

**SEPTEMBER
2017**

ON&T
Ocean News & Technology
www.oceannews.com

SPACE: Finland's New Frontier

Feature Story - Page 10





No Compromise

RELIABILITY

VideoRay ROVs are the overwhelming choice of underwater professionals throughout the world for observation-class ROVs. From the interior of nuclear power plants, to the open ocean, more than 3,700 VideoRays are trusted by users just like you in demanding and hazardous missions. Reliability is often the most important factor when selecting a ROV system. Don't compromise with less expensive alternatives – understand what you are paying, and your costs when it doesn't work.

www.videoray.com



212 East High Street, Pottstown Pennsylvania USA | PHONE: +1 (610) 458-3000 | EMAIL: sales@videoray.com

© Copyright 2016, VideoRay LLC The Global Leader In MicroROV Technology

VideoRay® is a registered trademark of VideoRay LLC



Take a deep breath.

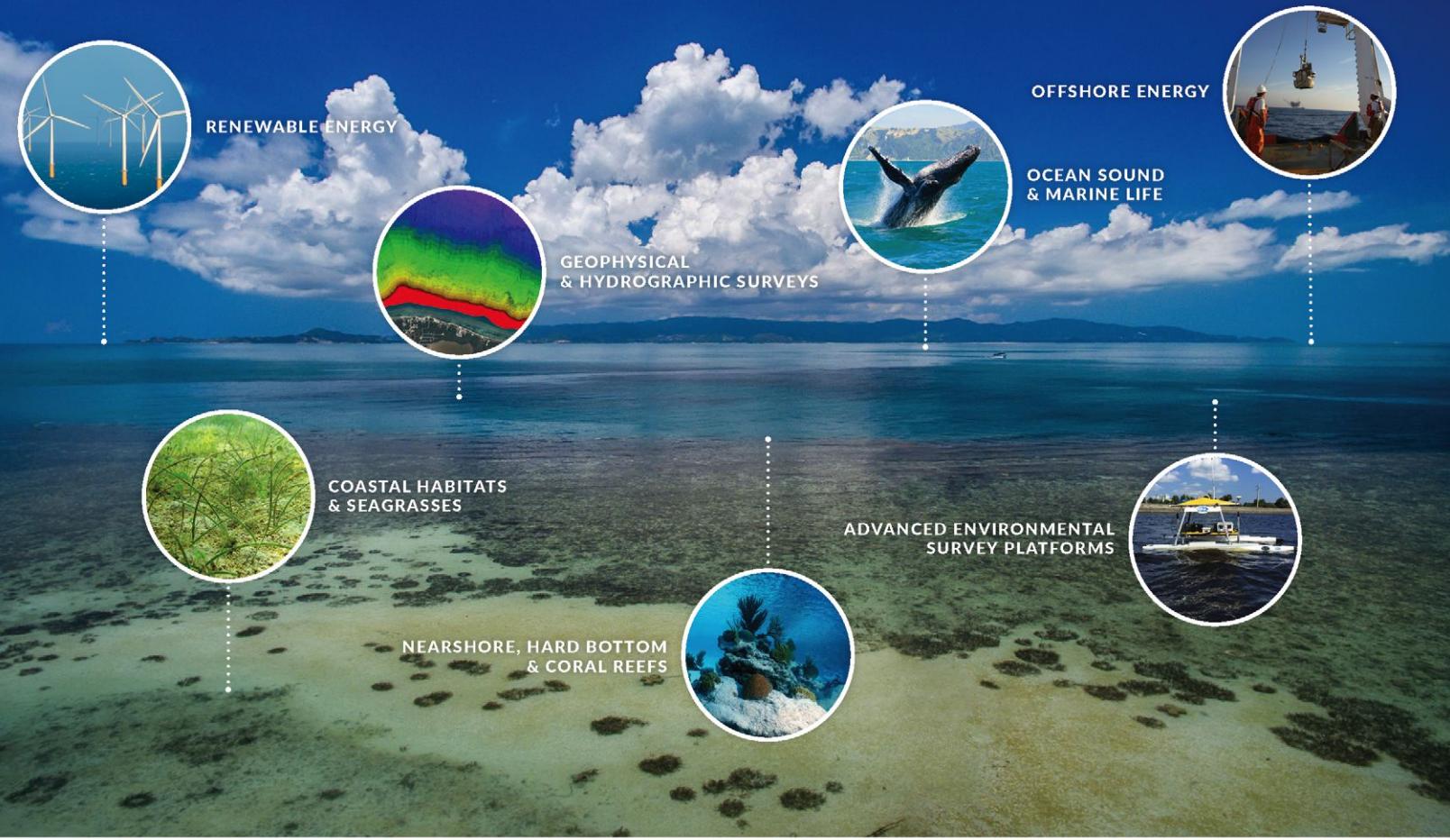
Built for exceptional oxygen stability, the RBRcoda ODO saves on energy, with a power consumption 75% less than other optodes. An oxygen measurement you can relax about.



RBR

rbr-global.com

Reliable technical performance, unbiased analyses, and scientific integrity.



Managing the environmental impact of marine activities around the world.

EIA, EIS, ESHIA, EMP / Permitting Services / EBS & Drill Surveys / Oil Spill Response (MESSR, STEP)

Beach Restoration & Nourishment / Habitat Mitigation, Damage & Risk Assessments

Coral, Seagrass, Oyster & Mangrove Services / Habitat Surveys & Mapping / Physical Sampling (Sediment, Water, Biological)

Hydrographic & Geophysical Surveys / Metocean & Current Studies / Acoustic Monitoring & Modeling

Sound Mitigation (PSO, MMO, PAM) / Environmental Data Geospatial Services (EDGS) / Library & Document Services



I FIND
WRECKS.
I SOLVE
MYSTERIES.
I AM
REMUS



HYDROID
A KONGSBERG COMPANY

Intelligent Marine Robots You Can Rely On

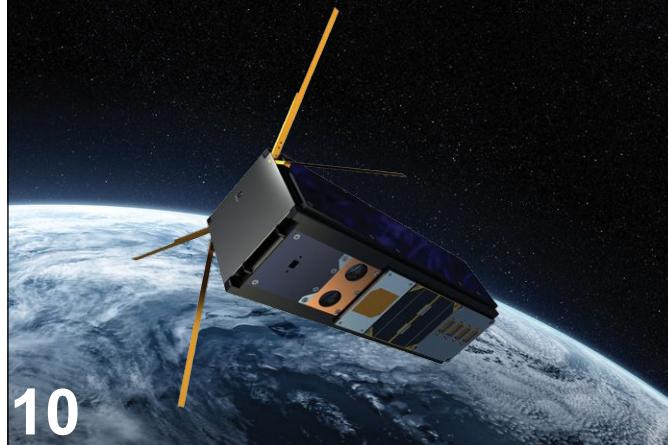
OUR REMUS VEHICLES

work for you to complete your mission –autonomously–whether solving underwater mysteries, performing site investigations or studying the ocean floor.

To learn more, visit **HYDROID.COM/IAMREMUS**

CONTENTS

FEATURE STORY



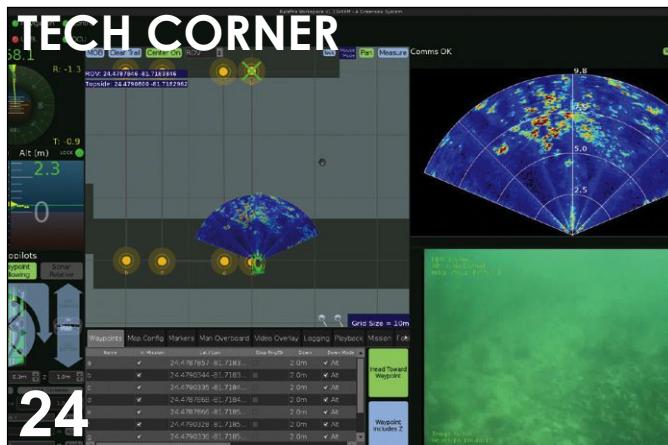
10

Space: Finland's New Frontier



14

Shifting Storms to Bring Extreme Waves



Small Vehicle Supervised Autonomy:
How a SWaP-C Optimized INS Makes it all
Possible



26

Aquaterra Energy Signs Investment Deal
with EV

DEPARTMENTS

- 14 Ocean Science & Technology
- 26 Offshore Energy
- 38 Subsea Intervention & Survey
- 50 Communication & Subsea Cables
- 56 Defense

IN EVERY ISSUE

- 8 Editorial
- 60 Offshore Stats and Data
- 64 Events
- 68 Milestones
- 70 Ocean Industry Directory



Phoenix International Holdings, Inc.



Sea-Bird's Inductive Modem System



JW Fishers' Right Tool for the Job



Geometrics: Geophysical Instruments



The OceanCubes Project



CS Recorder Completes Cable Reburial Project in 3 Weeks



Electromagnetic Weapon
Primed for Operational
Demos



About the Cover

The SeaTwirl floating wind turbine uses a vertical axis wind turbine with a tower placed on an underwater buoyancy element and keel structure. For more, visit seatwirl.com.

EDITORIAL



Paul K. Matthias

Senior Program Manager,

Woods Hole Oceanographic Institution

ON&T

Editor

Rhonda Moniz

News Editor

John Manock

UK Correspondent

Kira Coley

Art Director/Production Coordinator

Suzanne Short

Copy Editor

Robyn Bryant

Newsletter Editor

Inger Peterson

Web News Coordinator

Whitney Schwerin

Circulation

Jessica Lewis

Jlewis@tscpublishing.com

ADVERTISING SALES

Lisa Chilik

Tel: 574-261-4215

Lchilik@tscpublishing.com

Mimi Shipman

Tel: +44 (0) 777 6017 564

mshipman@tscpublishing.com

Meagan Kohls

Tel: 985-519-0583

mkohls@tscstrategic.com

ADVISORY BOARD

Philippe Pierre Cousteau
Washington, D.C.

Dr. Phil Hart

Halifax, Canada

Drew Michel

Pierre Part, Louisiana

TO SUBSCRIBE

www.oceannews.com/subscribe

PUBLISHED BY

Technology Systems Corp.
Patrick C. Lagrange, CEO

Greg Leatherman, Managing Editor
of TSC Publications

Ocean News & Technology ISSN# 1082-6106 is published 12 times a year by Technology Systems Corporation, 7897 SW Jack James Dr., Suite A, Stuart, FL 34997, telephone 772-221-7720. Copyright ©2017 Technology Systems Corp. All rights to editorial content are reserved. No article, photograph, or illustration may be reproduced in whole or part without the written permission of the publisher. Unless otherwise stated in writing by the contributor, all images submitted to TSC may be used in other promotional materials belonging to TSC without permission. Subscriptions are free to qualified individuals or companies. For all others, call TSC for subscription information.
Printed in the USA.



The Future of Ocean Observatories

Ocean observatories consisting of anchored, cabled, and/or free-swimming instrumented platforms are transforming ocean science while contributing to societal awareness of the environment. Unlike ship-based data collection and finite-duration mooring-based process studies, ocean observatories can operate 24/7/365 in the harshest ocean environments on Earth, providing an abundance of continuous, long-term, real-time and near real-time multidisciplinary measurements of the physical, chemical, biological, and geological ocean realms. These measurements support scientific discovery, marine operations, fishing and aquaculture, environmental studies, ocean policy, and defense.

The Western Channel Observatory, off the coast of Plymouth (UK), is one of the oldest ocean observatories—monitoring the marine environment continuously since its launch in 1888. Since the 1960s and the advent of ocean observing satellites, ocean observatory measurements have been complemented by large-scale remote sensing measurements of the ocean surface captured from space. Since the 1980s, many ocean observatories have been deployed around the globe, including, among others, the Argo Global Profiling Float Array; the Irish Sea Coastal Observatory; the TASMAN coastal monitoring platform off New Zealand; the Monterey Accelerated Research System (MARS) in Monterey Bay, California; Neptune Canada on the Juan De Fuca Ridge; the Triangle Trans-Ocean Buoy Network (TAO/TRITON) in the western Pacific; the Martha's Vineyard Coastal Observatory (MVCO); and the Integrated Ocean Observing System (IOOS) of distributed observing systems.

In 2015, the Ocean Observatories Initiative (OOI), funded by the National Science Foundation with over 800 oceanographic instruments distributed across seven arrays, was commissioned, providing an abundance of freely available, multidisciplinary ocean data. Planned for a 25-year operational lifetime, the OOI has thus far collected and is serving over four years of continuous ocean measurements from an assortment of vehicles and moorings positioned in the high latitudes of the Atlantic and Pacific Oceans and off the east and west coasts of the U.S.

Future ocean observatories will leverage ocean and computer engineering, including evolving artificial intelligence, robotics, and battery technology. Within a decade, vehicle docking, recharging, and data download will be well-established. Higher bandwidth telemetry will support higher resolution data, more instruments, and greater observational complexity. Evolving battery technology will enable longer deployment intervals, reducing operational cost. Computing technology and artificial intelligence will supply advanced data processing and the creation and display of new “virtual” products, interactive models, and intuitive displays of collocated measurements in new ways. Cyber infrastructure will support correlation of regional historical data with contemporary measurements, two-way integration of observing assets with assimilative ocean models, robust two-way command and control that would evolve into machine-to-machine control, and the creation of higher level ocean and atmosphere models.

There is a not-too-distant future where instrumented vehicles and platforms communicate among themselves and self-organize to optimize their configurations and instrument sampling strategies in order to best capture emerging oceanographic phenomena. We will do this by building on technology advances already well underway and delivering fully autonomous, cost-effective, multidisciplinary, instrumented arrays that continue to significantly broaden our knowledge of the blue planet.



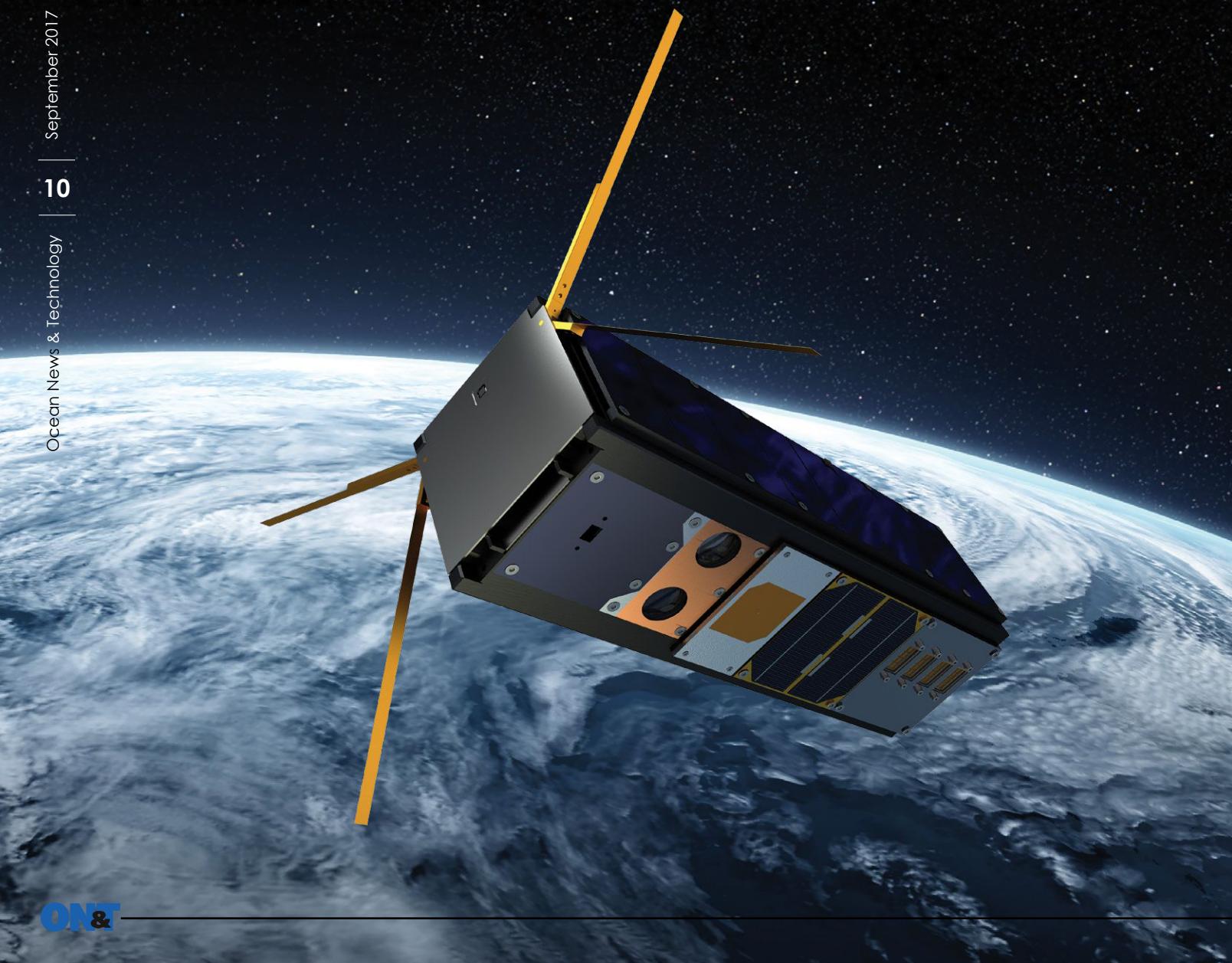
Plant one on every asset.

The NOVATECH™ iSurface beacon.
A new Iridium® location and recovery
surface beacon designed to withstand
harsh marine environments.

metOcean[®]
telematics

FEATURE STORY

SPACE: FINLAND'S NEW FRONTIER



September 2017

10

Ocean News & Technology

As the initiator of several technological revolutions, including the mobile phone and wireless wearable technology, Finland and high-tech go hand in hand. Now, they have their sights set on revolutionizing a new technological frontier—space. On 18 April 2017, history was made as Aalto-2 became the first Finnish built satellite to be launched into space from Cape Canaveral, Florida. Then on 23 June 2017, Finland's Aalto-1 carried the world's smallest Hyperspectral imager into space on the Polar Satellite Launch Vehicle sent up by the Indian Space Research Organization. The Aalto-1 and Aalto-2 missions have ignited the rise of astropreneurship and the establishment of a NewSpace sector in Finland. Independent space companies, the first space law, and a Finnish space program are set to reshape traditional technologies, develop faster and cheaper access to space than ever before, and advance earth observations far beyond today's satellite capabilities.

Invented at California State Polytechnic University and Stanford University at the turn of the century, CubeSats have made space missions affordable for university departments and small independent companies. For Aalto University, CubeSat technology enabled their students to make history by building the satellites for the first-ever Finnish space mission. The first satellite, Aalto-1, had two initial goals: 1) a technology demonstration of the state-of-the-art payload and 2) serve as a learning curve in the operation and management of space missions for future launches.

By: Kira Coley, ON&T UK Correspondent

FEATURE STORY

Antti Kestilä, head of the Aalto-1 mission operations at Aalto University, explains: "Aalto-1's mission was first of all educational—we wanted to teach, and learn ourselves, how to start and design from scratch, manage, build, and operate a complete space mission. Thus, besides the actual satellite, we have our own ground station as well. We did not have much experience of this kind of project before, and never in the past has this kind of 'complete' mission been done in Finland."

At the start of the project, Aalto University contacted several other Finnish institutions interested in contributing a payload to the mission. The Technical Research Centre of Finland (VTT) provided the hyperspectral imager camera, Helsinki University and Turku University together built the radiation monitor, and the Finnish Meteorological Institute created the more exotic plasma brake—a modified concept based on the principle of an electric solar sail aimed at reducing the amount of space debris.

"The Aalto-1 is a fairly complex satellite with its three main payloads. If everything works well in the long term, a science campaign is planned with the hyperspectral imager and radiation monitor," said Kestilä. "We built most of the satellite bus system and the ground station in-house with a student workforce that was sometimes volatile in terms of dedication. Throughout its duration, the project included almost a hundred people."

The launch was initially scheduled with SpaceX's Falcon 9 at the end of 2015. On two separate incidents, the Falcon 9 rockets exploded, causing a launch delay by over 1.5 years. In the end, it was changed to the Indian PSLV, which launched the Aalto-1 along with 30 other small satellites this past June.

World's Smallest Hyperspectral Camera

While traditional cameras measure three colors, hyperspectral cameras can measure dozens of freely selected narrow color channels. The measurement wavelengths are also software programmable—the same camera hardware can be easily scaled to different applications, even after launch. For this reason, it can be utilized for a range of earth observation missions such as algae monitoring, water pollution, and vegetation health.

The potential for hyperspectral imaging to progress ocean and coastal science has been recognized for many years. In 2009, NASA launched the HREP-HICO experimental payload into space, providing scientists with an exceptional new view of the coastal ocean and the Great Lakes.

In 2022-23, the NASA satellite mission PACE (Plankton, Aerosols, Cloud, ocean Ecosystems) aims to deliver the most comprehensive look at global ocean color measurements in NASA's history. But, the hyperspectral imager on board Aalto-1 could make it easier than ever before.

Traditional cameras weigh around 100 kg, but the hyperspectral imaging camera built by VTT for remote sensing weighs just 600 g. "VTT's hyperspectral camera uses novel Fabry-Perot based sensor technology that enables us to miniaturize it without losing much performance. It can even image up to 60 separate spectral channels at one time, creating very high-contrast images. There have been several hyperspectral imagers in past missions, but none this small," explains Kestilä, who was part of the team that created the system for Aalto-1 as well as for the PICASSO and the upcoming Reaktor Hello World nanosatellite missions.



Antti Kestilä (right) and Tuomas Tikka (left) preparing Aalto-1 satellite for thermal vacuum tests. Photo credit: Antti Näsilä.

"The imager could pick out things like seaweed growth in a sea, metal in a forest, etc.—stuff that separate-channeled imaging enables. This imager is the first of its kind, so it can only image an area roughly 150 km² [in size] with an approximately 100-m resolution, but future ones can be improved significantly in spatial performance."

In July this year, the team downloaded the first image sent by Aalto-1, which is also the first ever image taken from a Finnish satellite. It was taken while orbiting over Norway at an altitude of about 500 km and shows the Danish coast as well as some of the Norwegian coastline.

Also onboard is the radiation monitor. RADMON is a technology derivative from the Bepi-Colombo ESA mission to Mercury. The Aalto-1 team aims to measure radiation in a selected energy spectrum, studying the radiation environment in low Earth orbit (LEO). The South Atlantic Anomaly—an area over the south Atlantic that affects aircraft and satellites due to the Van Allen Radiation Belts—is one such target phenomenon they will be studying.

"The RADMON is a tech demo as well. If it works, the South Atlantic Anomaly is a good way to show this. In a later science campaign, it'll have other phenomena that it can hopefully be able to detect, and maybe even reveal new and interesting properties about them and, for example, how space weather driven by the sun affects them," said Kestilä.

"If everything works as expected, we'll try to do a science campaign with images of selected parts of the planet and chart large portions of the LEO radiation environment. After maybe six months to one year, we then intend to significantly change the satellite attitude so that we can start with the plasma brake mission—this requires the satellite to be pointed in a different orientation to that required by the spectral imager and RADMON."

The Launch of Finland's Space Industry

Finnish scientists are not new to space technology. In fact, there are already over 300 Finnish employees in 60 companies in the space systems and applications industry. Finland has also contributed to almost every major European Space Agency (ESA) mission to date, demonstrating their abilities in producing complex, compact, and superior space technology. Now, the emerging trend towards nano- and microsatellites perfectly align with Finland's unique position—they will no longer just contribute, but build their own space empire.

From the Aalto-1 project, two spin-off companies have been formed with plans to launch their first small satellites within the next year. The students who built Aalto-2 now work at Reaktor Space Lab, a start-up company that designs, manufactures, and tests small satellites.

Smaller satellite platforms and sensors will allow one

rocket launch to carry dozens of satellites, significantly reducing launch costs and opening the sector to more independent companies and individual departments. With more players in the industry, the next decade will likely be an exciting one for space industries. We could see a boom in technological advancements across the sector and witness the swift expansion of capabilities beyond today's reach.

Furthermore, small satellites can form large constellations, extending the data network and information infrastructure to remote areas such as the Arctic Ocean. Finland's space strategy highlights an interest in projects that will respond to the Arctic's growing demands, such as accurate navigational data for vessels, or changes in natural conditions, such as the melting of glaciers and permafrost.

Aalto University is launching another CubeSat, the Finland 100-satellite, later this year. The satellite sports a wide-field white light ("normal") camera and a low-frequency (1 to 10 MHz) radio payload with which it can record a range of "natural" radio-signal emitting phenomena, such as the northern lights. Notably, the satellite was also partly 3D-printed, which is rapidly growing in popularity in the space community.

Kestilä comments: "After the delays to the Aalto-1 mission, we are very delighted and somewhat relieved to launch and have it operating as intended. For Finnish space efforts and technology, finally launching Aalto-1 and getting its first image down was a historical event. And it has been a tremendous experience to be a part of it! I've now been part of a complex space project from the start, giving valuable insight into such types of missions and the challenges we face. These missions are a culmination of years of work, learning, and waiting. It also gave validation to the efforts of the hundreds of people who took part, helping us and the Finnish space industry continue with newer and braver projects."

Professor Jaan Praks, project director and co-founder of Reaktor Space Lab, added: "These small satellites have started a new and exciting space era in Finland. The young CubeSat generation has brought innovation and new strategies to the commercial sector and, at the same time, the Finnish scientific space program is emerging. The newly founded Center of Excellence on Sustainable Space—uniting [the] University of Helsinki, Aalto University, University of Turku, and [the] Finnish Meteorological Institute—is planning a series of CubeSat missions and technology development in the coming years. Now, space is more accessible and popular in Finland than ever before."

Acknowledgements

Antti Kestilä, head of the Aalto-1 mission operations at Aalto University.

Professor Jaan Praks, Aalto project director at Aalto University and co-founder of Reaktor Space Lab.

Shifting Storms to Bring Extreme Waves

The world's most extensive study of a major storm front striking the coast has revealed a previously unrecognized danger from climate change; as storm patterns fluctuate, waterfront areas once thought safe are likely to be hammered and damaged as never before.

The study, led by engineers at University of New South Wales (UNSW) in Sydney, was published in the latest issue of the journal *Nature Scientific Reports*.

"If you have waterfront property or infrastructure that has previously been sheltered from the impacts of extreme waves, this is worrying news," said Mitchell Harley, lead author and a senior research associate at UNSW's Water Research Laboratory (WRL). "What this study confirms, is that simply by changing direction, storms can be many times more devastating. And that's what we're facing in many locations as the climate continues to change."

Ian Turner, director of WRL and a co-author, said sea level rise was no longer the only factor at play when preparing for the impact of climate change on waterfront areas. "Shifts in storm patterns and wave direction will also have major consequences because they distort and amplify the natural variability of coastal patterns."

14

Ocean News & Technology

The study relied on data collected during the June 2016 "superstorm" that battered eastern Australia. One of the fiercest in decades, it inundated towns, smashed buildings, swept away cars and infrastructure, and triggered hundreds of evacuations across a 3,000-km swath from Queensland in the north all the way to Tasmania in the south. Three people died and there were more than 80 rescues from stranded cars.

A week before the storm hit and for many weeks afterwards, researchers used a fleet of drones, floating sensor buoys, aircraft fitted with LiDAR laser ranging sensors, fixed cameras on buildings and quad bikes, and jet skis fitted with real-time satellite positioning across a 200-km swathe of the eastern seaboard. This produced the largest and most detailed pre- and post-storm coastline analysis ever done.

They found that 11.5 million cubic meters of sand were eroded from beaches across a 200-km stretch of Australia's eastern seaboard in just the three days of the storm—the equivalent of filling the Melbourne Cricket Ground (capacity 100,000 people) to the brim with sand more than seven times.

This was similar to the amount of sand shifted on the U.S. east coast by Hurricane Sandy in 2012, the largest Atlantic hurricane on record, which killed 233 people and caused US\$75 billion in damage.

It is the damaging power of wave energy—and the disruption of long-established storm patterns due to climate

change—that present a new danger. The June 2016 "superstorm" that devastated Australia's east coast was only moderately intense, equivalent to a 1-in-5 year event; however, it did hit from the highly unusual easterly direction.

"And that's what's really worrying," said Turner. "The damage we saw from a moderately intense storm last year is a harbinger of what's to come." "Climate change is not only raising the oceans and threatening foreshores, but making our coastlines much more vulnerable as the direction of incoming storms change."

"We need to be prepared," he added. "Not just for the fact that what we consider as 'king tides' will be the norm within decades, but that the storms that strike the coast will come from unexpected directions, damaging coastal areas and infrastructure once thought safe from storm damage."

