

# OPENSEA EDGE

## MODULAR HARDWARE AGNOSTIC AUTONOMY SOLUTION

HD VIDEO  
CAMERA

SONAR

OPENSEA EDGE MODULE  
DUAL NVIDIA EDGE  
PROCESSORS

HOST ROV INTERFACE

ACOUSTIC COMMS FOR  
UNTETHERED  
COMMAND & CONTROL

BATTERY PACKS FOR  
LONG DISTANCE  
UNTETHERED OPERATION

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### COVER IMAGE

Jellyfish surround ecoSUB Robotics' ecoSUB-m5-Scout AUVs as they act together by communicating acoustically with each other and the surface to achieve a coordinated mission in April 2022 at the Defence Diving School, Horsea Island, near Portsmouth, U.K. (Credit: Planet Ocean Ltd.)

### NEXT MONTH

Sensor, radar tech for vessels in areas of limited GNSS capability ... Deepwater AUV survey for floating offshore wind ... Sonar on cruise ships contributes to global seafloor mapping ... EV *Nautilus* expeditions for deep-ocean exploration ... Maritime personal protective equipment.

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**)) Finalized Agreement for UN High Seas Treaty.** The UN High Seas Treaty has been agreed to in March 2023 and is expected to cover almost two-thirds of the ocean that lies outside national boundaries. It will provide a legal framework to establish networks of marine protected areas (MPAs) to contribute to the conservation of marine biodiversity. The High Seas Treaty is most timely in providing a governance framework for MPAs to implement one of the goals of the Convention on Biological Diversity's recently adopted Global Biodiversity Framework: to protect and conserve at least 30 percent of the ocean and to ensure 30 percent of degraded areas are under restoration by 2030. The High Seas Treaty is likely to result in the general exclusion of minerals activity in MPAs, potentially significant constraints on fisheries activity and some moderate restrictions for shipping. The OCEAN project, funded by the EU and the UK Research and Innovation Grant, supports the treaty with enhancement of "on the spot" navigational awareness relating to hazards around vessels. The OCEAN project will provide near-real-time warnings to navigators when in areas of an expected high level of marine mammal presence and activity to protect marine wildlife and increase ship safety.

**)) DHS Awards Funding to Flood Data Startups.** The U.S. Department of Homeland Security (DHS) Science and Technology Directorate (S&T) has given a Phase 1 Other Transaction award of \$195,260 to Cloud to Street (commercially conducting business as Floodbase), a Brooklyn, New York-based startup, to develop flood analytics technology that will help the Federal Emergency Management Agency (FEMA) improve preparedness and response efforts. Under its Flood Data Collection and Analysis solicitation, S&T's Silicon Valley Innovation Program (SVIP) sought novel solutions to provide real-time flood data sources and data analysis in support of FEMA's National Flood Insurance Program (NFIP). Cloud to Street, a women-founded and led company, is one of the first applicants to receive an award under this topic call. Its platform provides flood data and analytics through a combination of satellite imagery, artificial intelligence and on-the-ground data. Cloud to Street's flood analytics will include daily flood monitoring nationwide, assessment of potential impacts, and enhanced detail on major flood events. DHS S&T has also awarded \$199,140 to FloodMapp, an Australia-based company with a location in Norfolk, Virginia. FloodMapp, a woman-founded and led company, will develop its data analysis tool that uses near-real-time data and modeling to provide street-level flood inundation and depth data before, during, and after a flood event, along with assessment of potential damage to properties. The goal is to better understand the source, location and depth of floodwaters, which could enable the NFIP to estimate the impacts of flood events more accurately.

**)) DNV Ocean Spatial Competition Forecast.** The collaboration between ocean industries will need to intensify for the rapid buildout of offshore wind and aquaculture to coexist sustainably with other industries and the ecosystem, according to DNV's Spatial Competition Forecast, which predicts the amount of ocean space occupied by installations will grow five-fold by 2050. This will be driven by offshore wind, which will account for 80 percent of stationary infrastructure at sea by midcentury, followed by aquaculture (13 percent) and oil and gas (5 percent). While ocean space is plentiful, industrial activity will be located primarily close to shore, which will heighten the need for ocean coexistence. To enable stakeholders to gauge the demand for ocean space, DNV has developed the Spatial Competition Index. According to this index, the North Sea is the area in Europe that will see greatest competition due to the large number of shipping lanes and ports, as well as the strong presences of the fishing, aquaculture, oil and gas, and wind industries. Installations for offshore energy and food production will cover 23 percent of the area between 2 to 50 km from shore in water depths less than 50 m. China's emergence as the powerhouse of the blue economy is reflected in offshore construction: It will account for a third of all global infrastructure built at sea by 2050, mainly due to the sharp increase in offshore wind, which will make up 13 percent of the region's electricity production. The Indian subcontinent sees the strongest growth in area covered by stationary infrastructure, as the region experiences fast offshore wind development requiring vast areas. Globally, the area occupied by fixed offshore wind will grow from about 9,000 km<sup>2</sup> today to about 242,000 km<sup>2</sup> by midcentury. Floating offshore wind will grow from a low 15 km<sup>2</sup> today to more than 33,000 km<sup>2</sup> by 2050. Compared with bottom-grounded installations, floating offshore wind can potentially ease some of the tensions between offshore wind and fisheries, as it takes renewable energy production out of the way of the fishing fleet operating on shallow banks. DNV's Spatial Competition Forecast builds on the findings of the previously published Ocean's Future to 2050. The results are based on what DNV forecasts to be the most likely energy mix in 2050 and not what is required to reach net zero. To limit global warming to 2°, the amount of offshore wind in Europe, for example, would need to double.

**)) Artificial Reef Assembly in Rotterdam.** The Rotterdam Reef project has moved forward with 17 Reefy modules assembled underwater by Boskalis to create an artificial reef approximately 25 m long and 3 m high. Reefy's Reef-Blocks are massive Lego-like blocks that form a stable structure that dissipates wave energy and creates an underwater labyrinth where fish and other species can shelter and breed. The blocks comprise sustainable concrete with a surface texture that stimulates biological growth, such as oysters and mussels, to create a living layer that promotes biodiversity and can grow with sea level rise, requiring less maintenance. **ST**

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*Stephen Fasham, CEO, Covelya Group*

# How to Attract and Retain Talent in Manufacturing

**A**s a group of companies that develops and manufactures instruments and systems worldwide, we at Covelya Group—along with many others in our industry—have felt the effects of the skills shortage.

When the economy woke up after the pandemic lockdowns and the demand for goods surged, we needed a new intake of people to meet this demand. But people were in short supply. In the first quarter of 2022, there were 1.29 million job vacancies in the U.K.—the highest number since records began.

An innovative approach was called for, as restricting the search to people with manufacturing backgrounds would have led to a shortfall. Savvy employers know that the right attitude and a willingness to learn is far more important than coming into a job armed with a set of skills that can be taught. What we were looking for were people with the right personal qualities, but to find them, we needed to be more imaginative than ever before.

The solution came in the form of a new program called the Sonardyne Training School, initiated by our largest operating company, Sonardyne International, which has allowed us to tackle the skills shortage issue head on. Sonardyne was in urgent need of assembly operators for its underwater technology. Rather than rely on traditional methods of recruiting, we embarked on a program designed to widen the pool of talented applicants and attract a more diverse workforce.

The program has started with eight weeks of training, leading to a 16-month fixed contract. Recruits learn new skills, including mechanical assembly, soldering, crimping and how to read engineering drawings. The first intake has already begun and is proving to be a huge success. The recruits range from age 18 through 60 and include a former apprentice hairdresser and a test technician who wanted to return to the workforce after a long hiatus. "I am learning lots within a short space of time and cannot wait to join the rest of the team when I am fully trained," said Tendai Z. Munetsi, one of the recruits.

It's not just the shortage of people that needs addressing; it's also the diversity of people. We have seen how much stronger we are as a company when our team is more diverse. When your talent search is not limited to those who have a manufacturing background, your pool of people naturally becomes more inclusive, which brings countless benefits to a business like ours.

The initiative appeals to people who want a change of direction in their careers and may never have considered manufacturing as a viable option before. It's also perfect for those who have been in the industry previously but, for whatever reason, have taken a career break.

Another way we're working to plug the skills gap is to invest even more into our existing staff through upskilling. We want people to feel satisfied within their roles and to feel that they are always learning. That's why we focus on continuous training for everyone, from the shop floor to the boardroom.

With the first cycle of the Sonardyne Training School nearing completion, we're excited to look at expanding this initiative. Plans are afoot for a potential twin initiative with Chelsea Technologies, another Covelya operating company that engineers ocean monitoring systems. We're also considering applying the initiative to other roles at Covelya, such as planning, purchasing and data processing.

Research says that if we do nothing to tackle the skills gap, \$285 billion of the U.K.'s economic growth is at risk between now and 2026. For us, creativity and broader thinking is helping narrow that gap, safeguarding the future of the company and the industries we serve. **ST**

# SEA TECHNOLOGY® 2023

## JANUARY

### Annual Review & Forecast

**\*\*** *Oceanology International Americas*, February 14-16, San Diego, CA

## FEBRUARY

### Instrumentation: Measurement, Processing & Analysis

**\*\*** *US Hydro*, March 13-19, Mobile, AL

## MARCH

### Electronic Charting/Vessel Management/ Ports & Harbors/Dredging/Homeland Security

**\*\*** *Ocean Business 23*, April 18-20, Southampton, U.K.

## APRIL

### Offshore Technology/Alternative Energy & Ocean Engineering

**\*\*** *Offshore Technology Conference*, May 1-4, Houston, TX

**\*\*** *XPONENTIAL 2023*, May 8-11, Denver, CO

**\*\*** *UDT 2023*, May 9-11, Rostock, Germany

## MAY

### Communications, Telemetry, Data Processing

**\*\*** *OCEANS 2023 Limerick*, June 5-8, Limerick, Ireland

**\*\***Sea Technology supports these shows via media partnerships.

## BONUS INFORMATION TO KEEP OUR READERS UP-TO-DATE

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| • Capital Report           | • Marine Renewables | • Ocean Engineering   |
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# Editorial Calendar

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## JUNE

Seafloor Mapping/Sonar Systems/Vessels

## JULY

Deck Gear, Cable, Connectors, Power Systems & Salvage

## AUGUST

Ocean Resources Development & Coastal Zone Management

\*\*IMAGE 2023, August 27-September 1, Houston, TX

\*\*OCEANS 2023 Gulf Coast, September 25-28, Gulf Coast, MS

## SEPTEMBER

Geophysical Exploration/Seafloor Engineering

## OCTOBER

Environmental Monitoring, Remote Sensing & Pollution Control

\*\*CLEAN GULF 2023, November 7-9, San Antonio, TX

## NOVEMBER

Undersea Defense/Antisubmarine Warfare

## DECEMBER

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# Edge Computing for AUVs and ROVs

## *Integrating Decision Making into the Vehicle*

By David Pearson

Ever since the first ROV dive, the data bottleneck between the vehicle and surface has presented a major roadblock. While improving technologies, including a handful of notable data communication breakthroughs, have steadily increased the data capabilities of subsea vehicles, the density of water and its data-blocking prowess remains the problem, and that isn't changing any time soon.

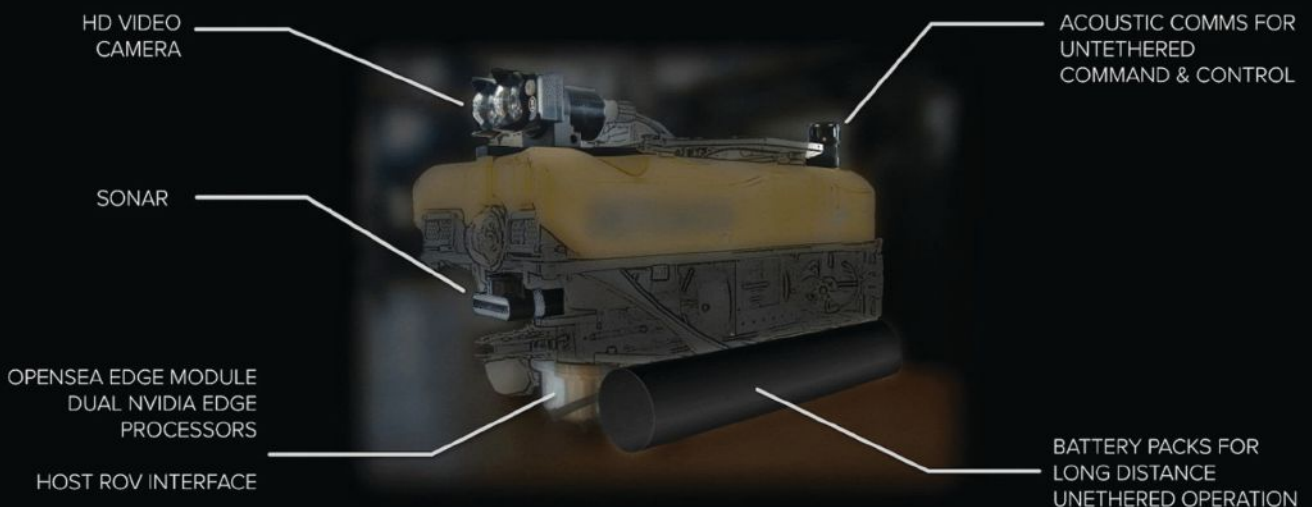
With this in mind, it has long been understood that one particular way to progress subsea vehicle capabilities is simply to reduce the volume of data we attempt to move between the vehicle and the surface.

