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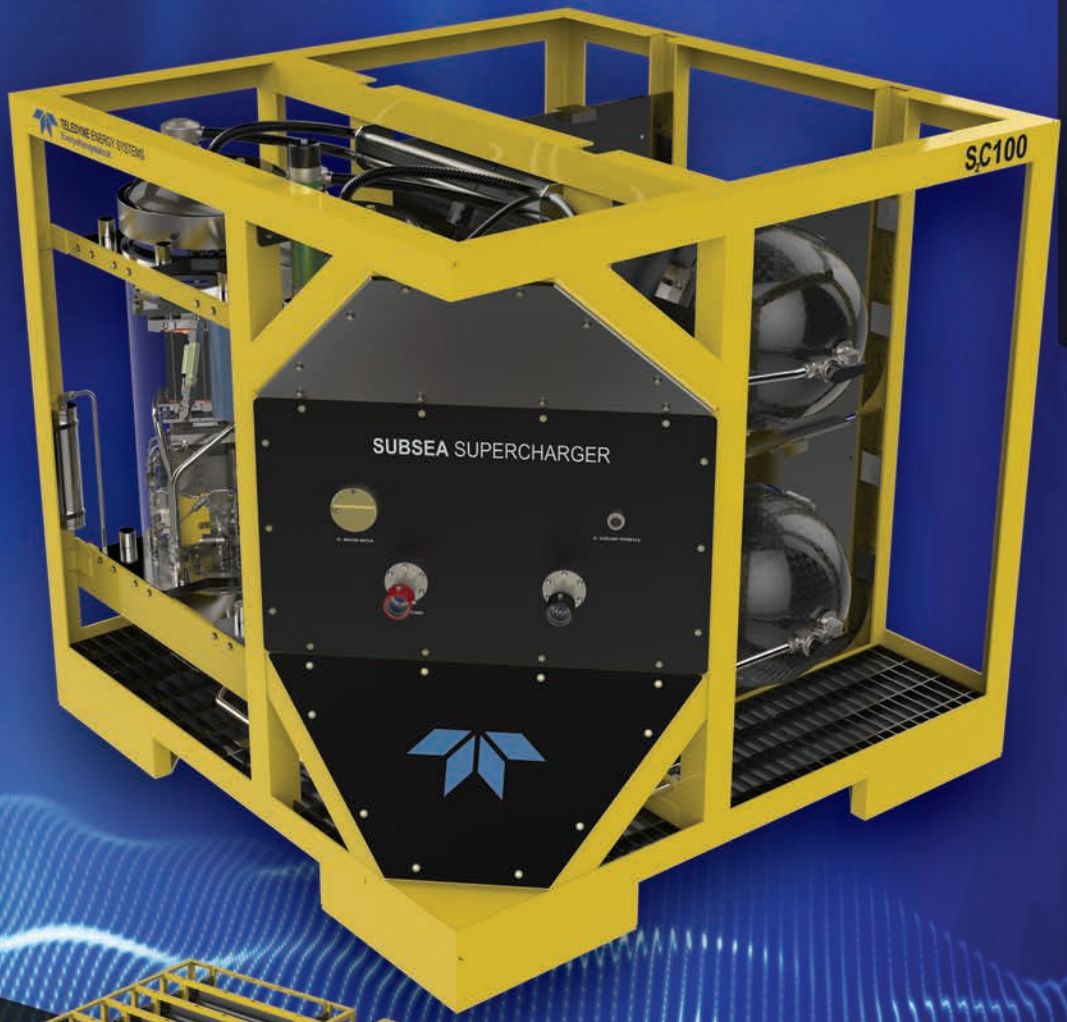

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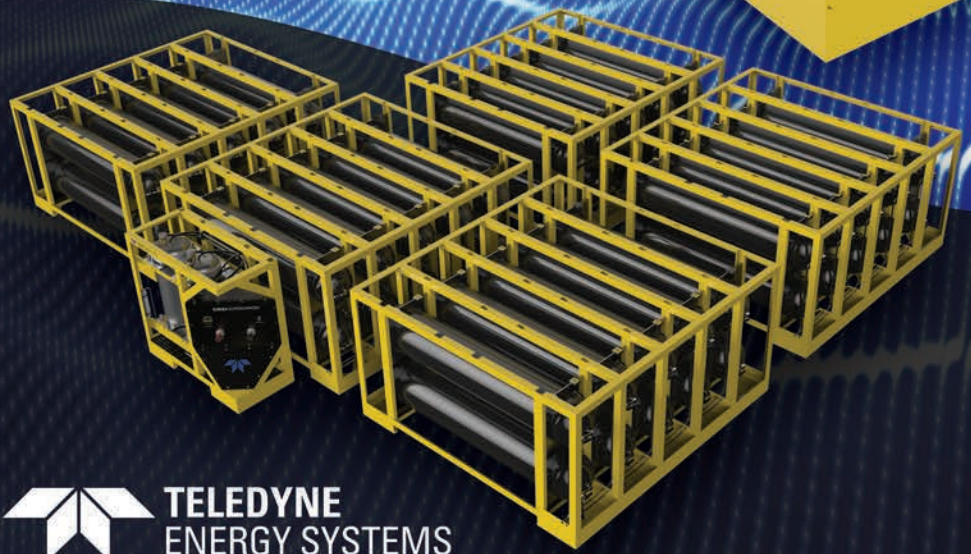

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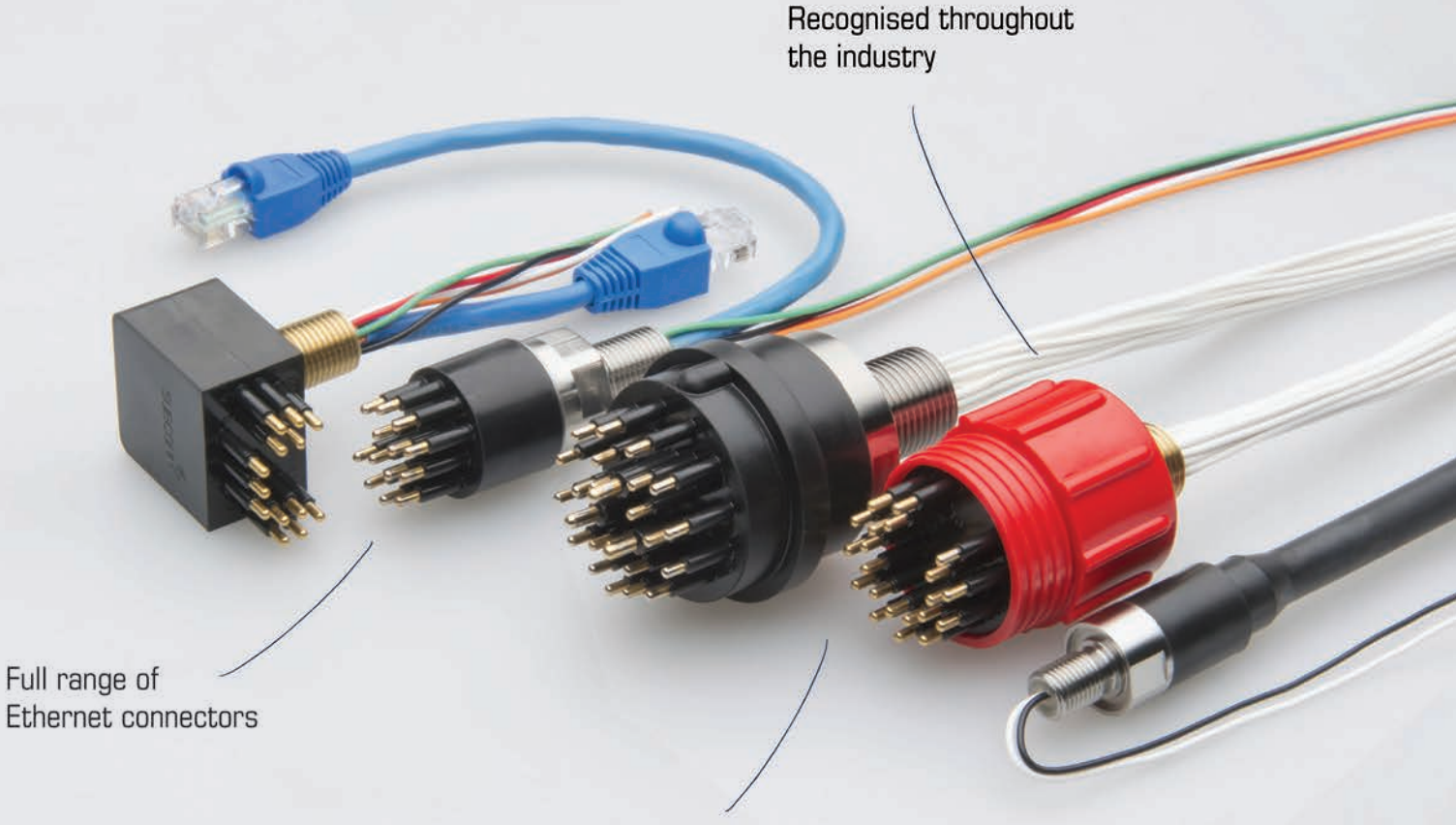

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Editor's Note

Observing All

Last month 1,500 from the global ocean and subsea communities gathered in Honolulu, Hawaii, for just the third OceanObs conference held in 20 years. The meeting, held once every decade, attracts leaders from around the world to discuss progress, planning, implementation and application of the broad topic of ocean observation. Initiated in 1999 in France with an attendance of 300, the 2019 edition boasted an attendance growth of 5x, including *MTR* contributor **Justin Manley**, for in-depth discussion on progress made and the path ahead. I won't spoil Justin's good work, rather I simply invite you to turn to page 34 for his observations, no pun intended, on this critical area of research and action.

As anyone within earshot of any media source knows, the bid for the 2020 U.S. presidency is well underway. Before the discussion goes any further, to be clear this is not a political column or pitch, as editorially we do not have a 'horse in the race.' However, with the 24/7 coverage and soundbites from the 10 leading candidates on the Democratic side of the ledger, I thought a focused view on these candidate's position on Offshore Wind could be instructive and interesting, if for no other reason, my own edification. I posed the challenge to **Tom Ewing**, a veteran government reporter who contributes regularly on the maritime side of our ledger, as Tom is quite adept at taking a deep dive into all matters government; even more adept at wading through mountains of information to find the theoretical needle in the haystack. His report starts on page 10.

Finally, as the cover suggests, Research Vessel technology is front and center this month. While much focus and attention, justifiably, is centered on unmanned autonomous systems, the research vessel remains a staple in the study of our world's waterways. We start on page 40 with an insightful feature on NATO's RV Alliance from navy correspondent **Edward Lundquist**. We finish, starting on page 54, with one-page feature shorts on some innovative new vessels and technologies which are designed to help you do you jobs more efficiently and effectively.

Gregory R. Trauthwein
Associate Publisher & Editor

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Lundquist

Edward Lundquist is a retired U.S. Navy captain who write frequently for Marine Technology Reporter. He travelled to La Spezia, Italy to report this story.

Manley

Justin Manley is a technologist and executive with experience in startups, corporations, academia, and government. At Just Innovation Inc. he supports clients with a focus on unmanned systems.

Maslin

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Mulligan

Tom Mulligan graducated from Trinity College Dublin in 1979, with a BA Hons Degree in Natural Sciences (Chemistry). In 1986 he obtained a Masters Degree in Industrial Chemistry in 1988. Today he is Marine Technology Reporters science and technology writer based in Dublin.

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General Dynamics Mission Systems

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EOMAP Wins Funding for Next-Gen Satellite-Derived Bathymetry

EOMAP has been awarded by the German Aerospace Center (DLR) to further develop its physics-based method of mapping the depth of the sea from satellite observations.

Satellite-Derived Bathymetry (SDB) uses data gathered by satellites and aircraft to generate depth measurements and seafloor characteristics for regions of shallow water. Developed 20 years ago by EOMAP scientists then at DLR (Germany) and CSIRO (Australia), SDB's potential to create a continuous-ly updated global database of shallow-water bathymetry is hampered by the heavy computing power required to process the large amounts of data now available. The new funding will allow EOMAP to push ahead with new SDB procedures based on high-performance scientific computing employing field programmable gate arrays (FPGAs). FPGAs are sem-iconductor devices that can be programmed by the user. They are currently used in applications such as automotive and communication technologies. Their big benefits are their higher speeds and lower energy consumption compared to normal processors. However, the optimal interaction of FPGA and CPU processing requires deep knowledge of scientific programming.

This application of multi-temporal analytics, which EOMAP patented for SDB in 2017, will significantly improve the accuracy of water depth measurements and further push the boundaries of today's phys-ics-based SDB solution. "We believe, that multi-sensor and multi-temporal physics-based analytics for SDB will not be fiction anymore and be a next step to increase depth accuracies," Thomas said.

OSIL Releases Box Corer T-Bar System

A T-bar mini-penetrometer for exclusive in-field seabed strength profiling of box core samples is avail-able from Ocean Scientific International Ltd (OSIL). The T-bar penetrometer measures the resistance of sediment to continuous penetration at a slow steady rate using a cylindrical rod (T-bar) at the end of a perpendicular push rod or thruster and, uniquely, is small enough to fit on to the top of a box corer sample box immediately on its recovery on-deck to allow for on-site sampling on the back of the ves-sel.

Using axial load, dual axis tilt and friction sleeve sensors the system can provide a real time display that records penetration length, penetration resistance and inclination from the vertical for every millime-ter of penetration at 2cm/s, and also stores the data for later analysis. The system can be fitted with a 25cm2 T-bar, 50cm2 T-bar, or 50cm2 Ball, depending on soil conditions.

Penetrometer testing is used to characterize the undrained shear strength and residual shear strength profiles of seabed soils, which provides valuable data for the positioning and design of a variety of sub-sea structures.

General Dynamics Launches New Bluefin-12 AUV

General Dynamics Mission Systems released the new Bluefin-12 autonomous unmanned underwater vehicle AUV at DSEI 2019, another evolution of the Bluefin family focused on increased mission modu-larity and embedded intelligence to complete users' long endurance, high-consequence and changing missions.

The Bluefin Robotics core autonomy with Standard Payload Interfaces (SPI), open-architecture com-patibility and greater than 4,000 cu. cm.-payload section supports the rapid integration of sensors and payload needed for the successful completion of new missions.

The Bluefin-12 may be configured with an optional turnkey survey package delivering integrated sur-vey capabilities including high-resolution sonar, environmental sensing, powerful on-board data pro-cessing and highly accurate navigation.

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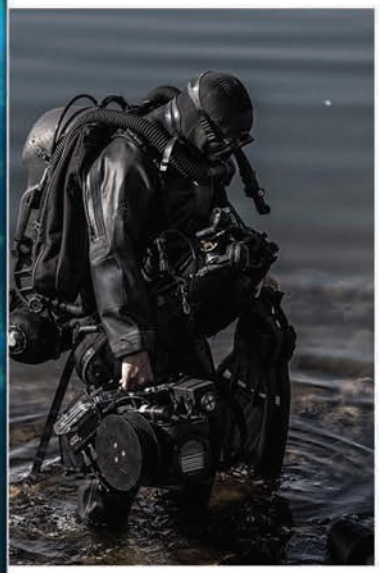

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POWER PLAY

Democrats & Energy
A Closer Look

As the battle for the Democratic presidential nomination in 2020 heats up, *MTR* political insider Tom Ewing takes a closer look at each of the 10 remaining candidates and their stance on the advent and future of Offshore Wind Energy.

By Tom Ewing

Photo Credits: Joe Biden (Official White House photo by David Lienemann); US Senator Bernie Sanders. Credit: US Senate website; US Senator Elizabeth Warren, Credit: US Senate website; Pete Buttigieg, MTR; Photo: Amy Klobuchar; US Senator Cory Booker. Credit: US Senate website; US Senator Kamala Harris. Credit: US Senate website; Julian Castro, credit: Candidate's website; Beto O'Rourke (Office of Congressman Beto O'Rourke); and Andrew Yang (Official campaign headshot by Clara Lu)

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Photo: Joe Biden (Official White House photo by David Lienemann)

Joe Biden presents "The Biden Plan for A Clean Energy Revolution and Environmental Justice." Some important goals include: Double offshore wind generation by 2030; ban new oil and gas permitting on public lands and waters.