Previous studies have estimated that sea level rise from climate change—of between 40 cm and 1 m over the next century—could put \$226 billion of infrastructure at risk in Australia alone. This includes road and rail, commercial and residential buildings, and even light industrial buildings. But also threatened are 75 hospitals and health centers; 258 police, fire, and ambulance stations; five power stations, and 41 waste disposal facilities.

"When it comes to severe weather, a lot of the attention is paid to tropical storms like cyclones and hurricanes," said Harley. "But this data highlights the amount of coastal damage that can occur with east-coast lows in Australia. Despite creating near hurricane-force winds, intense rain, and large ocean waves of up to 9 m, they are less worrisome to many people."

Narrabeen Beach in Sydney experienced the most erosion seen in 40 years of monitoring—and 36% greater than the second-most erosive event in May 1997. But it was not the worst affected. "Although a swimming pool at Narrabeen became the iconic image of the June 2016 storm, the greatest erosion was actually seen at Nine Mile Beach, an unpopulated area just north of Forster," added Harley. "And that was due to a localised focusing of wave energy."

Coupled with a vast bank of data collected over the past 40 years at Narrabeen-Collaroy beaches—one of the world's longest-running beach erosion monitoring programs—coastal engineers now have enough information to build models that can accurately predict the damage storms would do days before an event.

It would also provide a crucial insight into how climate change will interact with the long cycles of El Niño and La Niña and predict coastal vulnerability from sea level rise and changing storm patterns in the decades ahead,



UNSW's WRL team with some of their survey gear. Left to right: Kristen Splinter, Christopher Drummond, Mitchell Harley, and Ian Turner.

explained senior lecturer Kristen Splinter, an engineer and modelling specialist at WRL who deep-dives into the data to build predictive tools.

And this is true not just for Australia, but for the world. "With this data, we can now construct accurate coastal erosion models to predict damage days before a storm hits," said Splinter. "It will also be pivotal in understanding the future effect of climate change on coastal variability around the world."

Turner agreed: "This isn't just about protecting beaches. Billions of dollars' worth of city infrastructure around the world is threatened by coastal erosion: buildings, roads, power and water utility corridors, sewerage lines—and this will only worsen as sea levels rise, causing storm tides to do more damage and reach deeper inland."

The WRL team collected the reams of data with the help of staff from the New South Wales Office of Environment and Heritage and worked with UNSW's School of Aviation. Other authors were Kristen Splinter, Matthew Phillips and Joshua Simmons from WRL; Michael Kinsela and David Hanslow from the Office of Environment and Heritage; the School of Aviation's Jason Middleton and Peter Mumford; and Andrew Short from the University of Sydney.

For more information, visit www.wrl.unsw.edu.au.

**IN SITU
SEAWATER DENSITY
MEASUREMENT**

NOSS SENSOR

Density

Absolute salinity

Refractive index

Pressure

Temperature

POSSIBLE USE

*Embedding on CTD probes,
buoys,
profiling floats,
AUV,
gliders...*

nke
INSTRUMENTATION

www.nke-instrumentation.com

New Images from Under Alaska Seafloor Suggest High Tsunami Danger

Scientists probing under the seafloor off Alaska have mapped a geologic structure that they say signals potential for a major tsunami in an area that normally would be considered benign. They say the feature closely resembles one that produced the 2011 Tohoku tsunami off Japan, killing some 20,000 people and melting down three nuclear reactors. Such structures may lurk unrecognized in other areas of the world, say the scientists. The findings will be published in the August 2017 print edition of the journal *Nature Geoscience*.

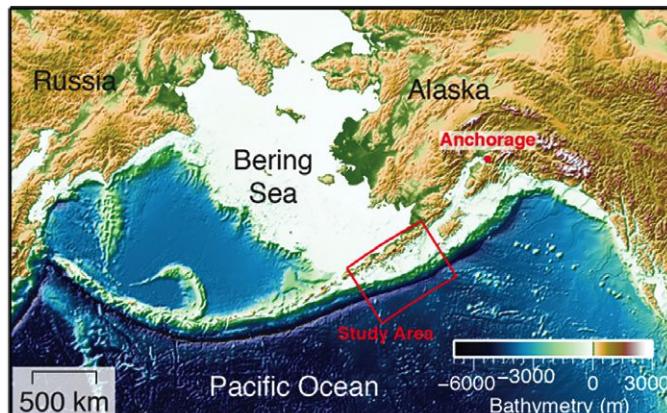
The discovery “suggests this part of Alaska is particularly prone to tsunami generation,” said seismologist Anne Bécel of Columbia University’s Lamont-Doherty Earth Observatory, who led the study. “The possibility that such features are widespread is of global significance.” In addition to Alaska, she said, waves could hit more southerly North American coasts, Hawaii, and other parts of the Pacific.

Tsunamis can occur as giant plates of ocean crust dive under adjoining continental crust, a process called subduction. Some plates get stuck for decades or centuries and tension builds until they suddenly slip by each other. This produces a big earthquake, and the ocean floor may jump up or down like a released spring. That motion transfers to the overlying water, creating a surface wave.

The 2011 Japan tsunami was a surprise because it came partly on a “creeping” segment of seafloor, where the plates move steadily, releasing tension in frequent small quakes that should prevent a big one from building. But researchers are now recognizing it may not always work that way. Off Japan, part of the leading edge of the overriding continental plate had become somewhat detached from the main mass. When a relatively modest quake dislodged this detached wedge, it jumped, unleashing a wave that topped 130 ft in places. The telltale sign of danger, in retrospect: a fault in the seafloor that demarcated the detached section’s boundary landward of the “trench,” the zone where the two plates initially meet. The fault had been known to exist, but no one had understood what it meant.

The researchers in the new study have now mapped a similar system in the Shumagin Gap, a creeping subduction zone near the end of the Alaska Peninsula some 600 mi from Anchorage. The segment is part of a subduction arc spanning the peninsula and the Aleutian Islands. Sailing on a specially equipped research vessel, the scientists used relatively new technology to penetrate deep into the seafloor with powerful sound pulses. By reading the echoes, they created CAT-scan-like maps of both the surface and what is underneath. The newly mapped fault lies between the trench and the coast, stretching perhaps 90 mi underwater, more or less parallel to land.

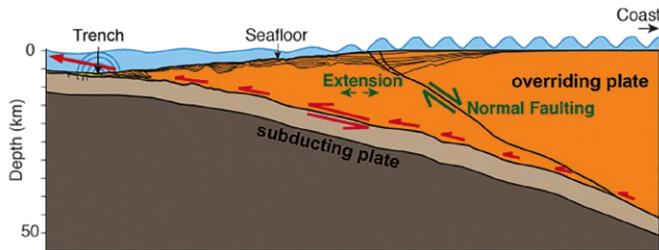
On the seafloor, it is marked by scarps about 15 ft high, indicating that the floor has dropped one side and risen on the other. The fault extends down more than 20 mi, all the way to where the two plates are moving against each other. The team also analyzed small earthquakes in the region and found a cluster of seismicity where the newly identified fault meets the plate boundary. This, they say, confirms that the fault may be active. Earthquake patterns also suggest that frictional properties on the seaward side of the fault differ from those on the landward side. These differences may have created the fault, slowly tearing the region off the main mass, or the fault may be the remains of a past sudden movement. Either way, it signals danger, said coauthor Donna Shillington, a Lamont-Doherty seismologist.



*The discovery was made around the western end of the Alaska Peninsula and the eastern Aleutian Islands.
Image credit: Anne Bécel.*

“With that big fault there, that outer part of the plate could move independently and make a tsunami a lot more effective,” said Shillington. “You get a lot more vertical motion if the part that moves is close to the seafloor surface.” A rough analogy: imagine snapping off a small piece of a dinner plate, laying the two pieces together on a table and pounding the table from below; the smaller piece will probably jump higher than if the plate were whole, because there is less holding it down.

Other parts of the Aleutian subduction zone are already known to be dangerous. A 1946 quake and tsunami originating further west killed more than 160 people, most in Hawaii. In 1964, an offshore quake killed around 140 people with landslides and tsunamis, mainly in Alaska; 19 people died in Oregon and California, and waves were detected as far off as Papua New Guinea and even Antarctica. In July 2017, an offshore quake near the western tip of the Aleutians triggered a Pacific-wide tsunami warning, but luckily it produced just a 6-in. local wave.



A tsunami can occur as ocean crust (brown area) dives under continental crust (orange), causing the ocean floor to suddenly move. In a region off Alaska, researchers have found a large fault and other evidence indicating that the leading edge of the continental crust has split off, creating a tsunami-prone area where the floor can move more efficiently.

Image credit: Anne Becel.

As for the Shumagin Gap, in 1788, Russian colonists then living on nearby Unga Island recorded a great quake and tsunami that wiped out coastal structures and killed many native Aleut people. The researchers say it may have originated at the Shumagin Gap, but there is no way to be sure. Rob Witter, a geologist with the U.S. Geological Survey (USGS), has scoured area coastlines for evidence of such a tsunami, but so far evidence has eluded him, he said. The potential danger "remains a puzzle here," he said. "We know so little about the hazards of subduction zones. Every little bit of new information we can glean about how they work is valuable, including the findings in this new paper."

The authors say that apart from Japan, such a fault structure has been well documented only off Russia's Kuril Islands, east of the Aleutians. But, Shillington said, "We don't have images from many places. If we were to look around the world, we would probably see a lot more." John Miller, a retired USGS scientist who has studied the Aleutians, said that his own work suggests other segments of the arc have other threatening features that resemble both those in the Shumagin and off Japan. "The dangers of areas like these are just now being widely recognized," he said.

Lamont seismologists have been studying earthquakes in the Aleutians since the 1960s, but early studies were conducted mainly on land. In the 1980s, the USGS collected the same type of data used in the new study, but seismic equipment now able to produce far more detailed images deep under the sea floor made this latest discovery possible, said Bécel. She and others conducted the imaging survey aboard the Marcus G. Langseth, the U.S. flagship vessel for acoustic research. Owned by the U.S. National Science Foundation, it is operated by Lamont-Doherty on behalf the nation's universities and other research institutions. The other coauthors of the study are Spahr Webb, Mladen Nedimovic, and Jiyao Li of Lamont-Doherty; Matthias Delecluse and Pierre-Henri Roche of France's PSL Research University; Geoffrey Abers and Katie Keranen of Cornell University; Demian Saffer of Penn State; and Harold Kuehn of Canada's Dalhousie University.

For more information, visit www.nature.com/ngeo/journal/v10/n8/full/ngeo2990.html.



Total Autonomy



All-in-one acoustic tracking, navigation and communications for small AUVs

Small AUVs need small instruments and they don't get much smaller than our new AvTrak 6 Nano OEM. We've managed to combine USBL tracking, support for LBL and bi-directional communications in one easy-to-fit, easy-to-integrate design. A li-ion battery gives you 10 days standby life to help recover your vehicle if lost and it's compatible with all the Sonardyne 6G systems fitted to ships and unmanned systems in use across the oceans. Enhance the mission capabilities of your marine robotic platforms. Search **AvTrak 6 Nano OEM**

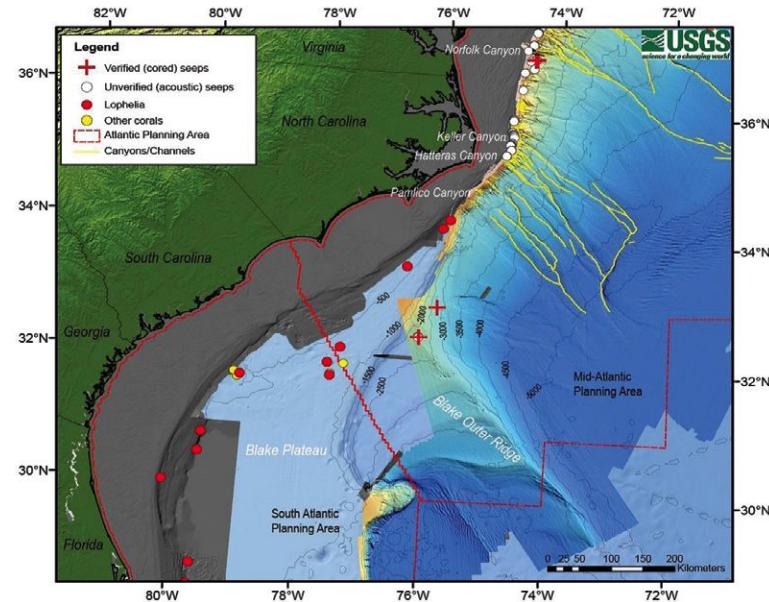
**POSITIONING
NAVIGATION
COMMUNICATION
MONITORING
IMAGING**

TDI-Brooks International Awarded Deepwater Atlantic Habitats II

TDI-Brooks International, Inc. has been awarded the Bureau of Ocean Energy Management (BOEM), National Oceanic and Atmospheric Administration (NOAA) Office of Ocean Exploration and Research (OER), and U.S. Geological Survey (USGS) funded study entitled "Deepwater Atlantic Habitats II: Continued Atlantic Research and Exploration in Deepwater Ecosystems with Focus on Coral, Canyon and Seep Communities."

This interagency five-year, multi-million dollar study will focus on the exploration and investigation of deepwater biological communities located in U.S. federal waters of the northwest Atlantic Ocean, potentially including offshore Virginia, North Carolina, South Carolina, and Georgia. The program focus is on hard substrate habitats, with some work related to soft bottoms and within the water column.

Read more: <http://ont.news/2vFHbKf>



Broad view of study area between Norfolk Canyon and Florida/Georgia border, including bathymetry, gas seep, and deepwater coral locations.

Visit us at SEG in Houston, TX
Booth 2515



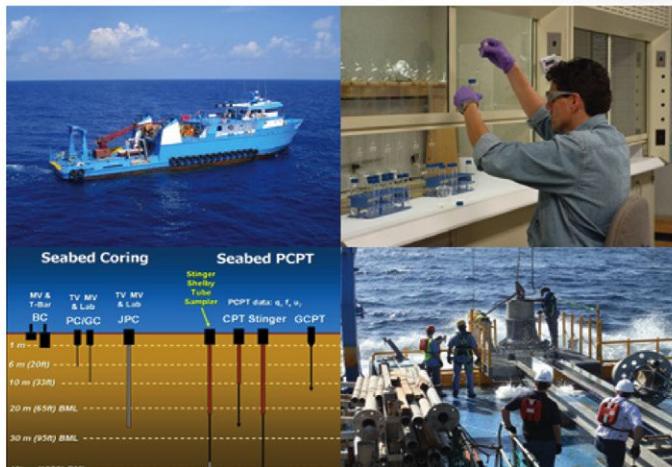
Providing expert scientific services on a global basis

- ✓ Seabed Geochemical Exploration, Interpretation & Analysis
- ✓ Seabed Geotechnical Surveys – Piston/JPC/Box Coring & CPT
- ✓ Seabed Heat Flow Surveys, Seep Hunting & Interpretation
- ✓ Environmental Baseline Surveys
- ✓ Geophysical Survey Services – Hazard/Bathymetry/2D Surveys
- ✓ Environmental Chemistry/ Geotechnical Laboratories
- ✓ Vessel Chartering & Management

Dr. James M. Brooks
President & CEO
jimbrooks@tdi-bi.com

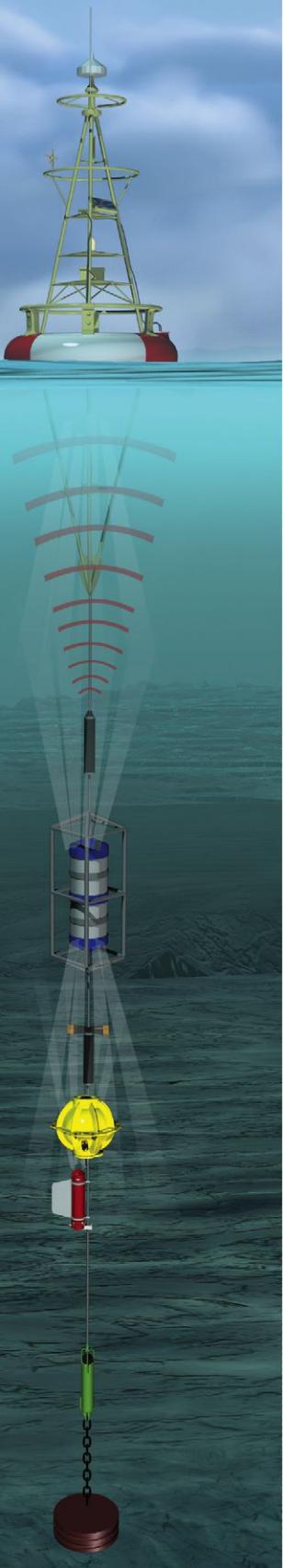
Dr. Bernie B. Bernard
VP/Chief Technology Officer
berniebernard@tdi-bi.com

Melissa Wood
Marketing & Business Development
melissawood@tdi-bi.com



www.tdi-bi.com

14391 South Dowling Road
College Station, Texas 77845, USA



Instrumenting a Mooring?

Teledyne Marine has you covered!

Only Teledyne Marine has the proven, industry-leading instruments you need – *all from a single supplier.*

With Teledyne Marine's new One Team sales structure, customers can now enjoy single point access for all of their mooring instrumentation needs, saving you time and money during your sourcing and procurement process, while providing you with the peace of mind that comes from working with the industry's leading experts in their fields.



Teledyne Benthos **Acoustic Modems** allow for real-time, wireless communications in shallow or deep water environments

Teledyne RDI's **Acoustic Doppler Current Profilers (ADCPs)** deliver highly accurate current data in up to 6000M of water.



Teledyne RDI's **Citadel CTDs** provide accurate Conductivity, Temperature and Depth measurements

Teledyne Benthos **Glass Housings** can house other instrumentation and/or relieve dangerous mooring strain.



Teledyne **Benthos Acoustic Releases** ensure that you get your mooring and critical data back.

IMAGING • INSTRUMENTS • INTERCONNECT • SEISMIC • VEHICLES



**TELEDYNE
MARINE**
Everywhereyoulook™

www.teledynemarine.com/blog/Moorings

'Perfect Storm' Led to 2016 Great Barrier Reef Bleaching

Researchers from James Cook University and the Université Catholique de Louvain, Louvain-la-Neuve, Belgium say unprecedented oceanographic conditions in 2016 produced the perfect storm of factors that led to a mass coral bleaching.

JCU's Professor Eric Wolanski said even in very warm years with a summer El Niño event, such as 1998, there was no massive coral bleaching in the Torres Strait and only small to moderate bleaching in the northern Great Barrier Reef.

"So, the extensive coral bleaching in these areas during the summer of 2016 was an unwelcome surprise," he said.

A 2016 aerial survey of the northern Great Barrier Reef lead by Professor Terry Hughes from JCU's Center of Excellence for Coral Reef Studies showed that 90% of reefs in some of these areas were severely bleached.

Professor Wolanski said satellite data showed the 2016 El Niño heating started in the Gulf of Carpentaria, with patches of water reaching an exceptionally high 34°C.

The water then flowed east onto the Torres Strait reefs and south to the Great Barrier Reef. The "residence time" of the very warm water in the Torres Strait and the Northern Great Barrier Reef was exceptionally long, which increased the thermal stress on the coral.

Read more: <http://ont.news/2vnH74g>



Save your ROV Umbilical from seawater Rust & Corrosion
LUBE WITH SNOKOTE-CL™

In Stock
World-wide Delivery
Can be air freighted



Specially formulated for seawater environment
Environmentally Safe
Non-Toxic . Non-flammable . No VOCs
Long Lasting Protection

FOR EFFECTIVE APPLICATION USE ROVSCO LUBRICATION EQUIPMENT

FOR MORE INFORMATION ON SNOKOTE-CL, LUBRICATION EQUIPMENT & PROCEDURES
VISIT WWW.SNOKOTE.COM, FOR SALES: sales@rovco.com, +1-281-858-6333

ROV SHACKLES
12 Ton TO 450 Ton WLL



**QUICK RELEASE
ROV SHACKLES**

**MOST SIZES IN
READY STOCK**

Worldwide Delivery

Quick Retrieve™
ROV Shackles
Securely Move
Equipment from
Seabed



PATENTED 8230799B2, WORLDWIDE PATENTS PENDING

Rovco, Inc., Houston, Texas, USA
sales@rovco.com, Tel: +1-281-858-6333, www.rovco.com



www.CSnetInternational.com • 321.327.7915



EXPERTS IN **SUBSEA DATA COMMUNICATIONS**

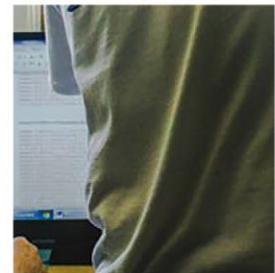
CSnet International provides broadband oceanographic, meteorological, seismological and hydrographic data services worldwide through the use of Ocean Observing Systems.



RELIABLE END-TO-END SOLUTIONS 24/7

CSnet owns and operates the Offshore Communications Backbone that provides researchers, engineers and decision makers in science, government and the marine industry the most complete, accurate, factual and timely data available.

Get CSnet International on your team when you need reliable data streaming in the world's deepest oceans or in the harshest environments.



TYPICAL **PROJECTS SERVED**

- Environmental Assessment and Monitoring
- MetOcean Data Acquisition
- Ocean Observing Systems for Science & Industry
- Tsunami and Seismic Warning Systems
- Pipeline and Infrastructure Monitoring
- In-situ Sensor Evaluations and Sensor Integration



OCEAN SCIENCE & TECHNOLOGY



Maneuvering the Largest Offshore Floating Facility Ever Built

At 488 m in length and longer than four football pitches, Shell's Prelude FLNG facility was always going to represent a formidable challenge, even for the skilled tug masters charged with towing the facility from the shipyard in South Korea where it was constructed and delivering it to its final destination, a remote gas field 475 km off the coast of Western Australia. But practice makes perfect, and HR Wallingford, using its Australia Ship Simulation Centre in Fremantle, Western Australia, created an accurate and detailed navigation simulation of Prelude for Shell, which was used to prepare the tow masters, tug masters, and pilots, allowing them to familiarize themselves with a realistic simulation of Prelude maneuvers at sea.

<http://ont.news/2vOrBvH>

ProSep Announces Major Milestone Achievement for Osorb Media

ProSep has secured a multi-million dollar order for one of its proprietary produced water treatments, Osorb Media. This revolutionary, re-generable, modified organo-silica is used for polishing oilfield water and gas streams. The order is a momentous breakthrough for this technology that has been in a developmental phase for the past seven years. "Very few technologies have been commercially accepted in the Oil & Gas industry in such a short time from discovery to first commercial sale, specifically ones that are in the tertiary and/or polishing treatment stage," said Mahesh Konduru, CEO at ProSep.

<http://ont.news/2upI6La>



September 2017

22

Ocean News & Technology

SHARK
SHARK MARINE
TECHNOLOGIES INC.

BARRACUDA

The Barracuda is a new breed of ROV, designed to work in high current.
Small, Streamlined, Extremely Powerful and loaded
with Advanced Capabilities.

- Lightweight, easy to deploy.
- High Thrust.
- Integrated Total Navigation System (TNS)
Including GPS, DNS,(LBL also available).
- Intelligent Flight with Shark Marine's
"DiveLog Software" Provides:
 - 3D Route Following.
 - Station Keeping.
 - Auto Depth / Altitude.
- Able to run off of a wide range of power supplies.

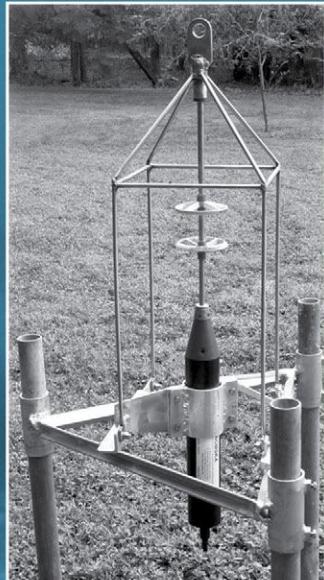


Shark Marine Technologies Inc. www.sharkmarine.com sales@sharkmarine.com Ph: (905) 687 6672

NOBSKA: The Perfect Current Meter

We at **NOBSKA** realize that there isn't a perfect Current Meter. If anyone tells you there is, BEWARE!!!
 The perfect current meter does not exist, but the right one for you may exist.
 This Chart can help you select the right **NOBSKA** Current Meter.

Model	3-D Vel	3-D Compass	3-D Tilt	Battery	RS-232	Memory	Comment
MAVS-5SD	✓	✓	✓		✓		2000 m. Real Time
MAVS-5SL	✓	✓	✓	✓	✓	✓	2000 m. Logging
MAVS-5DD	✓	✓	✓		✓		6000 m. Real Time
MAVS-5DL	✓	✓	✓	✓	✓	✓	6000 m. Logging
MAVS-5WTG	✓	✓	✓	✓	✓	✓	Directional Wave/Tide
★ MAVS-5-90DEG	✓	✓	✓	✓	✓	✓	90 Degree Bent Sensor
★ MAVS-5MMP	✓	✓	✓	✓	✓	✓	Moored Profiler MAVS



OPTIONS

Pressure, Temperature, Conductivity, Turbidity, RS-485, 90 Deg Right Angle Bent Sensor, Power and Comm Box, Mooring Frame, Sensor Guard Cage, Long Cable for Real Time Data Transmission, 1 Gigabyte Logging Memory Option

All **NOBSKA** Current Meters are Single Point Meters and utilize the Differential Travel Time measuring technique. This technique does not require scatterers in the water to make the measurement. A major benefit: you can measure the smallest currents in any kind of water—clear, turbid, fresh or saline. Another benefit is that the circular faired rings support the sensors, keep wake turbulence at a minimum and provide an ideal cosine response. Another major feature is the THROW-AND-GO operation whereby either you or we can preset the MAVS for its deployment schedule in the lab and then simply deploy it at the most convenient time.

Go to www.nobska.net and click on [WhyMAVS.ppt](#) to learn more



NOBSKA
Owned by Scientists - Serving Science

Sales & Marketing: 319 Seasons Dr. • Punta Gorda, FL 33983 • Tel: 941-766-0706 • Fax: 941-766-0707 • Email: dan-schaaf@att.net
Corp. Headquarters: P.O. Box 308, 12 Nobska Circle • Woods Hole, MA 02543 • Tel: 508-548-6450 • Email: awilliams@nobska.net



Don't Miss at OCEANS '17!

Hear Dr. Albert Williams of WHOI present paper on
Multiprocessor "Current Meter" for Deep Ocean Mixing Studies



SMALL VEHICLE SUPERVISED AUTONOMY:

How a SWaP-C Optimized INS Makes it all Possible

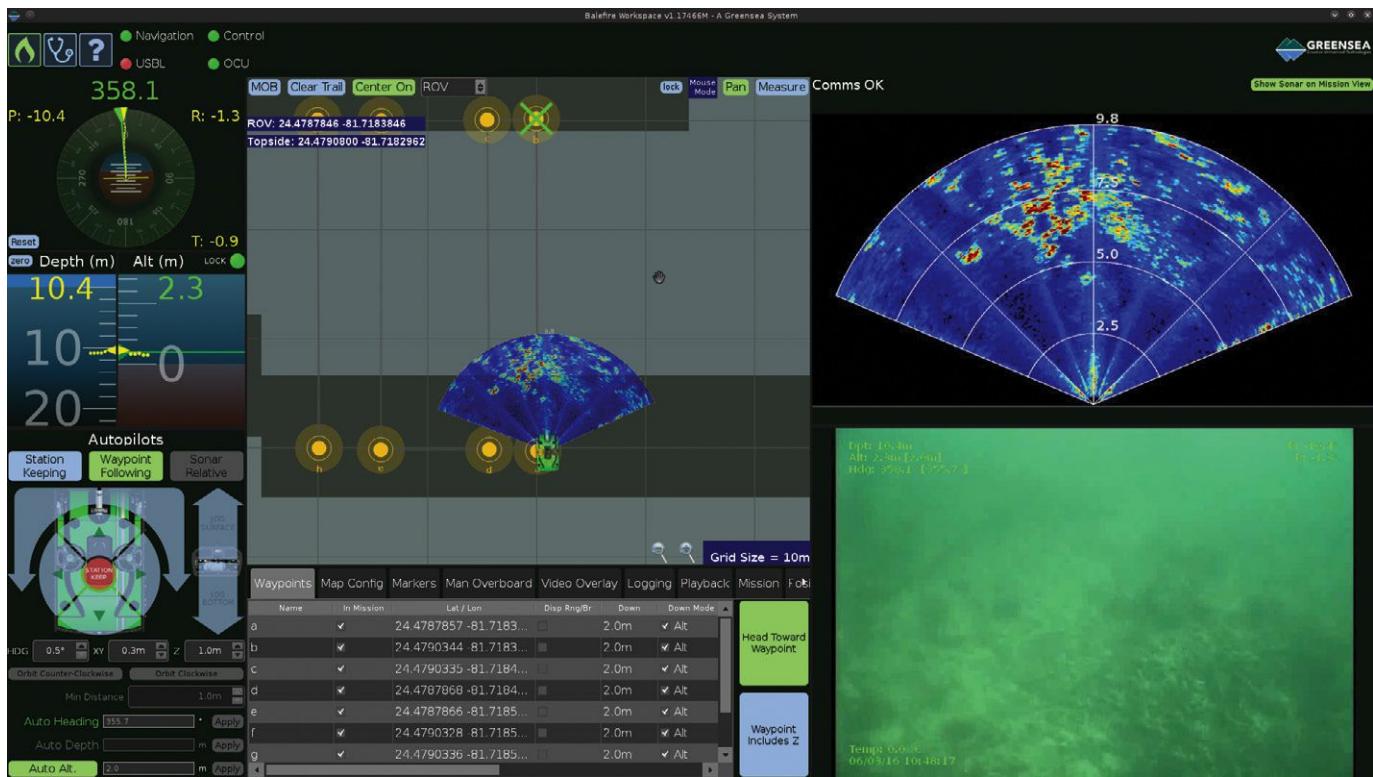
By: Marybeth Gilliam,
Chief Marketing Officer, VP Sales, Greensea

The Greensea INSpect GS4 Fiber Optic Gyro Inertial Navigation System provides highly accurate navigation for complex supervised autonomy tasks.