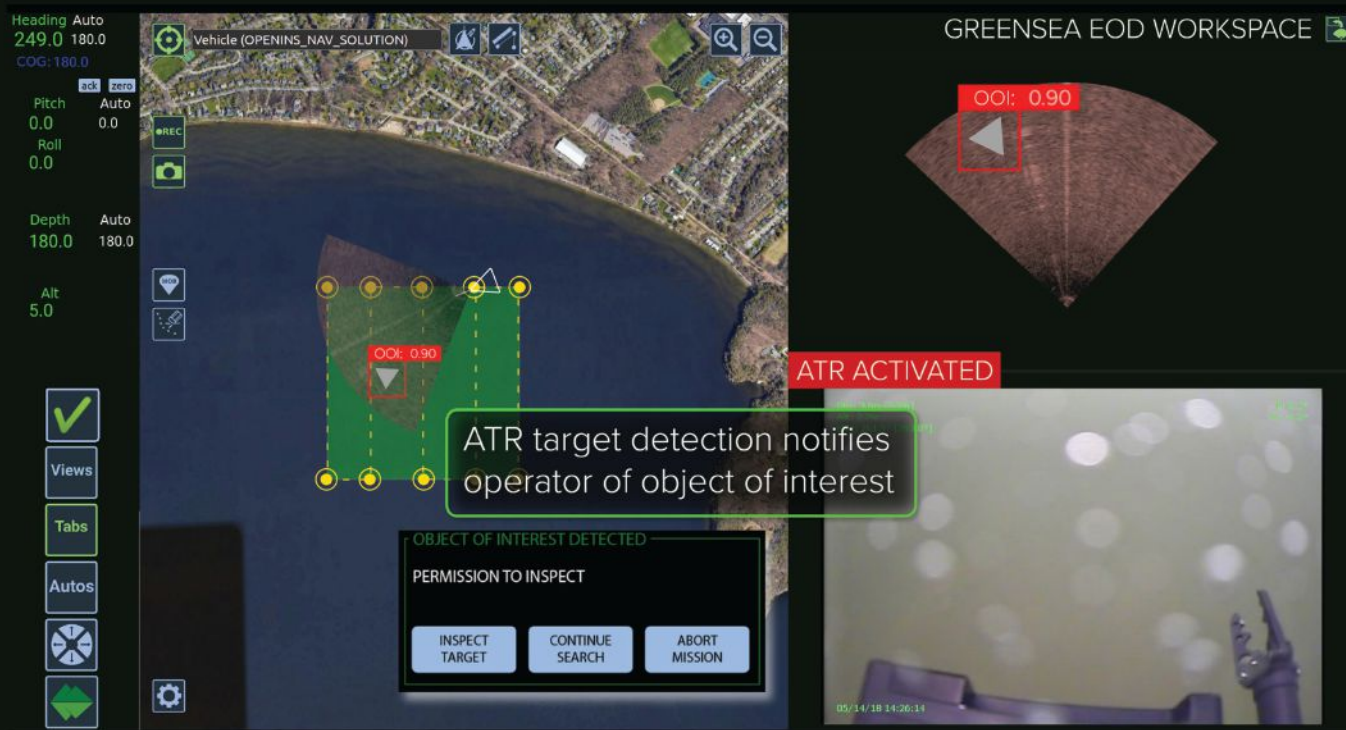
This is where edge computing or processing fits in. Processing data on the edge, which in the case of a vehicle means on the vehicle itself, cuts down on the size of the data stream moving up and down either a tether or an acoustic connection. Edge processing is rippling into the subsea vehicle market, with the pull of the aging out

*OPENSEA Edge is a convenient add-on package that delivers edge processing and perception system integration to a traditional ROV.*

## OPENSEA EDGE

### MODULAR HARDWARE AGNOSTIC AUTONOMY SOLUTION





*Greensea's Edge Workspace fuses vehicle control, navigation, payload sensors, diagnostics and data management into a single screen.*

and reduction of topside crew in the industry coinciding with the push of breakthroughs in small form factor computing, AI and machine learning (ML) technologies in the wider tech space.

### Adaptive Intelligence Payload

For example, a seabed crawling mine countermeasures robot can now carry libraries of object recognition data in its onboard data storage system and carry its own processing power to interrogate that library. If it also has the machine learning capabilities to compare what its sensors are seeing with previously identified sensed objects, it can then “tell the difference” itself between a boulder and an object of potential interest, such as a seabed mine or a riser, for example, without relying on sending or receiving data from above.

Like a human brain, a small form factor subsea vehicle computer can learn over time from experience. Our brain would cross reference an object or scenario with hundreds or thousands of previous experiences in our “onboard data bank” and come up with the best guess for a conclusion. Like a human brain, AIs do need teaching, and this is part of the reason why highly autonomous edge processing subsea vehicles will not appear overnight. The common analogy is that of teaching a human five-year-old to perform a (to an adult) simple operation, such as making the bed in the morning. On day one, the child most likely needs extensive micromanage-

ment—“first you pull this, then you plump that”—but by day four or five a single instruction of “make your bed” might suffice. An AI, though, can learn years’ worth of human learning within days in the niche areas in which it works. Unlike a human, it can direct all its considerable efforts to learning to distinguish between a boulder and a riser without concurrently having to, say, form a sense of humor or an opinion on the best toppings for pizza.

Such a vehicle, while it might still require periodic mission instructions from humans above to a greater or lesser degree, no longer has to be piloted in the traditional hands-on sense. It can be given instructions to carry out and left to its own devices, fulfilling the tasks in its own, efficient way. This enables streamlining of processes, including allowing single shore-based operators to operate fleets of robots, where formerly only one-on-one control was feasible. It also brings the possibility of tetherless operation into range, opening up areas of subsea work that could in the past only be carried out by slower, more “oversight needy” tethered robots. In certain scenarios where in the past only experienced commercial divers had the experience to be able to interpret information and act accordingly on a dive, edge processing subsea robots could mean the human element can be removed from tasks that are dull, dirty or dangerous.

### OPENSEA Edge

Greensea Systems Inc.’s OPENSEA Edge is helping facilitate the industry’s move toward edge processing and its benefits. OPENSEA Edge, which is currently operating in three subsea vehicles in the defense sector, is the latest enhancement to Greensea’s well-established open-architecture platform, OPENSEA, which is itself operating on over 3,000 subsea vehicles worldwide.

*The three current OPENSEA Edge development robots comprise two subsea tracked crawlers built by Greensea subsidiary Bayonet Ocean Vehicles and one VideoRay Defender.*



### Early Adopters

The three current OPENSEA Edge development robots comprise two subsea tracked crawlers built by Greensea subsidiary Bayonet Ocean Vehicles and one VideoRay

Defender. All three are working in the mine countermeasures space for a defense partner. The Defender is a formerly tethered vehicle that has leveraged the benefits of OPENSEA Edge to ditch the tether.

Moving from tethered to tetherless operation is a potential game changer for many industries well beyond the technology's defense roots. Tethers require tether management, a task so intense and mission critical it is often conducted by a second person in addition to the ROV pilot, whose sole task is to prevent tether damage or vehicle/ tether entanglements. Untethered vehicles can be much more efficient, within data bandwidth constraints. Imagine a task such as an inspection of subsea piles of a pier structure. It's easy to see how an untethered ROV or AUV can inspect all sides of all pile bases quickly, without tying itself in knots.

The largest cost of a tether is pegged to the ship to which it is tied. By obviating the need for a mothership, tetherless operations opens the door to seabed residency for subsea vehicles. The residency model appeals to in-

While OPENSEA provides the software capabilities of navigation, control, autonomy, perception and long-range communications, OPENSEA Edge provides a modular, hardware-agnostic processing platform that converts a traditional ROV into one with autonomy, AI, vehicle perception, and tetherless, over-the-horizon, communication and control. Essentially, it is a convenient add-on package to deliver edge processing and perception system integration to a traditional ROV. OPENSEA Edge addresses the future requirements of manufacturers, service providers and system integrators as the industry moves increasingly toward autonomous and unmanned operations.

The hardware agnosticism is a big part of OPENSEA Edge's potential to solve real-world subsea problems, starting from today. There are vehicles from ROV/ AUV manufacturers that already employ edge processing, and it's great to see this trend growing in the industry. For other vehicles, Greensea's technology can enhance any given platform with an edge computing add-on.



dustries such as offshore energy that have extensive subsea assets requiring regular inspection. In such a model, multiple robots reside in a subsea shelter from where they can recharge batteries, ready to fly out to conduct inspections of underwater infrastructure as planned or required, in any weather and without direct surface vessel support.

### Hardware and Software

The introduction of edge processing principles to the subsea space has been as dependent on hardware as on software breakthroughs. OPENSEA Edge utilizes parallel NVIDIA processors to handle sonar and video perception feeds while providing autonomy, communications, and task management for the robot. This platform puts a tremendous amount of processing power at the edge, right on the robot, where it can work directly with sensor data and make decisions for the vehicle.

Meanwhile, OPENSEA's Safe C2 software package for low-bandwidth and high-latency communication links provides a seafloor to over-the-horizon communications solution for operators supervising the robot. With the open-architecture framework of OPENSEA and available processing space, developers can install their own autonomy and perception-handling software, including AI/ML libraries.

### Collaboration Is Key

The continuing pathway for making our subsea robots smarter, more efficient, less dependent on human controllers, and able to begin more extensive tetherless and resident operations will only remain open through collaboration. While Greensea is an expert in ROV control

and autonomy, only by working with other subsea technology leaders has OPENSEA Edge been able to deliver a complete solution.

One example is Greensea's collaboration with U.K.-headquartered SeeByte, a specialist in automatic target recognition (ATR) technology. The ATR system uses fast, machine learning techniques to detect and classify targets from forward-looking sonar data. Any ROV equipped with OPENSEA Edge can now identify targets, based on an extensive and growing internal library of past experiences. For example, a Bayonet ocean crawler can now "tell the difference" between a rock and a sea mine in the field thanks to SeeByte's data interrogation systems and Greensea's and SeeByte's ever-growing shared object libraries.

### Conclusion

With edge processing, ROVs come alive. Data processing, navigation and control on the vehicle allow for decision making on the edge. This paves the way for easier vehicle fleet management, failure mitigation, and the platform capabilities required to integrate new levels of autonomy. With this key enabling technology, the subsea industries are well on the way toward underwater robot residency and extended reach. **ST**

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*David Pearson is a chartered marine technologist and program manager of autonomous systems at Greensea Systems Inc. He leads a team of multidisciplinary software developers and is responsible for the timely and accurate delivery of complex software systems. He is fully committed to, and specializes in, advancing the technology of ocean robotics across the full landscape of defense, offshore energy, scientific and commercial maritime industries.*

# ADCP Data Retrieval

## Reliable Wireless Communication for Long-Term Seafloor Deployments

By Florie Mancel

Acoustic Doppler current profilers (ADCPs) are commonly used in oceanography, hydrology, and other fields to measure the speed and direction of water currents. They work by emitting sound waves into the water and measuring the Doppler shift of the reflected waves. This allows them to determine the velocity of the water at different depths. ADCPs are used to study ocean currents, tides, and circulation patterns, as well as to monitor water quality, measure discharge in rivers and streams, and study the movement of sediment and other materials in the water.

Accessing data from an ADCP installed on the seabed can be challenging. One method is to use divers to

retrieve the ADCP so data can be downloaded topside, but this is time consuming and costly. Another method is to use a cable to transfer data from the ADCP to a buoy or vessel, but it can be damaged when left unattended and may be hazardous to marine traffic. There is also the option of underwater wireless communication, but the lack of bandwidth and significant packet loss due to prevailing conditions means that data often fail to reach the surface or may be incomplete and unusable when transmitted.

### Wireless Issues

While wireless data transfer is ideal in order to avoid

| Standard wireless transfer                       | Diver retrieval                                  | Cabled communication             |
|--------------------------------------------------|--------------------------------------------------|----------------------------------|
| Dumb file transfer                               | Risk of injury or loss of life                   | Expensive to buy and maintain    |
| Low data rates / Unreliable link                 | Cost to hire can be high                         | Difficult to deploy              |
| Location dependent performance                   | Impossible to get regular data                   | Prone to entanglement            |
| Dependent on prevailing environmental conditions | Dependent on prevailing environmental conditions | May require additional equipment |

Drawbacks of current methods used for data retrieval from in-situ ADCPs.

*The SWIS: ADCP Edition is a plug-and-play wireless communication system for ADCPs on the seabed.*



uncertainties during long-term ADCP deployments, cables and divers have long been the go-to solutions due to what has typically been poor wireless user experience with patchy connectivity, lost data and slow transfer speeds.

The difficulties of transferring data underwater are due to the unique properties of the subsea environment.

Most wireless communication technologies use electromagnetic waves to communicate, and these waves are rapidly absorbed by water. Therefore, they are ineffective for subsea communication, except at very short ranges or exceptionally low data rates. Optical communication technology is sometimes used in clear waters for short-range communications and very high data rates, but most communication technology underwater is acoustic. The reason for this is that acoustic waves can travel over long distances given the right conditions.

### Improving ADCP Data Transfer

The issues that plague standard underwater wireless communication systems, especially in the context of ADCP data transfer, come from the fact that the modems used are “dumb” units with little computing power or capability to understand the data they are sending or receiving or to detect that data packets have been lost. In order to overcome this, it’s possible to integrate data loggers and extra software that will give

the system more context, but building such a network

is both complex and costly, in addition to being prone to errors and breakdowns due to incompatible or poorly configured components.

Alternatively, there is now a purpose-built solution with built-in computing power and understanding of the ADCP data it is transferring, which can, for the first time ever, provide instant plug-and-play wireless data transfer performance in practically any conditions. Pre-configured for simple deployment and easy operation via a user-friendly interface, the solution has been developed by the Singapore-headquartered technology company Subnero to provide robust communication even in challenging conditions, and is based on its existing WNC (wireless network communication) underwater modem technology. It offers the intelligent data transfer benefits of the established software-defined modem technology Subnero already provides, without the complexity of manually building a network using different technologies and suppliers.

Called the Subnero Wireless Integrated Suite (SWIS): ADCP Edition, it provides a seamless end-to-end solution for the wireless transfer of data underwater and is specifically designed to accommodate the nuances of data acquired and transmitted from ADCPs installed on the seabed. The depth rating is 6 km, and the communication range is about 4 km (depending on environmental conditions, which can also affect data rate). The system is designed to transfer data intelligently. Lost data packets can be accounted for and re-sent, so corrupted files are a thing of the past. It can even work out different ways to transmit based on environmental conditions.

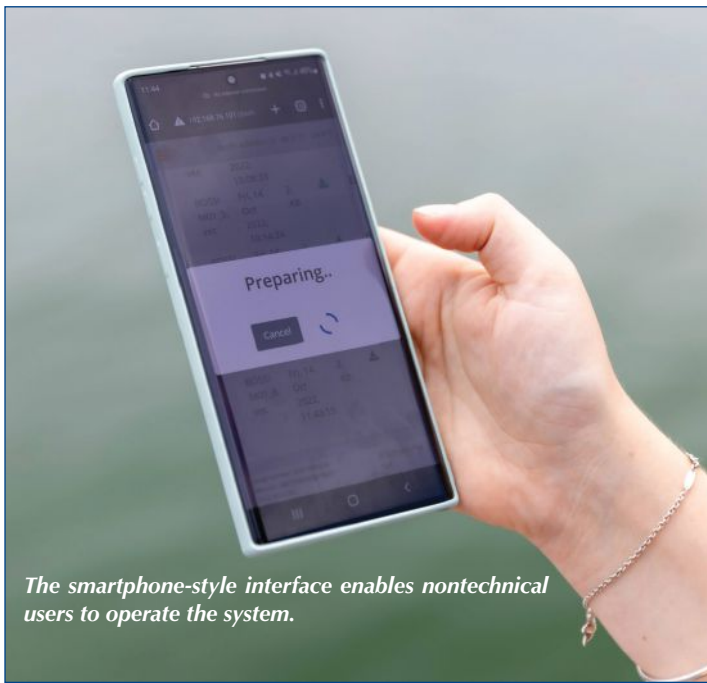
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*The smartphone-style interface enables nontechnical users to operate the system.*

Importantly, the lion's share of R&D has been done in Singapore, where it was proven to significantly outperform standard wireless systems. Well known for its challenging waters, high performance in Singapore means even better performance in most other regions globally.

### Optimizing ADCP Operations

While providing intelligent, content-aware data transfer, SWIS further shifts the paradigm by offering a contemporary, user-friendly, smartphone-style interface that can be operated by practically anyone, meaning that some technical aspects of projects that require an ADCP can be carried out quickly and easily by less experienced staff. Additionally, the fully integrated approach to system management unlocks unique features to further reduce complexity and optimize the efficient operation of an ADCP for any application through the realistic implementation of high-performance wireless data transfer.

Features not possible on incumbent technologies include content-aware data summarization (CADS), which provides smart previews for partial or whole deployments

using the powerful, built-in machine learning-based content-aware data processing (CAP) engine. It supports user-selectable date range and compression ratio for ADCP files, allowing for easy location of the required data, which can then be used to decide if the full file is immediately needed for any specific workflow.