"Make no little plans; they have no magic to stir men's blood and probably themselves will not be realized."

Daniel H. Burnham, American architect and urban planner

For the 2020 Democratic candidates, energy and climate change are interrelated topics, really fused into one super-topic. For the Ds, climate action is needed now – bold, sweeping, all-inclusive, and, yes, very expensive, action. This is existential, many of the Ds write – our existence depends on direct action.

Central to avoiding climate catastrophe is making electricity the singular fuel – from keeping the lights on and your cell phone charged to industrial production to transportation (maybe excepting aircraft). All of that electricity is to come from non-carbon generation, primarily solar and wind. Whether that's feasible or even necessary, is today's generational gamble.

This report takes a quick look at some of the candidates' positions on energy and climate. Ten candidates are included, selected not because of any in-house bias but because they are the top ten according to our poll of the political pollsters.

The candidates have much in common. There are no small plans, or at least brief plans.

This summary is from a review of candidates' web sites. Most do not specifically address "offshore wind," a focus of this column. Nevertheless, other topics, can impact offshore wind, e.g., broader, more general ideas about renewable energy or proposals for related federal programs.

This review is not a ranking, an endorsement nor an attempt to ascribe support or sense of electability. (Note: costs presented are estimates, of course; also, not all websites reference how a candidate might pay for new plans and programs.)

Joe Biden

Policy statement:

"From coastal towns to rural farms to urban centers, climate change poses an existential threat – not just to our environment, but to our health, our communities, our national security, and our economic well-being."

Biden presents "The Biden Plan for A Clean Energy Revolution and Environmental Justice." Some important goals:

- Double offshore wind generation by 2030.
- Ban new oil and gas permitting on public lands and waters.
- Use renewables to produce carbon-free hydrogen at the same cost as that from shale gas.
- Develop inexpensive new nuclear reactors.
- Implement carbon capture and sequestration.

"On day one" Biden plans executive orders "with unprecedented reach that go well beyond the Obama-Biden Ad-

Photo: US Senator Elizabeth Warren, Credit: US Senate website

ministration and put us on the right track."

Cost: $1.7 trillion in federal spending over 10 years and leveraging an additional $5 trillion in local, state and private sector investments resulting in a "100% clean energy economy and net-zero emissions no later than 2050."

Elizabeth Warren

Opening statement:

"The science is clear. The world's leading experts have long known that climate change is caused by human beings, it is here, and it is accelerating."

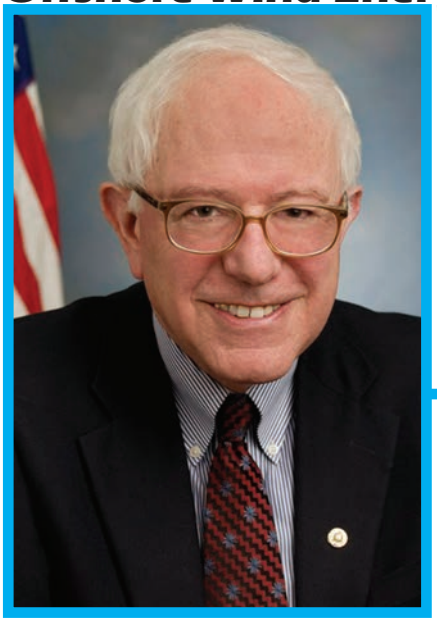
Warren presents a veritable library of energy and climate issues and ideas.

Central focus: A 10-year plan to achieve 100% clean energy by decarbonizing electricity, vehicles and buildings. She proposes:

- A "Green Apollo" plan – investing $400 billion in 10 years in R&D.
- "Green Manufacturing" plan, a 10-year, $1.5 trillion investment in American-made energy products.
- A goal to generate 10% of US electricity from renewable sources offshore or on public lands.
- Prioritizing leasing and development in designated areas.
- Prohibiting all new fossil fuel leases on public lands, including offshore drilling.

Elizabeth Warren's central focus is 10-year plan to achieve 100% clean energy by decarbonizing electricity, vehicles and buildings. She also proposes prohibiting all new fossil fuel leases on public lands, including offshore drilling.

Making Hydrographers' Tasks Easier



US Senator Bernie Sanders. Credit: US Senate website

Bernie Sanders said "The climate crisis is not only the single greatest challenge facing our country; it is also our single greatest opportunity to build a more just and equitable future, but we must act immediately."

Bernie Sanders:

Opening statement:

"The climate crisis is not only the single greatest challenge facing our country; it is also our single greatest opportunity to build a more just and equitable future, but we must act immediately."

Sanders cites scientific comments that "we have less than 11 years left to transform our energy system away from fossil fuels to energy efficiency and sustainable energy." Sanders claims he can avert climate catastrophe and create 20 million jobs. He would ban offshore drilling. Wind energy would be part of a huge expansion in renewable generation. Sanders writes that "after 2035 electricity will be virtually free, aside from operations and maintenance costs." Some other big ideas:

- A $16.3 trillion public investment across the economy, from autos to agriculture to a "reimagined and expanded Civilian Conservation Corp."
- Rejoining the Paris Agreement and providing $200 billion to the Green Climate Fund.
- Expanding the "climate justice" movement.

Sanders says his plan has been "scored" by financial experts and will pay for itself because of reduced fossil fuel subsidies, decreased defense spending and "making the wealthy and large corporations pay their fair share."

Kamala Harris

Policy statement:

"We're facing a climate crisis. From families devastated by hurricanes in the South and East Coast, to farmers facing flooding in the Midwest, to firefighters battling wildfires in California, one thing is clear: We need to take bold, direct action now."

Harris' climate plan extends throughout the economy, with social justice goals and equitable economic develop-

US Senator Kamala Harris. Credit: US Senate website

Kamala Harris would "increase wind – both onshore and offshore." She would create a "Public Land Renewable Energy Zone Strategy" to "responsibly expand" renewable energy on public lands.

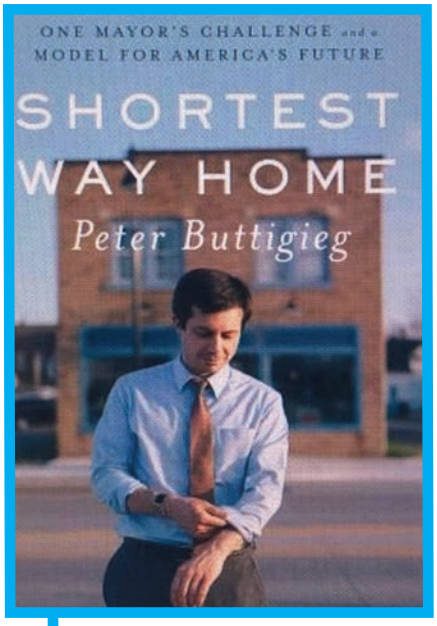


Photo: MTR

ment. It would hit big oil for decades of social transgressions, at least according to Harris. A basic climate idea includes a "foundation for justice."

Wind energy is highlighted. Her plan would "increase wind – both onshore and offshore." She would create a "Public Land Renewable Energy Zone Strategy" to "responsibly expand" renewable energy on public lands. Some other highlights:

- Rejoin the Paris Agreement.
- Recommit US dollars towards the $100 billion Paris fund to fight climate change.
- Demand international CO2 reductions, particularly from China and India.
- Address maritime emissions via the International Maritime Organization.

Pete Buttigieg

Policy statement:

"The American people are facing one of the greatest tests in our history. Climate catastrophe is on the horizon, and history will judge us for how we rise to meet this challenge. We have seen this problem evolve from a theory to a reality to, now, an emergency."

To get to net-zero emissions by 2050, Buttigieg's plan has three pillars:

- Build a Clean Economy;
- Invest in resilience; and,
- Demonstrate Leadership.

Buttigieg would spend $25 billion/year on renewable energy R&D by

Pete Buttigieg proposes to spend $25 billion/year on renewable energy R&D by 2025 and $200 billion in actual investments over 10 years. Wind energy is within a broader focus on renewables.

Photo: Amy Klobuchar

Amy Klobuchar would aim to achieve 100% net-zero emissions by 2050, and conduct a thorough review of offshore drilling.

2025 and $200 billion in actual investments over 10 years. A spin-off benefit: "creating more high-paying jobs in wind and solar." Wind energy is within a broader focus on renewables.

Buttigieg suggests (1) creating Climate Action Bonds and (2) modernizing wholesale electricity markets. He supports a carbon tax that would increase annually; revenue would be "rebated back" to people.

Amy Klobuchar

Policy statement:

"The evidence is clear: the climate crisis isn't happening in 100 years — it's happening now. 2018 was the fourth-hottest year on record globally and it was another near-record year for U.S. weather and climate disasters."

To achieve 100% net-zero emissions by 2050 Klobuchar would:

- Join the Paris climate agreement.
- Restore the Clean Power Plan.
- Strengthen vehicular fuel-economy standards.
- "Introduce sweeping legislation to address the climate crisis." Including:
- Build on the framework of the Green New Deal;
- A "massive investment" in green jobs and infrastructure; and,
- "Better greener transportation" that connects people and businesses with "better transportation options" such as light and heavy rail.

Klobuchar plans a thorough review of offshore drilling.

To pay for her policies, Klobuchar would repeal the "regressive portions

Photo: US Senator Cory Booker. Credit: US Senate website

Cory Booker said "Our planet is in crisis. Climate change is not some distant threat — we're witnessing many of its effects today." Among his suggestions: A moratorium on drilling on public lands and a ban on fracking.

Photo: Andrew Yang (Official campaign headshot by Clara Lu)

of 2017 Republican tax reform, equalize tax rates for capital gains and ordinary income, put the Buffet rule in place, and close the carried interest and big oil loopholes."

Cory Booker

Policy statement:

"Our planet is in crisis. Climate change is not some distant threat — we're witnessing many of its effects today. And the immediate burden of much of the pollution causing climate change is disproportionately borne by low-income communities and communities of color."

Booker's ideas include:

- Rejoin the Paris Climate Accord.
- A moratorium on drilling on public lands.
- Ban fracking.
- Require climate change analysis when permitting new fossil fuel infrastructure.
- Prohibit construction of new fossil fuel infrastructure when cost competitive clean energy alternatives are available.
- End federal subsidies for fossil fuel production.

Andrew Yang

Policy statement:

"Our planet is a mess."

Yang's campaign has three top policy planks:

- The Freedom Dividend - a universal basic income of $1,000/month,

Andrew Yang says "Our planet is a mess." Part of his plan to clean up the mess: Spending $4.87 trillion on energy/climate programs over the next 20 years, and Yang's position paper references a need for "tens of millions of wind turbines."

Photo: Julian Castro, credit: Candidate's website

Julian Castro plans Castro plans a 100 percent clean-energy economy. His ideas include "Direct" the investment of $10 trillion over 10 years to create 10 million jobs and transition away from fossil fuels.

$12,000 a year;

- Medicare for All; and,
- Human-Centered Capitalism.

Climate change is within a lower-tiered set of issues under the broad heading of "Environment."

Yang asserts that economic hardship keeps people from demanding preventative actions. His example of popular thinking: "I can't pay my bills. The penguins will have to wait." More drastically he asserts that "We need to get the economic boot off of the throats of our fellow Americans so everyone can get their heads up and start facing this threat head-on."

To build a sustainable, green economy Yang includes –

- Spending $4.87 trillion on energy/climate programs over the next 20 years.
- A carbon fee starting at $40/ton, with regular increases up to $100/ton.
- New nuclear power generation.

Finally, it's worth noting that Yang's position paper references a need for "tens of millions of wind turbines."

Julian Castro

Policy statement:

"This crisis is the greatest existential threat to our future, but we have the power to mobilize the greatness of America."

Castro plans a 100 percent clean-energy economy. Some ideas:

- "Direct" the investment of $10 trillion over 10 years to create 10 million jobs and transition away from fos-

Photo: Beto O'Rourke (Office of Congressman Beto O'Rourke

Beto O'Rourke does not specifically mention offshore wind, but such projects would likely have high priority within his extensive set of ideas. Initial steps include: Set a net-zero emissions carbon budget, by 2030, for federal lands, stopping new fossil fuel leases, changing royalties to reflect climate costs, and accelerating renewables development and forestation.

sil fuels.

- Rejoin the Paris Climate Accords.
- No fossil fuel development on public lands. No taxpayer subsidies for fossil fuel production.
- Castro supports a "carbon pollution fee" on "up-stream, large-scale polluters." That revenue would be re-invested in climate/environmental programs.
- Establishment of a National Climate Council to coordinate federal activities.
- Create a $200 billion Green Infrastructure Fund to invest in physical infrastructure such as smart grids and electric vehicle charging stations.

Beto O'Rourke

Policy statement:

"Climate change is the greatest threat we face — one which will test our country, our democracy, and every single one of us."

O'Rourke does not specifically mention offshore wind, but such projects would likely have high priority within his extensive set of ideas. Initial steps include:

- Rejoining the Paris Agreement and seeking a more "ambitious global plan."
- New power plant Clean Air Act regs and setting a "trajectory to rapidly accelerate the adoption of zero-emission vehicles."
- Set a net-zero emissions carbon budget, by 2030, for federal lands, stopping new fossil fuel leases, changing royalties to reflect climate costs, and accelerating renewables development and forestation.

In his first bill to Congress O'Rourke would "mobilize" $5 trillion, over 10 years, for climate change.

This would be fully paid for – the federal portion would be $1.5 trillion – via "revenues generated by structural changes to the tax code that ensure corporations and the wealthiest among us pay their fair share and that we finally end the tens of billions of dollars of tax breaks currently given to fossil fuel companies."

Photo: Oceanology International

Oi2020: A Preview

With 50 years of expertise, Oceanology International is the world's largest ocean technology exhibition and conference, and a must-attend event for those involved in exploring, monitoring, developing or protecting the world's oceans, from seabed to surface and beyond.

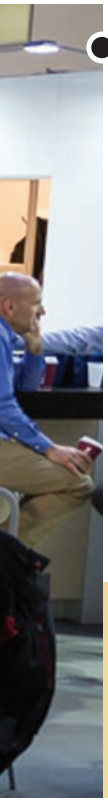
Known as the world's leading exhibition and conference for marine science and ocean technology communities, the event attracts individuals and teams belonging to academia, industry, and government to gather every two years to showcase the latest advancements and innovations in the field of marine technology.

The next Oceanology International Exhibition (Oi2020) will be held at ExCel London from March 17-19, 2020, and attendees will have the opportunity to discover game-changing innovations and solutions from more than 480 global suppliers. The event will also feature a diverse selection of education-based sessions designed to boost attendees' technical and market knowledge. Several social and networking events will be held so that attendees can connect and discuss business with industry colleagues and friends in a relaxed and casual setting.

The most recent Oceanology International event was held in London in March 2018. More than 500 companies from 79 countries exhibited at the Oi18 Marine Science Exhibition and Conference. Many companies and event partners hosted social events at their respective booths while live equipment trials were demonstrated in the Royal Victoria Dock. Exhibitors included companies specializing in a wide range of ocean technology ranging from software development to underwater communication, geophysics, offshore construction, metrology and environmental management.

Note some of the many benefits of exhibiting and/or attending Oi2020 in London next year:

- **Connect with 8,000 visitors** and position your business as an innovator and expert within the ocean technology and marine science communities.
- **With the event's range of networking, opportunities,** you'll be able to connect with leading buyers and suppliers in the ocean technology and marine science industries, including marine renewables, oil and gas, maritime defense and aquaculture, as well as many other end-user sectors, making it the ideal event to diversify your business.
- **As the leading forum where industry, academia and government share knowledge** and connect with the world's marine science and ocean technology communities. Oi2020 will feature the world's top manufacturers and suppliers of ocean technologies and components and global service providers and contractors.
- **The event venue's dockside position** gives exhibitors an excellent opportunity to demonstrate their equipment in action to the global marine science community. Visitors are able to watch live coverage of equipment at work via the popular elevated viewing platforms on the dockside or via a covered private meeting area as well as network.



