Vehicles (UUV). L3Harris has established itself as the leader in man portable UUVs, providing highly capable vehicles to a wide array of military, commercial and research customers. With over 15 years experience in the underwater field, our engineers have developed a reliable and easy to use platform that is trusted to complete marine missions all around the world.

**OUTLAND TECHNOLOGY**

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☎ 985 847 1106

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☐ www.outlandtech.com

✉ Jeff Mayfield

Offering the most rugged equipment and unsurpassed customer service, Outland Technology has been the world's leading manufacturer of underwater video, lighting and ROV equipment for over 30 years. We recognize that no two jobs are the same and specialize in products that are customizable for your specific applications.

**SEAROBOTICS CORPORATION**

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Stuart, FL 34997

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☐ www.searobotics.com

SeaRobotics Corporation, headquartered in Stuart, Florida, specializes in the design and manufacture of intelligent marine robotics, including a line of Autonomous Surface Vehicles (ASVs) for commercial and defense markets around the world. Applications for SeaRobotics vehicles range from bathymetric and hydrographic coastal surveys to, harbor, and riverine inspection and surveillance. From ground-breaking ASV design through to custom manufacturing for theme parks, SeaRobotics designs, engineers and manufactures smart solutions for complex marine challenges. In addition to our ASV line, SeaRobotics also designs and builds hull and tank bio-inspired underwater grooming and cleaning systems.

**VIDEORAY**

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VideoRay is the world's leading manufacturer of portable underwater robotic systems. VideoRay Mission Specialist Systems have redefined the "inspection class" category. Much more than underwater cameras, they deliver industry leading power and maneuverability and are rugged enough to work anywhere, handling tough jobs and applications. They are used around the world in demanding underwater missions to support national security, first responders, object search and recovery, infrastructure examination and science and research. VideoRay is available on the General Services Administration (GSA) Schedule.

WINCHES, HANDLING, & CONTROL SYSTEMS**OKEANUS SCIENCE & TECHNOLOGY LLC**

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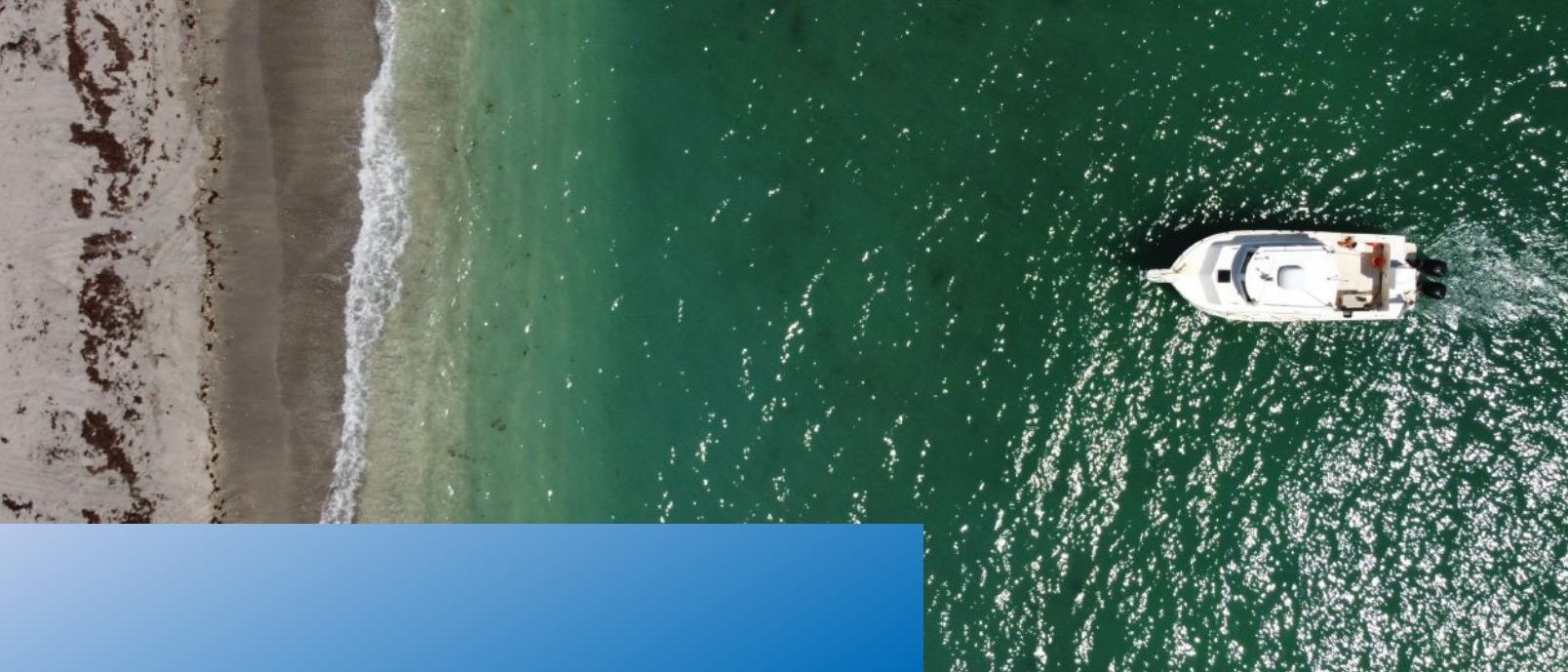
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Okeanus Science & Technology is an established market leader for field-proven deck handling systems, including an exclusive series of winches, LARS, and A-frames. Whether we are custom- fitting a heavy pull multi-purpose winch or developing a prototype sample collector for deep- sea exploration, we have the industry expertise, marine engineering experience, and technological know-how to deliver failproof, mission-critical assets. Okeanus also owns an expanding portfolio of rapidly mobilized rental equipment and instrumentation to manage your operations with optimal flexibility. Okeanus has offices in Houston TX, Houma LA, and East Greenwich RI.



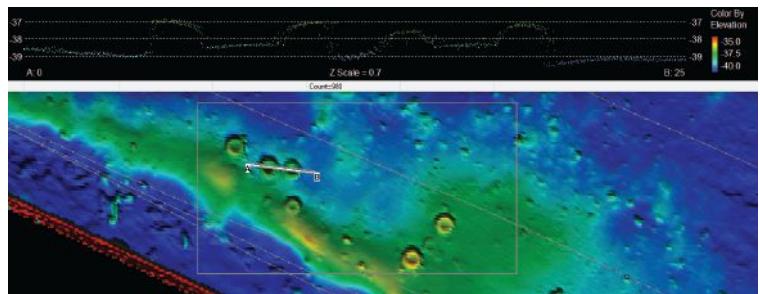


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