September 2017

24

Ocean News & Technology



The Greensea Workspace ships free with all Greensea INSpect products and provides mission planning and device integration for navigation, sonar, and video. All data are logged, timestamped, and georeferenced.

Supervised autonomy for small vehicles is being discussed at the highest levels of military, commercial, and science organizations. It gets all the limelight. However, without SWaP-C (size, weight, power, cost) optimized inertial navigation, even the best control system in the world cannot get the job done.

Inertial Navigation Systems (INS) provide the positioning and sensory inputs necessary for accurate mobile robotic control. Just as your inner ear gives you balance, the aided INS provides robots with spatial awareness. This position and spatial awareness is a fundamental requirement for control, autonomy, and intervention tasks.

Alone, an INS cannot provide the positional accuracy required for supervised autonomy. To aid the INS, sensors such as a Doppler Velocity Log (DVL), Ultra Short Base Line (USBL), sonar, and camera are used to stabilize the vehicle's position. It is the job of the INS to analyze, compare, and fuse all available sensory inputs to provide an accurate and stable navigational estimate.

Importantly, an INS position is an estimate; there is some level of inherent error in data. Navigational error comes in many forms, and each type has a different effect on autonomy. High-quality inertial navigation products are designed to consider how the navigational error is affecting the attached autonomy engine to ultimately stabilize control.

Supervised autonomy represents a paradigm shift in how operators utilize robotics. Operators are no longer required to directly control the thrusters. Instead, they can provide high-level tasking instructions such as following pre-determined routes, inspection, or servicing subsea assets. The prerequisite for all of these tasks is high-rate, high-accuracy situational awareness, which is provided by an INS. For tasks such as following a pipeline or creating a photo mosaic, the robotic platform is using its location, heading,

depth, and many other fundamental senses to travel in the correct direction for the correct amount of time. The accuracy of the navigation directly impacts the vehicle's ability to produce results. In the case of a photo mosaic, as the positioning system's errors grow over time, the location of each photo becomes increasingly inaccurate. In the case of following a pipeline, the error growth could cause the vehicle to drift away from the pipeline and would cease to provide meaningful data.

Balancing the need for accuracy with the physical and budgetary limitations of a small subsea vehicle is the core principle behind SWaP-C optimized navigation. Historically, INSs were too large and power hungry for any small vehicle to utilize, not to mention extremely expensive. Even if it were physically possible, it would be unrealistic to spend two to three times the cost of the vehicle on navigation alone.

But today, affordable inertial navigation systems are available to support advanced vehicle control on small inspection-class vehicles. These small, lightweight, low-power, low-cost, INSs have been optimized for the vehicle size and the applications they are most likely to perform—including inspections of tunnels, pipelines, risers, hulls, ports, harbors, etc. and light intervention tasks such as unidentified ordnance disposal. In fact, the U.S. Navy currently uses a SWaP-C optimized INS on the SeaBotix vLBV with SmartFlight supervised autonomy for explosive ordnance disposal.

As service providers need to lower costs, they are turning to inspection-class vehicles. Commercially available SWaP-C optimized INS products and supervised autonomy make the inspection-class vehicle a practical solution. With accurate navigation for small vehicles, the possibilities for complex applications are growing and early adopters are testing the limits of small vehicle

productivity. Operators are assembling their vehicles with the understanding that getting the job done starts with knowing exactly where you are.

The use of the CPICS particle and plankton imaging system to characterize biodiversity in the plankton was reported in the June issue of ON&T add this and showed that plankton biodiversity measured by CPICS can be used as a sensitive indicator of climate change.

Read next month's ON&T article on operating an INS in ferrous environments.



The appearance of U.S. Department of Defense (DOD) visual information does not imply or constitute DOD endorsement.

Aquaterra Energy Signs Major North Sea Investment Deal with EV

Aquaterra Energy, a leading global offshore engineering solutions provider, has secured a multi-million pound investment from EV Private Equity as the company gears up for service expansion and new technology launches.

The deal is the first to be agreed following EV's pledge last year to invest \$200 million in North Sea businesses with new technologies and high growth potential. The independent private equity firm confirmed it was seeking to invest between \$10 to \$40 million in each company.

Aquaterra, which has operations in Aberdeen, Norwich, and Cairo provides riser systems, offshore structures,

and rental equipment to the global oil and gas industry. The company recently designed, fabricated and installed a new Sea Swift platform for PICO Petroleum Integrated Services, the lead contractor for the Amal field in the Gulf of Suez, offshore Egypt. In another multi-million pound contract, Aquaterra is supplying high-pressure riser equipment for a subsea abandonment project in the central North Sea.

Aquaterra is also seeing growing interest from operators in its specialist WellStart service, which minimizes third-party interfaces in early stage well construction, providing the expertise to overcome the technical and economic challenges in setting out the first phase of the well.



Aquaterra Energy recently designed, fabricated, and installed a new Sea Swift platform for PICO Petroleum Integrated Services, offshore Egypt.

Aquaterra Energy's WellStart specialism minimizes third-party interfaces in early stage well construction

George Morrison, managing director of Aquaterra Energy, said: "We have a robust plan for service and product expansion, including a strong focus on our WellStart capability and the investment will help us to fuel the growth of the business. EV's support to the existing management is a vote of confidence in the hard work of the team and the success that has been achieved during what has been a challenging period for the industry.

"We have exciting opportunities for ongoing investment in new technologies and will be looking to maximize value from our innovative field development solutions, including Sea Swift, WellStart, and riser analysis. We look forward to working together with EV to continue to deliver the high-quality, high-value products and services needed by our customers in the improving oil and gas environment."

Greg Herrera, senior partner at EV, commented: "EV is excited to partner with Aquaterra and to have the opportunity to work with the company's talented management team and employees. We believe this will be an excellent platform for both organic and acquisition-based growth opportunities."

Tomas Hvamb, investment director at EV, added: "We believe that the company's core offering, providing net lower cost solutions, resonates in today's capital-constrained market and, furthermore, that there may be excellent synergies to be realized with other companies in the EV portfolio."

Aquaterra has appointed Alan Wilson as Chairman. Mr. Wilson is a chartered engineer with 33 years of experience in the oil and gas industry. Added to his extensive experience in senior executive roles in the industry, he has also served as chairman and non-executive director of other private equity-backed and privately owned companies within the oil and gas sector. He said: "Aquaterra Energy has achieved impressive growth and success in the international oil and gas market by providing world-class products and services, and I'm delighted to join the board at such an exciting phase of the company's development."

The company has also appointed its co-founder Mark Boyd and the former CEO of Expro, Gavin Prise, as non-executive directors.

As part of the deal, a re-finance package has been agreed with HSBC. Keith Robertson, associate director, Leveraged Finance Scotland, commented: "HSBC welcomes this opportunity to support the next phase of development for this innovative and internationally focused oilfield services company, which is well positioned to capitalize on current market dynamics. We look forward to working together with Aquaterra's highly regarded management team and sector specialist investors EV Private Equity over the years to come."

For more information, visit www.aquaterraenergy.com.

Iver3 Autonomous Underwater Vehicles



Rapid Data Collection For
Coastal Applications
Side Scan
Bathy Water Quality
Magnetometer



OceanServer

www.ocean-server.com
+1 508-678-0550

Crowley Supports Stampede Platform Tow-Out and Installation in GoM

Crowley Maritime Corp.'s oceanclass tugboats and 455-series high-deck strength barges recently played an integral role in the safe, successful tow-out and installation of Hess' Stampede tension-leg platform (TLP) in the deep waters of the U.S. Gulf.

Demonstrating both nearshore and offshore capabilities, six Crowley vessels worked together alongside other third-party assets to deliver the oversized, overweight platform, tendons, and other equipment from the Kiewit facility in Ingleside, Texas, to the site of the Stampede floating production facility, about 150 mi offshore in 3,400 ft of water.

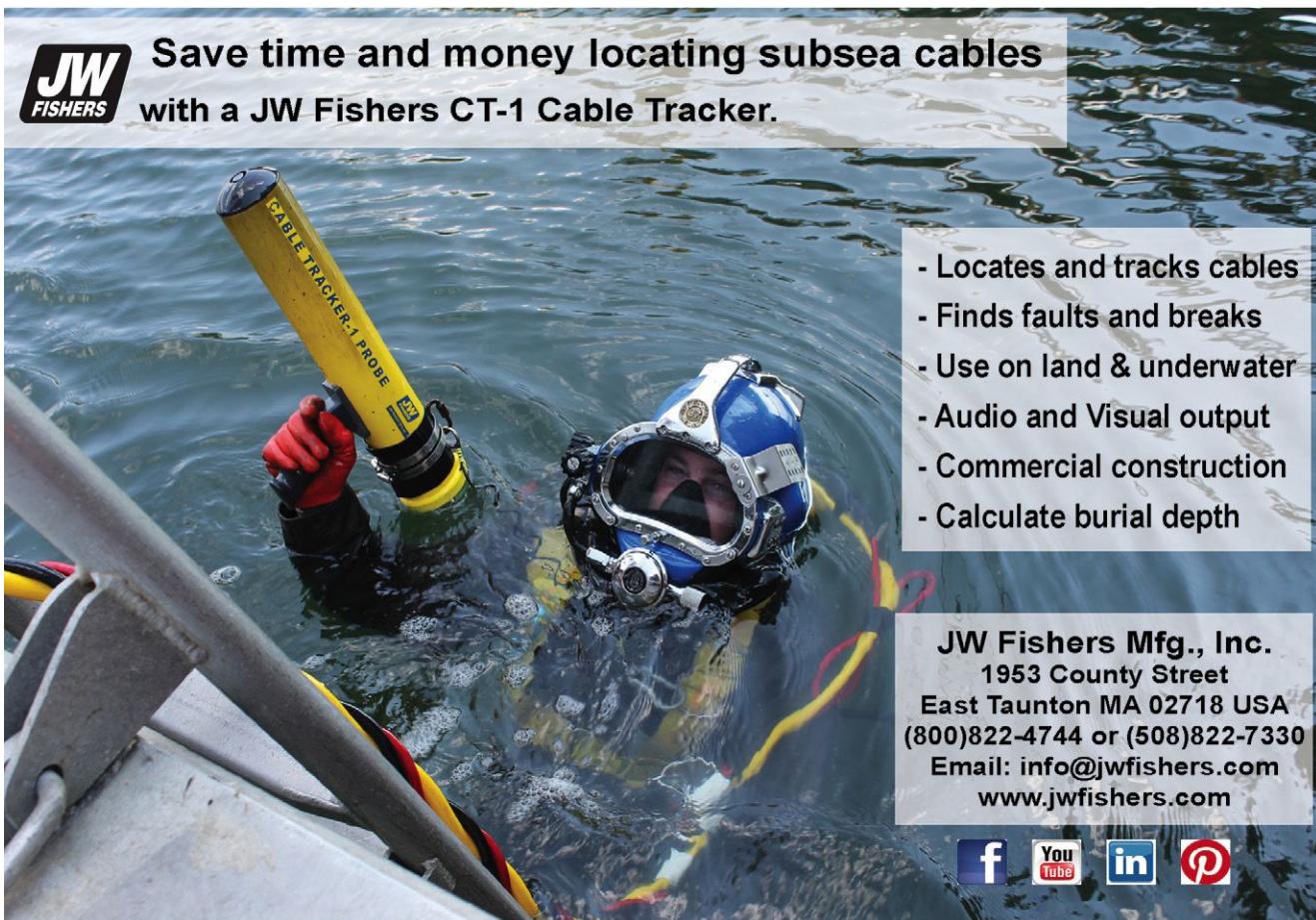
In the first stage, Crowley's ocean-class tugboat Ocean Wind and the 455-series barges 455-3, 455-5, and 455-7 worked together with other contracted vessels to deliver from Kiewit to the offshore site many 300-ft sections of nine 3,400-ft tendons that would secure the TLP to the seabed. From there, the company's Ocean Sun and Ocean Sky, along with several third-party



tugs, towed the TLP through the Ingleside Channel to offshore waters. After a scheduled brief stop at a holding location, the convoy of vessels began the second stage of the tow in offshore waters.

Read more: <http://ont.news/2vUT671>

JW FISHERS Save time and money locating subsea cables with a JW Fishers CT-1 Cable Tracker.



- Locates and tracks cables
- Finds faults and breaks
- Use on land & underwater
- Audio and Visual output
- Commercial construction
- Calculate burial depth

JW Fishers Mfg., Inc.
1953 County Street
East Taunton MA 02718 USA
(800)822-4744 or (508)822-7330
Email: info@jwfishers.com
www.jwfishers.com

COMPANY SPOTLIGHT



Phoenix International Holdings, Inc.

September 2017 will mark the 20th anniversary of employee-owned Phoenix International Holdings, Inc. In 1997, six underwater operations experts joined resources to form Phoenix Marine, Inc., an underwater services company dedicated to the waterborne repair of U.S. Navy ships. This goal was realized when the U.S. Navy awarded Phoenix a five-year diving and diving-related services contract, which we maintain to this day, now operating worldwide from our Norfolk, Virginia; San Diego, California; and Pearl City, Hawaii offices.

By 2000, Phoenix had won several internationally competitive contracts to search for and recover aircraft and rocket components from water depths to 3,000 msw, utilizing a 6,000-msw Remotely Operated Vehicle (ROV) designed and built at our Maryland facility. The success of those missions resulted in the additional award of a five-year contract to perform search and recovery services for the U.S. Navy.

In 2001, Phoenix led the assembly of a group of experienced and specialized submarine rescue-related companies (Team Phoenix) to assist the U.S. Navy in integrating and certifying its new Submarine Rescue Diving and Recompression System (SRDRS). As the U.S. Navy's submarine rescue support contractor, Team Phoenix has repeatedly deployed the SRDRS from its homeport in San Diego to a number of locations in support of international submarine rescue exercises involving as many as 24 nations.

Phoenix expanded into the commercial oil and gas market for the Gulf of Mexico in 2003, operating from our base in Bayou Vista, Louisiana and supported by our Houston, Texas location. Our underwater services started with surface air and mixed gas diving and we subsequently added Atmospheric Diving Systems (ADS) and ROV intervention, allowing us to perform inspection, repair, maintenance, decommissioning, and construction operations from the surface down to 6,000 msw.



The year 2012 marked another milestone in our underwater robotic capabilities when Phoenix purchased a 4,500-msw Autonomous Underwater Vehicle (AUV) christened Artemis (Goddess of the Hunt) to offer our clients deep-water survey and inspections at greater efficiency and reduced cost. The acquisition of this asset was a natural progression in company growth to offer towed pinger-locator, side-scan sonar, multi-beam sonar, sub-bottom profiling, and underwater digital imagery collection.

Throughout the past two decades of steady innovation and expansion, all of Phoenix's service lines have been, and continue to be, supported by our in-house engineering division comprising highly skilled electrical, mechanical, ocean and marine engineers and first-rate CAD designers. Our dedicated staff provides comprehensive project support, including FEED studies, research and development, 3D modeling, and operational assistance to both our military and commercial client bases.

Since our founding, Phoenix has performed emergent repairs to damaged U.S. Navy submarines, surface combatants, and transport ships as well as all types of commercial ships in dozens of international and U.S. ports. We have also had the opportunity to be involved in several high-profile assignments, including searching for and, in some cases, recovering components of Air France Flight 447, MH 370, the space shuttle Columbia, and the SS El Faro. We've made several dives to and into the wreck of the RMS Titanic and searched the remote Pacific Ocean for remnants of Amelia Earhart's plane.

As we look to the future, we reflect upon the growth and success of the company and its evolution over the years, including adopting an Employee Stock Ownership Plan (ESOP) in 2007 and our name change to Phoenix International Holdings, Inc. Recent expansion initiatives include the opening of our Fort Lauderdale, Florida facility focused on providing underwater inspection, maintenance, and

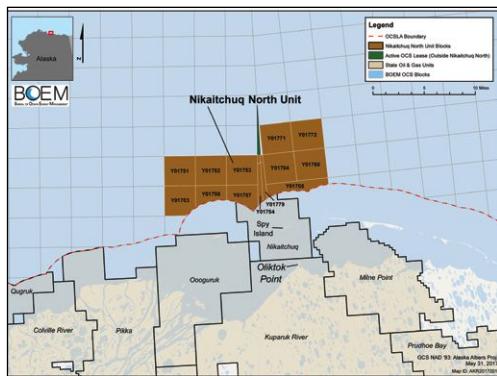
repair services for commercial vessels and the 2016 formation of a joint venture company in Australia (Infinity Phoenix Subsea) dedicated to marketing atmospheric diving services "Down Under." We have grown from a waterborne ship repair company into a diversified and internationally respected underwater service provider, active in undersea markets worldwide and providing manned and unmanned underwater operations and engineering solutions to solve our customers' problems. And we are just getting started.

September 2017

29

Ocean News & Technology

OFFSHORE ENERGY



BOEM Approves Eni Beaufort Sea Exploration Plan

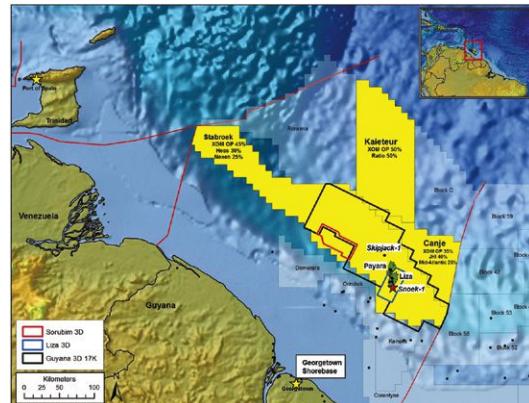
After a comprehensive review and consideration of comments received from the public, stakeholders, and federal and state partner agencies and tribes, the Bureau of Ocean Energy Management has conditionally approved a Beaufort Sea Exploration Plan (EP) it received from Eni US Operating Co. Inc. Eni US is a subsidiary of Italian multinational oil and gas company Eni S.p.A. In its plan, Eni describes its intent to drill four exploration wells into the federal submerged lands of the Beaufort Sea from its Spy Island Drillsite, a pre-existing facility located in Alaska state waters. Drilling will be conducted during the winter months only. The drilling is scheduled to begin in December 2017.

<http://ont.news/2uvY9Lm>

ExxonMobil Announces Successful Payara-2 Well Offshore Guyana

Exxon Mobil Corporation has announced it has discovered additional oil in the Payara reservoir offshore Guyana, increasing the total Payara discovery to approximately 500 million oil-equivalent barrels. These positive well results increase the estimated gross recoverable resource for the Stabroek Block to between 2.25 billion oil-equivalent barrels and 2.75 billion oil-equivalent barrels. The well was successfully drilled by ExxonMobil affiliate Esso Exploration and Production Guyana Limited and encountered 59 ft (18 m) of high-quality, oil-bearing sandstone in the Payara field.

<http://ont.news/2fz57su>



September 2017

30

SEE WHAT'S IN THE WATER

IN-SITU PLANKTON CAMERAS
REAL-TIME PARTICLE CLASSIFICATION
END-TO-END OBSERVING SYSTEMS

COASTAL
OCEAN
VISION

WWW.COASTALOCEANVISION.COM

Riptide set out to change the undersea vehicle market by combining best in class hydrodynamics, ultra low power processing, and game changing new energy technology, while significantly reducing vehicle costs. To accomplish this, we introduced the small, yet highly-capable micro-UUV.

And now, the Family just got **BIGGER**

Introducing the Riptide Family of Low-Logistics, Man-Portable UUVs



Micro-UUV
4.875" Diameter
~25 lbs
300m rated



1 Man-Portable UUV
7.5" Diameter
~65 lbs
300m rated



2 Man-Portable UUV
9.375" Diameter
~120 lbs
600m rated

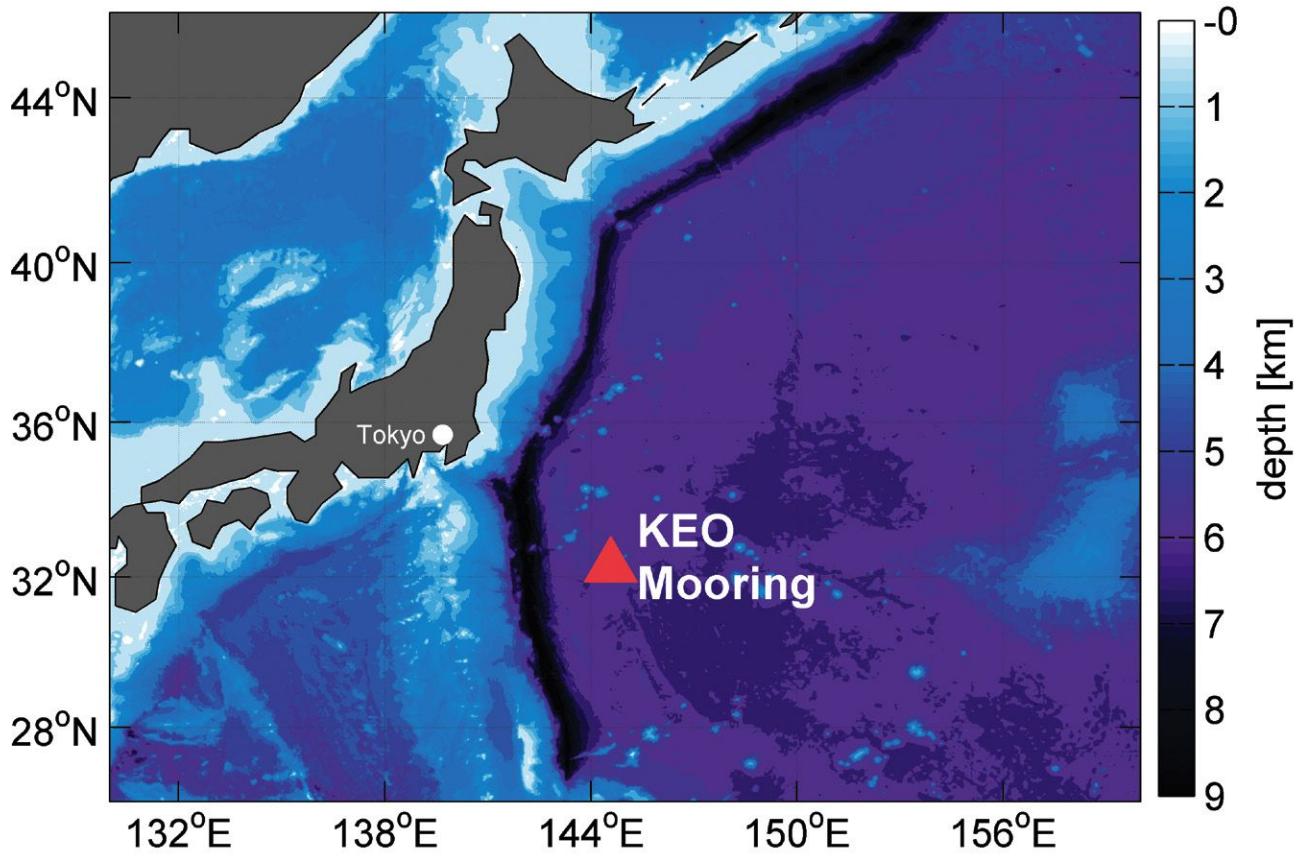
Riptide
Autonomous Solutions

Email: info@RiptideAS.com • Website: www.RiptideAS.com
Phone: +1 617-820-4586 • Address: 36 Farmside Drive, Pembroke MA, 02359 USA

Sea-Bird's Inductive Modem System

Providing Real-Time Data from NOAA PMEL Ocean Climate Station Moorings

By: Kim Martini, Ph.D., Senior Oceanographer, Sea-Bird Scientific



Site of the [Kuroshio Extension Observatory \(KEO\)](#) mooring in the Western Pacific.

Exchanges of heat and moisture between the ocean and the air have a tremendous impact on global weather and climate. To improve satellite products and forecast models, as well as our understanding of air-sea interactions, NOAA gathers meteorological and oceanic data from autonomous platforms. The resulting data empower the world to adapt to climate variations, while improved forecast models help reduce our vulnerability to weather and climate extremes.

Since 2004, the [Kuroshio Extension Observatory \(KEO\)](#) mooring has been monitoring the atmospheric and oceanographic conditions of the Western Pacific in real-time. [Sea-Bird's Inductive Modem system \(IM\)](#) is the backbone of the KEO oceanographic monitoring system, transmitting data from a suite of over 20 subsurface instruments to the surface buoy, where it is relayed back to users hourly via satellite telemetry. For example, on 19 September 2009, the center of Typhoon Choi-Wan passed 40 km southeast of KEO, allowing the mooring to capture the upper-ocean response to strong atmospheric forcing (Bond et al., 2011). That was an extreme event, but the same processes are still observed by KEO in 2017. This article briefly describes how inductive mooring systems are the optimal platform for observing these processes in real-time.

The KEO Mooring

The KEO mooring is one of several [Ocean Climate Stations \(OCS\)](#) operated by the NOAA's [Pacific Marine Environmental Laboratory \(PMEL\)](#) in Seattle, Washington. Two controllers on the buoy connect a meteorological instrument package and a chain of subsurface instruments to an Iridium satellite modem. Data are obtained hourly from the surface down to 550 m and transmitted for use in weather forecasting and operational oceanography as well as for studying upper ocean circulation, climate, and processes.

The deployment conditions for these moorings are harsh. Situated in the Kuroshio Extension, a recirculation of the Kuroshio western boundary current, the KEO mooring endures tropical cyclones and winter storms (Cronin et al., 2008). Surface currents, which can exceed 3 m/s, and persistent waves stress the storm-adapted mooring and the instruments. During typhoon season, storms pass within 500 nmi of the buoy nearly every two weeks. Since 2009, 11 storms have passed directly over KEO, including seven typhoons. Worldwide, economic damage caused by tropical cyclones approaches \$26 billion annually. One third of all tropical cyclone activity occurs in the northwestern Pacific Ocean, and data collected within typhoons from storm-adapted moorings such as KEO are used to improve short-term and seasonal storm predictions in the region.

The dynamic response of the upper ocean to atmospheric forcing is captured by a string of subsurface instruments connected with the Sea-Bird Inductive Modem system. Hourly temperature and salinity data are obtained from more than 20 sensors, including SBE 37-IM MicroCATs and SBE 39-IM Temperature Recorders with integrated inductive modems. Near-surface current data comes from Sontek Current Meters or Nortek Current Profilers connected to the real-time system with integrated Sea-Bird Inductive Modem Modules (IMM), the SBE 44 Underwater Inductive Modem (UIM), or the Underwater Inductive Modem Module. These instruments are clamped to a 700-m inductive cable that transmits commands and data between the instruments and the Sea-Bird IMM within the PMEL-designed [FLEX subsurface connection](#) to the surface buoy.

A real-time data telemetry system also enables remote troubleshooting and data security. If sensors go offline (equipment failures, ship strikes, or even fishing vandalism), an appropriate response for annual servicing and repair can be planned in this remote location. Data that are transmitted back are stored on external servers, ensuring data recovery even in the case of catastrophic sensor loss.