Oceanology International melds traditional exhibition, conference & live tech demos via the dockside fleet.

In addition, because Oi2020 is committed to providing both exhibitors and attendees in obtaining the best ROI, the event will feature the highest level of advice and tools tailored to each guest's specific experience. This is especially critical for networking and meetings, and for that reason, Oi2020 will feature a digital experience known as "My Event" for connecting and engaging pre-show. Simply think of My Event as your personalized Oi2020 experience. In just a few simple steps, attendees and exhibitors can start building new business relationships and create a personalized itinerary. Identify exhibitors you want to meet, find products that you're looking for, plan ahead by sending messages, and arrange meetings so you can make the most of the show.

www.oceanologyinternational.com

Marine Technology Reporter has been commissioned to publish the Official "Oceanology International 50th Anniversary Edition" which will distribute with the March 2020 edition of MTR. To advertise, contact Rob Howard at howard@marinelink.com, t: +1 561-732-4368; or Mike Kozlowski at kozlowski@marinelink.com, +1-561-733-2477.

Photo: © Alejandro/AdobeStock

Plastics in Marine Sediment
An explosion since WWII

The amount of plastic fragments in Santa Barbara Basin sediments has been increasing exponentially since the end of World War II, according to a study by researchers from Scripps Institution of Oceanography at the University of California San Diego.

The sharp increase matches a rise in the rate of plastic production worldwide and a surge in California's coastal population during the same time period. The research team, sifting through nearly 200 years of sediments, noted that since the 1940s the amount of microscopic plastics has doubled about every 15 years.

"This study shows that our plastic production is being almost perfectly copied in our sedimentary record. Our love of plastic is actually being left behind in our fossil record," said Scripps microplastics biologist Jennifer Brandon, lead author of the study that appeared recently in the journal *Science Advances.* The study is the first of its kind in that it examined accumulation of plastic over time in a location that afforded researchers the opportunity to resolve the trend in fine detail. Supported by California Sea Grant, the National Science Foundation, and private donors, the study is the latest among several to illustrate how pervasive plastic pollution is in the global oceans. Ten years after Scripps researchers made the first estimate of the dimensions of plastic on the surface ocean near Hawaii, another Scripps study earlier in June found microplastics at depths up to 1,000 meters (3,300 feet) off Monterey, Calif. In April, an explorer visiting the deepest part of the ocean, the Mariana Trench in the western Pacific Ocean, found plastic bags at the seafloor. And in February, a team led by Newcastle University in the United Kingdom found plastic microfibers in the guts of nearly three-fourths of the organisms collected in deep-ocean basins.

Brandon's team shows that the reach of plastic extends farther in the oceans. It chose Santa Barbara Basin to look for plastic buried in the seafloor. There, relatively still waters and a near total absence of oxygen preserve sedimentary layers, each half centimeter of which represents roughly two years of history.

The researchers sampled sediment layers that they dated back to 1834 by collecting them in a core. Most plastics were invented in the 1920s, but not used in significant commercial quantities until after WWII.

The researchers found microplastics in steady amounts in all layers of their core before 1945, but almost all of that plastic was actually contamination introduced during processing of the core. Most of the plastic found through the entire record was in the form of clothing fibers. The quantity of fibers found in sediment dated to 1945 and later increased rapidly so that by 2010, when the samples were collected, people were depositing 10 times as much plastic into the basin as they were before World War II.

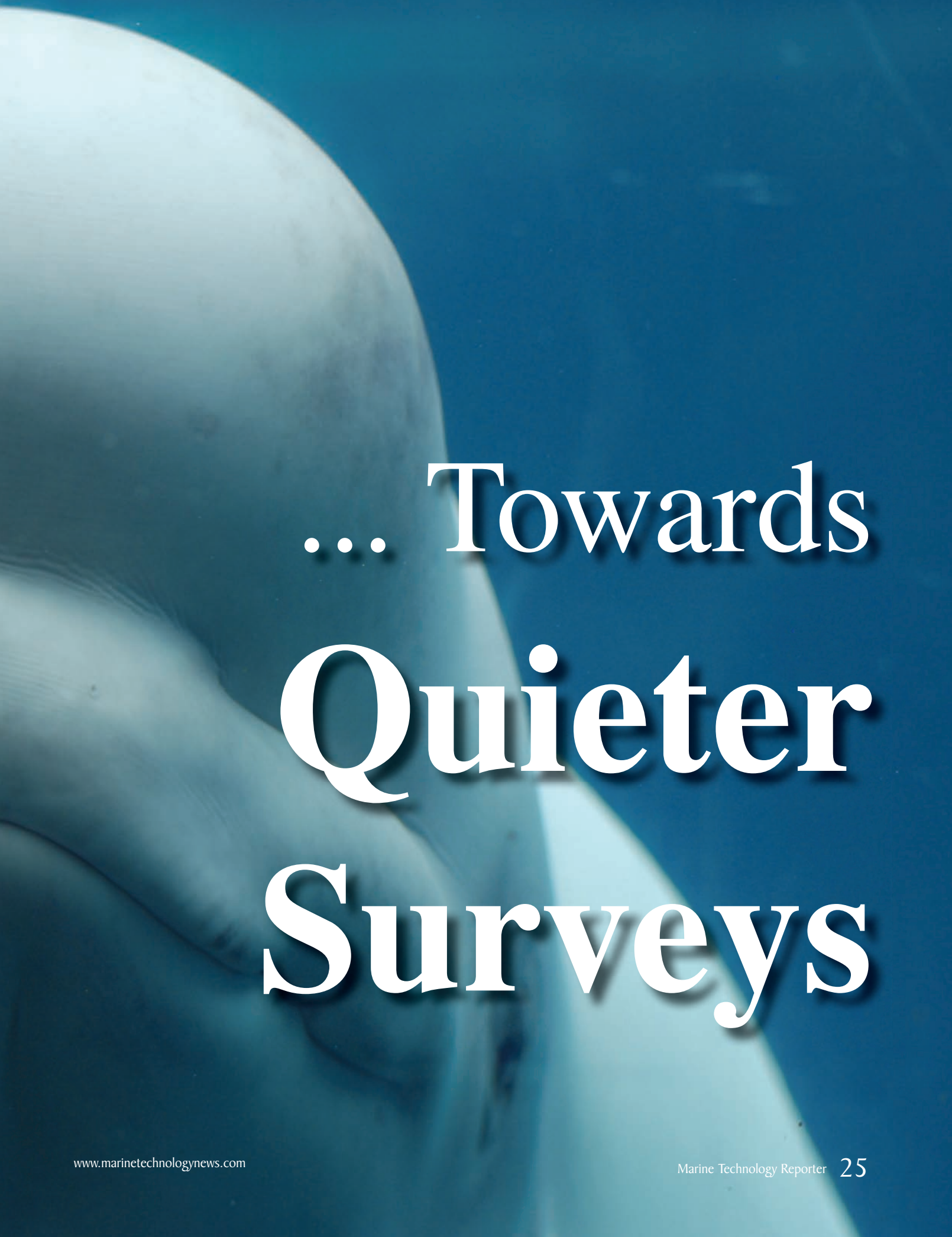
The postwar period also showed a greater diversity of plastics including fragments of plastic bag materials and plastic particles in addition to fibers.

Brandon said the discovery supports the idea of using plastic accumulation as a defining signifier of the Anthropocene, a proposed new geological epoch marked by humanity's effect on Earth. Specifically, the rise of plastics beginning in 1945, when the world recovered from war, could serve as a proxy for a time period within the Anthropocene that scientists have labelled "the Great Acceleration."

Previously, scientists have estimated that between 4.8 and 12.7 million metric tons of plastic waste enter the ocean every year. Because the amount of plastic waste tends to track with population, Brandon and coauthors anticipate that nearshore areas could bear a disproportionate brunt of that infusion as population growth continues to be greatest in coastal regions. The study did not include an analysis of the potential effects the plastics could be having on marine life, but the authors referenced previous research showing that ingestion of plastics by marine organisms can cause physical damage that reverberates through the marine food web.

The research team included Scripps paleobiologist William Jones and biological oceanographer Mark Ohman. The sediment samples were collected during the 2010 Cal-Echoes research expedition, which was supported by UC Ship Funds.

A seismic shift ...



… Towards Quieter Surveys

By Elaine Maslin

Since the earliest days of offshore oil and gas exploration, the need to "shoot" seismic surveys has been helping companies to find the hydrocarbons they can then produce.

Seismic data helps geophysicists and geologists understand the rock formations in the earth, what might be happening in them and, crucially, if they might contain oil and gas. Similar to acquiring seismic data onshore, it means emitting sound energy (a source) then detecting its return and interpreting that information to image the subsurface.

ing). Some countries have even banned seismic exploration altogether (Italy has had a temporary ban in place pending new assessments).

But, there's still pressure to protect marine life so there's also work to rethink the source. Since 2011, a group comprising of Total, Shell and ExxonMobil has been working on alternatives, based on marine vibroseis technology, under a joint industry project managed by Texas A&M University. Marine vibroseis works by emitting a continuous lower level energy.

"Instead of a clap, one instantaneous

but one has, says Feltham; Applied Physical Sciences (APS), part of General Dynamics, which has developed the Marine Vibrator - Integrated Projector Node (MV-IPN).

"It has a piston that moves in and out, dynamically coupled to the water, creating sound waves from the source into the surrounding water and subsurface," he says.

This reduces the peak to peak ratio, which is of most concern in terms of impact on marine life and the environment, but also eliminates high frequency sound waves that come out of instanta-

While the industry moved away from use of dynamite as a source in the 1960s, the sound energy created, now mostly by air guns, can still impact marine life. As such, it's use is highly regulated.

While the industry moved away from use of dynamite as a source in the 1960s, the sound energy created, now mostly by air guns, can still impact marine life. As such, it's use is highly regulated. Many countries use UK-based Joint Nature Conservation Committee guidance, which will see activity delayed if a marine mammal is detected within 500m. The Australian National Offshore Petroleum Safety and Environmental Management Authority has a 1-3km zone, while in Brazil and Ireland it's 1km. There are also other bodies with their own guidance as well as country specific regulations. Most mean having onboard mammal observers and towed passive acoustic monitoring (with PAM onboard unmanned vessels also emerg-

instance of noise with high peak to peak pressure ratio, we propose a quiet hum in the background, but is designed to have the same seismic energy as the clap," says Andrew Feltham, Research Geophysicist – Acquisition, at Total. "We're substituting high amplitude with a longer duration. The idea is to have a quieter instantaneous peak to peak pressure level and significantly reduce, if not eliminate, potential harm to the marine environment."

The marine industry has been trying to use this technology this since the 1960s, by taking land vibroseis technologies offshore, but with "with limited success". Because of this, the JIP was formed, contracting with three different companies. Some haven't worked,

neous sources and hard to control. If these can be avoided, it means reducing impact on mid-water hearers (mammals) that hear down to about 100Hz and higher frequency hearers.

In testing in Lake Seneca, New York, the system was used with a 5-100hz linear sweep – a frequency band commonly used. Test data suggests a marine vibrator array should reach a peak 205dB signal and the higher frequency signals otherwise emitted by instantaneous source were avoided.

"By eliminating sound above 100Hz we're having no impact on the mid and high frequency hearers and reduced peak to peak pressure," says Feltham. "Now, it's just the low frequency hearers we need to make sure are well pro-

tected."

According to modelling, this system would also greatly reduce the area in which, if animals enter, operations would have to stop. For a large gun array, with 259dB peak to peak ratio pressure, you'd have to be about 2.8km from the source before the peak to peak pressure reduces to 190dB (a level deemed appropriate according general rules for limiting impact on marine mammals). For the marine vibrator technology, the distance would only need to be 67m from the centre of the source – for a full array covering 18m x 18m (with single units only having a radius of 4m) – and potentially far less.

"If we were to use marine vibroseis systems, we could reduce the peak to peak pressure level, which is where a lot of the concern for marine mammals and the impact of seismic surveys on their environment exists. If we could reduce the region of impact to potentially to the size of source itself, we could greatly improve seismic surveys around the world," says Feltham.

Additional benefits include greater control over the sound energy – being able to create specific signatures, potentially improving imaging and enabling multi-source surveys. No longer using compressed air also means the source isn't limited by being connected with umbilicals, enabling dispersed source arrays, to cover greater areas.

There's still work to be done, working with environmental regulations in different countries and testing the technology. But, Feltham is positive. "In terms of background anthroprogenic noise, we believe we can significantly reduce the environmental footprint by using marine vibroseis rather than a conventional system.

We've designed a system that we think limits impact on mid and high frequency hearers and significantly reduces the size of the mitigation zone that would need to be around the source while operating in the environment."

SINTEF's Exi

At SINTEF, Norway's premier research body, the breadth and number of research undertakings are mostly targeted for industrial and national clients, but the results speak of wide-ranging societal impact. **By William Stoichevski**

Credit: Screenshot of SINTEF video

stential Rise

Over our decades of SINTEF coverage, the SINTEF Group — now six business units, including dedicated "ocean", "energy" and information technology divisions — has tripled its revenues to about $356 million. The multidisciplinary research community "delivers innovation", it says, and 4,000 customers worldwide attest to that by buying over $50 million worth of SINTEF R&D every year. Now one of Europe's largest research institutes, some 2,000 international employees have pushed the 60-year-old institute to the forefront of purposeful commercial and publicly funded research.

"Technology for a better society" is SINTEF's stated vision, and contract R&D is the declared path to that end. Yet, many a Norwegian environmental rule (or tax) or report is steeped in the logic and findings of SINTEF surveys and analysis. In fact, when you think of what's new out of Norway, you're probably thinking of a technology or undertaking that has the fingerprints of SINTEF researchers all over it. Its research cadres — staff, former staff and supervising and executing principals that never quite move on — is rounded out by research project teams created internally by SINTEF as assignments for clients arise. At recent count, that's about 5,700 projects a year in Norway and abroad for this R&D "conglomerate" with a hand in all manner of enterprise.

Commercializing

Above all, it's SINTEF's ability to attract and develop talent and help create new enterprises by commercializing scientific advances that have transformed this community into a company. Along the way, it has helped change attitudes about targeted research being too … targeted.

SINTEF sees society's problems as twofold: one opportunity for study and one to create commercial value out of the apparent solution. So, when salmon lice infestations at a Norwegian

HELP WANTED:
A researcher uses a particulate scanner.

salmon farms became too great a problem, SINTEF adopted a two-tier approach: help regulators study the salmon, the lice and the river and offer to help creating innovations like lasers that shoot the lice off the fish. For large-scale aquaculture and fisheries vessels, there's SINTEF wave and model analysis in first-class test tanks. The result has been offshore aquaculture structures on the scale of an offshore oil rig and fish-handling vessels for worldwide markets.

"The commercialization of our research results is part of SINTEF's role in society. We achieve this by means of licensing and creating new companies based on technologies developed as part of our research activities," a SINTEF statement asserts, adding, "We are active shareholders in our spin-off companies and … sales of our ownership interests in successful spin off companies release funds which are invested in new knowledge development." The net-sum of those spin-off companies is over four billion Norwegian kroner a year. So, it's win-win, added value and the rest.