The system also provides onboard fault detection, with quick and easy retrieval of ADCP status and smart scheduling for regular and ad hoc downloads, which can provide significant power savings. Remote control, data redundancy, and the ability to save smart profiles for different locations and environments are also new functionalities not seen before on the market.

All of this contributes to unlocking new workflows that support end-users to make better informed decisions and work more efficiently regardless of the ADCP application. The web-based user interface (UI) powered by UnetStack is integral to this. It allows for touch screen or mouse-and-keyboard-operated configuration, data download, and visualization. No software installation is required, and it is operating system and platform independent. All that's needed is a browser on a desktop PC, laptop, tablet or smartphone and an internet connection, and you can remotely access and download ADCP data, including relevant content, such as device information, smart previews and file list, from anywhere in the world.

With the current approach of building one-off solutions featuring dumb modems, smart data loggers and third-party software essentially calling for a custom project every time, end-users, including hydrology departments, will benefit from the simplicity of the plug-and-play approach now available to them via the SWIS: ADCP Edition. The ability to avoid the capital and operational costs of creating cabled communication networks or using divers to manually retrieve data are obvious reasons to take wireless seriously. The Subnero approach might finally be the key to unlocking the wireless performance that end-users have been demanding for decades. **ST**

*Florie Mancel is the business development manager for Subnero Pte Ltd.*

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# Data Sharing for Ports

## *Data Management Platform Yields Efficiency Gains in Shipping*

By Abhishek Nair

**T**he maritime industry's digital ecosystem involves many moving parts belonging to multiple organizations from various sectors, and typically with competing interests between sectors. For this ecosystem to be efficient, all the disparate parts need to come together with seamless data flow, made relevant to each party in a quick and transparent manner.

The challenges of the global supply chain over the past few years have created a “coalition of the willing” in terms of data processing and sharing. However, the

reality is that sharing relevant information is much easier said than done. From a practical standpoint, organizations understand the importance of data transference and sharing, but a lack of industry standardization means that very few organizations are actually operating digital systems that can exchange information. Ironically, even if parties want to share information, they are often unable to do so.

However, there have been some standout success stories, such as the work done by PortXchange with the Port

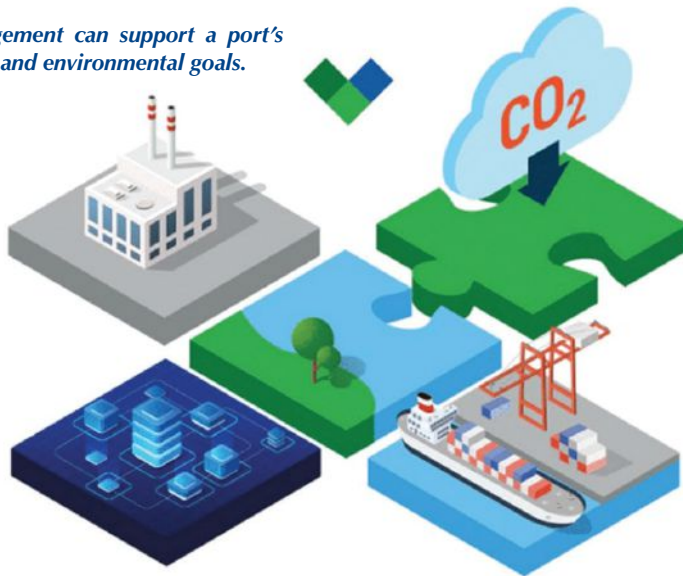
*PortXchange Synchronizer is a platform that unifies a port's data systems in real time to improve operations.*



# PLUG YOUR PORT

FOR A  
BETTER WORLD

*Data management can support a port's profitability and environmental goals.*



of Rotterdam, a fully integrated port that has been a pioneer in fostering digital innovations for port operations. PortXchange was spun out of the Port of Rotterdam back in 2019 and has since carried out trials across multiple ports, including the ports of Houston, Moerdijk and Algeciras (*Sea Technology*, June 2021). The company's data management platform has been used to optimize more than 100,000 port calls thus far.

The Port of Rotterdam has been working on integrating all parties involved in its operations via data sharing, which has brought benefits in operational efficiency and emissions reduction. For this to happen, a port needs to reach a certain level of digital maturity. A digitally mature port is equipped with the necessary solutions to facilitate data sharing processes in a standardized way, first between its stakeholders, then, at a later stage, with other ports globally.

## Pioneering Field Trials

To measure the impact of the benefits of data sharing, PortXchange conducted separate field trials with the Port of Rotterdam, Port of Felixstowe and Port of Algeciras to measure the reduction of fuel consumption and carbon emissions savings with just-in-time (JIT) arrivals. What we found was that there was huge potential across all three ports to benefit from JIT arrivals.

We believe that this is the first time that such JIT field trials have taken place out of the laboratory and, therefore, represent one of the first examples demonstrating how standardized data transfer between different parties involved in a port call have an impact on operational efficiency and the environment.

JIT arrivals are widely recognized as a means of making ports more efficient, sustainable and optimized for the port call process. The concept is based on the idea

that the vessel can maintain an optimum speed to arrive at the pilot boarding place when availability of berth is guaranteed. This is achieved by providing information about the availability of berths, tugs and pilots to the vessel in real time.

PortXchange Synchronizer provides a platform for sharing real-time operational data between shipping companies, terminals, ports and service providers to optimize planning and deconflict potential issues. Once a vessel has an estimated time of arrival, a port call is created and relevant parties can see associated plans for that vessel. The operational information is merged with AIS data and machine learning predictions to give a real-time status of each port call.

The findings were clearly positive:

Across the three ports trialed, bunker consumption was reduced by an average of 12.6 metric tons per port call, equivalent to a reduction of 39.5 tons of CO<sub>2</sub> emissions.

These findings, recorded over two months at the Ports of Felixstowe and Algeciras and over six months at the Port of Rotterdam, represent significant cost savings and emissions reductions. We anticipate that ports around the world will benefit from such gains with PortXchange's data management platform.

To give a more detailed example from the field trials, working with the Port of Algeciras, PortXchange was able to observe all the carriers calling at a specific terminal. All the information from the various systems involved was shared in a single platform, resulting in reduced idle time, costs and vessel delays. On average, the idle time per vessel arrival/departure decreased by nearly 40 percent, and CO<sub>2</sub> reduction was reduced by 32.9 tons per port call.

By using the PortXchange Synchronizer, shippers and their port communities have been able to save on time, fuel burn and demurrage.

## Identifying the Bottlenecks

Experience tells us that there is never going to be a one-size-fits-all solution. What has worked at the Port of Rotterdam won't necessarily work at another port because every port is different in terms of its workloads, the digital maturity of its systems, and the respective challenges these represent.

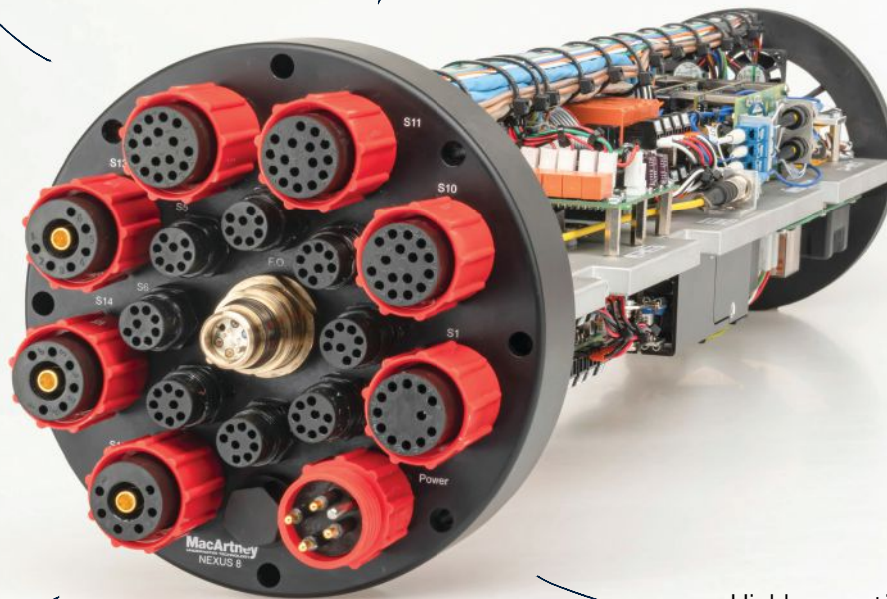
So, whenever we implement a new port optimization platform, we need to be aware of the current data processing systems in place and study the port in order to identify where the bottlenecks and pain points lie. In certain ports, the bottlenecks might be physical infrastructure, whereupon you gain in operational efficiency

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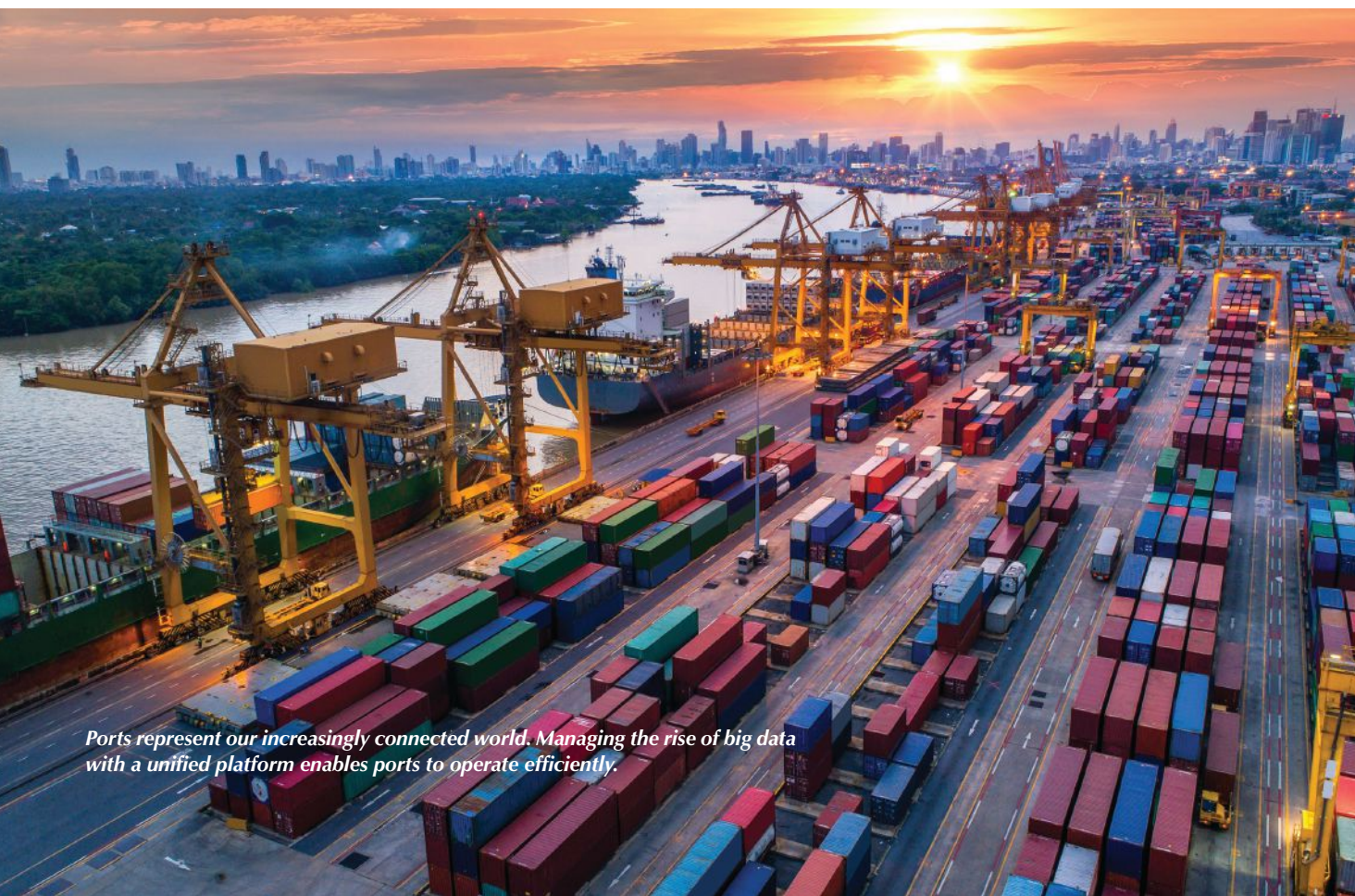
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*Ports represent our increasingly connected world. Managing the rise of big data with a unified platform enables ports to operate efficiently.*

by improving workloads. In other situations, bottlenecks arise due to a lack of communication. Sometimes, they can arise because of too much information and an inability to draw out the relevant data.

By first identifying the bottlenecks, we can start bringing in the relevant parties and create a common forum to map out the problem, which we can then address with data management.

### **Change Management Is Key**

Digital systems must be in place to ensure that data sharing is a long-term investment. Perhaps more importantly, work practices and culture must change accordingly, which will require investment in change management to facilitate the restructuring of processes.

Change can lead to uncertainty, but as the pace of the industry and maritime responsibilities continues to increase, any efficiency gains that minimize the number of informational tools necessary to perform key work functions can only be a good thing. There needs to be buy-in from top management from every organization involved, which then percolates down to the employees. And there needs to be a commitment to move forward with the latest technology as it evolves.

Embracing change and innovation in the maritime industry requires a steadfast commitment and unwavering resilience. The payoff is well worth the effort, as improved efficiency breeds greater profits, and the subse-

quent reduced carbon emissions benefit both ports and the communities they serve.

### **Providing a Digital Roadmap**

Technology is advancing with digital acceleration, meaning that ports will need to be “technology agnostic” and open to considering using additional systems. Ports should continuously incorporate new technologies into their processes as soon as those technologies prove to be useful. The result will be more profitable ports. The adoption of new technologies improves efficiency, which enables handling more cargo in the same amount of time, thus generating more revenues for the port.

With leading stakeholders being more willing to share information and technology advances creating unified sources of information, we expect to see improved global port-to-port connectivity as ports adopt platforms such as the PortXchange Synchronizer to facilitate the exchange of relevant information as they play their role in a more connected world. **ST**

*Abhishek Nair is the director of business development at PortXchange, where he leads ports and port communities worldwide in improving operational efficiency by using digital tools and leveraging the power of technology. He is a sailor whose love for the seas, ships and ports drives him to solve challenges of the future for the shipping industry.*



# Streamlining Bathymetry Logistics

## *UAV with Versatile Payload Yields High-Res Data*

By Maxim Baklykov

**B**athymetric surveying in shallow water and near-shore areas can be a challenging task, depending on the circumstances; for example, in the context of steep shorelines, navigation obstacles, and restrictions related to permit requirements, private property access and use of boats in protected zones. Logistics can be a significant part of the cost of a bathymetric survey project.

Bathymetric surveying with the use of a UAV reduces the logistical burden. It is a relatively new way of data collection. Airborne LiDAR bathymetry was the first aerial drone-based bathymetric surveying approach, followed by UAV-based echosounding technologies. In Europe, there was a breakthrough in 2022 in synchronizing the two methods, both on the hardware and software levels. At the UAV 2022 summer school in Estonia, members of the newly launched EAGE UAV community experimented with the synchronization of photogrammetric, LiDAR and bathymetric surveys.