Typhoon Choi-Wan

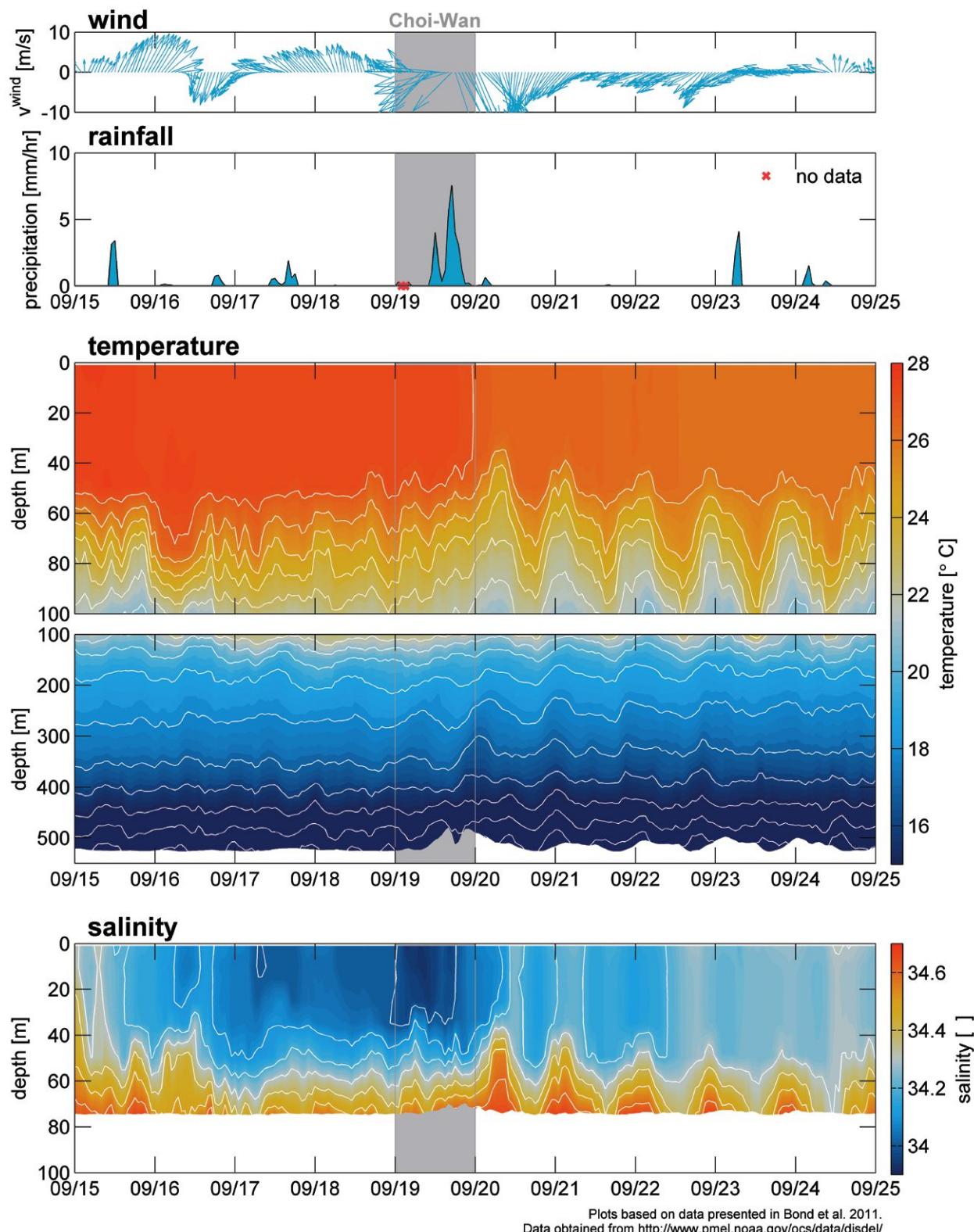
On 19 September 2009, the center of Typhoon Choi-Wan passed 40 km southeast of the KEO mooring as a Category 1 Typhoon. The string of underwater instruments detected upper ocean cooling, dynamic responses to wind, and freshening by rainfall caused by Choi-Wan. The data also include the first direct observation of precipitation with a rain gauge over the open ocean during a tropical cyclone (Bond et al., 2011).

As tropical cyclones transit across the ocean, they leave a cold wake in their trail. Turbulence generated by winds and waves mix cool water upward to the surface. The formation of the cold wake can be directly observed in subsurface data. As the storm passed the KEO mooring, the upper 50 m became cooler and saltier as deeper water mixed upward to the surface. Cold wakes alter upper ocean heat content, influencing the subsequent typhoon evolution that is fueled by air-sea fluxes.

EDITORIAL FOCUS

September 2017 | Ocean News & Technology

34



Plots based on data presented in Bond et al. 2011.
Data obtained from <http://www.pmel.noaa.gov/ocs/data/dsde/>

Wind and rainfall from the meteorological package deployed on the top float of the KEO mooring are shown in the upper two panels. Subsurface temperature data are shown below, with the upper 100 m enlarged. Subsurface salinity is in the bottom panel. Typhoon Choi-Wan went past the mooring on 19 March and is highlighted in gray.

Bond et al. (2011) also observed storm-generated internal waves in KEO data. An impulsive change in wind direction on 19 September caused water to move up and down between 40 and 50 m. This pumping at the base of the mixed layer created internal waves, which propagated downward into the ocean interior. Heaving density layers by internal wave crests and troughs can clearly be observed in the thermocline between 200 and 300 m.

Comparing atmospheric data from the surface meteorological package with subsurface oceanographic data, Bond et al. (2011) differentiated changes in salinity associated with precipitation from those caused by advection, the horizontal movement of water. There was a period of decreased salinity down to 30 m on 18 September, when strong rainfall was recorded. Later freshening events on 20 and 21 September were caused by currents moving freshwater resulting from nearby rainfall past the mooring.

This case study illustrates how a densely instrumented mooring can be used to make observations of complex ocean processes in dynamic and challenging conditions. By combining the suite of instruments with real-time data telemetry, these data can also be assimilated into regional forecasts. In addition, these data can also be used for model comparisons and validation, a tool for determining whether the underlying physics are correct for meteorological and climate models.

As the OCS KEO mooring enters its 14th year of climate monitoring in the North Pacific, it continues to help scientist improve storm predictions, while measuring the exchange of heat and moisture between the ocean and atmosphere and delivering data in real-time. Find out more about the data the KEO mooring produces, as well as other related information, below.

Real-time Mooring Resources

Data from the KEO Mooring can be downloaded from the NOAA Ocean Climate Station Website (www.pmel.noaa.gov/ocs/data/disdel/).

The NOAA PMEL manual for the setup and deployment of OCS buoys is a useful reference for designing mooring systems with Sea-Bird Inductive Modem technology (www.pmel.noaa.gov/ocs/pubs-ocs/technotes/OCS_TN1_OCS_Buoy_Manual_v2.1.pdf).

Additional information on processing data obtained by OCS buoy systems can be found in the NOAA PMEL Data Acquisition and Processing Report (www.pmel.noaa.gov/ocs/pubs-ocs/technotes/OCS_DAPR_KE001.pdf).

Mooring diagrams, positions, and deployment dates for all KEO moorings deployed since 2004 are available on the Kuroshio Extension Observatory website (www.pmel.noaa.gov/ocs/KEO).

Additional scientific publications using OCS data are available via the NOAA PMEL OCS Publication List (www.pmel.noaa.gov/ocs/publications).

OCS moorings are funded by the Ocean Observing and Monitoring Division, Climate Program Office, National Oceanic and Atmospheric Administration, U.S. Department of Commerce.

References

Bond, N.A., Cronin, M.F., Sabine, C., Kawai, Y., Ichikawa, H., Freitag, P., and Ronnholm, K. 2011. Upper ocean response to Typhoon Choi-Wan as measured by the Kuroshio Extension Observatory mooring. *Journal of Geophysical Research: Oceans* 116:C2.

Cronin, M.F., Meinig, C., Sabine, C.L., Ichikawa, H., and Tomita, H. 2008. Surface mooring network in the Kuroshio Extension. *IEEE Systems Journal* 2(3):424-430.

Ultra-Compact Dual Frequency Echosounders

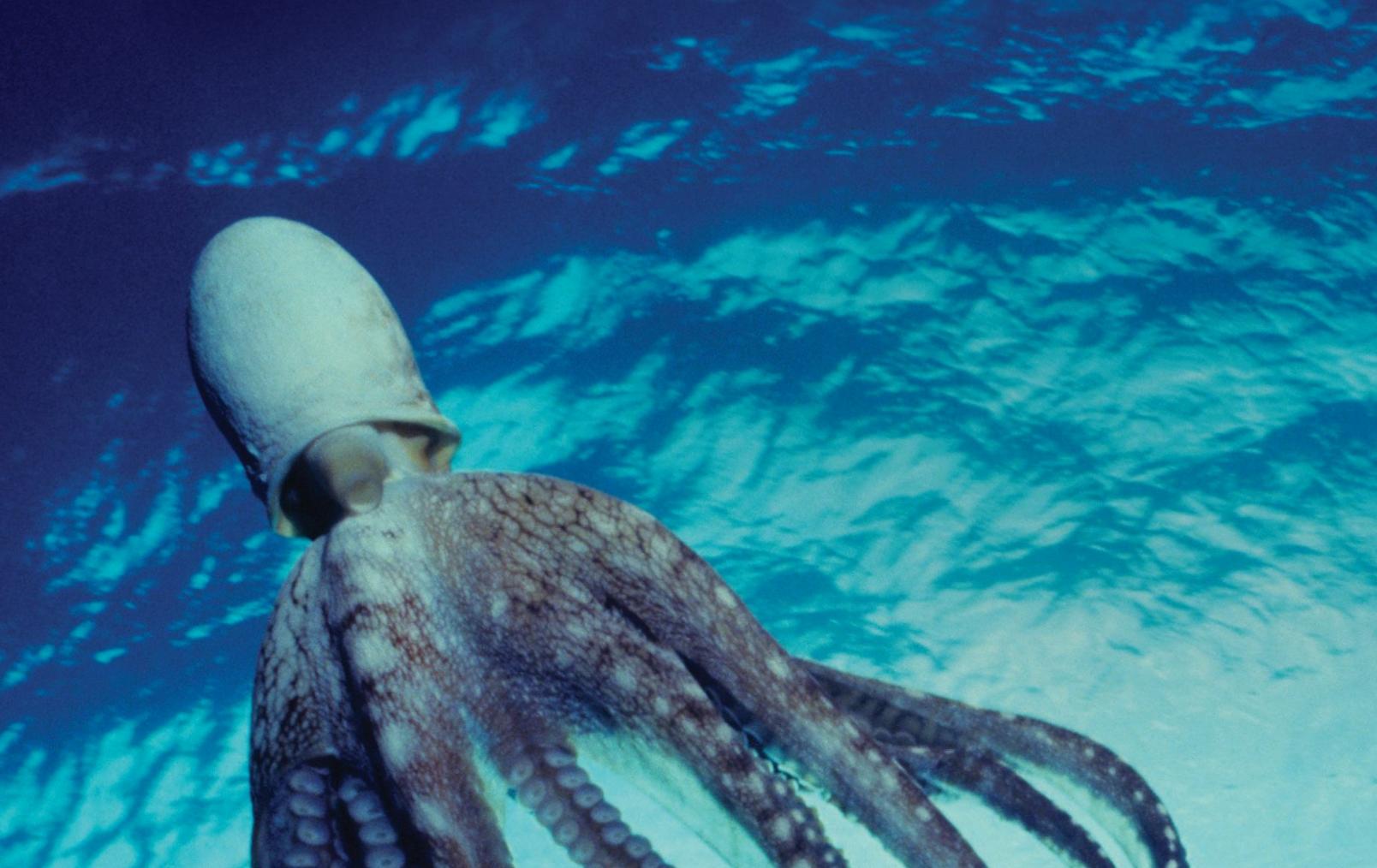


- 200kHz & 450kHz
- Multi-node Network
- Versatile Interface Scheme
- Compact and Easy to Operate
- Accurate Backscatter Data along Water Columns

High Resolution & High Speed Scanning Sonar Systems

- Search & Rescue
- Scour Monitoring
- Navigation for ROV&AUV





He used to be the ocean's
greatest multi-tasker.





Then we introduced our INSpect GS INS with device integration.



The Greensea Workspace fuses navigation, sonar, video, and mission planning into a single screen.* Better yet, it's yours—for free—when you purchase our Greensea INSpect GS INS. Workspace's centralized data framework allows for integrated data to be logged, time-stamped and geo-referenced. And all data is easily exported, so you can multi-task like the beast that you are.

> Watch a video > Get product details



* Greensea supports thousands of interfaces and most major sensor/device brands. Contact us to see if your devices are supported.
©2017 Greensea Systems, Inc.

JW Fishers Provides Right Tool for the Job

Commercial dive companies, law enforcement, Search and Rescue dive teams, and wreck hunters all rely upon a carefully chosen inventory of highly technical equipment to accomplish their goals in a safe, timely, economical, and professional manner. Selecting the right tools for the job involves detailed planning and depends entirely upon what an organization is searching for.

JW Fishers Mfg. specializes in the manufacture of a diverse line of underwater search equipment to provide operators with a one-stop shop for all of their search needs. Over the past 45 years, JWF has worked tirelessly to develop this carefully chosen inventory so that operators can focus on what's truly important: the mission. Operators of all backgrounds repeatedly return to JWF for assistance in complex searches so that they may have these critical tools for the job, often calling without knowing exactly what they need.

A few pieces from this purpose-based and highly technical inventory are JW Fishers' handheld underwater metal detectors that can locate all metals. A diver who is using this equipment on their search

can detect any buried object from guns, bullets, and cannons to rings, gold coins, and anchors.

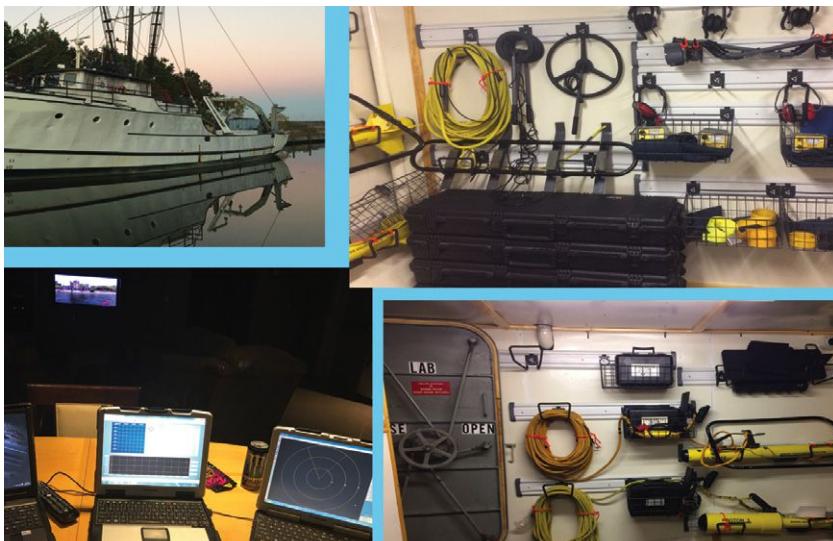
Boat-towed metal detectors allow the operator to search large areas in a short amount of time to locate anything from pipelines to shipwrecks. Remote Operated Vehicles (ROVs) are used to capture and record video footage underwater. These machines offer a high level of safety as the need to employ divers is reduced. It also records a search for future review or inspection. Sonar systems such as side scan sonar and sector scanning sonar are very popular because they "paint" a picture of the ocean floor — even in black water! They are extremely useful in locating sunken ships, downed aircraft, and even a drowning victim in the harshest of environments. When searching primarily for ferrous objects (iron and steel), the best piece of equipment is Fisher's magnetometer. The advantage of a magnetometer is its greater detection envelope over a traditional metal detector and that it can search larger areas quickly and effectively. Pingers and receivers are also becoming a very popular tool with many teams because they provide the ability to mark and relocate underwater sites with ease.



Crew from Reale's Diving. Photo credit: JW Fishers.

For hundreds of years, the coastal waters of the United States have been used for trade, exploration, piracy, and naval warfare. Numerous vessels have been sunk off the U.S. coast from Maine to Florida, Alaska to Hawaii, and the Puget Sound to the Baja Peninsula. One customer from the Carolina coast has been a long-time user of JW Fishers' inventory. His ship is outfitted with multiple pieces of JWF equipment to include four Pulse 8X handheld underwater metal detectors, two boat-towed metal detectors, a magnetometer, an ROV, and a Side Scan Sonar system. Over the years this explorer has located artifacts ranging from silver bars and cannons to old shipwrecks using JW Fishers' "right tool for the job." This particular customer has also been hired to perform scientific research and has been featured on popular television shows throughout the years.

Australia-based Realf's Diving & Salvage has been committed to identifying and meeting client's expectations for over 30 years. The business continues to service an ever-expanding local and international client base. Their principle areas of activity are servicing companies in



marine and construction industries as well as professional and commercial diving clients. To accomplish this vast array of jobs, they utilize a JW Fishers Side Scan Sonar, a Pulse 12 boat-towed metal detector, and a Pulse 8X handheld metal detector. Over the years, these tools have become "the right tool for the job" and have made search and salvage faster, easier, and safer.

For more information, visit www.jwfishers.com.

Standard Buoys

Custom Buoys

and everything in between

deepwaterbuoyancy.com | +1.207.502.1400

DeepWater BUOYANCY

Valeport's Latest Profiler Supports the Ongoing Quest for New Marine Discoveries

Valeport, a leading manufacturer of oceanographic, hydrographic, and hydrometric instrumentation, is supporting scientists with leading-edge research to expand knowledge of marine biodiversity with its latest CTD profiler, the fastCTD, which records the conductivity, temperature and depth of sea water.

The fastCTD is integral to the research kit that is accompanying respected marine biologist Dr. Sonia Rowley as she undertakes her latest expedition to the island of Pohnpei, in the western Pacific Ocean, from 2 August until 13 September 2017. The trip follows in the wake of successful explorations at Pohnpei, the Cook and McCall seamounts, and Lō'ihi volcano in 2016. Data recorded by Valeport's CTD profiler contributes to the research team's understanding of biological processes, such as an invasive algal bloom that was found on the reefs of Pohnpei during the previous projects.

Dr. Rowley, originally from Devon, UK, and now based at the University of Hawaii, uses the latest technological advances in closed circuit rebreather diving to explore the biodiversity of 'twilight coral reefs' at seamounts,

which are underwater mountains formed by volcanic activity. The majority of tropical coral reefs exist at depths between 100 to 500 ft which is too deep for traditional scuba diving but too shallow to justify the cost of using manned or unmanned submersible craft to reach them. Dr Rowley's advanced training enables her to reach these unexplored regions of the marine environment.

Kevin Edwards, marketing manager, said: "Valeport has supplied equipment to many research programmes and we're delighted to be supporting Dr. Rowley's innovative work with our fastCTD. The profiler has been designed to deliver the highest quality CTD casts at rapid drop rates, and feedback from Dr. Rowley has enabled us to make further refinements to the instrument that will benefit all our CTD customers. We pride ourselves on providing high-quality, reliable and innovative instrumentation, and we're excited to be facilitating experimental and ongoing environmental monitoring at depth and to contribute to pushing the boundaries of what we know about our oceans and the diverse ecosystems they house."

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



The fastCTD profiler has been designed to deliver the highest quality CTD casts at rapid drop rates.



**ADVANCED
NAVIGATION**
POSITIONING EVERYWHERE



SUBSONUS

USBL•MODEM•INS

- *Accurate Positioning*
- *Acoustic Heading Transfer*
- *Built-in Speed of Sound Sensor*
- *Automatic Setup*
- *Miniature Size*



Planet Ocean & ASV Global Demonstrate Autonomous Launch and Recovery

The demonstration, in front of invited guests from project partners Planet Ocean, National Oceanography Centre, ASV Ltd, and University of Southampton and funders Innovate UK and Dstl took place on a sunny July day in the Solent.

The day marked the final activity of the highly successful two-year Innovate UK project, during which two extremely capable, low-cost AUVs were developed along with the launch and recovery systems that can be installed on almost any floating asset. The technology has also contributed to a University of Southampton project that has been air launching ecoSUB- μ AUVs from their SPOTTER Unmanned Air Vehicle.

ecoSUB- μ Autonomous Underwater Vehicles were launched autonomously from three launch tubes mounted on the stern of an ASV C-Worker-5 Unmanned Surface Vessel. Missions can be sent to the AUVs whilst in their launch tubes via the C-Worker communications after which the system can operate autonomously. The C-Worker can then act as a communications hub, downloading high-resolution data from the ecoSUB for storage or onward transmission through high bandwidth channels

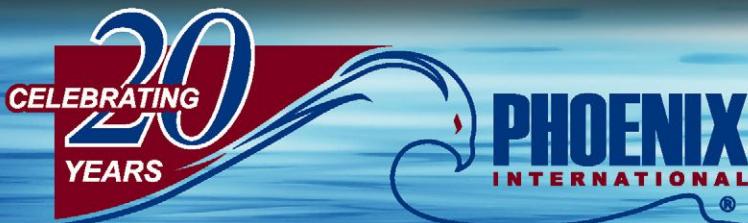


before collecting the AUVs using a specially designed recovery system modelled on a Jason's cradle.

This combination of platforms means that ecoSUB can be delivered quickly to the area of interest and deployed without the need for direct human intervention. The launch system developed by ASV can be scaled up; the C-Worker-7 can accommodate 60 ecoSUB- μ ASVs.

For more information, visit <http://planet-ocean.co.uk/wp/> or www.asvglobal.com.

Two Decades Of Innovation



UNDERWATER SOLUTIONS WORLDWIDE

www.phnx-international.com



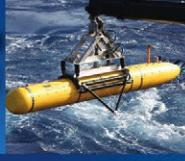
Offshore
Oil and Gas
IRM



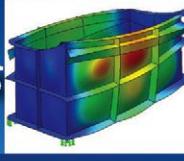
Commercial
& Military
Underwater
Ship Repair



Deep Ocean
Search and
Recovery



Engineering



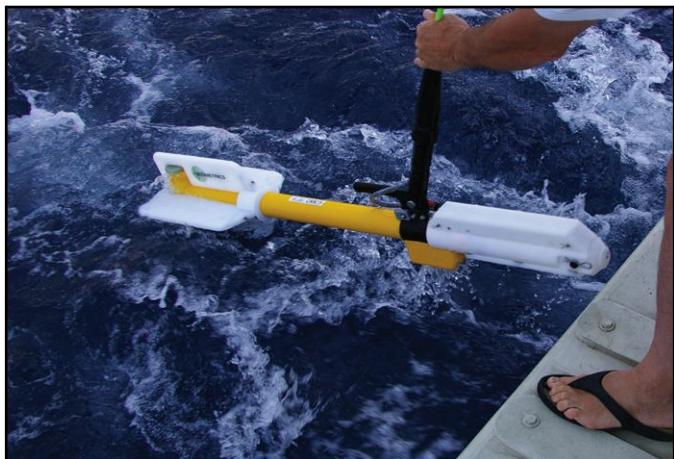
Submarine
Rescue



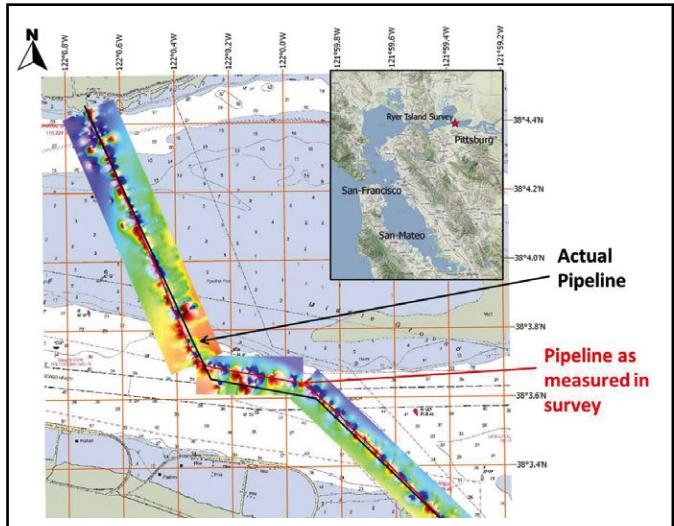


Geophysical Instruments

Cutting-Edge Technology from a Company with Nearly 50 Years of Marine Geophysics Experience



G-882 Magnetometer in Malta. Photo courtesy of Garry Kozak.



Results of a Geometrics Marine Survey over a gas pipeline in the San Francisco Bay, off of Ryer Island, California.



Photo courtesy of Fugro West, Inc.

Magnetometer

The Geometrics G-882 is a cesium-vapor marine magnetometer. At only 44 lb and with 200 ft of cable, the instrument is highly portable and can be handled by a single person and towed using a small vessel. However, don't be fooled by these dimensions. With a sensitivity at 0.004 nT/sqrt(Hz) and a depth rating of 2,700 m, the G-882 can be used for magnetic surveys of any size.

The G-882 is a workhorse. There are approximately 150 G-882s currently working in the North Sea as part of the unexploded ordinance (UXO) cleanup campaign for windfarm development. While this is currently the largest market for the G-882, it is also frequently used to monitor underwater pipelines and investigate archaeological sites, aircraft crash sites, and any other application where a magnetometer might be used. The G-882 can be used alone or combined in arrays of up to 12 magnetometers for greater coverage.

GeoEel Streamer

In 2006, Geometrics released the GeoEel streamer, a new marine 2D seismic product designed for sub-ocean bottom imaging. Frequently used in hydrocarbon exploration, GeoEel streamers are also used to assess hazards such as methane hydrates, debris-flow turbidite deposits, and faulting. The GeoEel streamer provides important information to improve the safety of gas and oil well drilling.

P-Cable System

As oil and gas companies continued to drill in more complicated areas, Geometrics realized the need for an ultra-high resolution 3D seismic imaging system. In 2010, they introduced the P-Cable system, which has been used successfully not only in hazard evaluations associated with oil well development, but in paleoseismic applications as well as climate change investigations. The P-Cable system allows for towing up to 24 GeoEel streamers and allows for better imaging of complex structures, less directional bias, full 3D migration, and better preservation of high frequencies.

Experience Matters

For nearly 50 years, Geometrics has been designing and building state-of-the-art geophysical instruments. We don't limit our focus to marine instruments, though they do constitute a significant amount of our business. If you have questions about Geometrics' products, please visit us at Oceans 17 in Booth 811 or contact Sales@geometrics.com.

SUBSEA INTERVENTION & SURVEY



Soundnine Inc. Introduces High-Accuracy OEM Temperature Sensors

S9's new OEM digital temperature sensors are ideal for integration on underwater instrumentation, drifting buoys, ROVs, AUVs, or industrial and laboratory applications. They offer high accuracy and stability, extreme durability, low cost, and easy integration. Two mechanical configurations are offered: a screw-in type having 7/16-20 threads commonly used on underwater bulkhead connectors or plain shank version. The screw-in type has an optional screw-on probe guard. Both are available with wire leads or solder connections.

<http://ont.news/2uNKydW>

Deep Ocean Engineering Phantom® T4H ROV Completes Dam Inspection

A Phantom® T4H ROV, designed and built by Deep Ocean Engineering, Inc., has successfully completed an inspection of the intake riser at Cherry Lake Dam near Yosemite in California. The dam, built in 1956, has provided water and power to the San Francisco Bay Area, Modesto, and Turlock districts for over 60 years, and the structure has not been seen since its construction. Deep Ocean Engineering's Phantom® T4H ROV successfully documented the state of the dam's water intake riser and the position of the gates at a depth of 258 ft (78.6 m), about a quarter of the ROV's rated capability.

<http://ont.news/2wQ8UFg>



September 2017

44

Ocean News & Technology

Serving the world of Hydrography & Oceanography



Tide
Gauges



Telemetry



Optical
Sensors



Wave
Recorders



CTD &
Multiparameter



Current
Meters



Ocean
Engineering



Echo Sounders
& Bathymetry



Sound
Velocity

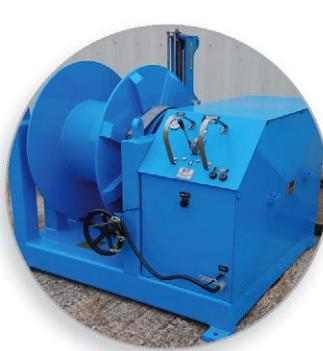
VALEPORT
in our element

Tel: +44 (0) 1803 869292
sales@valeport.co.uk

Valeport Ltd | St Peter's Quay | Totnes
Devon | TQ9 5EW | United Kingdom

www.valeport.co.uk





Decades of quality and reliability for
a wide range of offshore needs.