Lab luxury

It wasn't always that way. Just 20 years ago, SINTEF was nearly entirely reliant on research funds portioned out in Oslo. Nearly all of what was earned in 2000 was actually Norwegian government funding. Yet, the environmental assessments, materials testing and structural standards work carried out by SINTEF in the early days of Norwegian oil and gas — and the early days of Norway's oil-fueled industrial expansion — paved the way for what would become that gold mine of

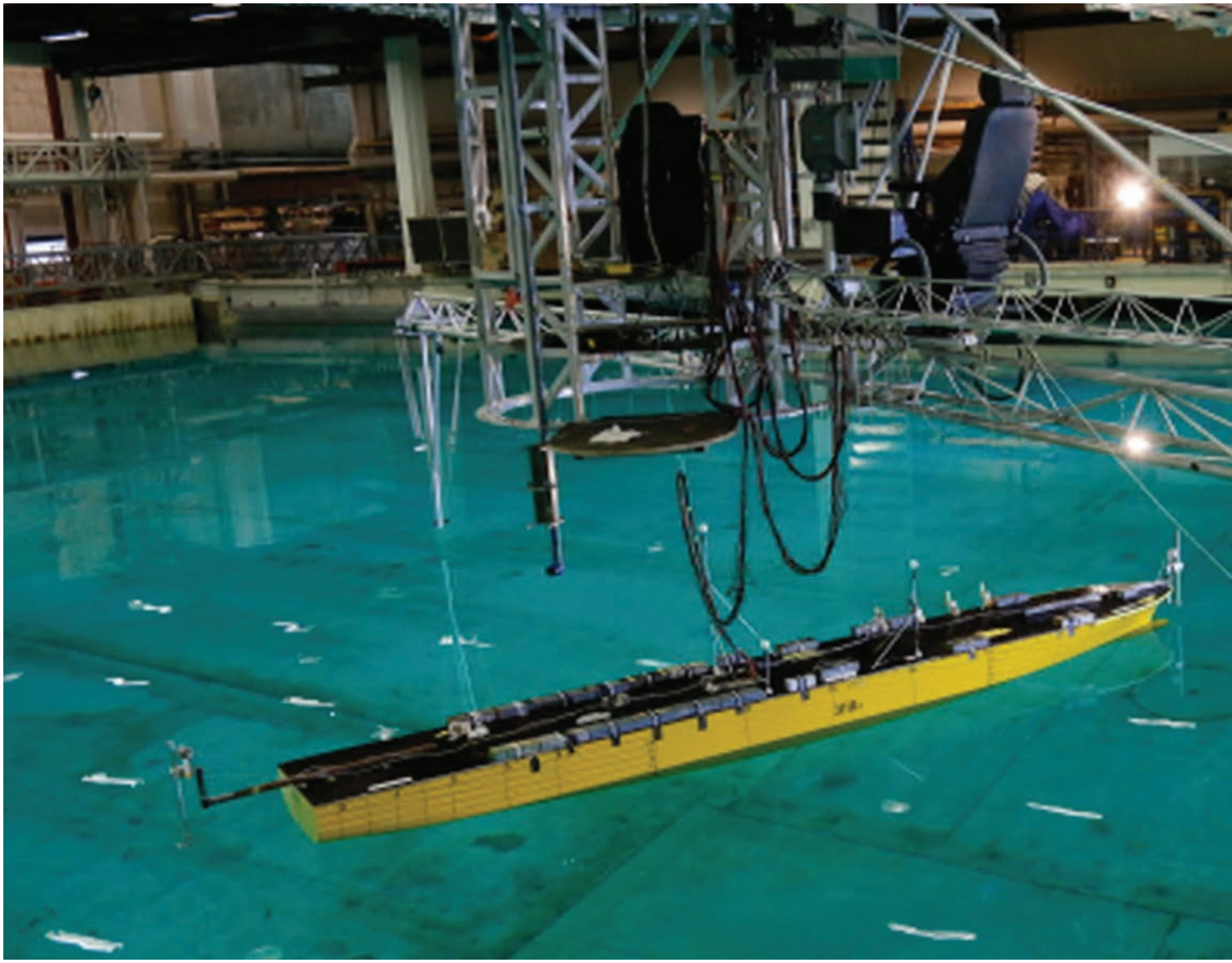
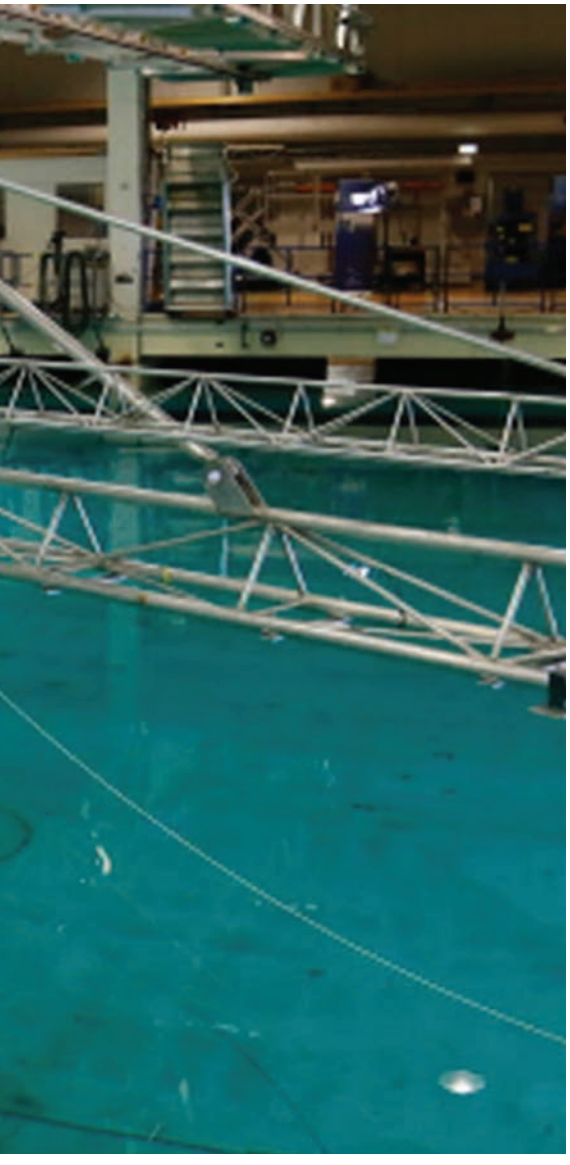


Photo: SINTEF

research and R&D contracts: a mighty offshore oil, gas and shipping value chain. A constant haul of government environmental and sectoral reports and offshore industry contracts has since swelled SINTEF annual reporting.

Contract gains, however, were reinvested in labs to serve new industries. Over 60 well-funded SINTEF labs, tanks and other facilities can now test the model hull of a floating production unit or trial the transport of multiphase oil and gas well streams. Advanced microelectronics and nanoscale R&D have

Your Sea Trials Here:
A SINTEF test basin.



led to advanced medical sensor development and an expanded lab offering for health industry and materials development, two areas of science only very recently associated with Norway. SINTEF now drives and qualifies advances in materials characterization and coatings technology. One obvious advance is that Norwegian subsea cables and subsea equipment bear a characteristic quality look. Labs in these and related segments include a throughput lab that uses dosing robots and pressure chambers to come up with "fluid transport" solutions for a variety of new and up-and-coming processes in industry and oil and gas. Among the non-offshore advances are special tubes and assemblies for Norway's nascent automotive sector.

Standards testing

At all SINTEF labs, the technology at researchers' disposal seems topnotch. The advanced materials lab in Oslo employs modeling and supercomputer infrastructure called SIGMA2, or the national infrastructure for computational science. Researchers use supercomputing and microscopy to determine the molecular responses of materials being lab-tested.

"We utilize a range of microscopy, spectroscopy and spectrometry techniques," one of a preponderance of foreign-born researchers says of the materials science at SINTEF. Complementary facilities include a coating laboratory and field testing understood to have been availed by the likes of coatings giant Jotun for the award-winning antifouling and other surfacing products that meet numerous ISO standards tested for at SINTEF. Ice-resistant coatings are now being tested.

But, it's in oil and gas that SINTEF researchers cover the gamut of Norwegian offshore energy value-creation. With the potential rewards high, spin-offs from oil and gas research have been many and stem from research into drilling and well control; exploration and production; gas-process tech; increased oil recovery; plug and abandonment; refining; safety and the environment; subsea systems and pipeline transport.

The modern Norwegian oil and gas industry is likely most in debt to SINTEF for the multiphase flow laboratory, and all its offshoots, where R&D tested new ways to handle well stream and get downhole tools, subsea and topside equipment into service. Some say it was here that Norway's decades old pump makers "scaled up" to produce space-age, valve-dense tools to get the most oil and gas out of offshore reservoirs.

Flow assurance has been key. SINTEF expertise helped engineer the removal of things like frosted hydrates (or slugs) from gas and oil on its way to final processing. Decades of research have given birth to the Nyhamna and Hammerfest gas

Available:
A large-scale multiphase test loop.

Credit: Screenshot of SINTEF video

plants' "slug catchers", the landfall of angular pipes bearing multiphase gas from remote and arctic offshore fields.

Thirty years of research into flow assurance yielded a host of large and small innovations, and large-scale, medium-scale and small-scale flow laboratories (loops) still offer the chance in here to study hydrate behaviour via closed loops (and particle rays).

For Norway, multiphase research has been the great nation-builder, bringing the wealth in cold-water oil and gas fields hundreds of kilometers to shore.

"It is often difficult to measure the gains of research in kroner, but I think I can safely say that this research (into flow assurance) has greatly benefited society, both the social and the commercial economy," former research minister, Tora Aasland, is quoted by SINTEF as saying.

Sharing the wealth

The national pattern of success in Norway has been to share new discoveries; new product or patent acquisitions from abroad; new advanced tools and prized, often foreign, experts across industrial segments and research institutions (examples include Japanese radios, stair designs, associate professors, rapid-prototyping machines and programming experts).

Enriched by a public-private business model, SINTEF people can find themselves in the lab; supervising strategic research via email or chairing spin-off companies. They might help test marine batteries to speed their use, or be the lead researcher contact at a newly assembled and funded industrial cluster. They could be devolving knowledge of spectral cameras to other researchers or the workings of marine cybernetics to foster a new UAV industry or launch the first mini-satellites (like the first launches by NTNU's AMOS UAV lab, akin to the 60 mini satellites being sent up by Space X's Falcon 9 rocket). But, in the aftermath of 2014's offshore standstill — with the specter of hundreds of out-of-work offshore vessels and other marine assets wasting away — Norway looked to innovation to find a way forward for its offshore industry.

Ocean and ship

One idea was to reorganize marine resources, including R&D, to instead tap the "ocean" industries, rather than just the seabed, for value-creation.

The ocean would provide the new raison d'être for fleets of offshore vessels modified to put crews aboard wind turbines; mine for seabed minerals or to tow cruise ships into fjords surveyed by SINTEF. Now, SINTEF Ocean Laboratory, a company in the new Group, will do the basic and applied research on the marine structures and operations the new ocean industries — everything from kelp-farming, to offshore aquaculture and wind energy — are expected to need. The Ocean Lab still studies seakeeping and DP; mooring; offshore floating production and loading; risers and pipelines … and aquaculture.

SINTEF clients are offered all the ocean elements in a deep test tank, ensuring the best study of marine technology. Indeed, the ocean labs are at the confluence of Norway's coastal industries prowess.

SINTEF Ocean is the place to be, too, for studying new, offshore renewable energy systems and for marine cybernetics, or the study of marine control systems, including automated hardware and propulsor tests. "Ocean" also offers suites of software for everything from the deft control and monitoring of environmental technology to shipping aps like ShipX for calculating hydrodynamic vessel inputs, and VeSim, a tool that simulates heading and speed in a busy seaway.

So, while preserving Norway's shipping and petro-strength is at the heart of so much R&D in Norway, SINTEF has built on that to branch out and offer researchers cutting-edge access to a brave new world of R&D subjects.

Photo: OceanObs '19

OceanOBS '19

Innovation Expanding Ocean Observations

By Justin Manley

Some people spend years following their favorite bands, others attend conventions for science fiction shows. But once a decade those dedicated to sustained ocean observing gather. The OceanObs conferences are held once every ten years to focus the attention of those planning, implementing, and applying ocean observing systems. Each conference allows this diverse group to review the state of science and operations, and to define goals for the next decade. The decadal conferences are an occasion to celebrate the accomplishments and vision of global ocean observers.

300 attendees gathered for The First International Conference on the Ocean Observing System for Climate (OceanObs'99, Saint Raphaël, France, 17-22 October 1999). The objective was to define the mix of operational measurements needed by several related global programs, specifically World Climate Research Program's Climate Variability and Predictability Program (CLIVAR), the Global Ocean Observing System (GOOS), and the Climate Observing System (GCOS). The conference addressed technical and scientific chal-

Dr. Jyotika Virmani & Dr. Marlon Lewis at OceanObs'19.

lenges of ocean observing systems and led to concrete actions. Notably OceanObs'99 emphasized the need to invest in an international Argo autonomous float program. This priority was taken up by sponsors, and the Argo system now provides critical operational data for global ocean observations.

OceanObs'09 (21-25 September 2009, Venice, Italy) convened over 600 attendees from 36 countries spanning diverse ocean stakeholder communities. The conference developed the Framework for Ocean Observing (FOO), which provided the justification and strategy for full implementation of the physical and carbon observing system. This conference demonstrated the scientific and societal benefits of a sustained ocean observing system.

Ten years later, over 1,500 members of the global ocean observing community gathered in Honolulu, Hawaii (16-20 September). The OceanObs'19 conference aimed to further align the science, technology, and capacity of ocean observing to address growing societal needs. Prior to the conference, Community White Papers were solicited from all interested groups, including scientists and end-users. These described needs and aspirations for the coming decade. The aspirations included addressing fisheries and ecosystem-based management practitioners, the maritime sector, national and local authorities, search and rescue, public and private sector researchers, and the public in general.

To address these goals, the OceanObs'19 organizers built the conference around seven themes: Ecosystem Health & Biodiversity, Climate Variability & Change, Water Food & Energy Security, Pollution & Human Health, Ocean Hazards & Maritime Safety, Discovery, and the Blue Economy. Two cross-cutting topics, Data & Information Systems and Observing Technologies and Networks, connect and integrate across the themes. The end result was a program encompassing five days of content. The event progressed across daily topics of information, innovation, integration and vision. The innovation day addressed new technology, science and market concepts for ocean observing.

Innovation day opened with plenary remarks from leading innovators in the community. They were complemented by a subsequent panel, five special sessions and seven breakout sessions. Throughout the course of the week a showcase of sixty exhibitors and 600 posters was available to attendees. The exhibits included diverse university and government efforts as well as many ocean technology manufacturers. The displays attempted to convey ocean observing in action and afforded visitors the chance to engage with new technologies such as in situ sensors as well as platforms including unmanned vehicles and drifting floats. Several new products intended to reduce the cost and complexity of ocean observing were introduced.

RBR Global presented its new concept, moto, which is an affordable, easily deployed drifter for short duration missions. Intended for roles such as hurricane research this new system was being presented to the OceanObs'19 community for feedback to ensure it would be "fit for purpose." Throughout the event this concept was often raised for all technologies as a way of reminding the participants that there are many solutions to diverse ocean observing needs.

Nortek was also onsite at OceanObs'19 embracing the conference charge to "improve the efficiency, decrease the cost, or add new observations that were not previously pos-

Justin Manley

RBR Hosted the OceanObs'19 Honorary Paddle on the Showcase Floor.

sible." Their solution was the ECO platform. ECO, Nortek's mini-ADCP for shallow water profiling will be available for sale in the Fall of 2019 and features a handheld, wirelessly charged 1MHz ADCP, programmed with a simple smartphone app with automatic cloud data processing and QA/QC. Nortek took the development one step further and designed a simple buoy and timed-release system to simplify deployment in shallow areas

These industry developments were well aligned with remarks in the innovation plenary, which included presentations from Dr. Wendy Watson-Wright of the Ocean Frontier Institute, Dr. Marlon Lewis of Dalhousie University and Dr. Jyotika Virmani of XPRIZE. These last two delivered a strong call for new ways of thinking about ocean observing technology.