Adding to the development of the use of aerial drones for bathymetric survey, last autumn saw the launch at Intergeo in Germany of TOPODRONE AQUAMAPPER, a 100-m-depth-rated bathymetric surveying device that integrates an echosounder and high-performance GNSS-based inertial navigation system.

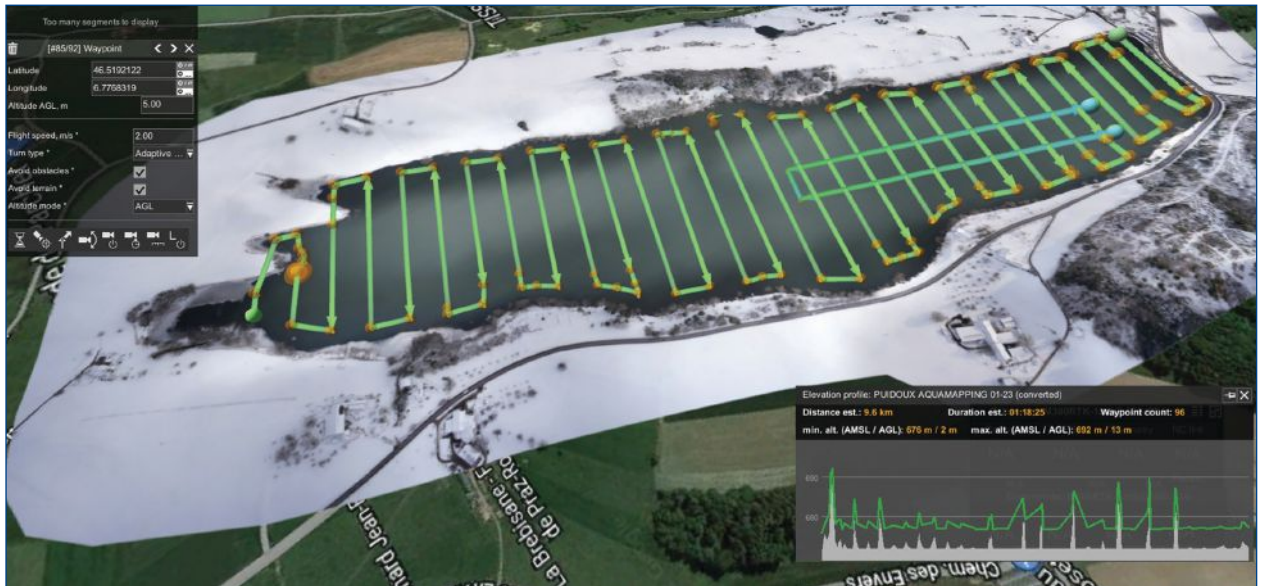
TOPODRONE's versatile design philosophy makes it possible to integrate AQUAMAPPER's bathymetric equipment with LiDAR systems and photogrammetric cameras installed as a payload on one drone using the same



*TOPODRONE and Erelis test AQUAMAPPER in Israel.*



*TOPODRONE AQUAMAPPER surveying a lake in Switzerland. (Below) Mission planning in UgCS software by SPH Engineering.*



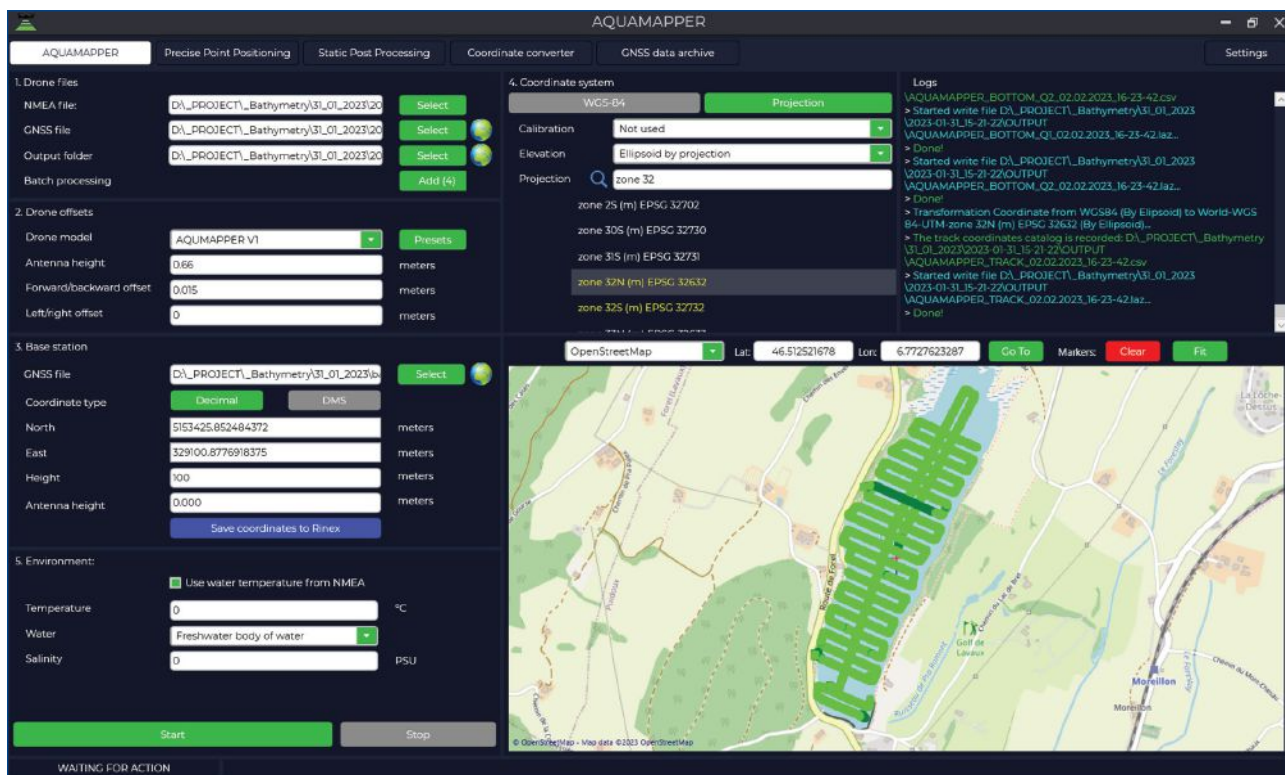
mission planning and data processing software. With this hardware and software combo, survey teams can remain small and agile.

### Switzerland Survey

A lake bathymetric survey project was conducted in January 2023 in Switzerland over 44 hectares of Lac de Bret with drone LiDAR scanning by the TOPODRONE team. As part of the preliminary work, aerial photography of the lake and surrounding area was performed using a DJI M300 drone with an onboard TOPODRONE P61

camera to produce a high-resolution orthophoto map. The preliminary data were used to plan the bathymetric missions of the drone, taking into account the coastline and possible objects in the water. The spacing between hydrographic profiles was chosen to be approximately 50 m.

A total of five bathymetric missions were performed with TOPODRONE AQUAMAPPER mounted on the DJI M300. The UgCS software by SPH Engineering was used for route planning, surveying and automatic control of the drone. The Emlid Reach RS2 base station was set up



*(Above) Data processing in TOPODRONE's post-processing software. (Right) Bathymetric profiles captured by AQUAMAPPER.*

in static recording mode.

Within a fieldwork period of 3 hr., the DJI M300 towed the AQUAMAPPER, maintaining the same altitude level above the water using a radar altimeter that enabled operation at speeds of up to 16 km/h. With its specially designed streamlined shape, the AQUAMAPPER completed a bathymetric survey of approximately 2 to 2.5 km in a single 20-min. drone flight.

The next step was to post-process the data. High-precision profiles of the lake bottom were calculated using TOPODRONE AQUAMAPPER post-processing software, taking into account echosounding data, high-precision GPS coordinates, water temperature and sensor inclination. A depth matrix of the lake bottom was then created and combined with drone LiDAR data, including of the terrain adjacent to the lake.

The airborne laser scan (ALS) obtained a highly accurate three-dimensional model. Then, automatic classification of the LiDAR point cloud was performed, classifying the terrain surface, buildings, vegetation, power poles and lines, and generating contour lines.

It should be noted that the results of the bathymetric measurements are in the same coordinate system as the

LiDAR data and can be combined with ALS material for further analysis, mapping and profiling.

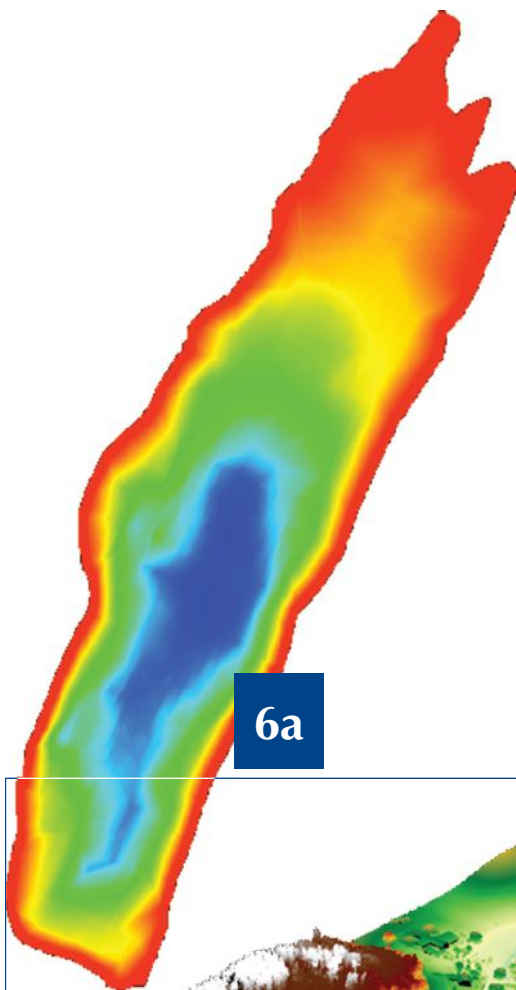
To check the accuracy of the bathymetric works, control profiles were measured crossing the main lines. The difference of the heights on them was not more than 3 to 5 cm.

### Floating Solar Farm Survey in Israel

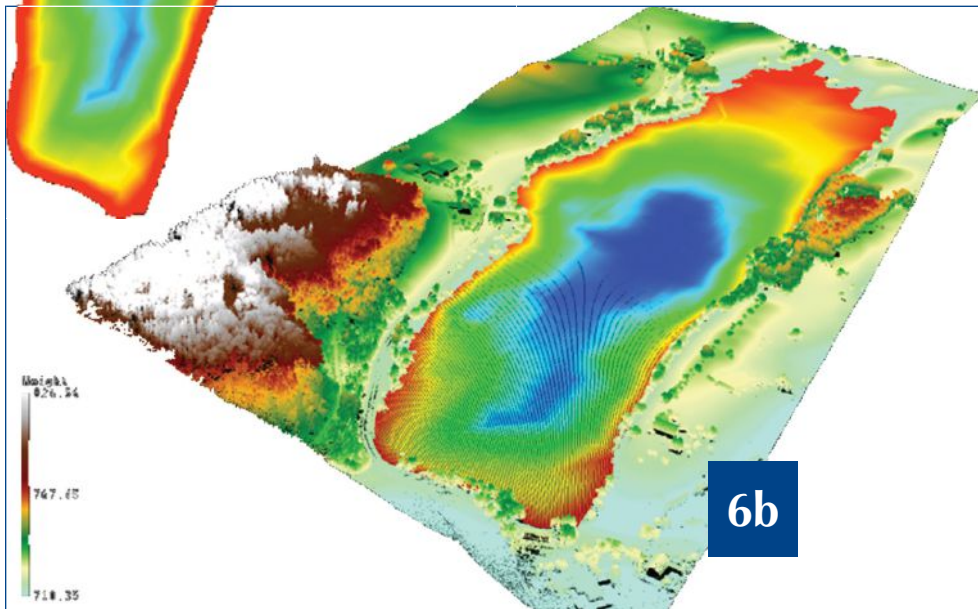
ERELIS Group, a drone service provider, performed a comprehensive water reservoir survey in December 2022 in northern Israel using TOPODRONE's LiDAR HI-RES and AQUAMAPPER. The basin of the reservoir was occupied by solar panels, which made it difficult to perform surveys using standard methods with boats.

As the first step, drone LiDAR survey and aerial photography were performed to identify the location of solar panels and cables in the pond, and then bathymetric survey was carried out, avoiding obstacles in the water in automatic mode. The bathymetric survey results were perfectly matched and integrated with the laser scanning data. The carrier for the equipment was a single UAV platform, the DJI M300.

The resulting set of LiDAR and bathymetry data enables monitoring of the water reservoir and its surroundings. The data sets from the project were a 3D model based on the results of laser scanning; a georeferenced orthophoto; and a 3D model of the bottom of the reservoir, contour lines and isobaths. A highly accurate three-dimensional model of the reservoir bottom enables



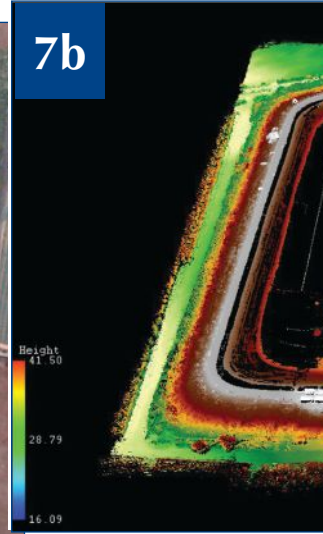
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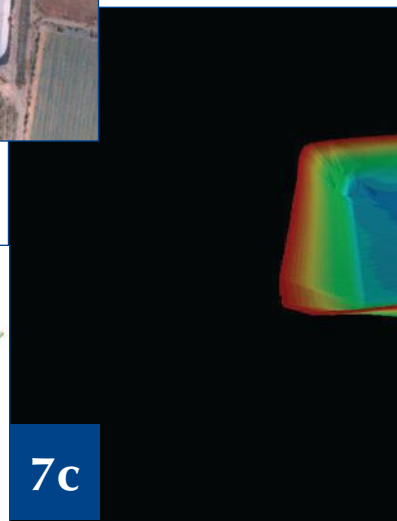
6b



7a



7b



7c

high-precision assessment of sediment volumes, general monitoring of the reservoir banks and visual analysis.

### Civil Engineering, Construction

GRAPHEIN, a Romanian surveying company, performed the drone survey in September 2022 for a challenging EU road construction project to build a highway in one of the toughest terrains in Romania. The project includes seven tunnels, 24 bridges and 18 viaducts.

In order to provide accurate maps and up-to-date information about terrain level, buildings, roads, power line networks, cadastral boundaries, river depths, etc., drone LiDAR corridor and bathymetric surveys were performed. The TOPODRONE LiDAR ULTRA on board

the DJI Matrice 300 drone was used to capture laser scanning data from 100- to 120-m altitude over rugged terrain forest, covering a 32-km-long and 400-m-wide corridor in 14 flights. AQUAMAPPER connected to the same DJI Matrice 300 drone was used to perform bathymetric survey over six river crossings.

### Conclusion

In surveying, there is an obvious trend toward optimizing the quantity of hardware and software. A single-carrier solution coupled with a single data processing software for multiple data collection equipment can enable a surveyor to achieve high-accuracy data for real-time analysis with less resources.