Okeanus, now the exclusive provider of SOSI and DT Marine winches, is the first and last stop for buying, leasing and servicing of oceanographic winches from one hp to over 200 hp.



www.okeanus.com



The OceanCubes Project

Low-Cost Cabled Observatories for Long-Term, High Frequency Monitoring of Coastal Oceans

An OceanCube is an un-manned underwater coastal observatory designed to provide real-time data and images. A central node houses a variety of biological, physical, and chemical sensors with four corners of a cubic volume providing current and temperature information.

The goal of the OceanCubes project is to develop and deploy inexpensive cabled seafloor observatories called OceanCubes (oceancubes.whoi.edu) in low and high latitudes where extended, high-frequency information is needed to characterize the aquatic environment.

This may be for understanding the impact of seafloor, midwater, or surface-deployed Hydrokinetic Energy Production systems, wind farm towers and their cables, or oil drilling and production rigs. Woods Hole Oceanographic Institution (WHOI) engineers, biologists,

and chemists have been using OceanCubes to study the upwelling of cold, nutrient-rich, and hypoxic water at several locations worldwide: Western Pacific Ocean (Okinawa and Tokyo, Japan), Eastern Pacific Ocean (near Coiba Island, Panama), and the Caribbean (Bocas del Toro). The four-cornered control volume design of the OceanCube allows for the measurements of materials and energy flux from the water column to the benthos at a rate of several times per second (Figure 1).

Each of the observatories consists of an instrument package on the seafloor between 2 to 10 km from shore at depths from 20 to 1,000 m. The package is connected by electro-optical cable to shore providing the capability for Internet-based teleoperation by scientists and engineers from anywhere worldwide. The main observatory node consists of a CTD (conductivity-temperature-depth)

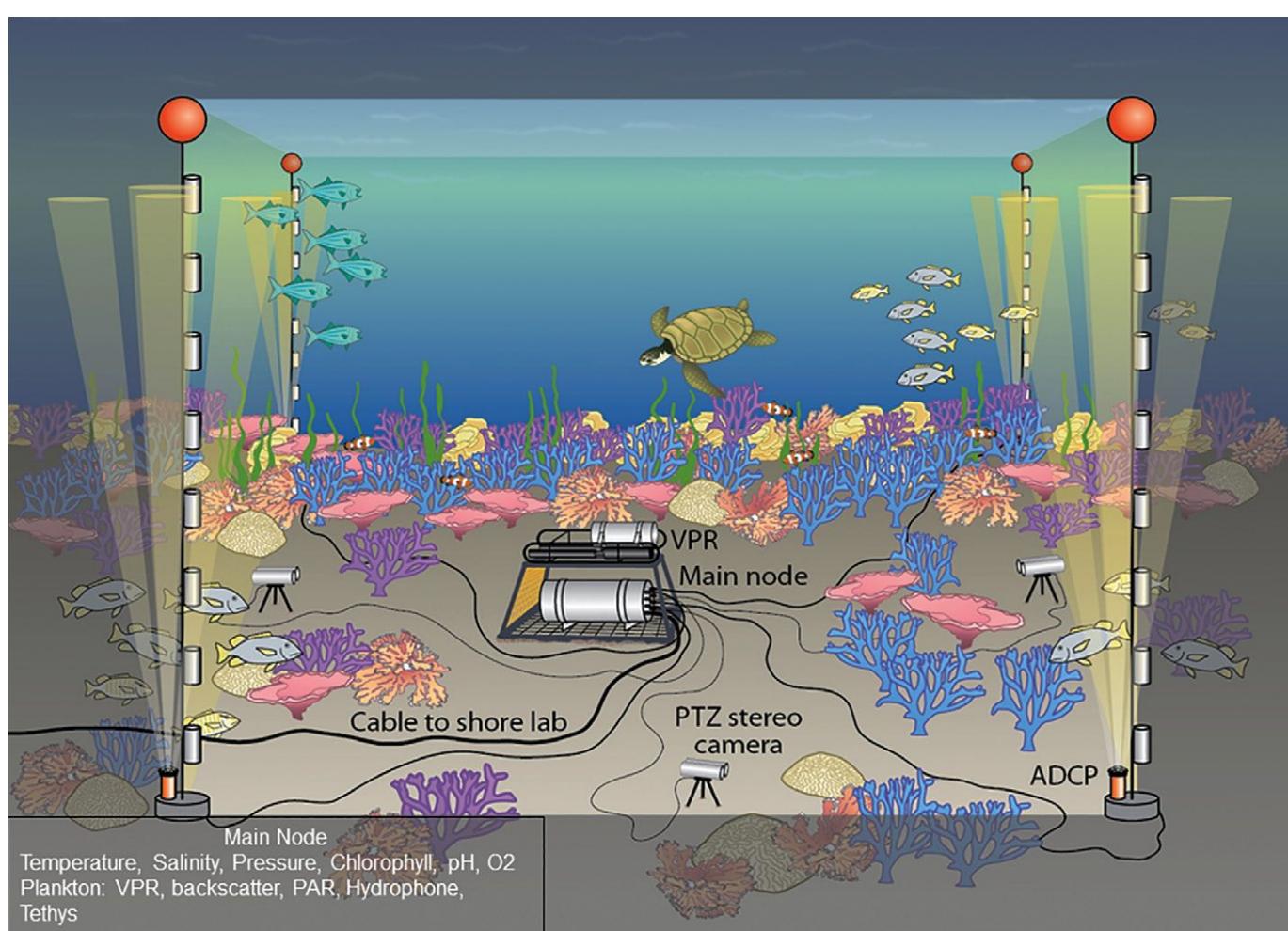


Figure 1. OceanCube observatory deployed at a depth of 20 meters showing four corners defined by thermistor strings and uplooking ADCPs, with a CPICS (VPR) particle imaging system in the center.

to measure temperature, salinity, and pressure; sensors for chlorophyll and CDOM fluorescence to detect the presence of oil, oxygen, nitrate, pCO₂, and pH; a bio-optical package for irradiance and radiance; a Continuous Plankton Imaging and Classification Sensor (CPICS) (<http://www.coastal-oceanvision.com>); several hydrophones for acoustic characterization of the underwater environment and sound production from underwater installations; a Raman spectrometer to detect and classify harmful algal bloom species and their toxins; and pan-and-tilt stereo cameras to observe, measure, and track fish communities (Figure 2).

Use of the CPICS particle and plankton imaging system to characterize biodiversity in the plankton was reported in the June ON&T, and showed that plankton biodiversity measured by CPICS can be used as a sensitive indicator of climate change.

The four-corner nodes each have a temperature string with sensors at an interval of 1 m and an uplooking Acoustic Doppler Current Profiler (ADCP). Vertical profiling packages can also complement water column measurements. The node is located in the center of a control volume through which the flux of material (plankton, carbon, oil, sound energy) is measured. A control volume is established by virtue of temperature strings and the ADCP sensors at each corner, ~100 m to 1 km on a side. The node and its sensors are part of an extensive underwater Local Area Network (LAN), with each sensor provided an exclusive IP address or port along with voltage and ground fault monitoring and power control (Figure 3).

All data from the sensors and cameras stream to shore where computers log the data and provide initial processing for web visualization and Quality Control. All data, both raw and processed, are accessible over the Internet through a web-enabled Graphical User Interface (GUI).

OceanCube observatories provide year-round data to support monitoring, research, and educational objectives related to understanding the impacts of Hydrokinetic Energy Production systems, wind farms, and oil rigs on the biodiversity, biophysical, and biogeochemical processes, particularly ocean acidification, of seafloor, coral reef fish, and plankton communities. To study carbonate saturation state and the impact of ocean acidification on coral reef systems, information on four primary variables (total dissolved inorganic carbon, total alkalinity, carbon dioxide, and pH) are required. Thermodynamic relationships between these variables allow for the measurement of two variables and the calculation of the other two.

The OceanCube observatories measure pH and pCO₂ thereby allowing inorganic carbon and alkalinity to be calculated along with the Aragonite saturation

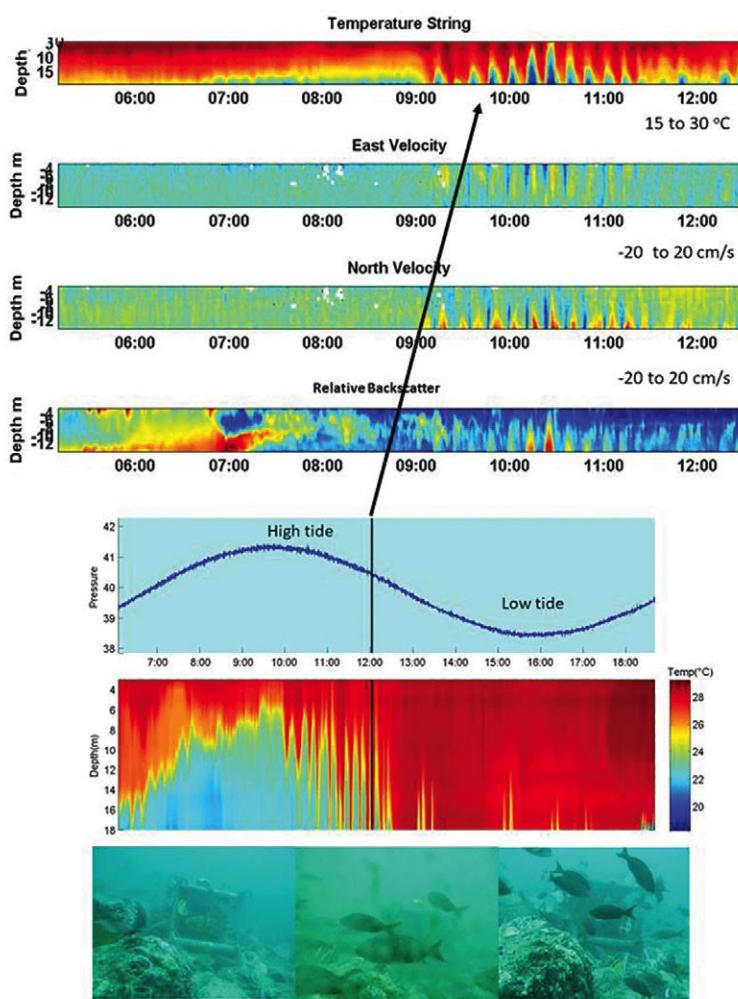


Figure 2. Top: Water column temperature at 1 meter intervals over time showing distinct internal wave pattern as upwelled cold water intrudes into warm surface water. East water velocity, north water velocity and relative acoustic backscatter also shown.

Bottom: The arrow indicates enlargement on bottom where tidal pressure, temperature, and images from the OceanCube indicate strong changes in thermal conditions and reef fish communities as the internal waves pass.

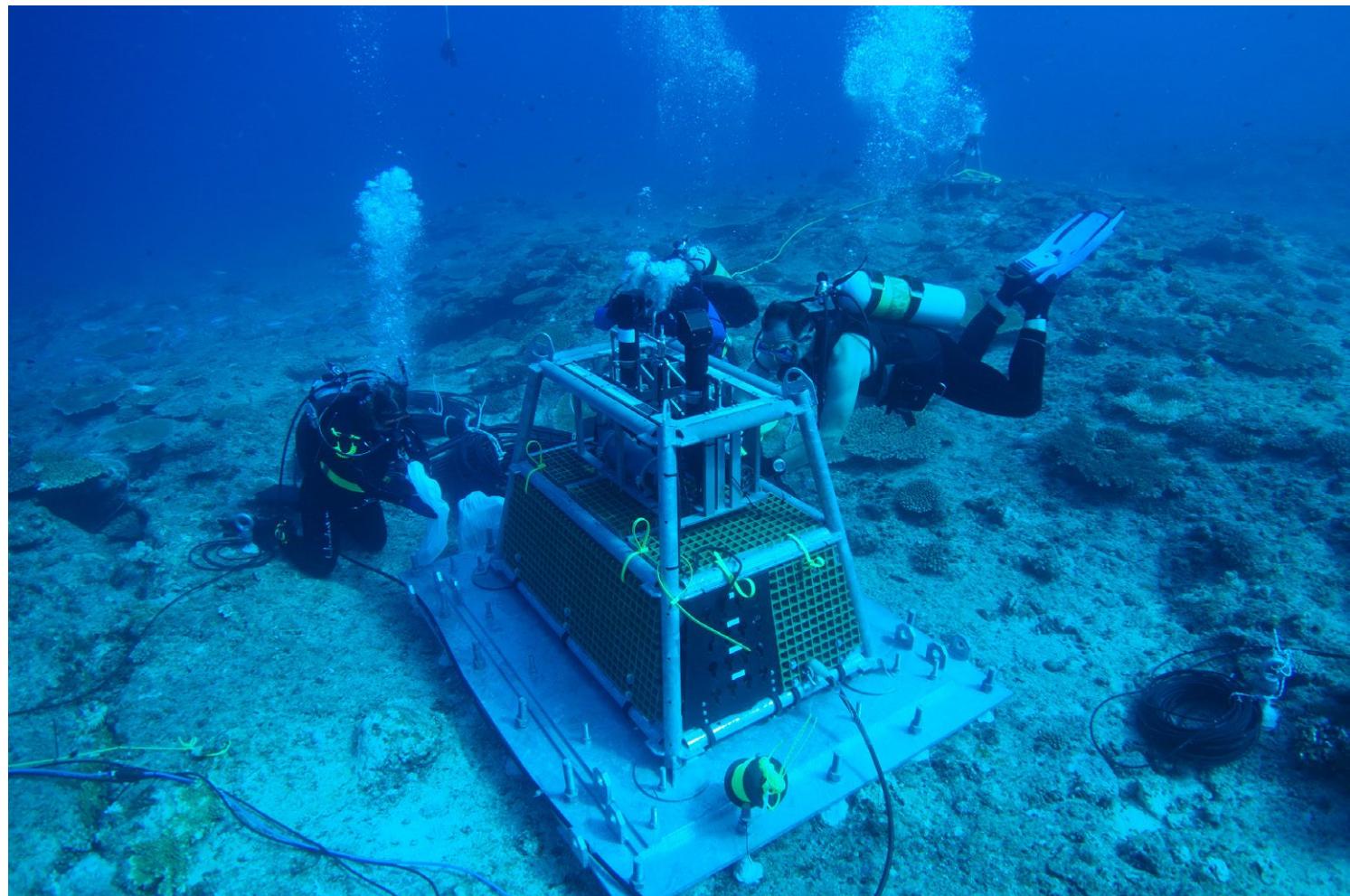
state, which provides an index of the ability for organisms to form calcium carbonate shells and exoskeletons (clams, oysters, scallops, lobsters, corals, etc.).

In addition, we are experimenting with Raman spectroscopy to measure carbonate ion directly, eliminating the need for pH and alkalinity measurements. The OceanCubes also monitor primary (phytoplankton and chlorophyll), secondary (mesoplankton), and tertiary (fish) production to provide a means for observing the impact of corrosive water on planktonic, coral, and reef fish communities.

Measurements of these variables and parameters within a control volume where the motion of water through the volume is known allows for calculation of biogeochemical flux (carbon cycle) of materials through the volume and into the benthos.

The observatories are designed to provide extensive expansion by adding experimental sensors as they become available. In combination with an array of cabled observing systems such as NEPTUNE and VENUS (<http://www.oceannetworks.ca/>) and MARS (<http://www.mbari.org/at-sea/cabled-observatory/>) in the Eastern Pacific Ocean and uncabled systems across the Tropical Pacific (<http://tpos2020.org/>), this unique approach to measuring components of the carbon cycle at high frequencies comparatively between many sites is providing a transformative view of the impact of upwelling due to ENSO and ocean acidification on coral reef dynamics.

OceanCube observatories were developed by Woods Hole Oceanographic Institution biologists, chemists, and engineers who have a vision for observing pieces of the ocean at very high resolution in order to answer scientific questions that could never be addressed before. In addition, OceanCubes provide an inexpensive platform for monitoring environmental impacts of hydrokinetic power generators, wind farm towers, oil platforms, and other mechanical devices on the seafloor. The technology was licensed to CoastalOceanVision, Inc. (coastaloceanvision.com) for commercial production.



OceanCube central node at Motobu Point, Okinawa. The region suffered a major coral bleaching event in the early 1990s. By locating cameras at this location, long term monitoring of growth and resilience to this bleaching event will be characterized.

OceanCubes Data Flow

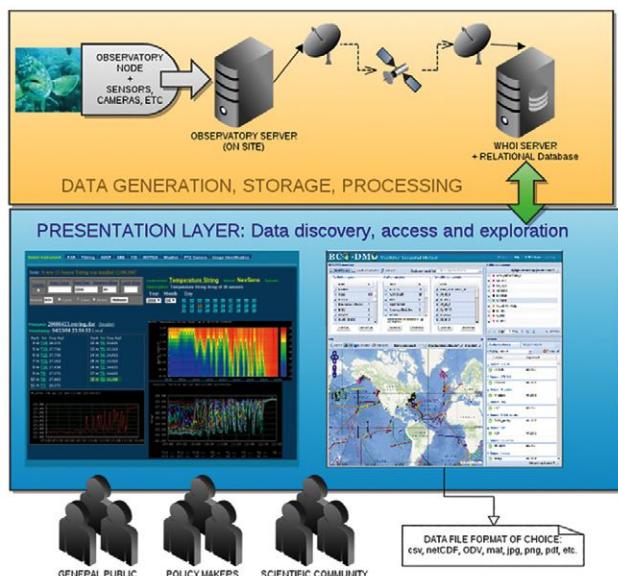


Figure 3. Data flow diagram for data generated by sensors on the OceanCube observing system, processed on a cloud computer and displayed for public viewing.

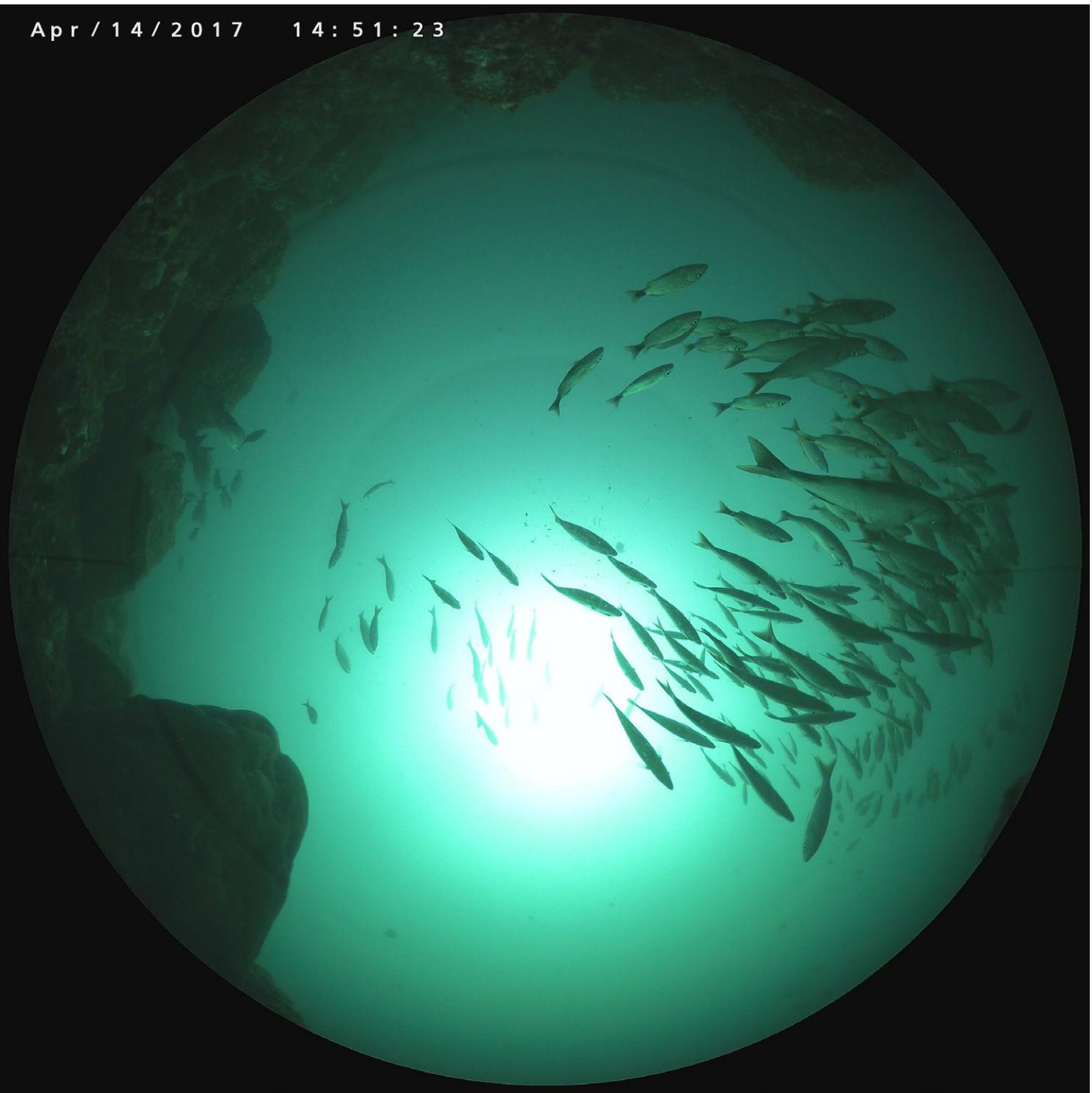


Image captured by 360 degree camera on the Panama Liquid Jungle Laboratory (LJL) OceanCube Observatory. The Isthmus of Panama divides two very different oceans. Only 80 km apart, each has dramatically different coral reefs systems and near-shore marine environments. The physical and nutrient drivers of primary and secondary production at Bocas del Toro in the tropical Western Atlantic (TWA) and the Gulf of Chiriquí in the Tropical Eastern Pacific (TEP) are different due to their position on either side of the Isthmus of Panama making them ideal sites for a comparative study using marine observatories. Both locations are subject to the annual movement of the Inter-Tropical Convergence Zone (ITCZ) causing intense seasonality. The presence of sustained observational capabilities at both sites is allowing simultaneous, real-time measurements of key variables comparatively across the Isthmus and address critical questions regarding climate change, ocean acidification and their impacts on diversity. The Cross-Isthmus OceanCube Observatory System is providing data for the investigation of the tropical ocean-atmosphere-climate system in response to sea level rise and increasing CO₂ concentrations (decrease in seawater pH, alkalinity, and carbonate saturation state), as well as its effect on marine communities and their associated feed-back mechanisms. Near-real-time telemetry and adaptive sampling of episodic events (e.g., red tide), which may dominate local and regional processes, on scales of seconds to years will provide the baseline for how the ecosystem is changing in response to anthropogenic (e.g., deforestation, altered atmospheric and ocean chemistry) and natural processes.

CS Recorder Completes Reburial Project

Global Marine Group (GMG) has successfully completed a remedial cable burial project for Prinses Amaliawindpark (PAWP), a wind farm off the Netherlands' West Coast. PAWP covers an area of around 14 km² and comprises 60 wind turbines connected by eight in-field cable strings that converge at the central offshore high-voltage station.

The project, operated by Eneco — an energy company responsible for generating and supplying sustainable energy originating from wind, heat, biomass, and solar farms — was completed according to schedule and in conjunction with operational and safety standards. Upon completion, the customer described the outcome as having met “superb standards.”

GMG's first project with Eneco has been executed by CWind, which is part of GMG and is responsible for delivering the company's power capabilities. The contract was secured, in part, due to GMG's proven track record of completing complex cable burial projects and having trenching equipment already mobilized for rapid deployment. The project utilized CWind's in-house resources, including the CS Recorder, which has DP2 dynamic positioning; the Q1000, a powerful remotely-operated vehicle (ROV) jet trenching system; a skilled onshore and offshore engineering team.

The 28-km shore connection cable responsible for delivering power to the onshore substation was installed in 2007 and was trenched below the sea-



GMG cable ship Recorder with Q1000 ROV jet trenching system.

bed to depths of up to 3 m. Natural movement of the seabed in the subsequent 10 years reduced its burial depth. As such, the main objective of the project was to rebury the cable to ensure its protection in commercial waters and to comply with the site's permit requirements.

"We are extremely pleased with the work carried out for us by the CWind team," said Jeroen Achterberg, Eneco Project Manager.

"With a 100% clean safety record and high levels of safety awareness during the reburial project, the results led to the project being completed within schedule and to superb standards."



Lee Andrews, managing director of CWind, added, "Key to the success of the PAWP assignment was our ability to respond quickly to the client's requirements by drawing on available in-house resources and, of course, our wide experience in offshore wind farm engineering. We completed the project in just three weeks with utmost safety and efficiency—great work by all concerned."

For more information, visit www.globalmarine.group.

High Performance Cable Handling Systems



**HEAVY DUTY • MEDIUM DUTY
LIGHT DUTY • PORTABLE**

**ANY APPLICATION
ANY LOAD**

RUGGED AND RELIABLE



For over forty years, InterOcean Systems has been designing and manufacturing a variety of standard and customized platform mooring release systems and cable handling systems for deployment and recovery of critical sensors and equipment.

Our state-of-the-art winches have earned a reputation for reliability and durability.

Contact us to learn how we can design a winch for your application.

InterOcean Systems, LLC

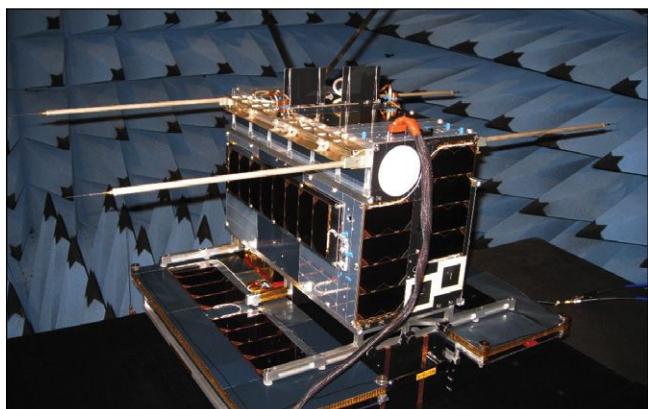
Tel. (858) 565-8400 • Fax (858) 268-9695

www.interoceansystems.com



An affiliate of Delmar Systems, Inc.

COMMUNICATION & SUBSEA CABLES



Norway Launches SFL Microsatellites for Maritime Communications

The Space Flight Laboratory (SFL) announced the successful launch of two Norwegian microsatellites developed and built by SFL for the Norwegian Space Centre with support from the Norwegian Coastal Authority, Space Norway, and the European Space Agency. The Soyuz-2, #1a rocket carrying the satellites into orbit, launched from Baikonur at 06:36:49 UTC Friday 14 July 2017. Shortly after launch both satellites were contacted from ground stations in, Svalbard and Vardo, Norway. Both satellites are healthy based on initial telemetry, and commissioning is underway.

<http://ont.news/2hS99Nq>

Radio Holland Awarded IT Package for Antarctic Supply Research Vessel

Damen Schelde Naval Shipbuilding has awarded Radio Holland a large and innovative contract to supply the IT systems on board the state-of-the-art Antarctic Supply Research Vessel (ASRV) for the Australian Antarctic Division. This three-year newbuild project is exemplary for the fact that Radio Holland provides more and more solutions for demanding and complex IT configurations and functionality. The 160-m ASRV is a survey vessel that combines icebreaking, survey, and supply activities.

<http://ont.news/2vN0Lo9>



September 2017

52

Ocean News & Technology



**DEVELOPING
COST-
EFFECTIVE
FIBER OPTIC
NETWORK
SOLUTIONS**



OSI specializes in full-lifecycle development and management of subsea telecom networks. Serving the oil and gas industry globally, our turnkey solutions offer increased operational efficiency, greater production, and the ability for your team to make decisions faster.

8502 SW KANSAS AVE., STUART, FL USA +1 (772) 219-3000 OCEANSPECIALISTS.COM

MONTH IN REVIEW

NATITUA Submarine Cable System Announced for French Polynesia

OPT and Alcatel Submarine Networks (ASN) have signed a turnkey agreement for the deployment of the NATITUA cable system in French Polynesia.

<http://ont.news/2wBEOG3>

Huawei Marine Delivers SEUL Submarine Cable to BTL in Belize

Belize Telemedia Ltd (BTL) and Huawei Marine announced the successful delivery of BTL's Strategic Evolution Underwater Link (SEUL) project.

<http://ont.news/2uvCWkO>

Alaska Communications, Ciena Boost AKORN Network Potential

Alaska Communications has upgraded its terrestrial and AKORN submarine networks with Ciena to improve Internet access and provide secure, reliable connectivity.