Through a methodical analysis of changes in technology and scientific understanding Dr. Lewis highlighted the need for a new approach to ocean monitoring tools, especially to understand changes to global ocean reservoirs of heat, carbon, nitrogen and other important factors. He noted that ocean technology has historically taken an artisanal approach, much like craft beer, focusing on quality over scalable solutions. He suggested we needed to move from this artisanal approach to scalable tools and noted that the use of robotic ocean systems is the only realistic approach; they complement surface satellite observations and provide a critical third dimension over the global ocean. Further the presentation offered a rationale to increase observational capacity by a factor of 1000. Of course, with current technologies this would be prohibitively expensive. But the idea leads to a potential demand for 350,000 sensing platforms per year. With a hypothetical price point of $300 this would imply a $100M per year program. This vision certainly challenged the technologists while inspiring the scientists.

Dr. Virmani offered ideas about the power of exponential technologies. She characterized the power of exponential developments through comparison to taking a walk. If one takes 30 linear steps a distance of roughly 30 meters is covered. But if every step is an exponential one, 30 steps becomes 26 trips around the world. Through incentive prizes Xprize aims to accelerate the development of fundamental new technologies. The recently completed Ocean Discovery prize is an ocean related example that was discussed but a new prize aimed at "avatars" offered an intriguing idea that ocean scientists might find more immersive ways to explore the ocean.

Concluding the plenary was a special announcement from U.S. Department of Energy (DOE) and National Oceanic and Atmospheric Administration (NOAA). They announced their new Powering the Blue Economy: Ocean Observing Prize, which will provide an opportunity for innovators to develop marine energy technologies at a scale that is more attainable than utility-scale power. It will also offer an opportunity for technologists to partner with the ocean observing community to address energy challenges of sustained ocean observing systems.

The innovation discussions continued over the course of the day. Through special sessions and breakout groups. These addressed key tools and techniques including remote sensing, environment DNA (eDNA), modeling and assimilation, platforms, sensors and software. The blue economy and community building were also

addressed. The content of the OceanObs'19 Innovation day was extensive did not lend itself to simple summaries. That said there was a key underlying question at work:

How can we spur innovation in observing technologies, products, and user services?

In considering this question several gaps and recommendations were discussed. There were many gaps identified in technology and innovation. These touched upon unmanned systems, especially unmanned surface vessels (USVs), remote sensing, cabled systems, drifting buoys, high frequency radar, sea level measurement and system of system concepts. The recommendations were likewise diverse and extensive. Some key recommendations discussed at OceanObs'19 included:

- **Technology Development:** Update existing observing systems with new sensors and technologies, such as biosensors and those that can collect wave data and measure biogeochemical variables

- **Remote Sensing:** Provide better in situ support for satellite technologies.

Improved Observations: The ocean observation community should make strides to incorporate additional measurements into observational frameworks.

B Focus on low-cost, ubiquitous solutions to platform development accessibility, thus expanding the ocean observation community to better reach the public and STEM education systems.

- **Collaboration:** Continue fostering close collaboration between the private sector and the regional ocean observing community, leveraging the strengths of each to fill regional observing and forecast gaps.

The extensive, diverse, set of recommendations was derived from the Innovation day activities and associated community white papers. The other themes, days and papers provided additional content and recommendations. Throughout the event questions and concepts were captured by online tools, moderators and attendees. The Ocean-

Nortek's New ECO ADCP

Justin Manley

Justin Manley

The Breaking Waves, Breaking Barriers Panel at OceanObs'19.

Obs'19 web site will make many of the presentations available and recordings of some key sessions will also be available there.

Throughout OceanObs'19 there were many side events focused on specific science questions and communities. One notable event was called Breaking Waves, Breaking Barriers. This event was sponsored by Schmidt Marine Technology Partners and was focused on women's instrumental role in ocean science, leadership, and mentorship. A panel of four leading women in ocean science offered insights from their own careers. Rosie Alegado from the University of Hawaii served as moderator and the panelists included Barb Kirkpatrick from the US, Nelly Florida from Indonesia, and Juliet Hermes from South Africa. They were joined by almost 40 more women in the field who served as ambassadors to answer questions and inspire discussion during a networking reception.

The breaking waves event was just one example of how the OceanObs'19 program fostered creative discussions and new relationships in the ocean observing community.

For the ocean technology community one of the key elements of the conference statement is especially relevant. It highlighted the need to: Harness the creativity of the academic research and engineering communities, and work in partnership with the private and public sectors to evolve sensors and platforms, better integrate observations, revolutionize information products about the ocean, and increase efficiency and reduce costs at each step of the ocean observing value chain.

The next ten years will be exciting indeed.

New Flag, New Mission, Quiet & Ice Capable NATO RV

Photo: CMRE

Alliance

By Edward Lundquist

NATO's 3,100-ton, 305-foot research vessel NRV Alliance has been a leading platform for underwater acoustics research to the benefit of NATO navies. The ship operated with a civilian crew under the German flag for many years for the NATO SACLANT Center, later renamed the NATO Undersea Research Center, and now known as the NATO Center for Maritime Research and Experimentation. Now Alliance flies a new flag, and has a broader mission. What's the status of Alliance?

Several years ago CMRE's operating model was changed, taking us from NATO ACT (Allied Command Transformation) and placing us as part of the NATO STO (Science and Technology Organization) and we became customer-funded. It was necessary to change the protocol that we used before with ACT and needed to look at other options for the flagging of Alliance. We went through a protracted period of talking with the nations from about 2014 right up until the end of 2015, and the net result was that Italy offered to provide military flags for both Alliance and the smaller RV Leonardo, along with a military crew. That brings some synergy for where we are situated here in La Spezia. Following that agreement, an MOU was formulated with the nations and with Italy, where the time at sea would be split. In compensation for Italy providing us with a military crew, they now

get a portion of the sea time available on the ships, with the rest of the time available for NATO use.

Is that a good deal for Italy?

Italy didn't have a platform like Alliance that they could use for national purposes until now. They end up with about 90 days of use of Alliance each year. So for the cost of a crew, it is a good partnership arrangement.

Who pays for the maintenance?

Ownership and custody was passed from ACT to CMRE in 2016, so we pay for everything. The only thing we don't pay for is the crew's salary. When we had Alliance crewed by civilian mariners our cost was about 2 million Euros a year.

Now that you are customer-funded, do you have enough business to support operations?

We have been fortunate. We have expanded use of the ship for additional customers, and we've been successful with it, particularly with institutes and academia, most notably in the U.S., which now have access to this world-class platform. I spend a proportion of my time meeting with the people from University-National Oceanographic Laboratory System (UNOLS), Office of Naval Research (ONR), National Oceanic and Atmospheric Administration (NOAA), and other people who go to sea on a regular basis but don't necessarily have the platforms available that they would like. So we've done a considerable amount of business with them.

Nobody has a platform like Alliance.

That's true, and we're doing our best to keep her in good condition and operating. Based on the world geopolitical situation, and the growing interest in the academic science community, we had aspirations to get the ship back out to the North Atlantic, and the high north, and the Arctic, because the world is changing, and interest in the high north is growing. Not many people have a ship that is ice-capable to get up there, stay up there, and operate in those conditions. Alliance is built as an ice-class ship. We were approached by UNOLS and Dr. Bob Pickart of the physical oceanography department at Woods Hole Oceanographic Institution, who had for a number of years been attempting to get a suitable platform to go up to the Arctic in the January – February – March time frame to look for cold weather intrusions. Basically, they're storm hunting.

What are cold weather intrusions?

That's the interaction of the surface water and the air that forms very violent low pressure systems that develop into some of the major storms that we've seen. It's where some really nasty storms start. And nobody's been able to get up there in the winter to study it. So we were approached: could we do this cruise? We then made the decision, and invested to get Alliance back to a polar standard; she hadn't been that way for a number of years. We had to go back and re-establish some redundant systems on the ship, such as the steam heating and other polar precautions. And we were able to do that cruise in 2018.

How did it go?

It went really well. The ship performed superbly, and did an amazing job in some very challenging weather conditions. The crew was fairly inexperienced to start with, but we put them through training, and they learned very quickly and became quite confident in operating in ice and other challenging conditions. So you could see their confidence grow throughout the cruise, and they achieved an awful lot. We had been up there in 2017 during summertime, before we had done all the ice enhancements. And we went back up for the entire summer of 2018. Really quite exciting stuff. We did have a significant engineering casualty at the end of our last cruise, where one of the two main propulsion diesel generators failed and while we had redundancy it did have an impact on our work.

Now that you've regained this capability to operate in the Arctic, are you looking at more customers that want to go there?

Absolutely.

Alliance used to be the quietest research ship, which was important for conducting research related to ASW.

Today we can say that we're not just quiet – we're ice capable.

Alliance is more than 30 years old. What comes after Alliance?

We definitely have an aspiration to look at what our next research vessel will be. I think in about 10 years' time we're going to be wanting to replace Alliance. She's a great ship, but she won't go on forever, and some of the compliance issues nowadays mean that she's going to need replacing in about 10 years' time. We're looking at a package of 150 million Euros to replace her. It wouldn't be a like-for-like, but still she will be a very capable platform for NATO. We will want a quiet ship, but the noise monitoring and acoustic quieting has moved on exponentially since Alliance was built. So most research ships coming out now are quiet enough.

Are there ships out there today that meet those "aspirations?"

There are other very good ships out there. The Norwegian's brand new PC-3 class icebreaking research vessel Kronprins Haakon will be operating in both the Arctic and Antarctic. It is an absolutely phenomenal vessel.

Is it quiet?

Nothing is as quiet as Alliance, but do we need her to be that super, super quiet? We may, because things change in the submarine world. But we can also use autonomous offboard

systems. We're not in the game of towing miles of towed arrays, which is what we used to do. So I think it's entirely possible to build a fully functional, quiet-enough platform to do that work. Alliance is fully ice capable, and that would be what I want for any replacement--because, really, it's where we need to be, it's where we need to operate. Our program next year, 70 percent of it is up in the Arctic.

I knew Alliance was a "global" classed ship, but I never thought that "global" meant "ice."

It's something that hasn't been exercised for a long time. We knew it was coming down the line, so we positioned ourselves to make sure that we were able to operate up there, and as a result, my phone often rings with people wanting to know if they can get up there with us.

Do you schedule your operations through UNOLS?

No, we don't, but I maintain a direct link with the UNOLS executive secretary, and he's on the scheduling committee, so whenever they have something coming up where they know they're going to need an ice-capable ship, or they're unable to meet it from the UNOLS pool, they'll come to me.

Is it difficult to put another rider on your ship to conduct whatever experiment they want to do?

Not at all. We always try to accommodate them.

And scheduling-wise, you have to accommodate the needs of the Italian Navy.

That's right.

Do the Italian sailors look upon Alliance as good duty?

They love the variety of it, and they love the ship itself, but as far as sea time goes, they tend to spend more time away than they would normally.

Are they required to do the day-to-day maintenance?

Yes, they are.

So what's your message to the research community? "Open For Business."

That's right. We're open for business. We're out there and in the right part of the world, and they know the platform that we have to offer. The more programs we can get out there, the better it is for all of us.

And how about your message to the NATO nations?

We need continued support. We are trying to increase our customer diversity, but there are costs we won't be able to recover just by customer funding through our NATO Programme of Work. The customer funding model is not a be-all and end-all for research, so we need look at all options for the future.

On-Demand, Continuous Eelgrass Monitoring

By Alessandra Bianchi

The Challenge

Eelgrass (Zostera marina) is a valuable coastal habitat in Massachusetts, forming a complex underwater landscape that stabilizes seafloor and adjacent shoreline, filters the water of sediments and nutrients, and provides important habitat for shallow water species.

South of Boston, the bays of Duxbury, Kingston and Plymouth (DKP) form a large embayment whose eelgrass population, once thriving, is now severely diminished. A 2016 report from the Massachusetts Division of Marine Fisheries (DMF) summarizes these data: the overall loss in DKP from 1951 to 2012 is 44.4%, with a concerning additional loss from 2012 to 2014 of 48%.

The Opportunity

Researchers believe that the decline in eelgrass has been caused by changes to the water quality in the embayment. Traditional methods to track water characteristics include manually collecting water "spot" samples at intervals and at a number of fixed locations, or from instruments attached to piers or buoys. The drawback is that these methods collect data for just that location and do not provide a clear picture of the overall embayment.

Scientists from the Massachusetts offices of Coastal Zone Management, DMF and MassBays National Estuary Program felt there was a better approach. Instead of sampling the water quality at a small number of fixed locations, they wanted to gather data across the whole embayment. In addition, instead of collecting samples at fixed intervals, they wanted to sample continuously to better understand the effects of the tidal cycle: the clean seawater coming in as the tide rises and then the discharge from the estuaries as the tide goes out.

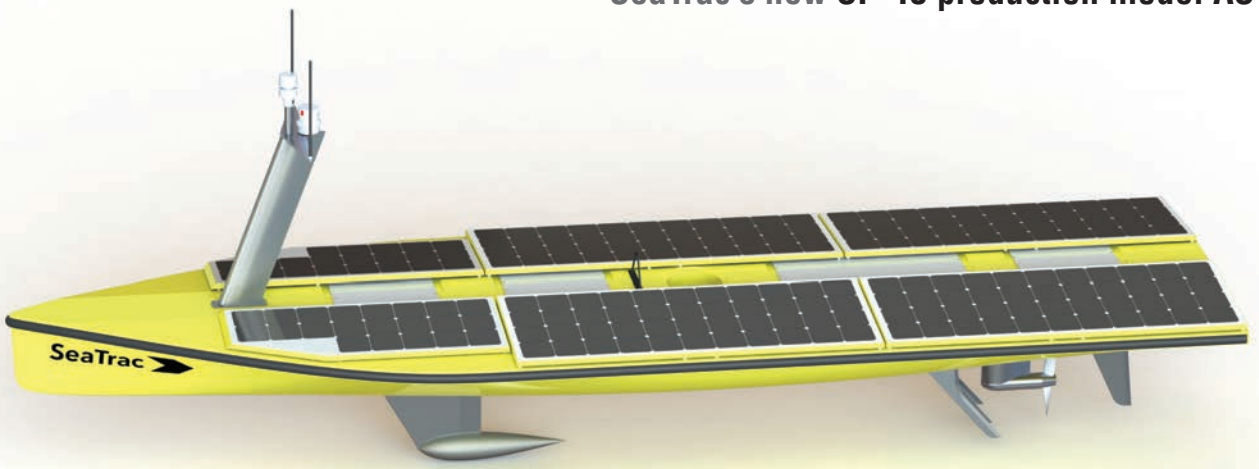
The difficulty in DKP is simple: the embayment is very large (3 miles across), and at low tide, much of it turns to mud flats. The main goal of this mission was to use SeaTrac's Development Platform to provide measurements of the water quality over the entire embayment. This would also provide the team with the opportunity to see if the platform could position the sensors accurately along the target course while handling the tidal currents, and to determine if the platform could manage the target mission as the tide came in and finish the required course before the tide went back out.

Based on lessons learned with the SeaTrac Development Platform, the team would determine what changes should be incorporated into SeaTrac's production model for use in future missions.