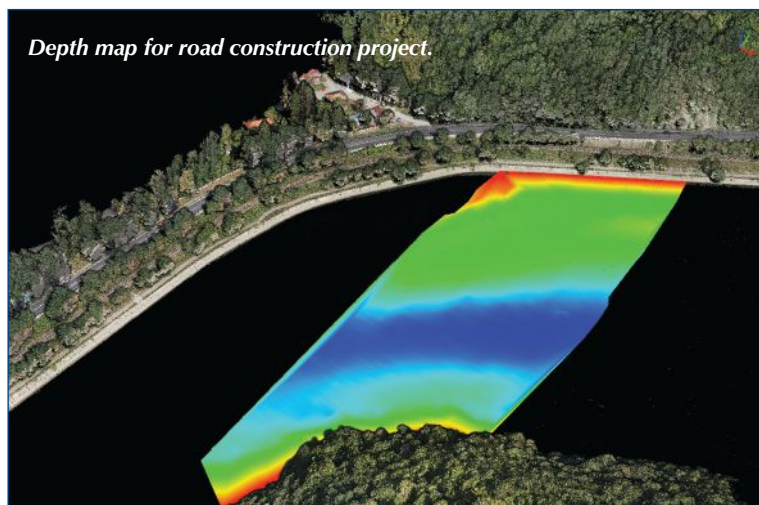
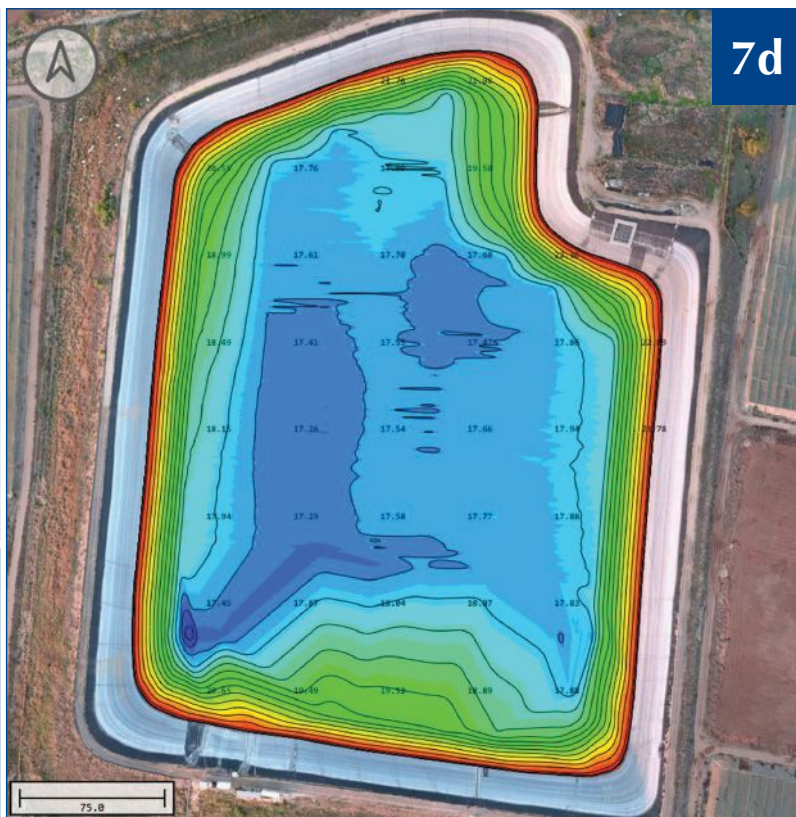
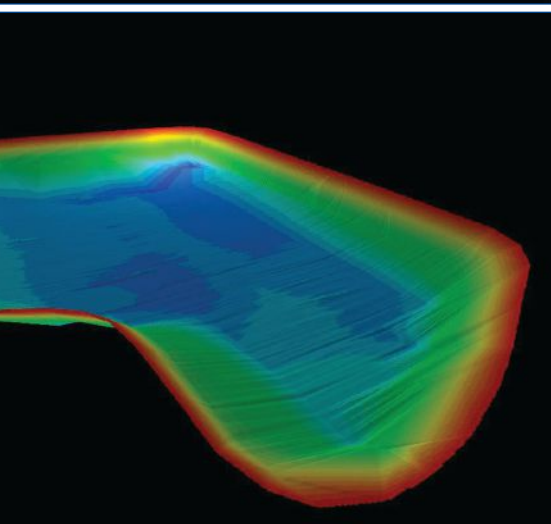
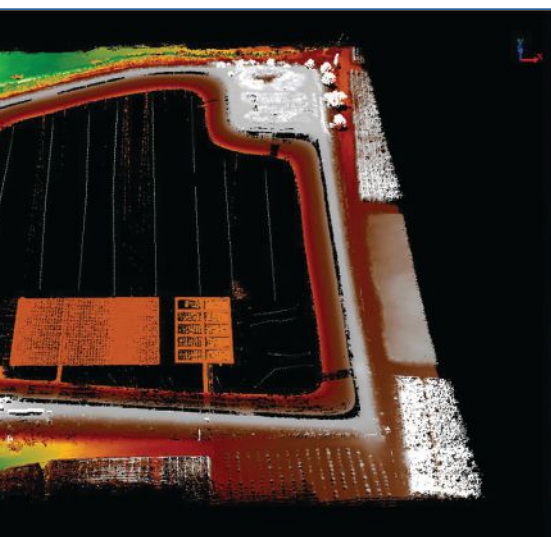


**Figure 6a:** Depth map. **6b:** Depth map combined with LIDAR data. **7a:** Orthophoto of reservoir. **7b:** LiDAR point cloud of reservoir and wires in the area. **7c:** 3D model of reservoir. **7d:** Depth map and orthophoto.

TOPODRONE combines hardware and software for bathymetric surveys that can be carried out with small teams. Only one to three people were involved in the use cases discussed in this article to perform both laser scanning and bathymetric survey with one drone. They benefited from accurate and detailed 3D footprints of the terrain above, below and around the water. TOPODRONE's AQUAMAPPER has already been recognized by the Association for Uncrewed Vehicle Systems International (AUVSI) as a finalist in the 2023 XCELLENCE awards.

A single-carrier solution is particularly useful for hard-to-reach areas, such as steep coastlines, mining pits and areas with terrain obstructions, as well as ponds, lakes

and canals. It is not necessary to have a wide point of entry into the water for deployment and recovery, and the system can operate in environments unsafe for humans. By functioning above the water, an aerial drone enables survey of lakes and rivers with strong currents, as well as contaminated water. The solution also allows for bathymetric work where the use of larger vessels is not economical or possible.

This new level of mobility and performance supports the global surveying and hydrographic community with data quality and efficiency. **ST**

*Maxim Baklykov is the CEO of TOPODRONE.*

# Database Management

## *Creating a Unified System for Aldabra Atoll Research*

By Simon Taylor

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I recently was contracted to formalize a collection of monitoring and reporting databases at one of the world's longest running tropical research stations, Aldabra Atoll, which celebrated its 50th anniversary in 2021. I have been lucky enough to visit this atoll several times over the last 15 years of supporting the Seychelles Islands Foundation (SIF), [www.sif.sc](http://www.sif.sc), which is responsible for the management and protection of the atoll.

The staff on the atoll spend their days collecting data on local ecology and biodiversity, and this information was typically stored in a loose collection of Microsoft Access databases, which posed a challenge because these databases were created and maintained over many years by staff and volunteers with skills sets ranging from expert to novice. Some contributors had mastered the databases and introduced very complex components,

*Aldabra's underwater world. (Credit: Imran Ahmad)*





*(From top to bottom) Rangers collecting subsistence fisheries data. (Credit: Michal Sur) Aldabra research station team. (Credit: Chris Jones) Aldabra giant tortoises. (Credit: Chris Mason-Parker) Fieldwork on Aldabra. (Credit: Martin van Rooyen)*





*Aerial view of Aldabra. (Credit: Martin van Rooyen)*

but once they left and something went wrong, the bugs went unchecked and caused ongoing problems.

While Microsoft Access is an excellent tool for nondevelopers to be able to create very useful database-driven applications, its limitations made us look at other options. Our goal was to converge the 12 main databases into a single system with one interface and to import all historical information.

### **A Central System**

We settled on a solution using standard web technologies to develop a central system that imported all the current data and allowed input, editing, and reporting of the data from a single user interface.

The system uses PHP and MariaDB (<https://mariadb.org>) on the backend and HTML/CSS/JS for the interface. We also integrated CyberTracker (<https://cybertracker.org>) to allow for easy data collection, and this synchronizes directly into the system on upload. The web interface is available off site for remote staff and researchers to contribute to the system.

There were a lot of challenges along the way, the biggest of which was getting all the Microsoft Access data into a consistent format in order to import without errors. Users over the years have changed the types of fields in the databases, which introduces errors in data entry every time the field type changes. The data in these fields then become inconsistent; for example, in the case of a text field originally called “date” that was changed to “datetime.”

We developed a set of scripts to process and test the data. With millions of records housed in a dozen data-

bases, this became the longest part of the process. Once the data sets were properly converted and imported into the new MariaDB database with a consolidated set of field types, we had a consistent base on which to build the rest of the system.

The Aldabra Atoll is remote, and the whole station is served by a relatively slow, expensive and overburdened satellite connection, so hosting the system online was not an option. There is a server on site to allow a quickly responsive system for the heavy users, and the data are then synchronized off site to allow access by other users.

The ongoing development and maintenance of this system can be managed by volunteers and staff with the necessary skills. There is also an overall requirement for oversight of the process by someone with database skills and knowledge of the system to ensure consistency going forward.

To learn more about Aldabra Atoll monitoring, visit: [www.sif.sc/aldabra](http://www.sif.sc/aldabra).

***“Our goal was to converge the 12 main databases into a single system with one interface and to import all historical information.”***

### **Acknowledgments**

Thanks to Christina Quanz from SIF, who contributed to this article. **ST**

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*As an IT consultant with over 25 years of experience, Simon Taylor has developed a passion for integration, helping organizations streamline their operations through seamless technology solutions (<https://taylorconsulting.co.za>). From enterprise resource planning to data management and cloud computing, he brings a deep understanding of integration best practices to every project, ensuring clients achieve maximum efficiency and ROI.*

## Offshore Wind Interest in Gulf of Maine

The U.S. Bureau of Ocean Energy Management (BOEM) has announced a determination of no competitive interest for a proposed research lease area offshore Maine. BOEM's determination means it will move forward with the state of Maine's research application, which could be used to inform any future commercial offshore wind development in the Gulf of Maine, as well as the deployment of floating offshore wind technology nationwide.

## US House Passes Bipartisan Science Industry Bills

The U.S. House of Representatives has passed two bipartisan Science Committee bills: H.R. 290, the Commercial Remote Sensing Amendment Act, and H.R. 342, the Cost-Share Accountability Act.

The Commercial Remote Sensing Amendment Act, sponsored by Chairman Frank Lucas (R-Okla.) and Ranking Member Zoe Lofgren (D-Calif.), updates reporting requirements for NOAA's Office of Commercial Remote Sensing Regulatory Affairs so that Congress can monitor how regulations are impacting the growth and improvement of the commercial remote sensing industry. Remote sensing uses data collected from satellites to produce images of Earth, which can serve as a resource for a wide variety of industries, such as agriculture, finance, trade and energy.

The Cost-Share Accountability Act, sponsored by Rep. Jay Obernolte (R-Calif.) and Rep. Bill Foster (D-Ill.), requires the Department of Energy (DOE) to submit a quarterly report to Congress describing the instances where they have modified or waived cost-share requirements for research, development, demonstration and commercial application activities. This bill creates greater transparency and competitiveness in DOE's awards process.

## NOAA, ASCE Agree to Work Toward Climate-Ready Infrastructure

NOAA and the American Society of Civil Engineers (ASCE) have entered a memorandum of understanding (MOU) for NOAA's science and products to be used to inform the building and civil engineering codes, standards, and best practice manuals developed by ASCE. The partnership and new MOU between NOAA and ASCE will in part be facilitated by the University of Maryland and is aimed at helping create a stronger, more resilient future for a key sector of the U.S. economy. The work will also focus on community inequities in climate resilience.

## Hydrogen for Ports Act Introduced in US Senate

The American Association of Port Authorities (AAPA) strongly supports the Hydrogen for Ports Act, legislation recently introduced as part of a package by U.S. Senators Chris Coons (D-Del.) and John Cornyn (R-Texas) to support the adoption of hydrogen in the port industry.

Hydrogen energy infrastructure has the potential to kick start a wave of growth in maritime transportation

while creating another tool in the energy mix to mitigate emissions. Hydrogen, a clean and energy-rich fuel source, holds incredible potential for reducing carbon emissions and diversifying energy sources at U.S. ports.

## Slocum Glider for EPA Great Lakes Research

U.S. Environmental Protection Agency (EPA) scientists have recently used a Teledyne Slocum Glider to understand the connectivity between nearshore and offshore areas in the Great Lakes that affect water quality, which has been declining.

During this survey, the glider completed 3,000 vertical profiles over 1,000 km between early and late summer deployments. Data collected by the glider showed a seasonal difference from early to late summer in an area of high thermal and chlorophyll gradients. Glider operations dramatically expanded observations used for water quality monitoring and modeling.

## Conservation Moves in Arctic and Pacific

U.S. President Joe Biden is withdrawing 2.8 million acres of the Beaufort Sea in the Arctic Ocean nearshore in the National Petroleum Reserve-Alaska (NPR-A) as indefinitely off limits for future oil and gas leasing to protect important habitat for whales, seals and polar bears, as well as for subsistence. In the Pacific, the Biden Administration plans to designate the waters surrounding the Pacific Remote Islands as a national marine sanctuary. **ST**

### Li-Ion Ocean Power

The advertisement features a blue background with a red header. It displays several images of Li-Ion battery systems: a large yellow 'Energy Storage System' with an 'API17F certified' seal, a 'Vehicle Charger & Batteries' unit, and several cylindrical 'Li-Ion Batteries'. A green 'UL 9540A' safety seal is also visible. The text 'All-Electric' is present near the top right. At the bottom, it says 'Li-Ion PowerPack™ - Underwater Power Solutions' and 'Highly reliable, efficient and safe Li-Ion batteries AC+DC Made for harsh offshore and subsea conditions such as offshore energy, scientific and AUV or ROV equipment'. A 'Learn more' button is located next to this text. The SubCtech logo and contact information are at the bottom.

Energy Storage System

All-Electric

Li-Ion Batteries

Vehicle Charger & Batteries

Li-Ion PowerPack™ - Underwater Power Solutions

Highly reliable, efficient and safe Li-Ion batteries AC+DC  
Made for harsh offshore and subsea conditions  
such as offshore energy, scientific and  
AUV or ROV equipment

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SubCtech GmbH  
www.subctech.com  
info@subctech.com

UL 9540A

ISO 9001

SubCtech

# international

## Auramarine Moves to Bigger Factory

Auramarine, a global provider of fuel supply systems and other critical auxiliary equipment for the marine, power and process industries, has relocated in Shanghai, China, to a larger facility. The new factory will enhance its global customer services offering and act as a base for its intensive research and development program in line with the drive for new sources of energy and sustainability in the markets it serves.

As Auramarine strives to support decarbonization goals and augment the uptake of future fuels, the factory features a separate dedicated manufacturing line for its fuel supply units for methanol consumers.