<http://ont.news/2vNI3Ok>

Ocean Engineering



SubCtech
Subsea Technologies



pCO₂ Analyzer

pCO₂ Analyzer

- Auto-calibration & cleaning

Li-Ion Batteries

- Highest capacity, reliability, safety
- Your power source for subsea, AUV, ROV



OceanPack™ FerryBox



Subsea Sensors



AUV Batteries



Battery Systems

Added Value

- MIL-STD, API17, ISO 13628 approved
- IPC class 3 production
- Customizing and personal support



SubCtech GmbH

info@subctech.com

www.gosubsea.com

www.subctech.com

S9

SOUNDNINE INC

Real-time Marine Research and Monitoring Solutions

Discover Ulti-Buoy

Turnkey mooring, data delivery and software



APPLICATIONS

- Temperature Chains
- Power plant discharge
 - Hydro Reservoirs
 - Water Quality
- Telemetry relay from Sub-surface mooring

www.soundnine.com

YOUR "HOMING DEVICE"

SEEKER - Acoustic Directional Receiver

The small and rugged RJE SEEKER is used to assist AUV and ROV operators in tracking underwater beacons and transponders, from 25kHz to 45kHz at full ocean depth.



Enabling ROV and AUV operators to track and relocate

RJEINT.COM | 849-727-8399



COMMUNICATION & SUBSEA CABLES

Arctic Ocean Subsea Cable Project Appoints Telecom and Fed Veteran as Interim CEO

Quintillion, the Anchorage-based company constructing an 1800 km state of the art, subsea fiber optic/broadband network, with landing points in six key Alaska markets located on the Arctic/Northern Slope, has named George M Tronsrue III as its interim CEO, effective immediately, according to a company press release dated 8 August 2017.

Quintillion CEO Elizabeth Pierce resigned in early August, citing personal reasons.

The historic subsea cable system will be connected in the Q4 2017 timeframe to the Quintillion terrestrial fiber optic network capable of transporting massive amounts of data and internet traffic to the lower 48 states and international gateways.

The cable-laying vessel C/V Ile de Batz and several support vessels are currently installing the remaining cable off the northern coast of Alaska. Installation will be completed later this summer and the system is scheduled to go live by December 1, 2017. Once Phase

I in Alaska is complete this year, the Quintillion Subsea Cable System plans to connect Asia to Western Europe via the southern portion of the Northwest Passage through the Alaskan and Canadian Arctic, with potential connections into Northern Canada. For more information, visit qexpressnet.com.



September 2017

54

Ocean News & Technology

ON&T
Ocean News & Technology
www.oceannews.com

A MARINE INDUSTRY DIRECTORY OF
UNMANNED VEHICLES
Mid Year Update

2017 BUYERS' GUIDE
CONNECTING A WORLD OF INDUSTRY PROFESSIONALS

The 2017 Unmanned Vehicles Buyers' Guide Mid-Year Update is here!

You no longer have to search multiple sites to find the information you're looking for. This one-of-a-kind directory includes detailed, comparative product information for ROVs, AUVs, Gliders, Towables and USVs as well as manufacturer contact listings.

Visit www.oceannews.com/directories for more information.

Southern Cross NEXT Seabed Survey Complete, System Operational by 2019

Southern Cross Cables Ltd and EGS have mapped 15,000 km of seabed spanning Clovelly, Australia to Los Angeles, California to optimize the fastest and safest route to lay its US\$350 million Southern Cross NEXT undersea cable.

The aim of the magnetic resonance sounding (MRS) survey was to map the sea floor in order to validate the best route to lay the cable. – this includes avoiding seamounts, trenches and shipwrecks or anything that may pose a threat to the cable in the future.

The survey leg of the project, which began in February, finished ahead of schedule. A Request for Quotation process is now well underway for cable suppliers, with vendor selection expected by the end of this year. The Southern Cross NEXT cable is planned to be operational by late-2019.

The survey found a slightly faster route than first anticipated, shaving further latency off what was already set to be the lowest latency connection between Australia, New Zealand and the United States. Additionally, the survey uncovered a previously-unidentified shipwreck, 37 km off the coast of Sydney – the details have been sent to the New South Wales Office of Heritage and the Environment.

The route was optimized via the Wallis and Futuna waters rather than through the Tongan waters, as originally planned. The new route brings the project closer to the ‘Great Circle Distance’ path (being the shortest theoretical path) and helps ensure the company can offer lower latency than originally designed.

Chief Technology Officer for Southern Cross Cables, Dean Veverka said, “On a survey such as this, you’re effectively hopping from country to country, dealing with different jurisdictions and laws and customs. It’s the finer details of projects such as these that the general population aren’t aware of; it’s not as simple as simply setting sail.”

The company has received firm expressions of intent from eight customers, including Fiji, Samoa, Tokelau and Kiribati. Once laid, the cable will deliver the highest capacity and lowest latency internet connection for Australians, New Zealanders and several Pacific Island nations accessing US-based web services and apps. The cable is expected to provide an additional 60 terabits per second of capacity for customers, adding to the existing 20 terabits of capacity of the current Southern Cross systems.



EGS vessel *Geo Resolution* surveys off Tokelau, a remote group of atolls in the South Pacific Ocean, halfway between Hawaii and New Zealand

Southern Cross Cables Limited provides fast, direct, and secure international bandwidth from Australia, New Zealand and Hawaii to the heart of the internet in the USA. It currently comprises two undersea cables, with the Southern Cross NEXT project providing a third high-capacity link. It engaged EGS, a global specialist multi-disciplinary marine survey company, to undertake the route survey for the new link.

Submarine internet cables have been peer-reviewed to be environmentally neutral, with no negative impact on marine life across the seabed. Further, the survey took place after the whale migration season so that sonar instruments on board did not interfere with the communication between whales during their migration from Antarctica to Australia’s east coast and Fiji.

EGS has now surveyed more than 410,000 km of undersea cable routes in 40 years which, if laid end-to-end, would circle the globe more than 10 times. Put another way, the cables end-on-end would comfortably reach the moon, which is roughly 384,000 kilometres from Earth.

Telecommunications carriers and consortiums have been racing to build subsea cable capacity across the Asia-Pacific region, including Superloop's Indigo subsea cable system; the Trident Subsea Cable; Vocus Communications' Australia Singapore Cable (ASC) and North West Cable System (NWCS); the Hawaiki cable; the Asia-Pacific Gateway (APG); the FASTER cable; and Superloop's Hong Kong cable. For more info, visit www.southerncrosscables.com.

Electromagnetic Weapon Primed for Operational Demos

At the recent Naval Future Force Science and Technology Expo, the Office of Naval Research (ONR) announced that the U.S. Navy's electromagnetic railgun is out of the laboratory and ready for field demonstrations at the Naval Surface Warfare Center Dahlgren Division's new railgun Rep-Rate Test Site at Terminal Range.

Initial rep-rate fires (repetition rate of fires) of multi-shot salvos already have been successfully conducted at low muzzle energy. The next test sequence calls for safely increasing launch energy, firing rates and salvo size. Railgun rep-rate testing will be at 20 megajoules by the end of the summer and at 32 megajoules by next year. To put this in perspective, one megajoule is the equivalent of a one-ton vehicle moving at 160 miles per hour.

"Railguns and other directed-energy weapons are the future of maritime superiority," said Dr. Thomas Beutner, head of ONR's Naval Air Warfare and Weapons Department. "The U.S. Navy must be the first to field this leap-ahead technology and maintain the advantage over our adversaries."



The revolutionary railgun relies on a massive electrical pulse, rather than gunpowder or other chemical propellants to launch projectiles at distances over 100 nmi — and at speeds that exceed Mach 6, or six times the speed of sound. That velocity allows projectiles to rely on kinetic energy for maximum effect and reduces the amount of high explosives needed on ships.

[Read more:<http://ont.news/2vuujEm>](http://ont.news/2vuujEm)



ROV solutions for windfarm inspection and monitoring

Discover ECA Group range of robotic solutions for video inspection and control of:

- Underwater structures of windfarms, whether anchored onto the sea bottom, or of floating type
- Connection cable networks between the windfarm and the coast line.

Discover all
our ROV solutions

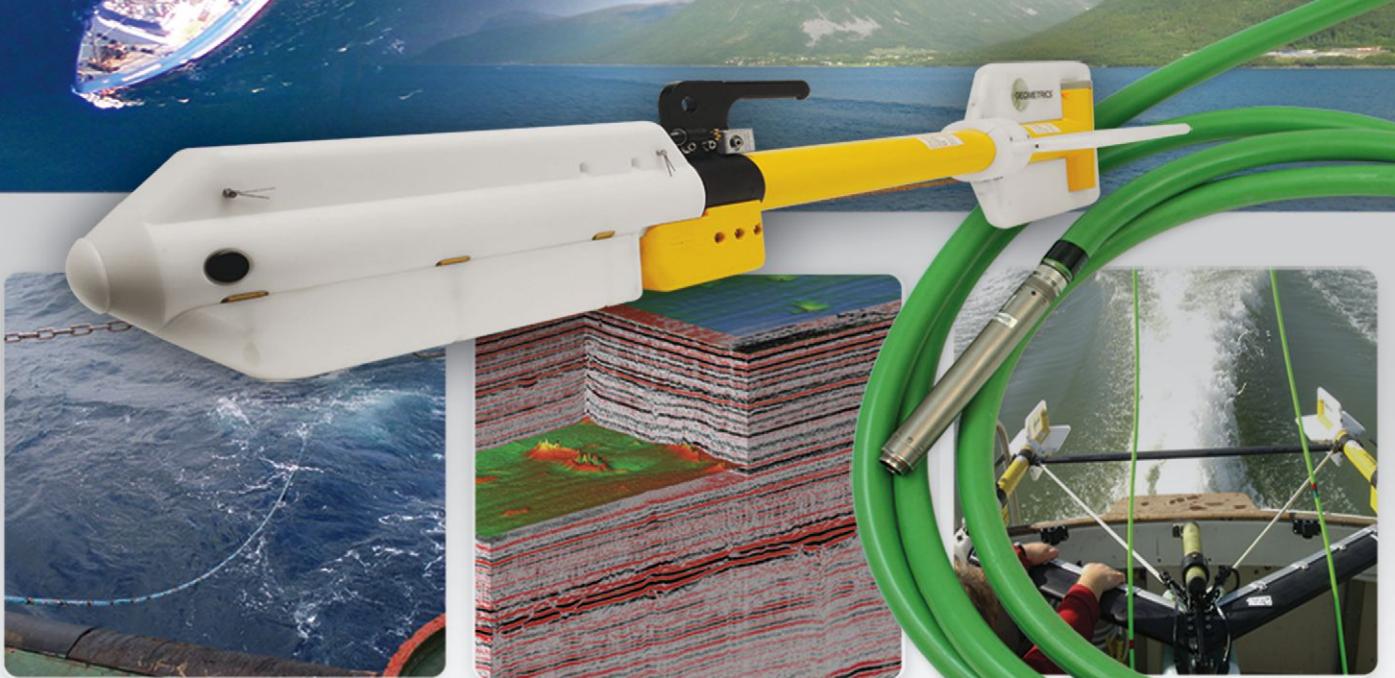


HYTEC™

contact@ecagroup.com | www.ecagroup.com

Marine Streamers & Magnetometers

Used everywhere



Geometrics, Inc. 2190 Fortune Drive, San Jose, California 95131, USA

Phone: 408.954.0522 • Fax: 408.954.0902

Email: sales@mail.geometrics.com



GEOMETRICS

Innovation • Experience • Results

Sales & Rentals Available • Visit us at: www.geometrics.com



Lockheed Martin Demonstrates LRASM's Surface Ship Launch Capability

Lockheed Martin successfully conducted the first-ever launch of the Long Range Anti-Ship Missile (LRASM) surface-launch variant from a topside canister. The flight test, at White Sands Missile Range, New Mexico, proved the missile's ability to conduct an angled launch from the newly designed topside canister, replicating a ship-launched environment. During the test, the LRASM, its Mk-114 booster, and booster adapter ejected cleanly from the topside launcher using the same launch control and launch sequencer software currently employed by the Mk-41 Vertical Launch System (VLS).

<http://ont.news/2wQbpHt>

Ingalls Shipbuilding Completes Builder's Trials for DDG 114

Huntington Ingalls Industries' Ingalls Shipbuilding division announced the successful completion of builder's sea trials on the guided missile destroyer Ralph Johnson (DDG 114). The Arleigh Burke (DDG 51) destroyer spent more than three days in the Gulf of Mexico testing the ship's main propulsion, combat and other ship systems. "It's always a great accomplishment when our shipbuilders successfully take a ship to sea for the first time," Ingalls Shipbuilding president Brian Cuccias said. "DDG 114's sea trials showcase the skill of our shipbuilders and our large, national DDG 51 supplier base."



September 2017

58

Ocean News & Technology



SENSORS FOR:
Ocean, Harbors
Intracoastal
Lakes, Ponds
Wave Tanks

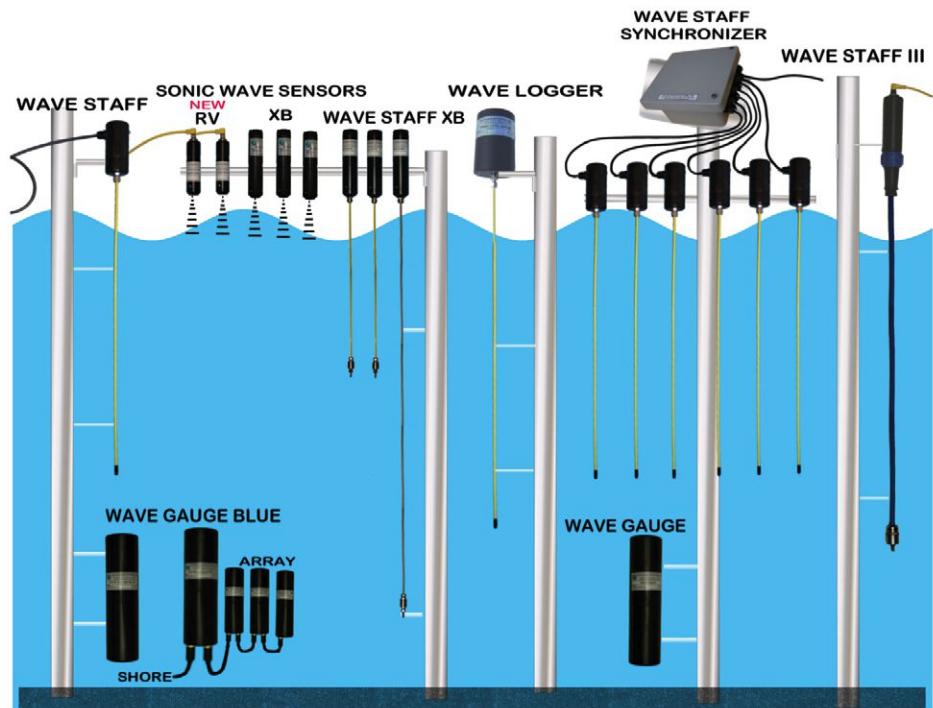
MEASURE:
Waves
Tides
Levels

DATA VIA:
Cable
Logger
Wireless

WE SUPPLY:
Tech Support
Software
Accessories
Custom Work

Ocean Sensor Systems

For Details Visit Us on the web or call 954-796-6583 USA
WWW.OCEANSENSORSYSTEMS.COM



MONTH IN REVIEW

BAE to Launch UK's First Maritime Autonomous Systems Testing Service

The Solent Local Enterprise Partnership (LEP) has awarded BAE Systems a grant to design and deliver the UK's first dedicated autonomous systems testing service.

<http://ont.news/2uxWjWs>

Fincantieri Begins Work on Italian Navy Multipurpose Amphibious Unit

The steel cutting ceremony of the multipurpose amphibious unit took place in July at Fincantieri's shipyard in Castellammare di Stabia.

<http://ont.news/2uOxnJt>

SubConn® Connectors Selected by Finnish Defense Contractor

The underwater mateable rubber moulded SubConn® Micro connectors have been selected by DA-Design OY for underwater technology applications.

<http://ont.news/2vNshlg>

AMETEK
SCP®, INC.

PBOF: Pressure Balanced Oil Filled Cabling, Connectors and Pressure Vessels

- Long Life: 2-3x PU Assemblies
- Repairable and Reconfigurable
- Crimped / Compression Fittings Available



Let Us Help You With Your PBOF Project!



OCEAN AERO
Accelerating Discovery

"Advancing Discovery"
The Submaran™ series of autonomous Unmanned Hybrid Surface & Subsurface Vehicles

**Science
Engineering
Security
Defense**



Visit us at **Oceans Anchorage 2017**
Booth 809

www.oceanaero.us

icListen

The New Digital Hydrophone Array

- Track, Locate and Detect
- Improve Signal Performance
- Use Beam Steering



Ocean Sonics

The Smart Hydrophone Company

OceanSonics.com

All Eyes Focus On Oil; Natural Gas May Be Just As Important

The global energy scene is consumed with debate over whether the OPEC agreement to cut its oil exports, which was supported by several non-OPEC countries, importantly Russia, will actually work to bring inventories back to historical levels. The assumption is that when inventories reach that target, crude oil prices will rise to levels at which producers will find most of their projects to be profitable. Every day is consumed with commentary about oil demand growth, new supply developments, OPEC's spare production capacity, the impact of electric vehicles on oil use, and so forth. Little attention, however, is directed to what is happening in the natural gas market, except among the board rooms of oil producers.

For decades, natural gas has been in the backwater of energy markets. Due to its chemistry, moving natural gas from wellheads to burner tips is a challenge. One of the more famous uses of natural gas occurred about 1000 B.C. at the Oracle of Delphi, on Mount Parnassus in ancient Greece. Later, around 500 B.C., the Chinese built crude bamboo "pipelines" to move natural gas seeping from the ground to where it was used to boil seawater to get drinkable water.

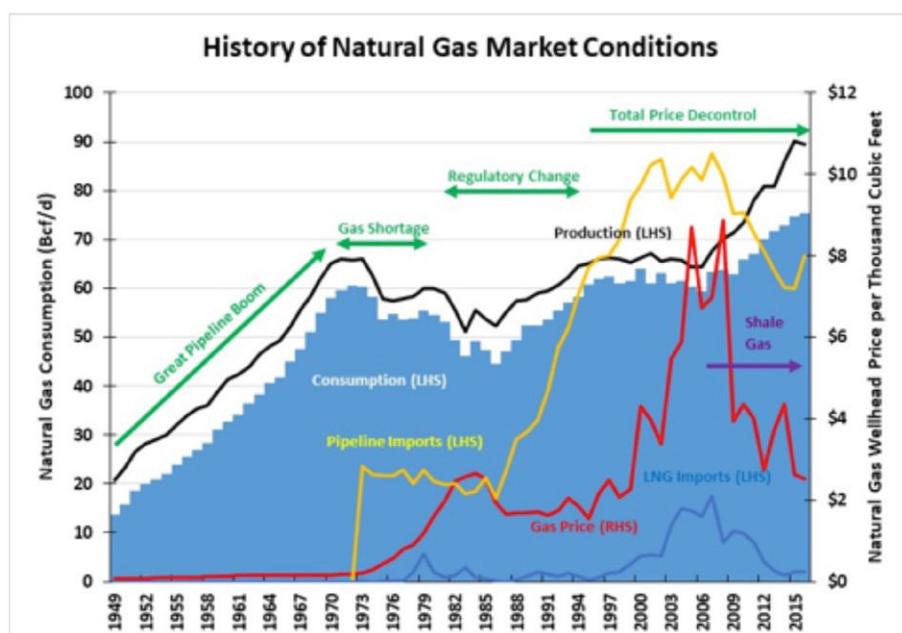
The commercial natural gas business began by tapping the gas released from coal to light houses and streets, initially in Britain around 1785 and then in Baltimore, Maryland, in 1816. Much earlier, natural gas seeping from the ground was discovered by French explorers around Lake Erie, which eventually led to digging the

first successful natural gas well in 1821 near Fredonia, New York.

During most of the 19th century, natural gas was used almost exclusively to produce light. In 1885, Robert Bunsen's invention, the Bunsen burner, opened new opportunities for natural gas. With the construction of workable pipelines in the 20th century, natural gas use expanded to home heating and cooking, and then for fueling boilers to generate electricity.

Internationally, the use of natural gas was limited, largely because it was found in regions far removed from civilization. The ability to construct pipelines to move the gas thousands of miles through deserts, over mountains and under oceans was limited, assuming they could even be financed. Thus, natural gas reserves found in North Africa, Siberia, Alaska, Australia, and the Andes were more of a problem than a success. However, by the middle of the 17th century, Robert Boyle had derived the inverse relationship between the pressure and the volume of gases. This led to experiments to liquefy gases, all of which was achieved by the early years of the 20th Century.

The first large-scale liquefaction of natural gas was done in 1918 in the U.S. The government was tasked with separating helium from natural gas in order to fill British dirigibles during World War I, but the effort to liquefy natural gas was expensive. Expanding our LNG receiving capacity happened just as gas demand growth



By: G. Allen Brooks
 Author of "Musings From the Oil Patch"
www.energymusings.com



slowed and U.S. supply began growing. Now, due to the supply surge from gas shales, the U.S. exports LNG, seeking to compete in the global gas market. Because gas is cleaner than coal and oil, this market is growing in response to concerns over carbon emissions.

To appreciate the history of natural gas in the United States, the chart on the left below shows the history of all the key variables impacting gas since 1949. We see the rapid growth of gas experienced during the 1950s and 1960s, and when it stopped at the start of the 1970s as gas supply tightened, leading to sharply higher prices. Those higher prices accomplished two things — increased supply and lowered demand. At that time, conventional wisdom predicted the U.S. would always be short of gas, which opened the door for increased imports via pipelines. There was also a spurt in LNG deliveries, which subsequently fell due to its significantly higher price versus domestic and Canadian gas imports. As time passed, the U.S. gas market was supplied by a mixture of pipeline import and domestic supply, but when demand resumed growing, we needed additional supplies. Eventually, more LNG supply was also needed.

This need for more supply occurred in the late 1990s and early 2000s, when we also experienced spikes in natural gas prices — largely due to bouts of super cold weather that taxed the U.S. natural gas market. These high prices kick-started the shale gas revolution. As we moved closer to current times, shale gas supply growth

began pushing out LNG, once again, and then cutting into pipeline imports. The lines showing pipeline and LNG imports demonstrates their speed of growth and then contraction. Those declines coincided with the sharp fall in natural gas prices to levels that prevailed during the 1980s and 1990s. The question confronting the domestic natural gas market now is whether these current conditions — low gas prices, expanding domestic gas supply, and shrinking pipeline and LNG imports — will continue.

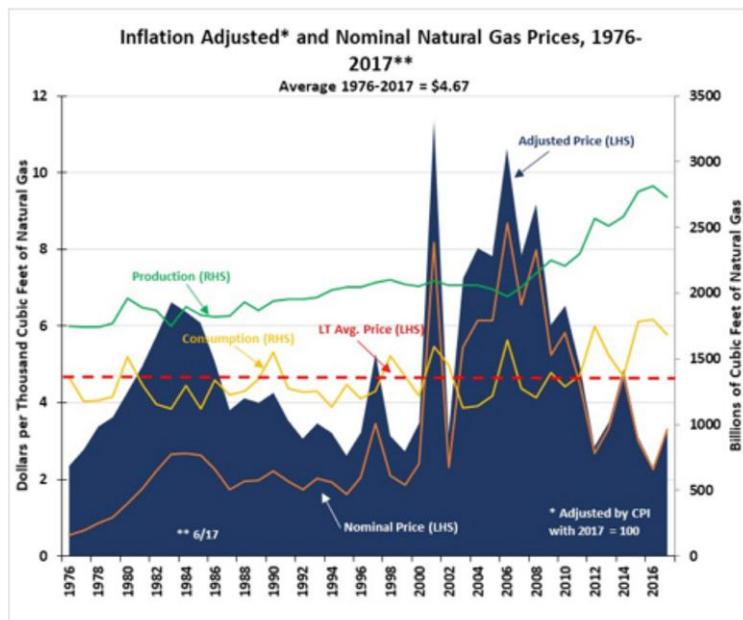
No one knows the future, but in seeking guidance, we produced a chart (below) showing inflation adjusted wellhead prices since 1976, along with nominal gas prices. The inflation adjusted price over this period averaged \$4.67 per thousand cubic feet of gas. The current gas price of \$2.94/Mcf is well below that historic average, with little hope of reaching that level anytime soon. The price is much closer to the nominal average price of \$3.08/Mcf.

Much like oil, our first period of super-high gas prices in the late 1970s and early 1980s was followed by nearly two decades of low gas prices. The recent bout with super-high gas prices, which lasted longer than the earlier one, may result in us having to experience another extended period of low gas prices as the market readjusts. A target of \$3.50/Mcf may be the best price we can expect. Watch gas supply growth as an indicator of whether history is repeating.

September 2017

61

Ocean News & Technology



OFFSHORE STATS & DATA

Crude & Natural Gas Spot Prices

Prices in USD as of August 7, 2017

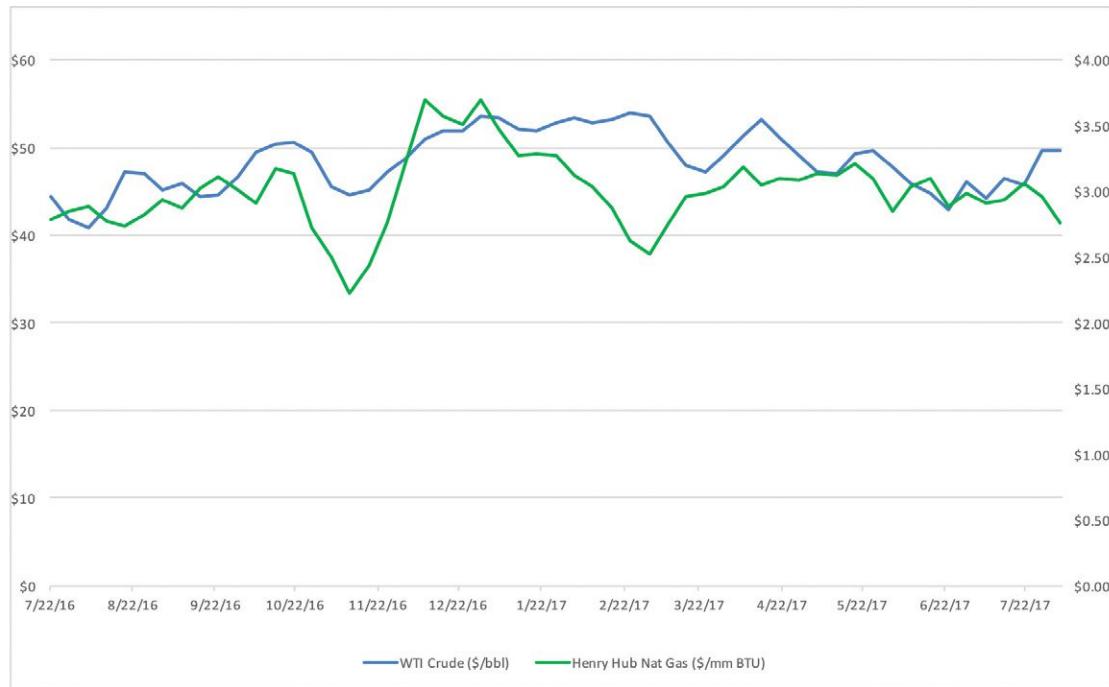
Oil output continues to increase as OPEC reported that July output reached its highest levels since December. Output in July reached 173,000 bpd, well above the 145,000 bpd that was forecast. The increased output continues to be driven by Libya and Nigeria. OPEC nations agreed to lower production in January, but Libya and Nigeria were exempt from the agreement to allow their oil production to recover from years of internal turmoil. But others, including Saudi Arabia, still produced at a higher rate than called for in the agreement.

Henry Hub natural gas spot prices closed at \$2.76 as of 8/4/2017 reflecting a decline of \$0.18 from our last report as global supplies remain strong. Strong production levels in the United States continue and the EIA reports that 2017 will see the U.S. become a net natural gas exporter. Three of the first five months of the year already saw U.S. exports exceed imports and the trend is expected to continue, not just in 2017 but through 2018 as well. High levels of exports of natural gas to Mexico are helping drive the shift.