The Mission

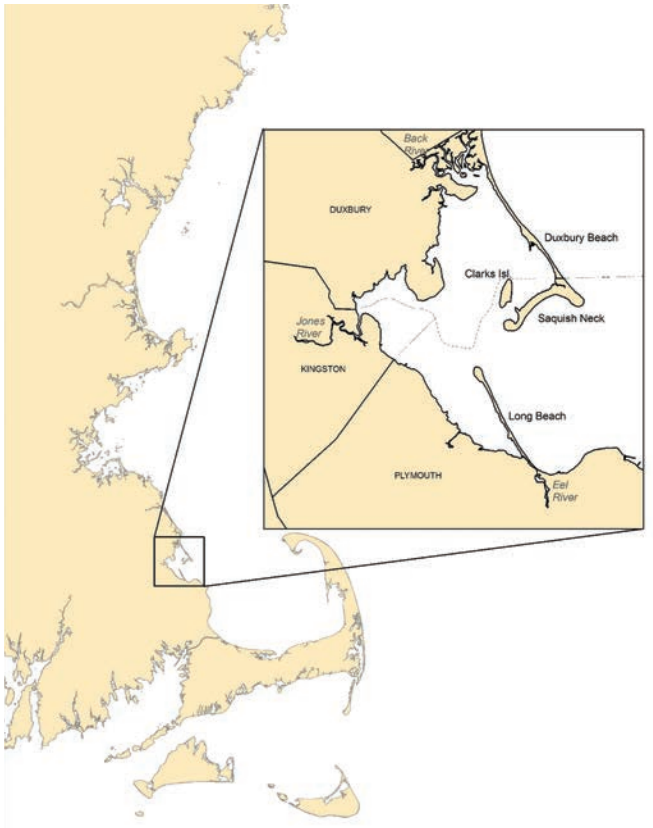
Since there is very little water in the embayment at low tide, the mission was to follow a route that began at low tide in deeper waters, and then progressed into the shallower water as the tide came in. During high tide, the mission ran over the shallowest parts of DKP. As the tide went back out again, the mission retreated to deeper water again. Starting two hours after low tide, and then finishing two hours before the next low tide provides about 8hrs of running time. With the SeaTrac's normal cruise of about 3kts, this equates to an overall mission length of just over 20 miles. MassBays and SeaTrac worked together to equip the SeaTrac Autonomous Surface Vehicle (ASV) with a YSI series 600 sonde, a water quality

SeaTrac's new SP-48 production model ASV.



Buddy Duncan, SeaTrac.

The Duxbury, Kingston and Plymouth (DKP) embayment.



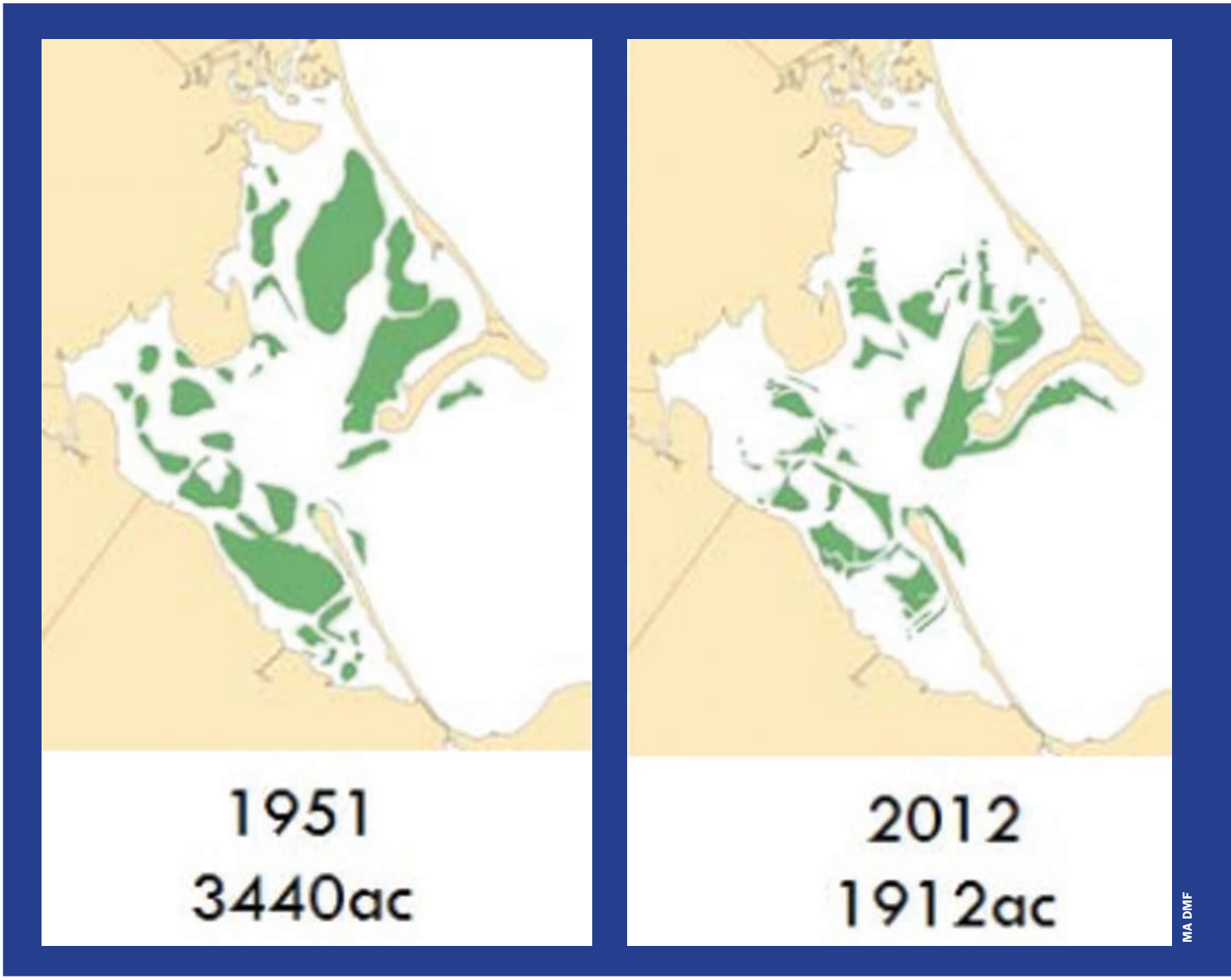
Credit: Massachusetts Division of Marine Fisheries

monitoring device carrying sensors that collect real-time data on temperature, conductivity (salinity), turbidity, dissolved oxygen and chlorophyll.

The SeaTrac ASV was launched from the public boat ramp in Plymouth and towed out of the harbor. During the mission, data from the YSI sonde was logged on the ASV and simultaneously sent back to shore through the three wireless links available: line of sight RF, cellular and Iridium, and saved to dedicated database servers. With this system, the team onshore was able to track live progress, as well as go back and review any historical data at any time.

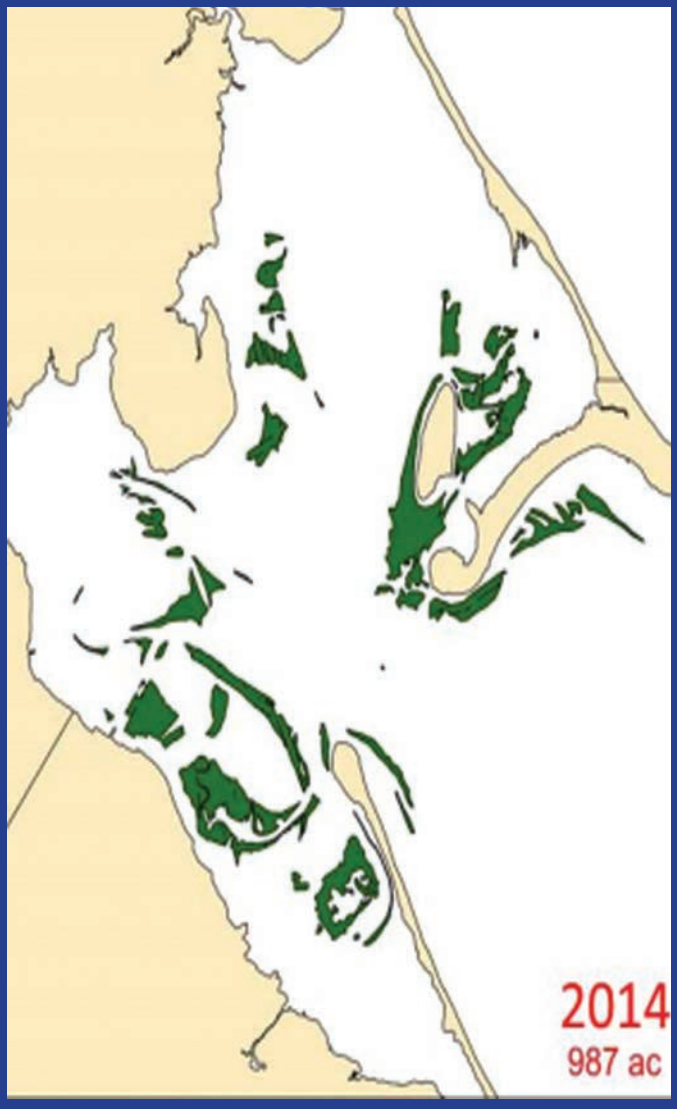
For SeaTrac, the goal of the mission was to see if the platform was capable of managing the currents and the speed/distance requirements to operate successfully in the DKP environment. Also, to ensure that the vessel would work successfully as a water quality data collection platform.

- **Power and Speed:** The SeaTrac ASV had plenty of power to support the sensor in this application, and the 3.25 kts of cruise was sufficient to collect data over the entire embayment.
- **Launch and Recovery:** The public boat ramp in Plymouth is large and well-built and resulted in a straight forward launch and recovery using the standard trailer for the ASV.



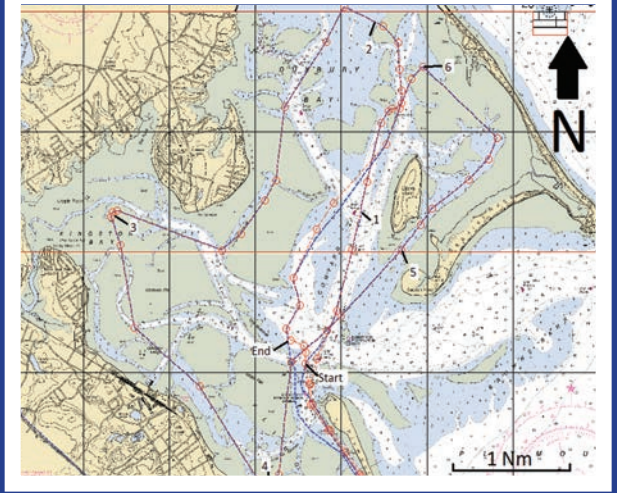
- **Weed:** The sensor was mounted on the bottom of the hull and caught weed. For the production model, a new moon pool has been introduced, allowing the sensor to be mounted vertically, with just the sensor cage and probes below the hull. A copper mesh around the probe cage will slow fouling and prevent weed from entering the cage.
- **Communications:** The cell coverage in DKP is excellent, and the cellular network was an ideal solution. For the scientists, the mission was a first step at using a moving sensor on an unmanned vessel in a large, complicated embayment.
- **Data:** The YSI sensor and the SeaTrac ASV provided a successful combination to collect water quality data. Being able to monitor the data live proved important: at one point, one of the YSI wipers got stuck, and by re-running the wiper routine on the fly, the sensor cleared itself.
- **Graphical Results:** Ben Wetherill with ACASAK Technologies performed analysis on the data saved from the missions, with some results included below. The following two maps show chlorophyll as captured in the first two voyages. The data showed consistently higher chlorophyll values in the shallower areas of the bays. Higher values are darker.

The images above show chlorophyll and turbidity. Turbidity correlates quite closely with chlorophyll, implying that the turbidity is probably caused by algae and not sediment. Also,



Eelgrass population (acres) in 1951, 2012 and 2014: note the drop from 3,440 to 987 acres.

The SeaTrac route around the DKP embayment, approximately 20 miles long.



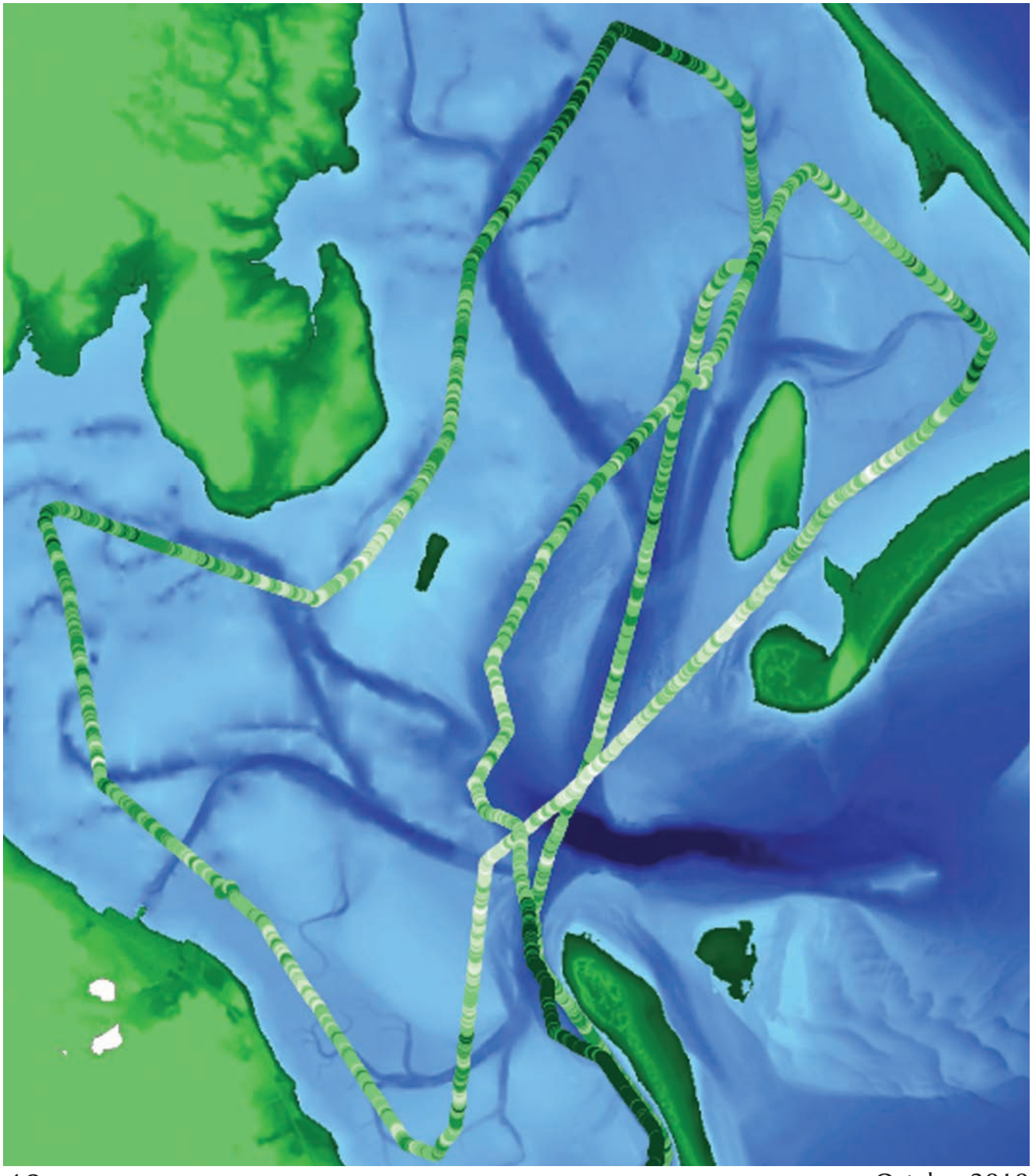
Screenshot by SeaTrac

by comparing this to the eelgrass beds shown in purple (in the right image), it looks like the turbidity is highest where there is no eelgrass.

Comments

Gathering water quality data with an unmanned vessel improves our understanding of the DKP embayment, and helps us understand how human actions and changing climate have an impact, which in turn helps us suggest changes to local policy and regulations to preserve the eelgrass that remains.

Chlorophyll results, Voyage 1.