## StormGeo Buys More Climatempo Shares

StormGeo, part of Alfa Laval, has increased its holding in Climatempo, a meteorological services provider in Brazil, setting itself up to offer more comprehensive and advanced weather intelligence solutions to customers throughout South America.

Having acquired 51 percent of Climatempo Group in 2019, StormGeo has acquired an additional 38.66 percent of shares, thereby increasing StormGeo's shareholding to 89.66 percent.

## neXat Creates Maritime Division

neXat, the company behind the world's first satellite capacity aggregation platform, aims to meet the growing demand for better connectivity at sea with the creation of a maritime division. neXat's new Maritime Unit will offer satcom installations on a variety of boats and onboard IT services, including radar, video graphics array and digital visual interface cabling.

The unit will be headed up by the former owner of Belgosat, Mario Alen.

## Digitalizing Fleet Scheduling

Norway-based Wilson has chosen Seaber.io, a Finnish maritime technology company, to enable the digitalization of Wilson's fleet scheduling to improve efficiency and reduce costs and emissions.

Seaber's intelligent technology provides data-led decision support. In addition to single-cargo voyages, Seaber supports multi-parcel and multi-port voyages, in which unnecessary ballast voyages and low utilization rates are common. The technology, based on a modern tech stack, integrates seamlessly with existing software solutions, such as ERPs and voyage management systems.

## Boxfish Chooses ROV Distributor

Boxfish Research has established a partnership with engineering consultancy S2 Services to distribute Boxfish ROVs to the offshore energy, navy, and defense industries in Malaysia and the larger Southeast Asia region.

New Zealand company Boxfish Research (*Sea Technology*, April 2023) designs and manufactures cutting-edge, autonomous-capable robotic vehicles and

ROVs. The battery-operated ROVs are agile and lightweight, delivering capabilities usually only seen in work-class vehicles.

## New Member of LNG Coalition

EA-LNG, the multi-sector industry coalition established to demonstrate the commercial and environmental benefits of LNG as a marine fuel, welcomes Énestas, the Mexican natural gas company that provides access to LNG for power generation, industry and transport.

SEA-LNG recognizes the importance of continuing to drive global infrastructure build out to improve availability of LNG bunkering to the rapidly growing global LNG-fueled fleet. The recent addition of Énestas to its membership supports this drive.

In January 2023, according to Clarkson's data, LNG was available at 185 ports worldwide, with 50 more facilities planned by 2025. This infrastructure supports local emissions and greenhouse gas reductions today and underpins the low-risk, incremental LNG pathway to zero emissions via bio-LNG and, in the longer term, renewable synthetic e-LNG.

## Value Maritime Expands to Singapore

Value Maritime (VM), an emission-reducing tech company for ships, has opened an office in Singapore to be closer to clients and grow its operations in the expanding Asia-Pacific shipping market. The new office is based in the Central Business District, the bustling heart of the shipping business in Singapore. Milou van der Ven will represent Value Maritime from its office in Singapore as the area manager for Asia.

Value Maritime invented the Filtree system, a prefabricated gas cleaning system for ships that filters sulphur and 99 percent of particulate matter and includes a carbon capture module that captures CO<sub>2</sub> on board.

## B Corp Accreditation for PortXchange

PortXchange Products B.V., a digital solutions provider for predictable and sustainable shipping, has officially become a certified B Corporation, joining a global group of companies using business as a force for good. PortXchange is among the few businesses in the maritime sector to gain the accreditation.

B Corp certification takes into account a company's impact on all stakeholders, including governance, workers, communities, the environment and customers. B Corp certification is a rigorous third-party accreditation that recognizes the initiatives PortXchange has implemented to reduce the environmental impact of the shipping industry while setting high standards in the way it conducts its business, including in diversity and equality.

## Svitzer Expands in Brazil

Svitzer, a global towage provider and part of A.P. Moller-Maersk, has expanded its presence in Brazil to provide operations and services at the Port of Salvador. Svitzer will deploy two modern, high-powered tugs at the port that will enable more complex maneuvers and assistance of different ship sizes in the region.

### HII Partners with Ocean Aero

HII and Ocean Aero have agreed to advance the combined capabilities of their respective unmanned maritime platforms and autonomy software solutions. They have recently commenced multiple, simultaneous efforts to enhance the operational reach and duration of the platforms, collaborative autonomy behaviors, shared sensor fusion and perception capabilities, and accelerated seabed-to-shore data transmission methods.

HII and Ocean Aero are involved in several unmanned maritime systems initiatives and exercises around the world. Ocean Aero recently completed Digital Horizon, the U.S. Fifth Fleet maritime domain awareness exercise in the Arabian Gulf, where HII's REMUS vehicles (MK18 Mod 1 and MK18 Mod 2) have been deployed continuously since 2013. The HII-Ocean Aero team plans to demonstrate their combined capabilities at an upcoming event in the region, in addition to other planned events and exercises for U.S. and international partners.

### Panama Commits to Reducing Plastic Pollution

Panama has announced major commitments to reduce plastic pollution, including stopping more than 160,000 tons of plastic that are imported and consumed in the country each year.

The commitments include: in three years, eliminating the use of single-use plastic items, such as plastic utensils and plastic cups; in five years, reducing the import and

consumption of plastic packaging by 30 percent, including plastic foam food containers; in seven years, reducing the import of virgin plastic by at least 20 percent; and in 10 years, reducing the sale and import of single-use plastic and virgin plastic by 50 percent.

### TCarta Marine Adds to Seabed 2030 Contribution

TCarta Marine has expanded its role in the Seabed 2030 project that seeks to map the entire ocean floor by 2030. Having already contributed 150,000 km<sup>2</sup> of 10-m-resolution seafloor depth measurements from its global satellite-derived bathymetry (G-SDB) product line, TCarta has also developed capacity building initiatives to train international hydrographic offices in creating their own SDB data sets for Seabed 2030 and other applications. TCarta completed training with the Mexican Hydrographic Office in 2022 and will begin a similar instructional program in Jamaica this year.

### Woolpert Opens Maritime Hub in Gulfport

Woolpert has opened its Maritime Systems Hub in the Gulf & Ship Island Building, a collaborative workspace in the Gulfport Blue Economy Innovation District. The historic building on the Mississippi coast hosts entrepreneurs, startups, and companies researching and developing blue technologies. Later this year, Woolpert will open an additional office in the new Roger F. Wicker Center for Ocean Enterprise, also in Gulfport. **ST**

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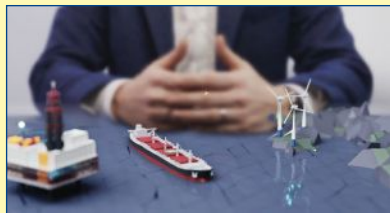
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## Digital Work Environment



Industrial Work Surface aims to fundamentally change how carbon-intensive industries operate by enabling a company's software users to work within a single digital environment. For example, companies can access and scale: carbon capture, utilization and storage (CCUS) facility modeling; predictive maintenance alerts and energy optimization recommendations; ESG reporting; and performance analytics on critical equipment. Kongsberg Digital.

## Bilge Water Treatment

PureBilge Compact is an oily water separator for small vessel segments to achieve compliance with bilge water treatment regulations. The PureBilge Compact is designed with a focus on reducing footprint. It is also an ideal retrofit solution for bigger vessels struggling with filters. Alfa Laval Marine Division.

## Offshore Helideck Monitoring

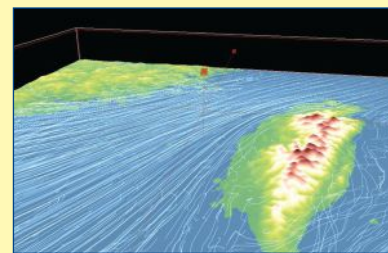
This system utilizes thunderstorm and lightning information from GLD360, a global sensor network that detects thunderstorms in real time anywhere in the world—including oceans, seaports and other areas outside the range of weather radars. Helicopter pilots, helideck operators and offshore authorities can now make informed "waiting on weather" decisions that result in minimized operational downtime, improved route planning, and reduced cost and impact of weather disruptions. Vaisala.

## Deep-Sea Smart Buoy System

Developed as a bespoke solution

for an oil and gas exploration company, this asset monitoring system enables access to real-time data from the seafloor. Acoustic transfer technology securely transmits data 24/7 from a monitoring structure on the seafloor to a smart buoy at the surface, which acts as a modem to communicate data back to shore via mobile or satellite link at a fraction of the bandwidth typically required. Harvest Technology Group Ltd.

## Weather Data for Offshore Wind



ANEMOI is a service that provides 1-km mesh wind and wave data to assist in the planning of offshore work related to the construction of wind power generation facilities. Forecasting accuracy can be enhanced by reflecting the data from observation devices that businesses install around their power plants. Forecasts can be made up to approximately 14 days ahead. Weathernews Inc.

## Internet-of-Things Platform

Triton has received Bureau Veritas (BV) type approval certification for cyber resilience. The solution gathers operational asset data from a vessel and its engines, pumps, hydraulics, alarms, and other equipment, amounting to over 10,000 signals for a single vessel. These are then communicated to crew on board and fleet managers onshore via various dashboards to track asset health, maintenance scheduling, and more. Damen Digital Solutions BV.

## Workforce Development App

Knowledge Coach has integrated

# SEA TECH e-NEWS

Sea Technology News | Features | Products

**Oyster Aquaculture Could Improve Potomac River Estuary**  
Oyster aquaculture in the Potomac River estuary could result in significant improvements to water quality, according to a new NOAA and U.S. Geological Survey study published in *Aquatic Geochemistry*. All of the nitrogen currently polluting the Potomac River estuary could be removed if 40 percent of its riverbed were used for oyster cultivation, according to the study. [3-23-2024](#)

**Navy's Laser Weapon Ready For Summer Deployment**  
Navy engineers are making final adjustments to a laser weapon prototype that will be the first of its kind to deploy aboard a ship into the summer. The prototype, an improved version of the laser weapon system, will be installed on the USS Ponce for testing in the Persian Gulf. Navy leaders have made electric-energy weapons a top priority to counter what they call asymmetric threats. The laser weapon could be used to deny U.S. forces access to certain areas. [3-23-2024](#)

**Ferry Sinks Off Coast of South Korea**  
With 463 passengers onboard, a ferry sailing from Incheon, South Korea, to the island Jeju sank near the southern tip of South Korea Wednesday, the southern tip of South Korea. Most of the more than 400 people on the ship were high school students and were on a school trip to the island. In the rescue effort, more than 80 vessels and at least 18 aircraft swept in to pull passengers from the water to safety. [3-23-2024](#)

**Pay Increase for Sailors Soon to Come**  
Sailors serving for the U.S. Navy could see a pay raise in the coming weeks, reported the Virginia Pilot. On May 1, sailors serving on the Virginia-class ships will receive a pay raise. The increase is pay commensurate with the Navy's increase in pay for its sailors. The raise is a part of a pay raise in work to those who work in jobs involving long deployments. Currently, this spend is between \$50 and \$700 dollars. [3-23-2024](#)

**US Senate Reviews DOE Budget Request**  
For fiscal year 2025, the Department of Energy (DOE) requested \$28.5 billion. The U.S. Senate Appropriations Committee, Subcommittee on Energy and Water Development, held a hearing and will review the funding request and latest week to review the request and latest week to review the request. According to Lamar Alexander (R-Tenn.), research should be a focus of spending. [3-23-2024](#)

**US Technology Helps in Search for Flight 370**  
More than a month after Malaysia Airlines Flight 370 went missing, crews are hard at work trying to uncover what happened to the Boeing 777. Acoustic signals emitted from the flight, provide a lead to the location of the plane, and eight countries are participating in the effort to scan the waters off the coast of Northwest Australia. Chris Johnson from Naval Sea Systems Command told Sea Technology how the U.S. Navy is helping in the search. [3-23-2024](#)

**2014 Sea Technology Buyers Guide Now Available**  
Published annually by Compass Publications, the 2014 edition of the *Sea Technology Buyers Guide* is now available. The *Buyers Guide* features a market analysis and seven sub-directories, including industrial firms, services, federal government organizations, educational institutions, oceanographic research vessels and geophysical survey vessels.

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Trivie's AI-based learning technology to deliver gamified micro-learning to 3t Transform clients that can dramatically increase knowledge retention and overall learning impact. The app will be able to demonstrate the real-time competency of employees, which can lead to significant safety risk mitigation. It can be used from any device. 3t Transform and Trivie Inc.

### Emissions Data Verification



Integrated with Veracity, DNV's independent cloud marketplace of industry data, applications and digital services, this automated data verification process creates a seamless experience for shipowners and managers. Operational vessel data will be crucial to correctly calculate emissions tax allowances. The data can be accessed for various use cases, making it easier for customers to access verified data that they can use and re-use for multiple business requirements. Coach Solutions ApS and DNV.

### 360° Subsea Data Visualization

Through iSite Subsea, users can source, view, manage, and report on seabed, survey and asset data using a single secure cloud-based interface, enabling interrogation and comparison of data over time, remotely, 24/7, and without specialist software knowledge. The new platform facilitates the digital delivery of data throughout the life cycle of a subsea asset for planning, evaluating, executing, and solving safety, environmental and risk scenarios. UTEC, an Acteon company.

### High-Visibility, Two-Color Rope

Fusion-X is made from a blend of polyester and HMPE (high-modulus polyethylene fiber). Building on the success of Fusion-12, Fusion-X is ideal for towing operations. This rope features increased abrasion

resistance, strength, and permanent and obvious twist identification. Samson Rope Technologies.

### Wind Measurement

FLiDAR WindSentinel has been certified to Stage 3 status. The buoy provides accurate and reliable data to support investment-grade wind campaigns. The LiDAR technology can measure wind at various heights offshore. AXYS Technologies Inc.

### 6,000-m CTD

SWiFT Deep CTD offers a seamless workflow and high-quality CTD profiles in a compact, robust and portable package. Survey-grade sensor technology is coupled with the convenience of Bluetooth, a rechargeable battery, and an integral GNSS module to geolocate each profile. Valeport Ltd.

### Flame Detectors

The Spyglass SG50-F series comes equipped with HD video capabili-

ties, enabling the detection of fires that may not be visible to the naked eye. Color video is effective in detecting fuel fires (such as gasoline and jet fuel), while the near-infrared video option can detect fires caused by other fuels (such as hydrogen and methanol). Teledyne Gas and Flame Detection.

### Remote Navigation Monitoring

ClassNK has granted its Innovation Endorsement for Products & Solutions to HermAce Remote Monitoring & Troubleshooting Platform, which remotely monitors the operational status of FURUNO's navigation equipment. HermAce can collect VDR data online. Furuno Electric Co. Ltd.

### Smart ROV Power Supply System

SVS-708 SuperSea Power Supply and SVS-709 SubSea VPSU enable smart power management and umbilical transmission for inspection-class ROVs and observation-class vehicles. SeaView Systems Inc. **ST**

A promotional graphic for Sea Technology on Twitter. It features a large, stylized blue bird (resembling the Twitter logo) holding an open magazine titled 'SEA TECHNOLOGY'. The magazine cover shows an offshore oil rig. The text 'FOLLOW SEA TECHNOLOGY ON...' is written in large, bold, yellow letters at the top. Below the bird is the Twitter logo and the URL 'twitter.com/SeaTechnology' in large, bold, yellow letters. The background is a dark blue gradient with faint, repeating text of 'twitter.com/SeaTechnology'.