September 2017

62

Ocean News & Technology



\$49.57

\$46.53 previous month



TRENDING UP



Cushing, OK
WTI Spot Price

\$2.76

\$2.94 previous month



TRENDING DOWN



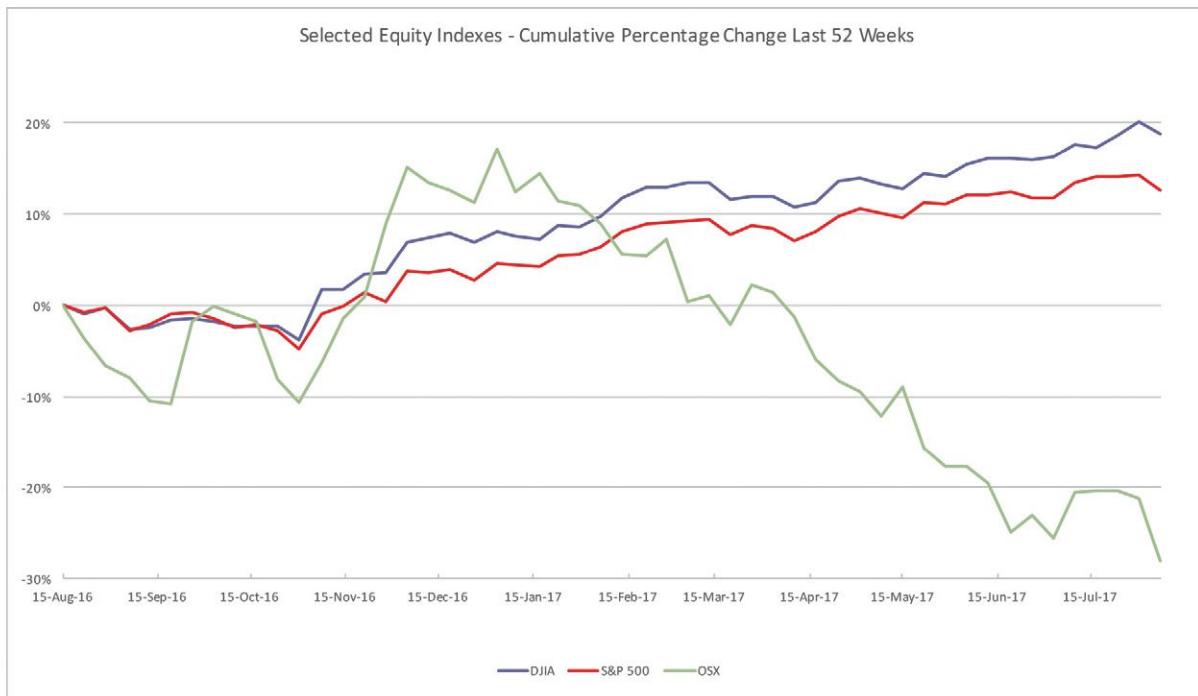
Henry Hub
Spot Price

Oil & Gas Industry Trends

Key Equity Indexes

Prices in USD as of August 7, 2017

The U.S. equity markets continued strong with the DJIA surpassing 22,000 in early August. Over the last 52 weeks, the DJIA is up by 24.53% and the S&P 500 is up by 18.65%. Tensions over North Korea, however, have begun to drag the markets back down. The struggles of the companies in Philadelphia Oilfield Services Index (OSX) continue, as shown in the chart below. The OSX has dropped by nearly 21% over the last 52 weeks. The slump by oil service stocks comes amid a decrease by the price of crude oil, although there was a small uptick in WTI pricing to nearly \$50/bbl in late July and early August versus priced in the low to mid \$40 range through most of June and July.



21,858.32

+246.54 from previous month



TRENDING UP

DJIA

2,441.32

+32.13 from previous month



TRENDING UP

S&P 500

123.08

-11.61 from previous month



TRENDING DOWN

OSX

2017 EVENTS

September 2017

64

Ocean News & Technology

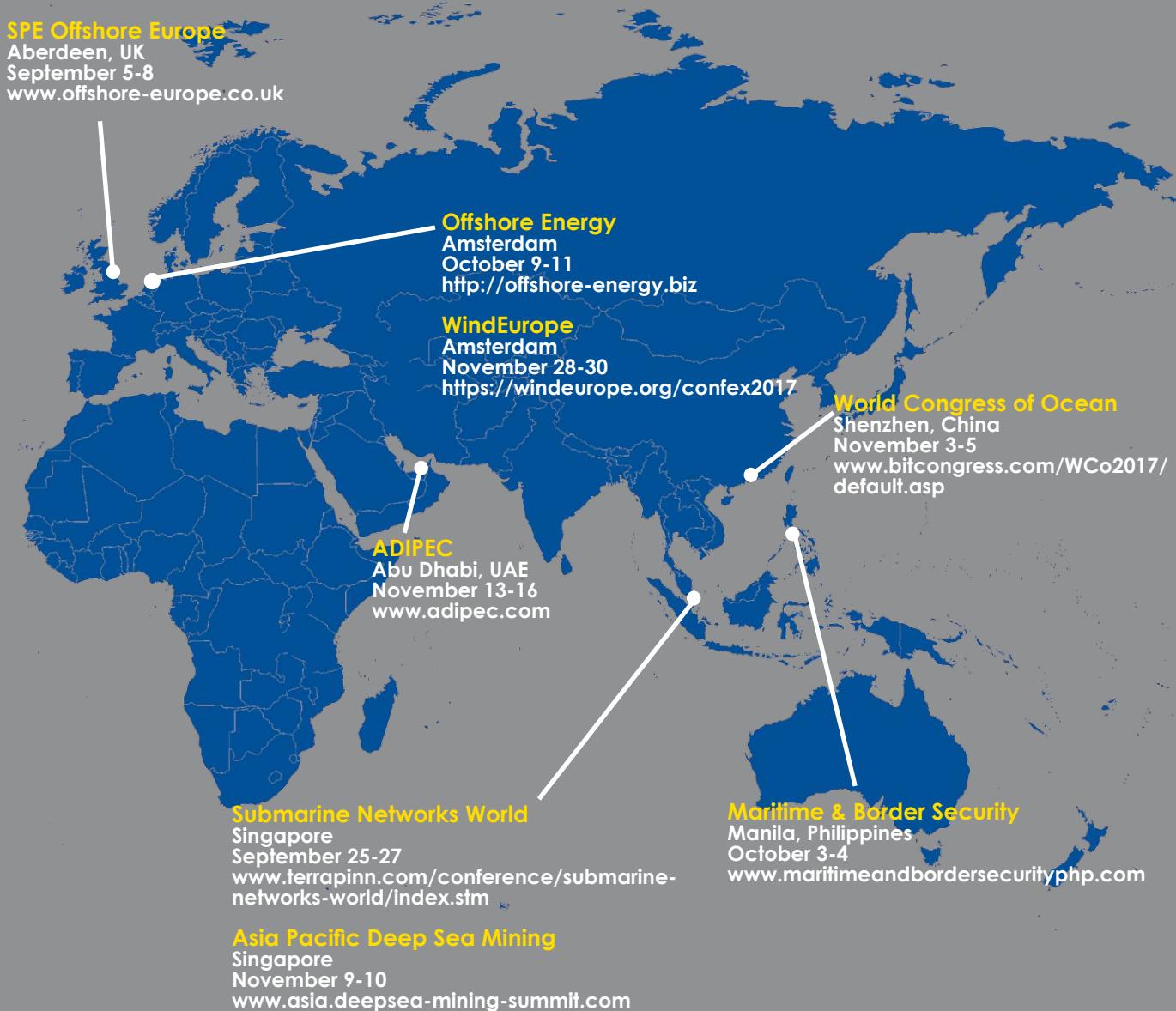
Oceans' 17
Anchorage, AK
September 17-21
www.oceans17mtsieeanchorage.org

Pacific Marine Expo
November 16-18
Seattle, WA
www.pacificmarineexpo.com

Teledyne Marine Technology Workshop
San Diego, CA
October 15-18
www.teledynemarinecom/events/teledyne-marine-technology-workshop-2017



Clean Gulf
Houston, TX
December 5-7
<http://interventiongom.offsnetevents.com>



2017 EDITORIAL CALENDAR

ON&T

CALENDAR

JANUARY

Editorial: Underwater Navigation; Manned Submersibles Research & Development Services
Product & Services Focus: Multibeam & Side Scan Sonar; Research & Development Services

FEBRUARY

Editorial: Oceanology & Meteorology; Decom & Abandonment
Product & Services Focus: Buoys & Monitoring Instrumentation; Environmental Monitoring/Testing Services

MARCH

Editorial: Subsea Fiber Optic Networks; Maritime Security
Product & Services Focus: Connectors; Cables & Umbilicals; Diver Detection Systems

APRIL

Editorial: Offshore Technology; Ocean Mapping & Survey
Product & Services Focus: Subsea Tools & Manipulators; Batteries; Training/Safety

MAY

Editorial: Autonomous Unmanned Vehicles; Defense & Naval Systems
Product & Services Focus: Tracking & Positioning Systems; Seismic Monitoring; Equipment Leasing/Rental Services

JUNE

Editorial: UW Imaging & Processing; Marine Salvage/UW Archaeology
Product & Services Focus: Magnetometers; Water Dredges & Airlifts; Diving Services

September 2017

66

JULY – Digital Distribution Only

Editorial: Ocean Engineering; Marine Construction
Product & Services Focus: Navigation, Mapping & Signal Processing; Data Processing Services

AUGUST

Editorial: Workclass ROVs; Deepwater; Pipeline/Repair/Maintenance
Product & Services Focus: Cameras, Lights & Imaging Sonars; Oil Spill Clean-Up Services

Ocean News & Technology

SEPTEMBER

Editorial: Ocean Observing Systems; Subsea Telecom; Offshore Wind Installation & Maintenance
Product & Services Focus: Water Sampling Equipment; Cable Installation Services

OCTOBER

Editorial: Offshore Communications; Subsea Inspection, Monitoring, Repair & Maintenance
Product & Services Focus: Acoustic Modems, Releases & Transponders; Marine Communications; Survey & Exploration Services

NOVEMBER – Digital Distribution Only

Editorial: Offshore Support, Supply & Emergency Vessels; Deep Sea Mining
Product & Services Focus: Ship Protection Systems; Cranes, Winches & Control Systems; Vessel Charter/Leasing Services

DECEMBER

Editorial: Light Workclass ROVs; Commercial Diving; Year in Review
Product & Services Focus: Diving Equipment & Services; Buoyancy Materials; Construction & Repair Services

SHOW DISTRIBUTION

JANUARY

UDT Asia – January 17-18*
Marine Data Infrastructure GCC – January 30-31*
Euromaritime January 31– February 2
GoM Oil Spill & Ecosystems – February 1-9
Oil North America – February 14-16

FEBRUARY

Underwater Intervention – February 21-23
US Hydro – March 20-23*

MARCH

Canadian Underwater Conf & Expo – March 26-28 Ballast Water Management – March 29-30
MCE Deepwater Development – April 3-5
Ocean Business – April 4-6
Telecom Exchange – June 20-21*

APRIL

Int'l Offshore Wind Forum – April 19-21*
OTC – May 1-4
AUVSI XPONENTIAL – May 8-11
IOSC – May 15-18
Deepwater Decomm Workshop – May 23-24*

MAY

UDT – May 30 – June 1
Offshore Wind Energy Europe – June 6-8
Seawork Int'l – June 13-15

JUNE

Teledyne CARIS User Workshop – June 19-22*
TBD

AUGUST

SPE Offshore Europe – September 5-8

SEPTEMBER

Oceans 17 – September 17-21
AWEA Offshore Wind – October 24-25♦
WindEurope November 28-30

OCTOBER

Oilcomm – October 3-5
MTS Dynamic Positioning – October 9-11
Offshore Energy – October 9-11
Teledyne Marine Technology Workshop – October 15-18
Offshore Well Intervention GoM – November 1-3*♦
Clean Gulf – December 5-7

NOVEMBER – Digital Distribution Only

World's Congress of Ocean – November 3-5*
International Workboat – November 29 – December 1*

DECEMBER

TBD

* Digital Distribution Only
♦ Pending



ADVERTISING

Lisa Chilik
574-261-4215
lchilik@tscpublishing.com

Mimi Shipman
+44 (0) 777 601 7564
mshipman@tscpublishing.com

Meagan Kohls
985-519-0583
mkohls@tscstrategic.com

EDITORIAL

MANAGING EDITOR
Greg Leatherman
772-617-6795
gleatherman@tscpublishing.com

EDITOR
Rhonda Moniz
Phone: 506-951-4896
rmoniz@tscpublishing.com

IMPROVING OIL AND HAZARDOUS MATERIALS SPILL
PREVENTION, PREPAREDNESS AND RESPONSE FOR INLAND,
OFFSHORE AND COASTAL INCIDENTS.



DECEMBER 5-7, 2017

George R. Brown Convention Center

HOUSTON, TX

REGISTER ONLINE USING
VIP CODE ONT17 TO
RECEIVE \$50 OFF A
FULL CONFERENCE PASS!

www.cleangulf.org

28789

September 2017

67

Ocean News & Technology



THIS YEAR, THE WIND INDUSTRY
WILL BE MEETING IN
AMSTERDAM

28 - 30 NOVEMBER 2017

Amsterdam RAI Exhibition and Convention Centre

BOOK YOUR STAND

Wind Europe • **CONFERENCE & EXHIBITION**
2017 28-30 NOVEMBER
AMSTERDAM

In partnership with:



To become an exhibitor
or sponsor please contact:

sales@windeurope.org



Find out more at:
windeurope.org/confex2017

ONT&

MILESTONES



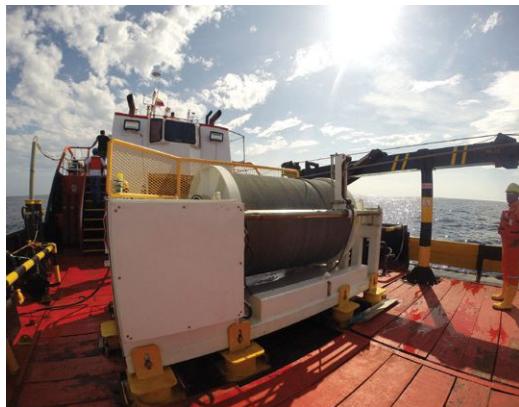
Official Launch of the Ocean Phoenix Project

Christophe J. Poizat, partner in the Ocean Phoenix Project, announced that SAS OCEAN PHOENIX is proud to present the concept of a giant factory-ship capable of eradicating the layers of plastic waste in the north Pacific Ocean and other oceans around the world. The design of this giant factory-ship, named "Ocean Phoenix," enables the retrieval, compression, and packing of ocean pollution in accordance with road transportation regulations. Each of these steps will take place on the Ocean Phoenix prior to the transferal of the waste to an accompanying support vessel, that will transport it onshore for recycling.

<http://ont.news/2uVBTGc>

Okeanus Science & Technology Acquires DT Marine Products

Okeanus Science & Technology, LLC has acquired the business assets of DT Marine Products, Inc. (DT Marine) of Houston, Texas. This acquisition will allow Okeanus to offer for sale or rental DT Marine's full catalog of marine and oceanographic winches to customers around the world. The acquisition will also give Okeanus a new presence in Houston, expanding the company's capabilities in the Gulf of Mexico region and complementing its existing offices in Houma, Louisiana and Redmond, Washington. Founded in 1999, DT Marine has an established track record of building durable, high-quality winches, and customers have come to depend upon their reliability and effectiveness for projects around the world. <http://ont.news/2w6En94>



September 2017

68

Ocean News & Technology

OilComm
Conference & Exposition



Co-located with

FleetComm

October 4 - 5, 2017 | Houston Marriott Westchase | Houston, TX

**Remote & mobile industries require first-class communications.
Find the technology you need in Houston this fall.**



**Use VIP Code: OCEAN for 25% off the Conference,
or a FREE Expo Hall Pass!**

30534



WHOI Announces 2017 Ocean Science Journalism Fellows

Eight writers, radio, and multimedia science journalists from the U.S., Canada, England, and India have been selected to participate in the competitive Woods Hole Oceanographic Institution (WHOI) Ocean Science Journalism Fellowship program. The program takes place 10-15 September 2017, in Woods Hole, Massachusetts, on Cape Cod. This year's fellows are:

Kate Allen, Toronto Star

Janet Babin, WNYC radio

Sean Gallagher, National Geographic Creative

Lindsey Hoshaw, KQED radio

Rhonda Moniz, Ocean News & Technology Magazine

Shadab Nazmi, BBC News

Laura Picardo, NBC Learn

Amy West, freelance journalist

<http://ont.news/2fHT47>

ASL Announces its 2017 Acoustic Zooplankton Fish Profiler Award Winner

The recent submissions for the 2017 AZFP early career scientist award exceeded expectations. The award selection committee of ASL is happy to announce that Dr. Susannah Buchan will receive, free of charge, a multi-frequency AZFP for a three-month deployment to conduct research on the spatial distribution of prey and baleen whale species off Isla Chañaral, northern Chile. This area, within the Humboldt Current System, is considered one of the most productive marine environments on the planet and sustains the highest fishery catches in the world.

<http://ont.news/2uCDDcc>



PPR Alaska Otter Series Skimmers

Innovative • Efficient • Versatile • Disruptive

Designed for Arctic Conditions

Recovers down to 1 micron sheen (Type I-Type V oils) @ 98% O.R.E.

Utilizing vacuum & specific gravity

No moving parts or mechanical means



PACIFIC PETROLEUM RECOVERY ALASKA

www.ppralaska.com

844.311.8334 - PO Box 240961 Anchorage, Alaska 99524

Introducing the New 2017 Ocean Industry Directory

The Ocean Industry Directory (OID) provides a dedicated solution for finding the product and service providers you need to complete marine projects efficiently and effectively. Avoid the confusion of searching multiple directories that are incomplete or fail to consolidate ocean industry companies in one place. The Ocean Industry Directory is a unique collection of ocean-oriented businesses that takes the mystery out of corporate listings by distinguishing between manufacturers, sellers, rental agents, and service providers.

Get Listed!

Exposure across multiple media channels is important in today's competitive marketplace. The Ocean Industry Directory is featured in every issue of Ocean News & Technology's print and digital magazines. In addition, the Ocean Industry Directory is a key component of www.oceannews.com and updated monthly.

If you're interested in becoming a part of the Ocean Industry Directory, consider the benefits of adding your own corporate listing and contact your sales representative to discuss your options.

SeaCatalog Partnership

ON&T is proud to announce our partnership with Seacatalog.com, the premier online marketplace for ocean industry professionals to obtain equipment and supplies for projects around the world. Enhance the value of your company's Ocean Industry Directory listing with a Seacatalog.com vendor account where customers can easily go to buy, rent or request a customized quote for your products. Join now and we'll add a Seacatalog.com member badge to your listing at no extra cost.

September 2017

70

Ocean News & Technology

EQUIPMENT RENTAL

OKEANUS SCIENCE & TECHNOLOGY, LLC

2261 Denley Road
Houma, LA 70363
Tel: 985-346-4666
Fax: 985-346-8444
E-mail: Bleblanc@okeanus.com
Website: www.okeanus.com
Contact: Benton LeBlanc



Okeanus is the premier rental provider for oceanographic and marine scientific research equipment utilized in nearshore and offshore projects around the world. Focused on providing industry-leading customer service, Okeanus offers advanced, high-quality technology coupled with knowledgeable and experienced staff that can deliver dedicated support regardless of a project's location.

 SeaCatalog Vendor

To find out more, contact your sales representative today!

	Free Plan Digital Only Listing	Silver Plan \$500 Digital Only Listing	Gold Plan \$950 Digital & Print Listing
Company name, address, phone number, and website	●	●	●
Link to chosen categories for products and services	●	●	●
Corporate Logo		●	●
100-word company introduction		●	●
Sales contact name and email		●	●
One corporate document upload		●	●
Print listing for one category			●



TSC Representatives

North American Ad Sales:

Lisa Chilik
Tel: 574-261-4215
Fax: 772-221-7715
lchilik@tscpublishing.com

Meagan Kohls
Tel: 985-519-0583
mkohls@tscstrategic.com

International Ad Sales:

Mimi Shipman
Mobile: +44 (0) 777 6017 564
Tel: +44 (0) 1460 242 060
mshipman@tscpublishing.com

ACOUSTIC SYSTEMS

APPLIED ACOUSTIC ENGINEERING LTD

Marine House, Garton Hall Road
Great Yarmouth, NR31 0NB, UK
Tel: +44 (0) 1493 440355
Fax: +44 (0) 1493 440720
E-mail: gavinwilloughby@appliedacoustics.com
Website: www.appliedacoustics.com
Contact: Gavin Willoughby



Manufacturer of fully integrated USBL acoustic tracking systems, both portable and vessel based, high quality multi-system compatible beacons for acoustic positioning and release, and seismic sub-bottom profiling systems for coastal, offshore or geohazard surveys. All products are supported by a network of overseas representatives providing a first class service on a global scale.

OCEAN SONICS LTD.

11 Lornevale Road
Great Village, NS, B0M 1L0
Tel: +1 902 655 3000
E-mail: info@oceansonics.com
Website: www.oceansonics.com



Ocean Sonics designs and manufactures the icListen, a compact self-contained easy to deploy digital hydrophone. As the world leader in gathering ocean sound, Ocean Sonics combines very high signal performance with innovative ease of use, to give customers the best digital hydrophone technology available. It's a compact, all-in-one instrument capable of processing data while collecting in real-time

Creating Acoustic Arrays is now simple. Connect two or more icListen hydrophones together and they self-synchronize, operating as one. Ocean Sonics offers a wide range of geometries, including vertical, horizontal, autonomous, very small geometrical arrays, or spread out over many kilometres.

RTSYS

25 rue Michel Marion
56850 Caudan, France
Tel: +33 297 898 580
E-mail: info@rtsys.eu
Website: www.rtsys.eu



- Acoustic Monitoring: EASDA14, Embedded Multichannel Passive Acoustic Recorders
- WiFi remote Buoy: BASDA14, Multi-sensor & Rechargeable Acoustic Buoy accessible in Real-time
- Sediment Characterization: INSEA, Acoustic Velocimeter for Sediment Characterization

We provide advanced embedded acoustic products in the environmental research, surveying and monitoring areas. With Synchronized Multichannel Acquisition and accepting a broad range of Acoustic Transducers and Hydrophones from 3Hz to more than 1MHz, our solutions allow the user a new range of applications.

HIGH TECH, INC

21120 Johnson Road
Long Beach, MS 39560, United States
Tel: 228 868 6632
Email: high_techinc@bellsouth.net
Website: www.hightechincusa.com
Contact: Glenn Pollock



HIGH TECH, INC.

Experts in rugged marine sensor systems utilized in geophysical surveys, anti-submarine warfare, marine mammal monitoring and downhole applications. Products include data acquisition systems, hydrophones, array cables, pressure vessels and peripherals related to marine systems.

ADCP/DVL

NORTEK AS

Vangkroken 2
1351 Rud, Norway
Tel: +47 67 17 45 00
E-mail: inquiry@nortek.no
Website: www.nortekgroup.com



Nortek excels in the development and manufacture of acoustic Doppler instrumentation. Doppler Velocity Logs (DVLs) are used for subsea navigation. Acoustic Doppler Current Profilers (ADCPs) are used to understand physical processes in the ocean, rivers, lakes and laboratories. We pride ourselves on being innovative in product development and production processes. Nortek provides solutions to engineers and scientists by offering real-time data collection and support from our responsive technical team.

ROWE TECHNOLOGIES, INC.

12655 Danielson Ct., Suite 306
Poway, CA 92064
Tel: 858 842 3020
E-mail: sales@rowetechinc.com
Website: www.rowetechinc.com
Contact: Chris Arends, Global Sales Director



Rowe Technologies Inc. [RoweTech] specializes in the design and manufacture of underwater acoustic Doppler products and imaging systems for the oceanographic, hydrographic and hydrologic markets. Founded in 2009, Rowe Technologies is a technology-based private company with the main office located in Poway CA, USA. Rowe's ADCP/DVL competitive advantage is single-unit configuration which allows simultaneous current profiling and bottom tracking.

BUOYS

METOCEAN TELEMATICS

21 Thornhill Drive Dartmouth,
Nova Scotia B3B 1R9 Canada
Tel: +1 902 468 2505
Fax: +1 902 468 4442
E-mail: emily@metocean.com
Website: www.metocean.com
Contact: Emily MacPherson



MetOcean Telematics designs and manufactures drifting buoys, environmental platforms, and the world renowned NOVATECH locator beacon product line. In addition to providing complete end-to-end telematics services, and one of the few manufactures in the world to achieve ISO 9001 certification, MetOcean Telematics's drifting buoy family consists of environmental and weather monitoring, oil spill response, and search and rescue drifters: NOVA profiling float, Iridium SVP (iSVP), iSPHERE, Argosphere, SLDMB, and iSLDMB.

BUOYANCY PRODUCTS

DEEPWATER BUOYANCY, INC.

39 Hill Street
Biddeford, ME 04005
Tel: +1 207 502 1400
Fax: +1 207 221 5718
E-mail: sales@deepwb.com
Website: www.DeepWaterBuoyancy.com
Contact: Dan Cote, Sales Manager



DeepWater Buoyancy creates subsea buoyancy products for leading companies in the oceanographic, seismic, survey, military and offshore oil & gas markets. Thousands of customers have relied on our products for over thirty-five years, from the ocean surface to depths exceeding six thousand meters.

NAUTILUS MARINE SERVICE GMBH

Alter Postweg 24
Buxtehude, 21614, Germany
+49 (0) 41618 66250
info@nautilus-gmbh.com
www.vitrovex.com
Contact name: Steffen Pausch



Nautilus Marine Service provides the finest VITROVEX® glass housings that are capable of operating in the most extreme regions of the Earth. VITROVEX® glass enclosures offer the dual advantage of buoyancy and pressure proof housings - a perfect combination for small and autonomous underwater instrumentation packages. Simple, reliable and affordable.

SUBSALVE USA

P.O. Box 2030
North Kingstown, RI 02852
Phone: 401-884-8801
Fax: 401-884-8868
E-mail: richard@subsalve.com
Website: www.subsalve.com
Contact: Richard Fryburg



Since 1977 Subsalve USA has been America's #1 manufacturer of standard and custom flotation devices and we are the innovators in buoyancy and engineered inflatables. Our products include: Professional, Commercial, Standard, Shallow Water, Enclosed Flotation Bags, Cable & Pipeline Floats, Water Load Test Bags, Rapid Recovery & Mark VI/ORCA EOD Systems.

OCEAN INDUSTRY DIRECTORY

CABLES

A-2-SEA SOLUTIONS LTD

Unit 15 Romsey Industrial Estate,
Romsey, Hampshire SO51 0HR,
United Kingdom
Tel: +44 (0)1794 830 909
E-mail: ross@a2sea.co.uk
Website: www.a2sea.co.uk
Contact: Ross Taylor



In the past 20 years, A-2-Sea Solutions Ltd has had significant involvement in major submarine cable installations, on behalf of manufacturers, purchasers and installers of sub-sea cable systems – operating worldwide.

From initial beginnings in submarine cable joint design and system maintenance, A-2-Sea are now providing customers with turnkey solutions for short haul cable system installations. Other key business areas include: product design and development, coastal and offshore survey, provision of beach and subsea cable joints, cable system maintenance with a 365/24/7 emergency hotline rapid response service.

In 2016, A-2-Sea Solutions was ranked 13th on the UK Sunday Times SME Export Track 100 league table and 21st on the Fast Track 100.

CORTLAND COMPANY

10333 Richmond Ave
Suite #1000
Houston TX 77042-4128
Tel: +1 (832) 833-8000
Fax: +1 (832) 833-8002
E-mail: cortland@cortlandcompany.com
Website: www.cortlandcompany.com
Contact: Marco Cano



Cortland has more than 30 years of manufacturing experience supplying custom-designed electro-optical-mechanical cables. We provide solutions that meet the challenges posed by harsh environments, hydrostatic pressures, and high mechanical stresses.

We manufacture custom EOM cables assemblies for various subsea applications which include CTDs, hydrophones, magnetometer, tow cables, ocean bottom, ROV cables, and other custom application. Our global presence and industry-leading design engineers, manufacturing facilities, and management teams, work together to implement integrated solutions with unsurpassed reliability that support the needs of customers worldwide. Visit us online at cortlandcompany.com

FALMAT CABLE

1873 Diamond Street
San Marcos, CA 92078
Toll Free: 800 848 4257
Tel: +1 760 471 5400
Fax: +1 760 471 4970
E-mail: sales@falmat.com
Website: www.falmat.com
Contact: Shawn Amirehsani



For over 50 years, Falmat Cable has been a key supplier and a solution provider to many global OEMs and end users supporting a wide range of marine applications. We design and manufacture high performance cables for use in harsh and demanding environments. Our rugged **Xtreme** cables are known and preferred worldwide for superior reliability and durability in commercial and military projects. We offer XtremeMarine cables with precision coaxial components for use with SD/HD video requirements, wet rated submersible pump cables, miniature fiber optic cables, a comprehensive range of highly engineered ROV Tethers plus our well recognized Xtreme Ethernet cables. Falmat is a Certified ISO9001/AS9100 organization. Visit our web site: www.falmat.com.