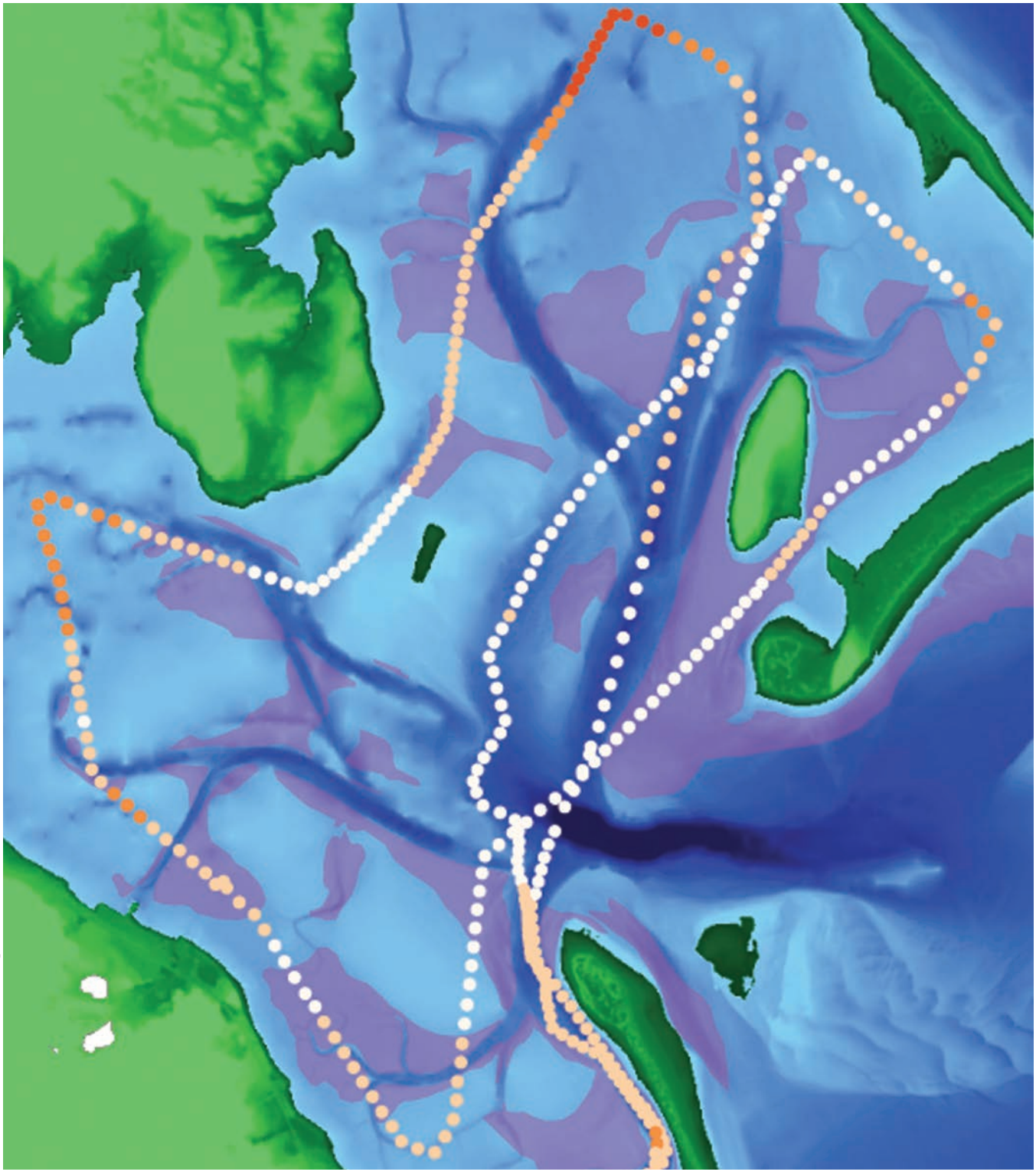


Credit: Ben Wetherill, ACASAK Technologies

According to Prassede Vella: "SeaTrac's autonomous, solar-powered vessel was the perfect vehicle to meet MassBays's needs, to collect continuous water quality data from a large area, making it possible to gather data through a complete tidal cycle, with associated hydrological conditions."

And from Ben Wetherill: "This system is further along than I expected. The software used to setup and manage the mission is really pretty cool. I was impressed with the ability to see the live data. And it was quick and easy to access the historical data saved online later."

Turbidity results, Voyage 1.



Credit: Ben Wetherill, ACASAK Technologies

THE #1 MARINE TECH

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Marine Technology Reporter is the industry's largest circulating magazine dedicated to the underwater technology and ocean science markets. From the surface to the sub-seafloor, *MTR* provides unbiased news and information on equipment, systems and platforms for use in everything from hydrographic and oceanographic research to defense and renewable energy.

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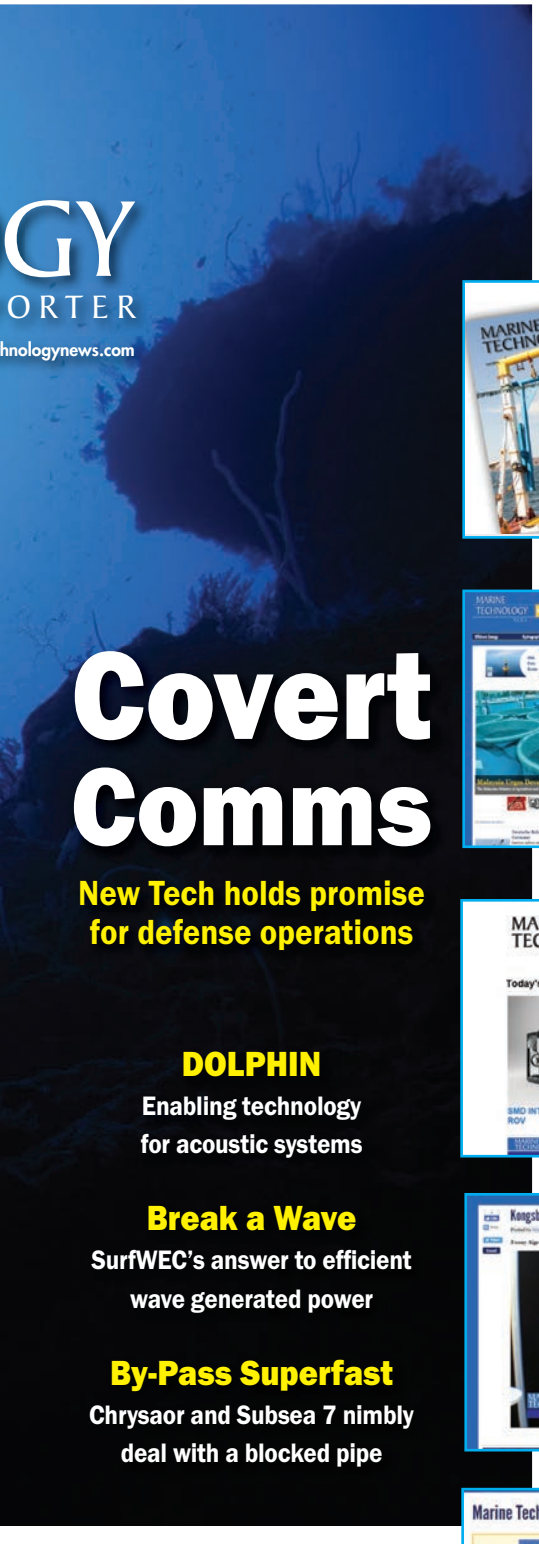

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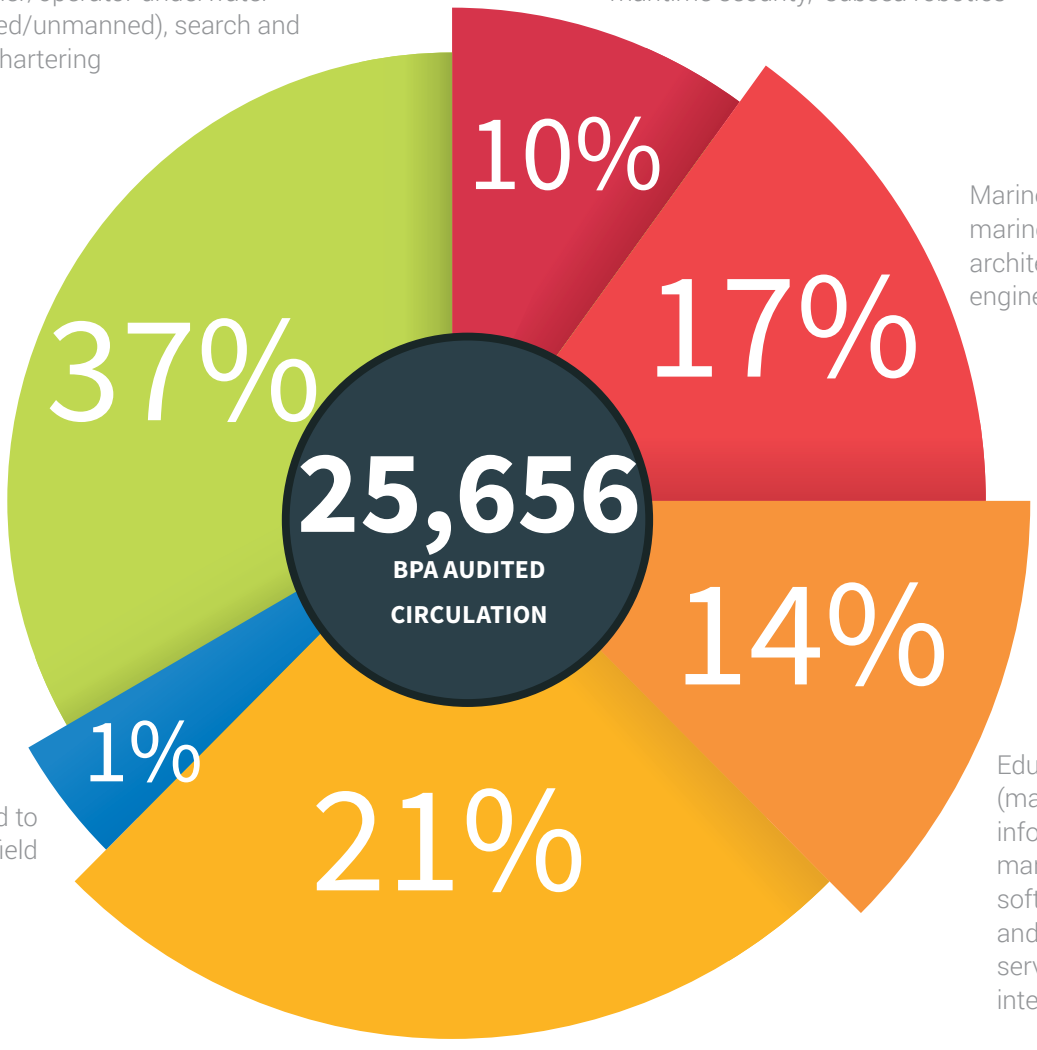

Commercial diving, commercial vessels owner/operator, dredging, marine geodesy, marine salvage, meteorology, ocean exploration/survey, oceanography, offshore oil & gas exploration and production, owner/operator underwater vehicles (manned/unmanned), search and survey, vessel chartering

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Environmental monitoring/pollution control, marine construction, offshore structures, pipeline contractors, port/waterway/coastal/ harbor authority, ship/boat building and repair services, submersibles

Others allied to the field

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2020 Editorial Calendar

JAN/FEB

Ad Close: Dec 21

Underwater Vehicle Annual

Subsea Defense Tech

Manipulator Arms and Tools

Autonomous Navigation GNSS MEMS

Unmanned Vehicle Propulsion

Event Distribution

Subsea Expo 2020- Feb 11- 13, Aberdeen
Underwater Defense & Security - Mar 3-5, Southampton
Canadian Hydrograpic Conference- Feb 24-27, Quebec City
Oceans 2020 Singapore - Apr 6-9 Singapore

FEBRUARY

Ad Close: Jan 22

MTR White Papers: Oceanographic

White Paper Electronic Edition Publication Date: February 2020

MARCH

Ad Close: Feb 21

Oceanographic Instrumentation: Measurement, Process & Analysis

Oceanology International New Tech Gallery

Fiber Optic Cables, Connectors & Slip Rings

Marine Drones

Hydrographic Sonar & Software

Event Distribution

Oceanology International - Mar 17-19, London
Sea-Air-Space- Apr 6-8, Baltimore, MD

APRIL

Ad Close: Mar 21

Offshore Energy: Oil & Gas, Wind & Tide

Subsea Electrification

Lights, Cameras, Lasers, Multibeam Sonar

Buoyancy Technology

Scientific Deck Machinery / LARS

Event Distribution

Offshore Technology Conference- May 4-7, Houston, TX
AUVSI XPONENTIAL- May 4-7, Boston, MA

MAY

Ad Close: Apr 21

Underwater Defense Technology

Comms, Telemetry & Data Processing

Hydrophones

Magnetometers & Streamers

Beacons, Flashers & Tracking Systems

Event Distribution

UDT- May 12-14, Rotterdam
Underwater Technology Conference- Jun 16-18, Bergen

JUNE

Ad Close: May 21

Hydrographic Survey: Single & Multibeam Sonar

Research Institutions

USV Platforms

GPS, Gyro Compasses & MEMS Motion Tracking

Interconnect: Underwater Cables and Connectors

JULY

Ad Close: Jun 22

MTR White Papers: Hydrographic

White Paper Electronic Edition Publication Date: July 2020

JULY/AUGUST

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MTR 100 - Edition

The 15th Annual Listing of 100 Leading Subsea Companies

MTR looks at 100 leading companies and executives in all subsea disciplines, defense, offshore energy and science.

Event Distribution

Offshore Northern Seas- Aug 31-Sep 1, Stavanger

SEPTEMBER

Ad Close: Aug 21

Autonomous Vehicle Operations

Subsea Residency

ROV Technology: Work Class to Micro Systems

Thruster Tech: Underwater Propulsion

Underwater Tools & Manipulators

Event Distribution

SNAME Sep 29- Oct 3,Houston, TX
Offshore Energy Europe- Oct 7- 10, Amsterdam

OCTOBER

Ad Close: Sep 21

Ocean Observation: Gliders, Buoys & Sub-Surface Networks

Instrumentation: Profilers, Samplers & Sediment Corers

Seafloor Mapping

Harsh Environment Systems for Arctic Ops

Geospatial Software Systems for Hydrography

Event Distribution

Oceans 2020- Oct 19- 22, Biloxi, MS
Blue Tech Week, San Diego, CA
MAST Japan Defense- Nov 2-4, Tokyo

NOVEMBER

Ad Close: Oct 22

MTR White Papers: Subsea Vehicles

White Paper Electronic Edition Publication Date: November 2020

NOVEMBER/DECEMBER

Ad Close: Nov 21

Acoustic Doppler Sonar Technologies ADCPs and DVLs

Fresh Water Monitoring & Sensors

Offshore Inspection, Maintenance & Repair (IMR)

Underwater Imaging: Lights, Cameras, Lasers & Multibeam Sonars

The 2021 Subsea Market Planner

Event Distribution

Underwater Intervention 2021

information may be subject to change

AAM Launches 77-ft. RV for Duke University

Images: All American Marine Inc.

All American Marine, Inc. (AAM) completed construction and launched an aluminum research and survey vessel for Duke University. The Duke University Marine Lab (DUML) is a hydrofoil-assisted catamaran from Teknicraft Design that measures 77 x 26.5 ft., based on a pair of Teknicraft Design vessels AAM built for NOAA.

The vessel is powered by twin Tier 3 CAT C18 "D" ACERT engines, rated at 803 bhp/2100 rpm and providing a cruising speed of 24 knots. It has liveaboard accommodations for 14. Driven by twin fixed pitch propellers, the RV can accommodate up to 30 passengers, built and certified under USCG Subchapter "T" regulations. The Duke Marine Lab is a year-round teaching and research campus located on Pivers Island in Beaufort, NC. It offers academic programs at the doctoral, masters and undergraduate levels, and is home to the Nicholas School of the Environment Marine Science and Conservation programs. The vessel was procured as part of an $11 million gift for the construction and operation of a new state-of-the-art research vessel that will expand teaching, research and outreach capabilities at the Marine Lab.

Images: All American Marine Inc.