## Indian Register of Shipping Chooses Virtual Twin Tech

The Indian Register of Shipping (IRS) has entered into a collaboration with Dassault Systèmes to leverage virtual twin technology for driving its digital transformation and boosting operational efficiency.

The collaboration involves the use of Dassault Systèmes' 3DEXPERIENCE platform to optimize the performance and efficiency of complex marine and offshore projects. The platform will enable IRS to enhance and implement data-driven decision making, concept design, engineering, integrated operations, and maintenance processes.

Through this initiative, IRS aims to enhance its capabilities, accelerate research and development, and monitor crucial key performance indicators (KPIs) of its customers' assets. Additionally, the platform will

enable IRS to create a virtual twin to enhance vessel life cycle management, offer digital services on a unified platform, and provide end-to-end digital traceability.

## Digital Administration

ZEABORN Ship Management will incorporate Harbor Lab's e-disbursement software and agents' directory into its systems for greater efficiencies and increased transparency across its port cost management processes.

With operations in Hamburg, Cyprus, Singapore and Manila, ZEABORN is partnering with Harbor Lab to unify its processes and become more cost and time efficient, especially when handling repetitive administrative tasks that can be supported by technology. ZEABORN will be able to compare quotes for husbandry services across ports

globally, appoint agents, share and digitally approve documents, and, most importantly, access clean and accurate data.

## Canada/UK Digitization Project to Lower Emissions

Helm Operations is partnering with Bristol-based Reygar to harness the benefits of digitization as part of the global effort to reduce the maritime sector's carbon footprint. The collaborative research and development initiative, jointly funded via Innovate UK's 2022 "Canada-UK Zero Value Chains – Transportation" call and the National Research Council of Canada, will pave the way toward lower carbon emissions and reduced operating costs for tug and workboat fleet operators worldwide.

The partners will further develop the integration between Reygar's BareFLEET vessel performance monitoring technology and the Helm CONNECT fleet management modules, with an on-vessel linkup



## Ocean Sensor Systems

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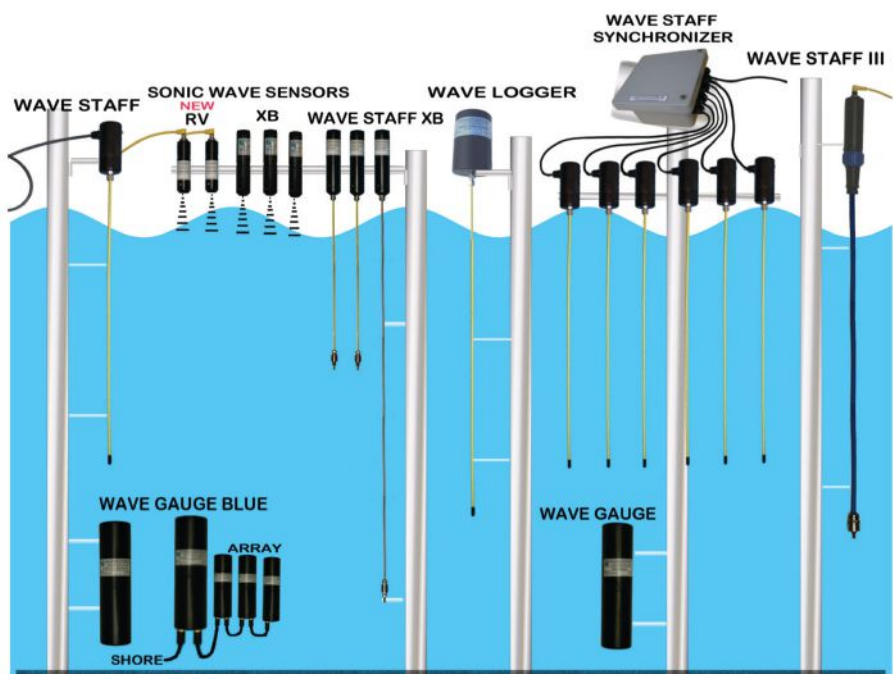
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The diagram illustrates a comprehensive ocean sensing system. It features several vertical poles in the water. One pole has a 'WAVE STAFF' sensor. Another pole has 'SONIC WAVE SENSORS' labeled 'NEW RV' and 'XB'. A 'WAVE STAFF XB' is also shown. A 'WAVE LOGGER' is mounted on a pole. A 'WAVE STAFF SYNCHRONIZER' is connected to multiple poles. A 'WAVE STAFF III' is on the far right. At the bottom, a 'WAVE GAUGE BLUE' and a 'WAVE GAUGE' are shown, along with a 'SHORE' connection and a 'WAVE GAUGE ARRAY'.

between Reygar's telematics unit and the Helm CONNECT user interface. The initial scope of work is expected to be complete by May 2024.

### Untethered ROV Autonomy

Greensea Systems Inc. has recently demonstrated untethered autonomy for ROVs using a commercially available Defender ROV from VideoRay, outfitted with batteries, acoustic modem and the new OPENSEA Edge system.

OPENSEA Edge puts a tremendous amount of processing power at the edge, right on the robot, where it can work directly with sensors to process data on board, eliminating the need for a topside computer via the tether. This dual, parallel NVIDIA edge platform runs Greensea's open-architecture software, OPENSEA, and handles the sonar and video perception feeds while providing autonomy, navigation, communications, and task management for the robot.

Greensea has demonstrated that a VideoRay Defender outfitted with OPENSEA Edge can search, classify, map and inspect as part of a mock explosive ordnance disposal (EOD) mission while untethered. Operators supervised the autonomous ROV through Greensea's EOD Workspace user interface for defense applications.

Greensea also utilized its proven Safe C2 (standoff command and control) technology to provide seafloor to over-the-horizon communications. This enabled the supervision of the ROV over very low bandwidth and very high latency/sparse data connections by an operator using a tablet.

In addition to VideoRay being the vehicle partner in this test, Greensea partnered with SeeByte Inc. for the automatic target recognition (ATR) on OPENSEA Edge and OceanComm Inc. for the acoustic modem solution.

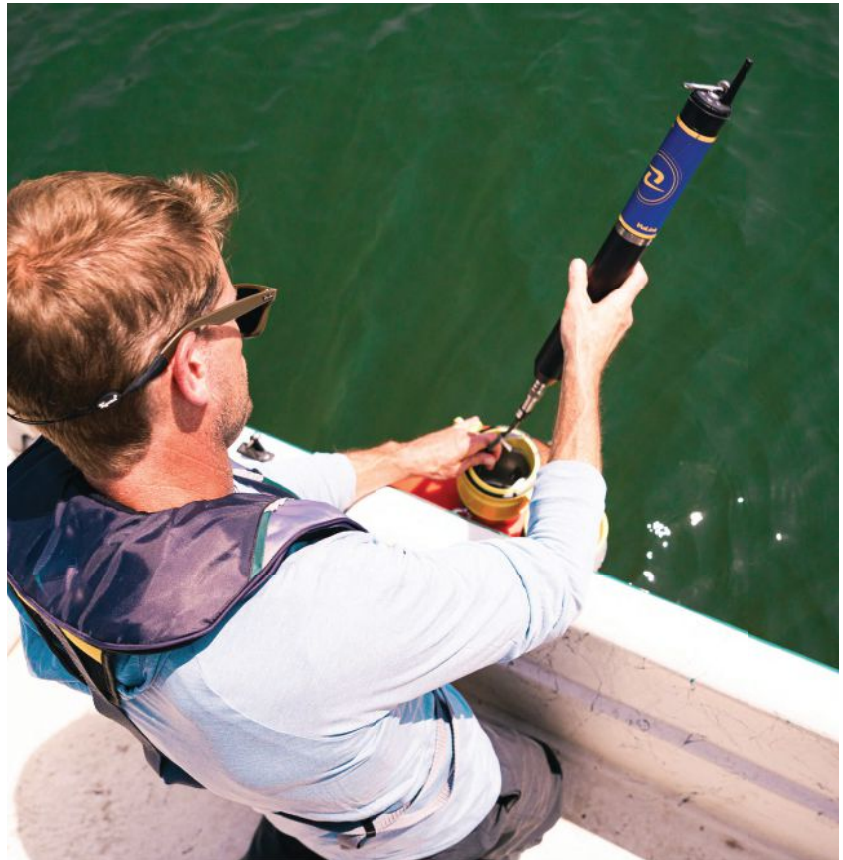
### New Member of One Sea

One Sea welcomes Finnish startup Groke Technologies as its new member, bringing additional expertise in situational awareness and au-

tonomous navigation to the global alliance on maritime autonomous surface ships (MASS).

Founded in October 2019, Groke Technologies provides situational awareness systems and intelligent information to support decision making and safer vessel operations with reduced burden on crew (*Sea Technology*, March 2023). The startup is based in Finland, with strong connections in Ja-

pan, where research and investment into autonomous maritime technology is accelerating. To date, six Japanese companies have invested in Groke: Mitsubishi Corp., Japan's largest trading house and a partner of Groke since its founding; Sumitomo Mitsui Finance and Leasing; tanker operators Uyeno Transtech, Tsurumi Sunmarine and Asahi Tanker; and tugboat operator Tokyo Kisen. **ST**



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# offshore oil & ocean engineering

## Subsea Services for Petrobras

TechnipFMC has been awarded a master subsea services agreement with Petrobras. The three-year contract has an option to extend for a further two years. TechnipFMC will provide life-of-field services to support its installed base offshore Brazil. The contract covers installation, intervention, and maintenance of both equipment and tooling, as well as technical support for subsea umbilicals, risers and flowlines.

The agreement succeeds a previous one and supports Petrobras's increased volume of operations. Services will be supplied from TechnipFMC's base in Macaé, Brazil.

## Fugro Achieves Milestone

Fugro has completed its first fully remote offshore survey inspection in the North Sea for energy company TAQA using one of its Blue Essence USVs with Blue Volta electric ROV (eROV). The complex project, in Europe's busiest part of the North Sea, involved the inspection of two platforms and over 40 km of pipeline off the coast of the Netherlands.

The inspection investigated the mobility of the seabed, pipeline depth measurements, visual inspections and cathodic protection measurements within the 500-m zone to ensure the integrity of TAQA's assets. During operations, both Blue Essence USV and Blue Volta eROV were remotely controlled via satellite link by operatives at Fugro's remote operations centers (ROCs) in the Netherlands and Aberdeen. The acquired geodata were accessed in near real time and used to inspect the offshore assets and surrounding seabed environment.

This project forms part of Fugro's wider strategy toward more uncrewed operations for greater agility, sustainability and safer offshore inspections. Remote operations enable employees to work onshore in ROCs rather than in high-risk offshore environments. The carbon footprint of the USV is up to 95 percent less than conventional support

vessels, and the client has access to near-real-time data for faster and more informed decision making.

## Reducing Drilling Emissions

Echandia, a Swedish developer of heavy-duty energy storage solutions for maritime and offshore applications, has received an initial order for battery systems to help reduce emissions and increase the energy efficiency on a jack-up drilling rig in the Middle East. The 860-kWh energy storage system is a container-based solution that allows for simple plug-and-play installation on board.

There is growing pressure on oil and gas producers from their customers to minimize the carbon footprint associated with the production of purchased energy carriers. Hybridization of the drilling platform contributes to this goal by eliminating peak loads that would otherwise require multiple generators to operate under off-design conditions. This allows for smoother operation, a reduction of fuel consumption and lowered maintenance costs, plus a return on investment.

## New Joint Venture

BOURBON and Horizon Maritime have a new joint venture, Bourbon Horizon AS, dedicated to providing marine services and operations in the North Sea and Canadian offshore markets. Incorporated in Norway, the new company is strategically positioned in Fosnavåg, Norway, and St. John's, Canada, with a base fleet of seven modern offshore support vessels.

## Greece's First FSRU

The work to develop Greece's first floating storage regasification unit (FSRU) has commenced at the Keppel shipyard in Singapore with the conversion of GasLog's DNV-classed LNGC Gaslog Chelsea, recently renamed as Alexandroupoli. Following conversion, the FSRU Alexandroupoli will serve as an offshore storage and regasification facility and will be part of the Alexan-

droupoli Independent Natural Gas System. The 155,000-cbm LNG carrier will operate in the Aegean Sea. The project is owned by Gastrade, a consortium of key players in the region's energy market.

## TDI-Brooks Adds CPT

TDI-Brooks has added a Manta-200 CPT system to its geotechnical capabilities. The cone penetration testing system is suitable for almost any project in shallow water up to 150 m. The Manta-200 represents the latest-generation CPT system for determining offshore seabed soil conditions.

The Manta is controlled from the surface with a real-time link over a combined power and communication umbilical. Data can be viewed in real time, enabling operators to manage the push and react to local sediment conditions. The CPT system is powered by a continuous drive system that guarantees uninterrupted penetration of the cone. Constant-tension winches are used to support deployment at the working depth. The Manta-200 CPT system is a modular design, with casings and tubes that can be operated simultaneously.

## Voyis Sale in Brazil

Voyis has made its first sale in Brazil, to DOF Brazil, a group of international companies operating in the offshore oil and gas service industry, specifically in the subsea inspection of underwater assets.

DOF acquired from Voyis three units of the Insight Micro laser scanner and stills camera. The optical sensor will enable DOF to create high-accuracy 3D models of offshore energy subsea assets in real time to reduce risk and provide an accurate record of the current state of the structures. Additionally, it will capture high-resolution still images, corrected in real time for true color and light leveling.

The Insight Micro laser scanner system was acquired to fulfill survey requirements for new offshore field developments. The Voyis sensors seamlessly integrate with the survey software from sister company EIVA for real-time results. **ST**

## Damen to Create Rudders for German Navy

Damen Marine Components has received an order to design, engineer and produce eight rudders for the four F126 frigates that Damen Naval is building for the German Navy. Each vessel will be equipped with two rudders, developed to withstand extreme shocks and to improve the hydrodynamic properties of the fast vessels.

The rudders have a relatively slim profile to reduce drag and improve course-keeping at high speeds, maintaining good maneuverability at low speeds in harbors or during special operations. Their design reduces cavitation and increases rudder efficiency.

## Textron UAS Takes Flight at Sea

Textron Systems Corp.'s Aerosonde unmanned aircraft system aboard the USS *Miguel Keith*, designated ESB 5, has taken its first operational flight.

The inaugural mission follows an October 2022 contract award by the U.S. Navy's Naval Air Systems Command (NAVAIR) to provide unmanned aviation support aboard the ship for up to five years.

The ESB 5 supports a broad range of military and aviation operations as part of the Forward Deployed Naval Force. Textron Systems is tasked to deploy its Aerosonde UAS to provide extended range intelligence, surveillance and reconnaissance (ISR) services with enhanced mission payloads aboard the ESB 5. The company's field service representatives will work alongside the sailors on board to provide support for a variety of maritime missions.

## MacArtney Winches for US Navy MCM USV

MacArtney Underwater Technology, with a long history of close cooperation with Textron Systems, has supplied custom-built winches to withstand shock and vibration from exploding mines for the Common Unmanned Surface Vehicle (CUSV) used on the U.S. Navy's Mine Countermeasures Unmanned Surface Vehicle (MCM USV).

Textron Systems placed its first order in 2015 for winches designed to comply with MIL standard 901D for shock and vibration. The company recently ordered four more after a one-year winch improvement program, during which MacArtney improved design and performance in line with Textron Systems moving the CUSV system from prototype status to low-rate production.