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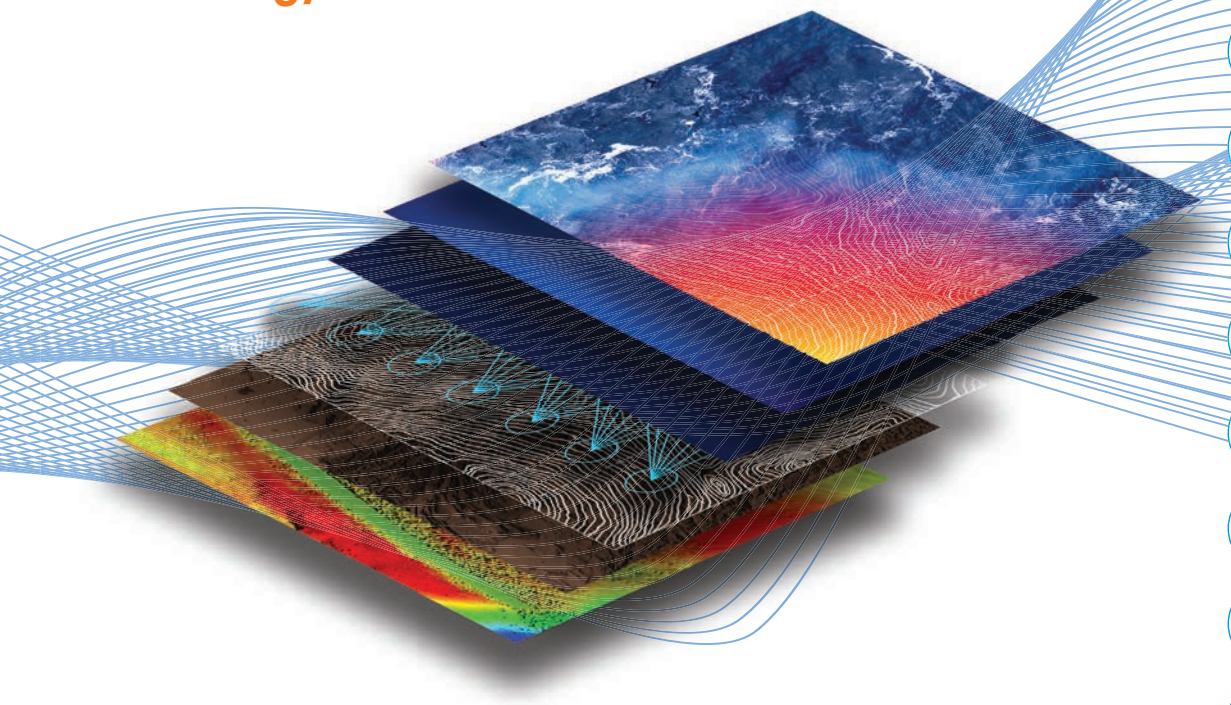

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Images: Skipsteknisk

Greenland RV Picks MAN Hybrid Propulsion

The Astilleros Balenciaga S.A. shipyard in Spain ordered a complete MAN propulsion package – including MAN 27/38 and 175D engines, a five-blade MAN Alpha propeller and both remote-control and MAN HyProp systems – in connection with the construction of a research vessel for the Greenland Institute of Natural Resources.

The 61m, ice-class trawler is designed by Norwegian company, Skipsteknisk.

Delivery of the propulsion package is scheduled for Q1 2020 with the vessel expected to enter service from spring 2021. MAN Energy Solutions further reports that a large number of fishing vessels featuring a Skipsteknisk design are currently under construction, of which 18 feature MAN propulsion packages.

MAN Energy Solutions reports that the vessel's propulsion package has been assembled with a special focus on minimizing noise. As such, the research vessel will be driven by a diesel-mechanical set-up with the 27/38 acting as main propulsion and the MAN 175D and D2862 engines as auxilliary gensets. The 175D and D2862 will receive double-resilient mounting to comply with the vessel's SILENT F notation. Similarly, the fully integated MAN HyProp ECO frequency drive for DE operation system will control the rotation of the five-bladed Alpha propeller. Notably, both auxiliary engines are double-resilient seated.

The DNV-GL's SILENT class is the first set of rules for underwater noise emission from vessels ever published. It provides owners of acoustically-sensitive vessels with concise, realistic criteria regarding underwater noise-emissions. It also gives environmentally-conscious owners an opportunity to demonstrate a low ecofootprint. Compliant ships are given the SILENT notation with an additional letter denoting a particular segment. In the case of the new research vessel, 'F' is reserved for vessels engaged in fishing.

ZF Thruster Tech for R/V Roger Revelle

The research vessel Roger Revelle is currently going through an extensive mid-life refit. One of the upgrades to the vessel is the installation of telescoping thruster technology from ZF Marine. The vessel is owned by the US Navy and operated by the Scripps Institute of Oceanography under a charter agreement with the Office of Naval Research.

In the pursuit of its mission, the crew of the R/V Roger Revelle depends on world-class navigation and station-keeping systems on a daily basis. To meet this need the vessel was built with a powerful propulsion system designed to keep it in position anywhere around the globe, in varied weather and sea states. Currently undergoing a major dry dock period as part of a mid-life upgrade, the vessel is receiving an 1,100 hp ZF Marine ZF AT 5011 RT TT-FP L-Drive Retractable Thruster. The telescoping design allows it to extend downward from the hull, where it can operate as an azimuth thruster, rotating 360 degrees. When retracted, it operates as a standard tunnel thruster. The result is a multi-functional solution that provides traditional bow maneuvering in port while increasing station-keeping performance of the vessel when on station at sea.

Operational control of the unit will be through ZF ThrusterCommand electronic controls. ZF Marine will be supplying the same system for the sistership, R/V Atlantis, during that vessel's mid-life refit, scheduled to start in 2020.

Images: ZF

Images: Sonardyne

Sonardyne selected for

Flagship Brazilian RV

Science equipment and underwater vehicles deployed from Brazil's flagship oceanographic research vessel, Alpha Crucis, are to be tracked using Ultra-Short BaseLine (USBL) positioning technology supplied by Sonardyne Brasil Ltda.

"To gather meaningful data to support our studies, first our scientists need to know exactly where their sensors and equipment packages are in the ocean when they make their observations," said Dr. Prof. Paulo Sumida, Vice-Dean from the Oceanographic Institute of University of São Paulo. "With Ranger 2, they'll be able to do just that. It came highly recommended by our colleagues in the international science community giving us every confidence to select it for the Alpha Crucis." The 64 m-long vessel, which is operated by the University of São Paulo, undertakes research projects spanning global climate change to biodiversity in Brazilian waters. It will be equipped with a Sonardyne Ranger 2 USBL high precision acoustic positioning system to enable the Alpha Crucis' 21-strong science team to precisely track their instruments and sensors to beyond 7 km.

Ranger 2 is designed to accurately track the position of subsea targets by measuring the range and bearing from a vessel-mounted transceiver to transponders on each target. The University of São Paulo selected Sonardyne's pre-calibrated Gyro USBL transceiver for the vessel and 4,000 m depth rated Wideband Sub-Mini 6 Plus (WSM 6+) transponders for its in-water equipment, which includes sediment corers, towed cameras, landers and remotely operated vehicles (ROV).

Gyro USBL is pre-calibrated thanks to its aligned acoustic transceiver and built-in attitude and heading reference sensor (AHRS). This combination eliminates the need for measurements to be undertaken to determine the alignment of the ship's motion sensors to the acoustic transceiver. Survey operations are faster and more precise, helping to maximize the available vessel time for science.

Polar Research Vessel Tech:
RRS Sir David Attenborough's Integrated Tech

RRS Sir David Attenborough was officially named at a special naming ceremony held at Cammell Laird's Birkenhead, UK, shipyard on September 26, 2019. While the ship features a long list of advanced technologies, Kongsberg integrated systems are central to the vessel's position as one of the most advanced research vessels ever built. Commissioned by the Natural Environment Research Council and built by Cammell Laird for operation with British Antarctic Survey, the RRS Sir David Attenborough is designed to carry out intensive, multi-disciplinary missions of scientific significance, with minimal impact on the ocean environment it will be used to study. "Kongsberg has supported development of the RRS Sir David Attenborough from the very early days, helping us to realize our vision for such a unique and pioneering ship," said Professor Dame Jane Francis, Director of British Antarctic Survey. "Our missions will take us to the most remote areas with the most extreme conditions, but we are confident that the technology onboard will enable safe navigation and control, as well as capture of the data our scientists need to address the environmental challenges that we all face today, and in the future."

Thanks to sophisticated, green, cost-effective solutions including an energy management system, cutting-edge sensors and remotely-operated robotic technologies which all come under Kongsberg Maritime's 'Full Picture' scope of delivery, the RRS Sir David Attenborough's design focuses on fuel and logistical efficiency, and is expected to save in excess of $122 million in operating expenditure over the course of its 30-year lifespan.

Royal Ceremonial Naming of RRS Sir David Attenborough. Sir David Attenborough and Duke and Duchess of Cambridge attended the event– pictured with Kongsberg Maritime systems on the bridge.

Credit: British Antarctic Survey.

Seaspan Delivers for Canadian CG

Seaspan Shipyards (Seaspan) said that the third Offshore Fisheries Science Vessel (OFSV) for the Canadian Coast Guard (CCG) has reached structural completion. With all external hull welds completed and inspection approved by Lloyd's Register, Seaspan's team is now undertaking the next phase of pre-launch activities including hull preparation and painting. The third OFSV is on track for launch in early 2020. This milestone on the third OFSV follows two other significant events that occurred in the last five months, including the launch of the second OFSV, the future CCGS Capt. Jacques Cartier on June 5 and delivery of the first OFSV, the CCGS Sir John Franklin on June 27. Sir John Franklin, is the first large vessel to be built and delivered under the National Shipbuilding Strategy. She is now undergoing Crew Training and Sea Readiness activities with her crew in advance of full operational deployment in early December.

MacArtney to Supply Swedish Research Ship

Deployment of MacArtney TRIAXUS for vertical profiling.

Images: MacArtney

After a successful Sea Acceptance Test in the North Sea, MacArtney has signed off on an integrated system solution for the new research vessel, the R/V Svea.

Working with the Swedish University of Agricultural Sciences (SLU) since 2009, MacArtney has provided a range of technology, from camera and light systems, to more recently, the co-design and upgrade of a Lobster Sledge with fiber optic multiplexer and interfaces.

Now MacArtney has delivered a fully integrated scope of supply including the MacArtney TRIAXUS and FOCUS 2 ROTVs (Remote Operated Towed Vehicles) and a customized CTD (Conductivity, Temperature and Depth) carousel with water sampling and drop-camera system comprising of LUXUS Power LEDs, Laser Pointers and HD Zoom Camera. Operating this integrated system solution is the R/V Svea, a new research and survey vessel built at the Armon shipyard in Vigo, Spain for the Swedish University of Agricultural Sciences (SLU), and the Swedish Meteorological and Hydrological Institute (SMHI), now operating in Skagerrak, Kattegat and the Baltic Sea.

The new research vessel, constructed for a wide range of maritime research and environmental monitoring, will be used by SLU and SMHI to collect scientific data for environmental monitoring, climate research and fishing quotas. The MacArtney package will be utilized to assist in this mission.

Known for its high-speed oceanographic data acquisition work and designed to undulate between 1 and 350m the aft installed TRIAXUS ROTV with lateral offset will enable vertical profiling to be carried out by the R/V Svea in an undisturbed water column. While the bow installed FOCUS 2, acknowledged for its stability in the water, can steadily tow a fully customized sensor package through the Epipelagic Zone.

The custom-designed carousel CTD with water sampling from Seabird and the MacArtney drop-camera system provides detailed profile and series data. Customized with identical hardware to the TRIAXUS and FOCUS 2 ROTVs, the systems are designed for redundancy and easy to maintain during extended expeditions.

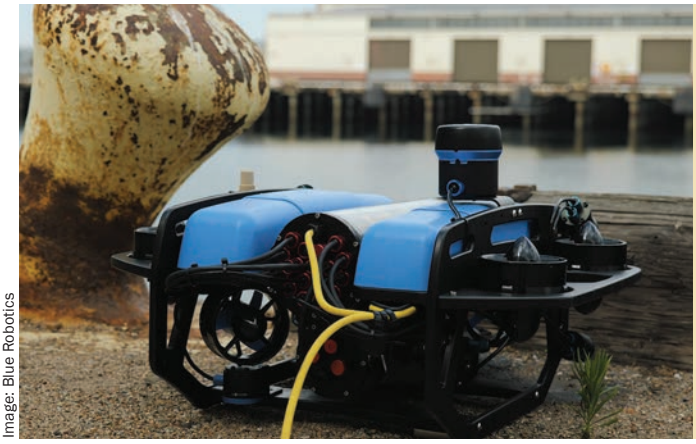

Image: Blue Robotics

Blue Robotics' Ping 360

Blue Robotics announced their newest product, the Ping360 Scanning Sonar, which offers small ROVs the ability to navigate in low visibility water conditions. The sonar achieves a new level of affordability, priced at $1,975. The Ping360 is available immediately from Blue Robotics and distributors. The Ping360 is a mechanical scanning sonar – it uses a small acoustic transducer mounted on a motor that rotates it in one-degree increments. As it rotates, it transmits and receives acoustic pulses to build a 360-degree image of the surroundings.

www.bluerobotics.com

Valeport Sensor Tech for Freedom ROV/AUV

Valeport sensor technology was selected by Oceaneering for integration into its subsea Freedom vehicles. Freedom will be fitted with Valeport Bathypack, Altimeter and Hyperion Fluorometer sensors. Valeport, worked closely with Oceaneering's engineering team to meet challenges in communication and connector requirements. The sensors in the Midas Bathypack were ethernet enabled to offer precision sound velocity, conductivity, temperature, depth and altimeter data, which is used to enhance the operational capability of the Freedom resident vehicle.

www.valeport.co.uk

Image: Valeport

3D Models of WWII Sub

Images: Photo courtesy of Viewport3

Viewport3 have been collaborating with explorer Tim Taylor to process underwater 3D scans on the bow and stern of a U.S. submarine which was lost in 1942. Taylor, CEO, Tiburon Subsea Services, sought solutions for his 'Lost 52 Project,' which mapped and filmed the site of the USS Grunion at the end of last year. The team located the missing bow section a quarter of a mile away 300 feet above the main wreckage, off the island of Kiska, Alaska. The discovery completes the mission undertaken by the sons of the submarine's captain – Mannert L. Abele 12 years ago. As an aid to the understanding the submarine's last moments, Viewport3 'fused' the 3D data with the high intensity side scan sonar provided by the customer, showing the relative locations of both parts and surprisingly, the slide made by the stern as it slid down the side of an underwater mountain.

USS Grunion (SS-216) was a Gato-class submarine commissioned on April 11, 1942. On her way through the Caribbean to her first posting in Pearl Harbor she rescued 16 survivors from USAT Jack, which had been torpedoed by a U-boat. Her first war patrol was, unfortunately, also her last. Sent to the Aleutian Islands in June 1942, she operated off Kiska, Alaska, where she sank two Japanese patrol boats. Ordered back to the naval operating base in Dutch Harbor, Alaska, on July 30, the submarine was never heard from again. She was declared overdue from patrol and assumed lost with all hands, on October 5, 1942. Viewport3 have been working with Mr. Taylor to process and develop technical-grade 3D data-sets of the USS Grunion's bow for use in virtual and augmented reality outreach, educational programs and applications. Viewport3 specialize in providing underwater photogrammetry services, using ROV or diver mounted cameras to obtain highly accurate point-cloud data, which can then be measured, compared, assessed, exported and in this instance, to educate.

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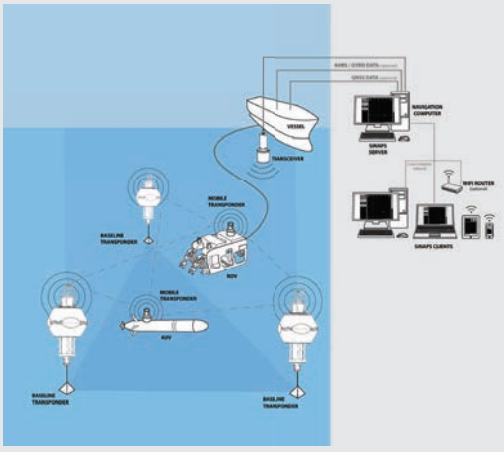

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