## Inmarsat Chooses Partner for Navy Contract

Cobham Satcom has been chosen by Inmarsat Government to supply new-generation SAILOR XTR user terminals for fast, reliable and secure worldwide end-to-end commercial satcom for the U.S. Navy Military Sealift Command's (MSC) Next Generation Wideband service.

Inmarsat Government is trusted with upgrading the primary MSC afloat network from Ku-band VSAT to the Global Xpress (GX) Ka-band under a 10-year follow-on contract with the Defense Information Systems Agency (DISA) awarded in August 2022. Cobham Satcom was

selected as the user terminal partner. The rollout starts immediately.

## Submarine Enters Indian Navy Service

INS *Vagir*, the fifth P75 *Kalvari*-class submarine, has been commissioned by the Indian Navy. It was built by Indian shipyard Mazagon Dock Shipbuilders Ltd., based on the Naval Group's Scorpene design. Launched in November 2020, INS *Vagir* has successfully completed all sea trials before entering into service.

The last submarine of the P75 series, the *Vagsheer*, is currently completing sea trials for delivery in 2024.

## HII Starts Construction on Submarine Facility

HII has begun a new project to support nuclear submarine construction at its Newport News Shipbuilding (NNS) division. The Multi-Class Submarine Production Facility is one of three new facilities to aid the construction and delivery of *Columbia*- and *Virginia*-class submarines. The Multi-Class Submarine Production Facility is funded jointly by the Navy and HII and is part of \$1.9 billion in capital investments HII is making at NNS. NNS is one of only two shipyards capable of designing and building nuclear-powered submarines for the U.S. Navy. The Navy has identified the *Columbia*-class as its top acquisition priority. Under a separate teaming agreement with General Dynamics Electric Boat, NNS is also building *Virginia*-class submarines for the Navy. **ST**

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# environmental monitoring

## In-Situ Rebrands

In-Situ Inc., a global manufacturer of water monitoring instrumentation and software, has rebranded to reflect the company's current status as a leader in both environmental and process water monitoring solutions. The company's new tagline is: "water simplified." This tagline speaks to its groundwater, surface water, coastal water, drinking water and wastewater audiences and captures the essence of the In-Situ brand: to simplify and improve water monitoring to help protect the world's water resources.

In-Situ developed the first all-in-one data logger/transducer/temperature sensor for self-contained long-term groundwater monitoring. The company then moved into the water quality market with rugged multiparameter instrumentation and a full smart sensor portfolio, and it has surged in the surface water space with user-friendly software for simplified setup, calibration and data access. The company's robust data services platform gives customers unprecedented control over how they view their data and manage their sites. In-Situ's introduction of the first cellular, in-well telemetry device has secured the company's position as a leader in remote monitoring solutions. More recently, strategic acquisitions in the U.S. and abroad have expanded In-Situ's product offerings to include industrial-grade water analysis and measurement technologies for wastewater and drinking water treatment process control.

As the company moves into new markets and expands its ability to solve water monitoring challenges, the In-Situ brand has matured as well. A new brand identity amplifies a reputation for reliability, ease of use and accessibility across a wide range of applications.

## Plastic Debris in Seychelles

A new study led by the University of Oxford has developed a high-resolution model to simulate the movement of plastic debris to-

ward the Seychelles. The model used data on ocean currents, waves, winds, and plastic debris entering the ocean from coastal populations, rivers and fisheries to predict plastic debris accumulation at 27 sites in the Seychelles and the wider western Indian Ocean. The results have been published in *Marine Pollution Bulletin*.

Indonesia was found to be the primary source of land-based plastic debris found on beaches in the Seychelles, with major contributions from India and Sri Lanka. This was particularly the case for medium-large debris that have a high buoyancy (such as bottle caps, sandals, bottles and small domestic items). Smaller plastic debris, such as millimeter-size plastic fragments and pellets, tended to originate from East Africa and the Seychelles itself. The Seychelles also accumulate significant amounts of plastic debris of marine origin from fisheries and shipping lanes, such as discarded or lost fishing gear. The large numbers of labeled bottles beaching at these islands suggest they come from Malaysia, Thailand and, in particular, China, and were probably discarded from ships. For some islands, a significantly higher proportion of plastic waste comes from marine sources, rather than land.

Plastic debris from both land and marine sources was most likely to land on beaches in the Seychelles at the end of the northwest monsoon, with the highest rates in March and April. Plastic debris accumulation may also be amplified by the El Niño–Southern Oscillation and Indian Ocean Dipole (Indian Niño) events.

This is the first study to produce a quantitative estimate of the sources of plastic debris for the Seychelles and other remote islands in the western Indian Ocean. The results illustrate the sheer scale of the plastic pollution challenge facing small island developing states and makes the need for a global plastic treaty more urgent than ever. The findings also build on the ever-growing evi-

dence that investing in waste management systems and implementing policies for waste disposal at the primary source nations is the best action to prevent land-based litter arriving at remote island sites.

## Majority of US Underestimates Sea Level Rise

Many communities in the U.S. underestimate how much sea level will rise in their area, according to a new study in *Earth's Future* led by Andra Garner, a climate scientist at Rowan University. Garner and colleagues compiled a database of the most recent regional climate projections in 54 locations across the continental U.S. and Puerto Rico and compared their estimates of sea level rise to the regional assessments published in the latest United Nations-appointed Intergovernmental Panel on Climate Change (IPCC) assessment report. Garner found more than half of the surveyed locations in the U.S. underestimate the upper end of future sea level rise compared to the IPCC regional projections.

In many cases, especially in Southern states, local policy makers rely on one average estimate of sea level rise for their area rather than accounting for more extreme scenarios. These policy makers do not account for the possibility of extremely high sea level, which results from greenhouse gas emissions and other factors, such as land subsidence. They also may not consider uncertainty around high-end scenarios for sea level or emissions.

## Dead Sea Erosion Study

Scientists in Israel used Nortek's Signature ADCPs in the Dead Sea to measure currents throughout the water column and directional waves simultaneously. By using the Signature1000's 3D profiling, the researchers measured nearly the full water column.

The data show that sediment transport in the area is dictated mainly by waves, not the current. This research could inform the design of boulder-based breakwaters, placed offshore to absorb wave energy and mitigate erosion. **ST**

# contracts

**Mermaid Subsea Services UK, Aberdeen, U.K.**, has received a multi-well contract, to be carried out on behalf of a North Sea operator. Accounting for the creation of up to 12 new roles at Mermaid's Aberdeen headquarters, the two-year contract will comprise the decommissioning of 22 wells and represents the company's largest contract to date. Undisclosed.

**National Energy Corp., Couva, Trinidad and Tobago**, a subsidiary of the state-owned National Gas Co. of Trinidad and Tobago, has taken delivery of a new Damen ASD Tug 2811 with a class-certified Damen Marine NOx reduction system to make it IMO Tier III compliant. Damen Shipyards Group.

**Cobham Satcom, Copenhagen, Denmark**, has extended a partnership based on integration of next-generation SAILOR XTR antennas with Navarino's global connectivity services. Navarino.

**James Fisher Subtech, Durban, South Africa**, has signed a charter agreement for the exclusive use of its inspection, repair and maintenance (IRM) and construction vessel, *Edda Savannah*, for work in both the North and Irish Seas using ROVs and multiple diving methods. Østensjø Rederi AS.

**METIS Cyberspace Technology, Athens, Greece**, has signed an agreement with a global data, analytics and technology company to integrate its vessel routing API into METIS Augmented Routing Optimization for weather-enhanced decision making and AI-based analytics to deliver measurable gains to ship performance. DTN.

**Orca AI, Tel Aviv, Israel**, has secured deals to deploy its automated situational awareness platform across the fleets of two U.S. Ro-Ro operators. Liberty Maritime Corp. and American Roll-On Roll-Off Carrier (ARC).

**Pioneer Consulting, Hoboken, New Jersey**, will oversee the engineering and design of the 276-km "Fiber Internet Serving Homes in Alaska" submarine cable system connecting Cordova and Seward. Cordova Telecom Cooperative Inc. **ST**

# meetings

*Note: The coronavirus (COVID-19) pandemic could affect event dates. Check event websites for the latest updates.*

## JUNE

**June 5-8—OCEANS 2023, Limerick, Ireland.** <https://limerick23.oceansconference.org>.

**June 6-7—Port Administration Management Conference, San Pedro, California.** <https://aapa.getregistered.net/2023-port-administration-management-conference>.

**June 6-8—Capitol Hill Ocean Week, Washington, D.C.** <https://marinesanctuary.org/chow-2023>.

**June 13-15—Seawork, Southampton, U.K.** <https://seawork.com>.

**June 20-22—INMARTECH, Barcelona, Spain.** <https://sites.google.com/view/inmartech-2023>.

**June 21-22—Royal Institution of Naval Architects Surveillance, Search and Rescue Craft Conference, Rotterdam, Netherlands.** [www.rina.org.uk/SURV11\\_2023.html](http://www.rina.org.uk/SURV11_2023.html).

## AUGUST

**August 20-24—World Water Week, Stockholm, Sweden.** [www.worldwaterweek.org](http://www.worldwaterweek.org).

**August 28-September 1—IMAGE 2023, Houston, Texas.** <https://ti.nyurl.com/uc2db9k3>.

## SEPTEMBER

**September 11-15—London International Shipping Week, London, U.K.** <https://londoninternationalshippingweek.com>.

**September 12-13—International Antifouling Conference, Gothenburg, Sweden.** <https://antifouling-conference-2023.confetti.events>.

**September 13-14—International Antifouling Conference, Gothenburg, Sweden.** <https://antifouling-conference-2023.confetti.events>.

**September 18-20—FWS – South America Offshore Wind, Rio de Janeiro, Brazil.** [andrew.chadderdon@questfwe.com](mailto:andrew.chadderdon@questfwe.com) or <https://fws.southamerica.com>.

**September 18-22—National Marine Electronics Association (NMEA) Conference & Expo, Orlando, Florida.** 410-975-9425, [mreedenauser@nmea.org](mailto:mreedenauser@nmea.org) or [www.nmea.org](http://www.nmea.org).

**September 25-28—OCEANS 2023 Gulf Coast, Biloxi, Mississippi.** <https://gulfcoast23.oceansconference.org>.

## OCTOBER

**October 3-5—International Boat Builders' Exhibition and Conference, Tampa, Florida.** [www.ibexshow.com](http://www.ibexshow.com).

**October 22-25—AAPA Annual Convention & Expo, Aurora, Colorado.** <https://aapa.getregistered.net/2023-annual-convention-and-expo>.

**October 24-27—WISTA International AGM and Conference, Montevideo, Uruguay.** <https://wistainternational.com/event/2023-wista-international-agm-conference>.

## DECEMBER

**December 4-6—Marine Renewables Canada Conference, Ottawa, Canada.** <https://marinerenewables.ca/event/marine-renewables-canada-2023-conference-december-4-6-in-ottawa>.

For more industry meetings, visit [sea-technology.com/meetings](http://sea-technology.com/meetings). **ST**

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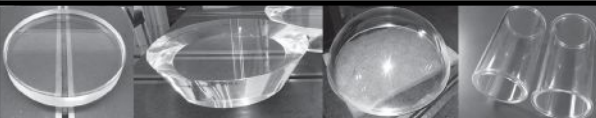
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## Developing Geothermal Energy Offshore—Shaun Toralde and Vijay Rengaraju

*Shaun Toralde (pictured) is the global geothermal segment leader at Weatherford, based in Houston, Texas. He has produced multiple international patents and technical papers on advanced technologies. Vijay Rengaraju is the global segment manager for new energies at ABB Inc. He is a key member of ABB's Energy Transition team and has been in the power generation industry for over 15 years.*



Life both thrives and is constrained by the presence of energy. There are scientists who argue that the earliest forms of life developed with the energy derived from deep-sea hydrothermal vents, which, by extension, would make geothermal energy the initial source of all life on Earth.

Geothermal energy, or energy from the heat of the Earth, is a resource that is continually being replenished by the decay of naturally occurring radioactive elements in the Earth's interior. Heat flow is more concentrated in areas where thermal energy is transported toward the crust by convection, such as along mid-ocean ridges and mantle plumes.

Despite the higher heat flow rate in offshore oceanic crust, virtually all geothermal energy development that has taken place has been on land and onshore settings. This is mostly driven by the lesser complexity and, consequently, the more favorable economics involved with developing geothermal resources on land.

Historically, there have been feasibility studies and proposals made concerning the development of geothermal resources in offshore shallow water or deepwater settings. Most of these focus on the collection of steam from offshore geothermal wells that would be sent to onshore locations for power

generation, or the conversion of the steam collected from geothermal wells into electricity using an offshore power plant, with the electricity relayed to a grid for use either on land or in offshore facilities, and even for powering deepwater oil and gas infrastructure. Areas that have been evaluated by researchers include Italy, Iceland and the U.K.

Studies in 2010 of offshore geothermal potential in Italy concluded that supercritical geothermal fluids are present in active volcanic areas in the Tyrrhenian and Aegean Seas. In 2013, plans were drafted by Eurobuilding after obtaining an exclusive concession on offshore geothermal development from the Italian Ministry of Economic Development.

In Iceland, North Tech Energy (NTE) was awarded in 2017 by the National Energy Authority two offshore geothermal research and exploration licenses (renewed in 2023) to gather information to determine whether these offshore high-temperature areas can be assessed for energy production.

Offshore geothermal applications have also experienced a recent resurgence in interest and investment similar to that on land brought about by the energy transition. Taking a page from recent onshore projects involving enhanced/advanced geothermal systems, offshore geothermal projects are also leveraging and adapting existing drilling and production technology and infrastructure from the oil and gas industry to accelerate technology development.

In 2022, CeraPhi Energy, in collaboration with Petrofac, was awarded work in the U.K. involving a geothermal study to undertake repurposing of offshore oil and gas wells using an advanced closed-loop system.

More recently, in February 2023, the Aquarius North Sea Geothermal Consortium, led by ZeGen Energy,

completed a geothermal assessment project for TotalEnergies. The 12-month study fully integrates subsurface, wells and topside elements, and provides guidance on how geothermal energy can be used to generate zero-carbon electricity and possibly be included in an offshore renewable energy portfolio.

In terms of a legal framework to guide offshore geothermal energy development, the historic ratification by UN member states in March 2023 of the High Seas Treaty is pivotal. Agreement on this treaty has been reluctant because of competing interests in marine resources, but with this international treaty in place, the goal is to protect 30 percent of the oceans by 2030. The High Seas Treaty will also help define environmental regulations to ensure that deep-sea exploration activities, including offshore geothermal development, are carried out sustainably and responsibly.

It is interesting to note that the International Seabed Authority, which oversees resource development licensing in international waters, recently called for proposals for consultancy services for the evaluation of geothermal energy potential in seabed hydrothermal vent sites in mid-ocean ridges.

Despite challenges in project implementation, offshore geothermal development initiatives have persevered, driven by the potential to contribute to the energy transition and decarbonization of offshore and deepwater petroleum resources. It could even prove instrumental in enabling carbon sequestration, hydrogen production and sea transport decarbonization projects by leveraging the reliable baseload power provision capabilities of geothermal energy systems in offshore and deepwater settings. Developed further, offshore geothermal energy could provide the firm foundation for the sustainable exploration of Earth's final frontier: the ocean. **ST**

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