SOUTH BAY CABLE CORP

54125 Maranatha Drive
P.O. Box 67
Idyllwild, CA 92549
Phone: (951) 659-2833
Fax: (951) 659-3958
E-mail: Sales@southbaycable.com
Website: www.southbaycable.com
Contact: Gary Brown, Sales Manager



Since 1957, South Bay Cable Corp has designed and manufactured specialized electrical, electro-mechanical and electro-optical-mechanical cables for use in demanding marine environments. Cables are designed to meet customer requirements and include tether and umbilical cables for ROVs, tow cables, video inspection, faired cables and a host of other customer specific applications.

CONNECTORS

BIRNS, INC.

1720 Fiske Place
Oxnard CA 93033-1863 USA
Int'l: +1 805 487 5393
Fax: +1 805 487 0427
USA: +1 888 BIRNS 88 (+1 888 247 6788)
E-mail: service@birns.com
Website: www.birns.com
Contact: Eric Birns



BIRNS, Inc. has been serving the subsea industry since 1954, and is an ISO 9001:2008 certified global leader in the design and manufacturing of high performance connectors, custom cable assemblies and lighting systems. With a NAVSEA PRO-020 certified molding facility, the company leads the industry with sophisticated connector lines, including exceptional electrical, electromechanical, coaxial, electro-coax, optical, electro-optical and electro-opto-mechanical hybrid options. BIRNS provides the industry's highest volume of cost-effective hydrostatic and helium pressure testing, and has a wide range of ABS Product Design Assessment (PDA) certified fiber optic and electrical penetrators. BIRNS also delivers brilliant LED and tungsten-halogen marine, chamber, security and commercial diving lights trusted in the world's most extreme environments.

BIRNS AQUAMATE LLC

122 Walthrop St.
Pawtucket, RI 02860 USA
Tel: +1 (401) 723 4242
Fax: +1 (401) 753 6342
E-mail: sales@birnsaquamate.com
Website: www.birnsaquamate.com
Contact: Eli Bar-Hai



Birns Aquamate design and manufacture underwater electrical connectors, cable assemblies, and cable terminations. The company produces a wide range of standard industry connectors such as the 5500 Series, SC, MC, LP, FAWL/FAWM, Rubber Molded, etc. BIRNS Aquamate is the only underwater connector producer that guarantees compatibility with other manufacturers. Birns also specializes in fast turn-around for custom design of special connector solutions. Stocking dealers in the UK, South Africa and Holland as well as dealers in Canada, Germany, Belgium, Norway, China, and Brazil.

SEACON

1700 Gillespie Way
El Cajon, CA 92020 USA
Tel: +1 619 562 7071
Fax: +1 619 562 9706
E-mail: seacon@seaconworldwide.com
Website: www.seaconworldwide.com



The SEACON Group are world leaders in underwater connector technology and provide an extensive and diverse range of electrical, optical and hybrid connector assemblies, submersible switches and cable system solutions for many applications within the Oceanographic, Defense, Oil and Gas and Environmental markets. With locations in California and Texas, USA, Mexico, Brazil, the United Kingdom and Norway and a worldwide network of agencies and representatives, SEACON is able to supply very quick solutions to any requirements across the globe.

TELEDYNE MARINE INTERCONNECT SOLUTIONS

1026 N. Williamson Blvd.
Daytona Beach, FL 32114
Tel: 386-236-0880
E-mail: TeledyneMIS@teledyne.com
Website: www.teledynemarine.com



Teledyne Marine Interconnect Solutions integrates the resources of ODI, DGO, Impulse, and Cable Solutions into a single organization that supplies innovative, high-performance solutions for harsh environment interconnect. Solutions for these harsh environments include wet-mate, splash-mate and dry-mate connectors, pressure boundary penetrators, cable assemblies, cable terminations, and custom-engineered encapsulation and molding. TMIS contains a broad portfolio of field-proven, time-tested electrical, optical, and hybrid interconnect capabilities optimized for applications where performance and reliability are imperative. Products are available as stand-alone items, or as complex solutions that integrate technologies into advanced, value-added systems.

DESIGN AND ENGINEERING

HYDRO LEDUC NA, INC.

19416 Park Row, Ste. 170
Houston, TX 77084
Tel: 281-679-9654
E-mail: bogden@hydroleduc.com
Website: www.hydroleduc.com



Hydro Leduc is a specialist in the design and manufacture of hydraulic piston pumps, hydraulic motors, hydro pneumatic accumulators, and customized hydraulic components satisfying customer needs with reliable products from a reliable source. As the leader in micro hydraulics, it is feasible to obtain several tons of force from a minimal power source within a restricted space envelope. The techniques of micro hydraulics allow simple solutions to problems that are often beyond the limits of traditional mechanical options. Hydro Leduc's expertise is at your service in varied applications such as oil service tools, oceanographic instrumentation, aeronautics, and any extreme working condition of temperature, pressure, medium, and environment.

EQUIPMENT RENTAL

OKEANUS SCIENCE & TECHNOLOGY, LLC

2261 Denley Road
Houma, LA 70363
Tel: 985-346-4666
Fax: 985-346-8444
E-mail: Bleblanc@oceanus.com
Website: www.oceanus.com
Contact: Benton LeBlanc



Okeanus is the premier rental provider for oceanographic and marine scientific research equipment utilized in nearshore and offshore projects around the world. Focused on providing industry-leading customer service, Okeanus offers advanced, high-quality technology coupled with knowledgeable and experienced staff that can deliver dedicated support regardless of a project's location.



FIBER OPTIC PRODUCT/SERVICES

OCEAN SPECIALISTS, INC.

8502 SW Kansas Ave
Stuart, FL 34997
Tel: +1 772 219 3033
Fax: +1 772 219 3010
Email: jbyous@oceanspecialists.com
Website: www.oceanspecialists.com
Contact: Jim Byous



Ocean Specialists, Inc. (OSI) is a submarine fiber optic network development company with global project capabilities. OSI works with clients during all project phases of subsea network development, from planning and design to procurement and implementation. Our customers, primarily representing Oil and Gas, Telecommunications and Ocean Observing, recognize the value of fiber optic networks to their field and services solutions, and look to OSI to deliver the skills and experience that developing these networks require.



GYRO COMPASSES

KONGSBERG SEATEX AS

Pircenteret
N-7462 Trondheim, Norway
Tel: +47 73 54 55 00
Fax: +47 73 51 50 20
E-mail: km.seatex@kongsberg.com
Website: www.km.kongsberg.com/seatex



KONGSBERG

Contact: Finn Otto Sanne at finn.otto.sanne@kongsberg.com

Kongsberg Seatex is a leading international marine electronics manufacturer specializing in the development and production of precision positioning and motion sensing systems. Our commitment is to provide quality products and solutions for safe navigation and operations at sea in the commercial offshore, maritime, hydrographics and defence industries.

INSURANCE

JOHN W. FISK COMPANY

4833 Conti Street, Suite 200
New Orleans, LA 70119
Toll Free: +1 888 486 5411
E-mail: insure@jwfisk.com
Website: www.jwfisk.com



Fisk Marine Insurance provides all types of insurance to any limit required for commercial diving, marine contractors, offshore oilfield and platforms, plug and abandonment (P&A) contractors, land based energy, ocean marine cargo and oceanographic research worldwide. Our coverages include Workers Compensation (USL&H & Jones Act), General Liability, Professional Liability, Hull P&I, Equipment, Bonds and International Packages for clients working outside of the USA. Contact us for more information: 1-888-486-5411 or insure@jwfisk.com. Visit our website: www.jwfisk.com

LIQUID STORAGE

AERO TEC LABORATORIES, INC. (ATL)

45 Spear Road Industrial Park,
Ramsey, NJ 07446 USA
Tel: +1 201 825 1400
Fax: +1 201 825 1962
E-mail: atl@atlinc.com
Website: www.atlinc.com
Contact: David Dack



ATL specializes in the design/manufacture of custom bladder-type fluid containment systems, including tanks, inflatables, pillows and bellows for surface and subsea. ATL's flexible fluid containers boast unparalleled chemical tolerance, abrasion resistance, and remarkable durability - used with methanol, diesel fuel, gases, ethyleneglycol, hydraulic fluids and chemical cleaning cocktails. Expedited deliveries are also available.

OCEAN INDUSTRY DIRECTORY

MARINE ENVIRONMENTAL CONSULTING SERVICES

CSA OCEAN SCIENCES INC.
8502 SW Kansas Avenue
Stuart, FL 34997
Tel: +1 772 219 3000
Fax: +1 772 219 3010
E-mail: gstevens@conshelf.com
Website: www.csaocean.com
Contact: Gordon Stevens



CSA Ocean Sciences Inc. (CSA) is a marine environmental consulting firm specializing in multidisciplinary projects concerning potential environmental impacts of activities throughout the world. With extensive experience in environmental sciences and technical field operations, CSA is staffed and equipped to offer a complete range of services for projects in offshore, nearshore, estuarine, wetland, and freshwater environments.

MOTION SENSING EQUIPMENT

KONGSBERG SEATEX AS
Pirsentertet
N-7462 Trondheim, Norway
Tel: +47 73 54 55 00
Fax: +47 73 51 50 20
E-mail: km.seatex@kongsberg.com
Website: www.km.kongsberg.com/seatex
Contact: Finn Otto Sanne at finn.otto.sanne@kongsberg.com



KONGSBERG

Kongsberg Seatex is a leading international marine electronics manufacturer specializing in the development and production of precision positioning and motion sensing systems. Our commitment is to provide quality products and solutions for safe navigation and operations at sea in the commercial offshore, maritime, hydrographics and defence industries.

NAVIGATION & POSITIONING SYSTEMS

ADVANCED NAVIGATION
Level 8, 37 Pitt Street, Sydney 2000
New South Wales, Australia
Tel: +61 2 9099 3800
E-mail: sales@advancednavigation.com.au
Website: www.advancednavigation.com.au



**ADVANCED
NAVIGATION**

Advanced Navigation is a privately owned Australian company that specialises in the development and manufacturing of navigation technologies and robotics. The company has a focus on generating products of the highest quality standard, both in terms of hardware and software. Advanced Navigation has specialised expertise across a broad range of fields including sensors, GNSS, inertial navigation, RF technologies, acoustics, robotics, AI and algorithms. Advanced Navigation is an ISO 9001 certified company and maintains a strict quality control system across the two research facilities and three manufacturing facilities that they operate in Australia. Advanced Navigation is a carbon neutral company, offsetting all emissions due to energy use through the planting of trees.

EVOLOGICS GMBH
Ackerstrasse 76
13355 Berlin, Germany
Tel: +49 (0) 30 4679 862-00
Fax: +49 (0) 30 4679 862-01
E-mail: sales@evologics.de
Website: www.evologics.de

**Evo
Logics®**

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

KONGSBERG SEATEX AS

Pirsentertet
N-7462 Trondheim, Norway
Tel: +47 73 54 55 00
Fax: +47 73 51 50 20
E-mail: km.seatex@kongsberg.com
Website: www.km.kongsberg.com/seatex
Contact: Finn Otto Sanne at finn.otto.sanne@kongsberg.com



KONGSBERG

Kongsberg Seatex is a leading international marine electronics manufacturer specializing in the development and production of precision positioning and motion sensing systems. Our commitment is to provide quality products and solutions for safe navigation and operations at sea in the commercial offshore, maritime, hydrographics and defence industries.

NETWORK AND DATA COMS

KONGSBERG SEATEX AS
Pirsentertet
N-7462 Trondheim, Norway
Tel: +47 73 54 55 00
Fax: +47 73 51 50 20
E-mail: km.seatex@kongsberg.com
Website: www.km.kongsberg.com/seatex
Contact: Finn Otto Sanne at finn.otto.sanne@kongsberg.com



KONGSBERG

Kongsberg Seatex is a leading international marine electronics manufacturer specializing in the development and production of precision positioning and motion sensing systems. Our commitment is to provide quality products and solutions for safe navigation and operations at sea in the commercial offshore, maritime, hydrographics and defence industries.

OCEANOGRAPHIC INSTRUMENTS/SERVICES

ASL ENVIRONMENTAL SCIENCES, INC.
Victoria, BC, Canada
Tel: +1-250-656-0177
E-mail: asl@aslenv.com
Website: www.aslenv.com



• **Metcean Equipment Leasing:** Acoustic Doppler Current Profiler ADCPs (including StreamPro & RiverRay), Ice Profilers, AZFP, acoustic releases, wave/tide gauges, pingers, satellite beacons, CTD+DO+Tu profilers, DO & turbidity loggers, weather station, cages, flotation, bottom frames.

• **Oceanographic Products:** Ice Profiler IPS5 & shallow water SWIP, Wave Profiler, Acoustic Zooplankton Fish Profiler (AZFP), Acoustic Scintillation Flow Meter (ASFIM), Imagenex scanning sonar logger (IRIS), instrument cages, bottom frames. Custom acoustic products and system integration.

• **Consulting:** Field work, data collection, analyses, numerical modelling, acoustics, remote sensing, oceanographic mooring design and system integration.

• **Manufacturer's Representative:** Teledyne RD Instruments, Teledyne Oceanscience, Teledyne Benthos, WERA Northern Radar.

NKE INSTRUMENTATION

rue Gutenberg
56700 Hennebont, France
Tel: +33 2 97 36 41 31
Fax: +33 2 97 36 10 12
E-mail: info.instrumentation@nke.fr
Website: www.nke-instrumentation.com



• Fresh and marine waters multiparameter probes: CTD, dissolved oxygen, turbidity, chlorophyll, Phycocyanin, Phycoerythrin, CDOM, detection of hydrocarbons, pH, Redox

• Dedicated monitoring data loggers and equipment for: sediment transport, underwater systems behavior, marine corrosion, pCO₂ sensor (stand alone or on drifting buoy), density, absolute salinity.

• Intelligent network: environmental parameters (meteorologic and oceanographic), Ecosystems Approach to Fisheries (EAF - Voluntary fishing vessels), Webdata application. Contact: Valérie Le Pen - vlepen@nke.fr or Goulven Prud'homme - gprudhomme@nke.fr

• Provor and Arvor profiling subsurface floats (ARGO project): CTD, dissolved oxygen, BGC, deep; Argos and Iridium transmission.

• Drifting surface buoys with temperature and GPS receiver for Surface velocity project. Contact: Nathalie Le Bris - nlebris@nke.fr or Jérôme Sagot - jsagot@nke.fr

RBR
 95 Hines Road
 Ottawa, ON K2K 2M5
 Tel: +1 613 599 8900
 Fax: +1 613 599 8929
 E-mail: info@rbr-global.com
 Website: www.rbr-global.com

RBR creates instruments to measure the blue planet. From the ocean abyss to the polar ice caps, our sensors track water parameters – temperature, depth, salinity, dissolved gases, pH, and many others. With design and manufacturing centrally located in Ottawa, Canada, our team works in a fast-paced, dynamic atmosphere to serve customers all over the globe.

ROMOR OCEAN SOLUTIONS
 41 Martha Avenue
 Mount Uniacke, NS Canada
 B0N 1Z0
 Tel. +1 (902) 466-7000
 Fax. +1 (902) 466-4880
 E-mail: Sales@romor.ca
 Website: www.romor.ca
 Contact: Damin Verge, President & CEO

ROMOR Ocean Solutions provides instrumentation solutions for the geo-physical, oceanographic, defense, security, oil & gas, and renewable energy industries. By partnering with world renowned manufacturers, ROMOR is able to offer technical knowledge, value added services, logistics expertise, and the most reliable instrumentation on the market.

SEA-BIRD SCIENTIFIC
 13431 NE 20th St.
 Bellevue, WA 98005
 Tel: +1 425 643 9866
 Fax: +1 425 643 9954
 E-mail: info@sea-birdscientific.com
 Website: www.sea-birdscientific.com
 Contact: Calvin Lwin, Sales

Sea-Bird Scientific combines the capabilities of Sea-Bird Electronics, WET Labs, and Satlantic to provide best-of-class sensors and systems for oceanographic research and environmental water quality monitoring of physical and biogeochemical properties. Sea-Bird Scientific is the leader in accurate, stable ocean instruments for measuring conductivity (salinity), temperature, pressure, oxygen, pH, chlorophyll, CDOM, turbidity, beam attenuation, irradiance, radiance, PAR, nitrate, and phosphate. Our CTD profilers, water samplers, moored CT recorders, wave/tide recorders, DO sensors, and optical sensors are used by research institutes, ocean observing programs, government agencies, and navies globally.

STAR-ODDI
 Skeidarsar 12, 210
 Gardabaer, Iceland
 Tel: +354 533 6060
 Fax: +354 533 6069
 E-mail: baldur@star-oddi.com
 Website: www.star-oddi.com
 Contact: Baldur Sigurgeirsson

A manufacturer of miniature data loggers with sensors as temperature, depth/pressure, salinity, tilt/acceleration, compass direction/magnetometer, light levels, acoustic receiving/transmitting. The loggers are used for various researches, including oceanography, fishing gear studies, equipment behavioral monitoring and fish tagging. Data is presented in the application software with a time-stamp for each measurement.

ROV SUPPLIES/TOOLS

ROVSCO, INC.
 5263 Barker Cypress Road, Suite 600
 Houston, TX 77084 USA
 Tel: +1 281 858 6333
 Fax: +1 281 858 6363
 E-mail: sales@rovscoco.com
 Website: www.rovscoco.com
 Contact: Jessica McKenney

ROVSCO is an ROV supply company, focused toward supporting worldwide the needs of work-class ROV operators for any small component or any large equipment. We have extensive experience in this and have been doing it for 31 years. Contact us for (all original brand) consumables, ROV electrical connectors, cable assemblies, hydraulic filters, parts & components. We will respond with a quick response, excellent service and great low prices.

We also manufacture tooling items which include ROV quick release shackles (11 ton to 250 ton), hydraulic compensators (1/2 liter to 2.5 gallon), video cameras & led lights, and 'SNOKOTE' for umbilical anti-corrosive protection.

RBR

ROMOR



SEA·BIRD
 SCIENTIFIC

STAR : ODDI



SMART TELEMETRY

OCEANWISE LTD
 Dovedale House, 16 Butts Road
 Alton, Hants, GU341NB, UK
 Tel: +44 (0)1420 768262
 Fax: +44 (0) 872 115 0560
 Email: info@oceanwise.eu
 Website: www.oceanwise.eu
 Contact: john.pepper@oceanwise.eu



Monitoring and measuring environmental data is not enough! You need to manage it so you get the right data in the right place at the right time. Our Port-Log.net Environmental Data Sharing and Publishing service gets the most out of your investment in data monitoring.

- Easy and inexpensive viewing and sharing of real-time data
- Secure and straightforward archiving and storage of all types of marine data
- Data accuracy, integrity and reliability

Enjoy the confidence of working with marine data experts!

SONAR SYSTEMS

EDGETECH
 4 Little Brook Rd.
 West Wareham, MA 02576
 Tel: +1-508-291-0057
 E-mail: info@edgetech.com
 Website: www.edgetech.com
 Contact: Amy LaRose



EdgeTech designs, manufactures and sells industry-leading side scan sonars, sub-bottom profilers, bathymetry systems and combined sonar systems. Additionally, the company produces world class underwater actuated and transponding solutions including deep sea acoustic releases, shallow water and long life acoustic releases, transponders, reliable USBL acoustic tracking and positioning systems, and custom-engineered acoustic products.

MARINE SONIC TECHNOLOGY

120 Newsome Dr. Suite H, PO Box 1309
 Yorktown VA 23692-1309
 Toll Free: +1 800.447.4804
 E-mail: Regan.Lipinski@na-atlas.com
 Website: www.marinesonic.com



Marine Sonic Technology builds high quality, high resolution side scan sonar systems.

Located in Yorktown, Virginia, Marine Sonic has been in business for more than 25 years.

Our towed systems are rugged, easy to deploy and simple to operate. We also offer highly efficient AUV/ROV embedded systems, which occupy minimal space and low power consumption.

SOUND VELOCITY PROBES/CTDS

SAIV A/S
 Nygardsviken 1, 5164
 Laksevag, Norway
 Tel: +47 56 11 30 66.
 Fax: +47 56 11 30 69
 E-mail: info@saivas.no
 Website: www.saivas.no
 Contact: Gunnar Sagstad

SAIV A/S

Environmental Sensors & Systems

- STD/CTD, Sound Velocity probes/recorder with optional multi-parameter facilities; Turbidity, Fluorescence, Oxygen etc. The new CTD/STD model SD208 with wireless communication and high accuracy: 0.002 mS/cm, 0.002 °C

- Precision pressure /depth (0.01% accuracy) and temperature sensors/recorders. Applications: hydrographic profilings, installation on ROVs and towed systems, etc. Robust and compact designs are combined with accuracy and "plug and play" compatibility. Output format for sonar equipment, e.g. EM1002, EM3000, SSP, HiPAP and Reson 8125.

SUBSEA FABRICATION

NEW INDUSTRIES
 6032 Railroad Avenue
 Morgan City, LA 70380
 Tel: +1 985 385 6789
 E-mail: bill.new@newindustries.com
 Website: www.newindustries.com
 Contact: Bill New



New Industries provides quality fabrication services to the offshore oil & gas and marine industries focusing on large diameter pressure vessels, suction piles, DNV buildings and deepwater subsea production equipment such as jumpers, PLETs, PLEMs and manifolds.

OCEAN INDUSTRY DIRECTORY

SUBSEA TECHNOLOGY

KONGSBERG MARITIME AS – SUBSEA DIVISION (DIVISION OF KONGSBERG GROUP)

Strandpromaden 50
NO-3183 Horten
Norway
Tel: +47 33 03 41 00
Website: www.km.kongsberg.com



Kongsberg Maritime is a marine technology company providing innovative solutions for all marine industry sectors including merchant, offshore, subsea, naval and fisheries. The company delivers systems that cover diverse maritime applications. Within subsea, Kongsberg Maritime's sonars, Sub-bottom profilers, multibeam and single beam echo sounders, cameras, positioning and underwater communication & monitoring systems, instruments, software and Marine Robotics are used in survey and inspection operations worldwide. Working closely with customers to develop technology that pushes the limits in subsea applications, Kongsberg Maritime is also dedicated to developing innovative environmental monitoring solutions such as the K-Lander system in addition to cutting-edge Marine Robotic platforms such as the futuristic Eelume vehicle.

SUBSEA TOOLING

SUBSEA AMERICAS

3447 Hwy 182
P.O. Box 185
Berwick, LA 70342
Tel: +1 985 714 1767 or 985 518-0055
E-mail: charles@subseAmericas.com
Website: www.subseAmericas.com
Contact: Charles Mayea



Subsea Americas (SSA) is a leading provider of rental ROV tooling equipment on a worldwide basis. SSA is a 24 hr. / 7 days a week service provider of a comprehensive range of standard subsea tooling equipment. From torque tools and flying lead orientation tools to 15k isolated hydraulic intensifiers and wire rope cable cutters - SSA can fully support the client's needs with quality service, and reliable equipment at a most competitive cost.

UNDERWATER VEHICLES/AUVs

HYDROID, INC. a subsidiary of Kongsberg Maritime

1 Henry Drive
Pocasset, MA 02559
Tel: +1 508 563 6565
Fax: +1 508 563 3445
E-mail: glester@hydroid.com
Website: www.hydroid.com
Contact: Graham Lester



Located in the U.S. and a subsidiary of Kongsberg Maritime, Hydroid is the world's most trusted manufacturer of advanced Autonomous Underwater Vehicles (AUVs). Our Marine Robotics systems provide innovative and reliable full-picture solutions for the marine research, defense, hydrographic and offshore/energy markets. Our products represent the most advanced, diversified and field-proven family of AUVs and AUV support systems in the world.

Developed by a veteran team of engineers, the innovations of Hydroid and Kongsberg Maritime provide a safe and reliable answer to the challenges that have hampered ocean exploration and security. For more information on REMUS technology, please visit www.hydroid.com.

OCEANSERVER TECHNOLOGY, INC.

151 Martine Street
Fall River, MA 02723 USA
Tel: +1 508 678 0550
Fax: +1 508 678 0552
E-mail: sales@ocean-server.com
Website: www.iver-auv.com
Contact: Jim Kirk



OceanServer Technology, Inc. is a leading provider of man-portable Autonomous Underwater Vehicles (AUVs) with over 250 AUVs deployed worldwide. The Iver AUV is an affordable, commercial vehicle used for general survey and sub-surface security work, and serves as a research platform for autonomy, behavioral and sensor development studies at universities and navy research facilities.

UNDERWATER VEHICLES/ROVs

DEEP OCEAN ENGINEERING INC.

2403 Queme Dr, San Jose, CA 95131 USA
Tel: +1 408 436 1102
Fax: +1 408 436 1108
E-mail: sales@deepocean.com
Website: www.deepocean.com
Contact: Mike Takeda



Deep Ocean Engineering, Inc. provides remotely operated and unmanned surface vehicle (ROV / USV) solutions which are used by a broad range of industry applications - security, military, nuclear and hydroelectric power plants, inshore dams and lakes, oil and gas, scientific research, fisheries, salvage, search / recovery, and pipeline inspections.

OCEANEERING INTERNATIONAL, INC.

11911 FM 529
Houston, TX 77041
Tel: 713.329.4500
E-mail: info@oceaneering.com
Website: www.oceaneering.com
Contact: Bill Mallin



At Oceaneering, we do things differently, creatively, and smarter. As your trusted subsea partner, our unmatched experience and innovative technologies and solutions allow us to adapt and evolve regardless of market conditions. Only by working together will we safely and reliably re-shape the future of the oil and gas industry.

We are connecting what's needed with what's next as the world's largest ROV operator and the leading ROV provider to the oil and gas industry worldwide. We push the limits of ROV intervention and meet new, demanding tooling intervention.

OUTLAND TECHNOLOGY

38190 Commercial Ct.
Slidell, LA 70458 USA
Tel: 985-847-1104
Fax: 985-847-1106
E-mail: jeff@outlandtech.com
Website: www.outlandtech.com
Contact: Jeff Mayfield



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

TELEDYNE SEABOTIX

9970 Carroll Canyon Road
Suite B
San Diego, CA 92131 USA
Tel: +1 619 450 4000
Fax: +1 619 450 4001
E-mail: SeaBotixInfo@Teledyne.com
Website: www.SeaBotix.com
Contact: Alasdair Murrie



Teledyne SeaBotix is a world leading manufacturer of capable underwater MiniROVs that perform a multitude of tasks including maritime security, search and recovery, hull and pipeline inspection, hazardous environment intervention, aquaculture, sensor deployment and oceanographic research. The Little Benthic Vehicle systems have become the benchmark in compact ROVs around the world and ROV equipment for over 30 years. We recognize that no two jobs are the same and specialize in products that are customizable for your specific applications.

VIDEORAY

212 East High Street
Pottstown, PA 19464
Tel: +1 610 458 3000
Fax: +1 610 458 3010
E-mail: sales@videoray.com
Website: www.videoray.com
Contact: Chris Gibson



With more than 3,700 ROV's in service around the world, VideoRay is the global leader in Observation ROV technology. VideoRay's underwater robot systems are extremely versatile, portable, affordable, and reliable solution for underwater operations including surveys, offshore inspections, search & recovery, homeland & port security, science & research, aquaculture, and many other underwater applications. The latest Mission Specialist systems provide solutions for particularly difficult underwater challenges. VideoRay is available on the General Services Administration (GSA) Schedule.

WINCHES, HANDLING & CONTROL SYSTEMS

ALL OCEANS ENGINEERING LTD.
 Tyrebagger Works, Clinterty, Kinellar
 Aberdeen AB21 0TT, UK
 Tel: +44 (0) 1224 791001
 Fax: +44 (0) 1224 791002
 E-mail: admin@alloceans.co.uk
 Website: www.alloceans.co.uk
 Contact: Brian Abel



MECHANICAL HANDLING UNDERWATER

Launch and Recovery Systems - 6,000m plus Underwater Winches - ROV and Diver operated Tether Management Systems - 6,000m plus Torque Tools - Electric and Hydraulic systems - ROV and Diver operated General Products - Compensators, latches, swivels, metrology sets, cable reels, pressure housings, junction boxes Workshop Services - Fabrication, assembly and testing Engineering - prototyping, product development, solutions engineering AC-ROV - The mini ROV that broke the mold.

OKEANUS SCIENCE & TECHNOLOGY LLC

17455 NE 67th Court, Suite 120
 Redmond, WA 98052
 Tel: +1 (425) 869-1834
 Fax: +1 (425) 869-5554
 E-mail: info@oceanus.com
 Website: www.oceanus.com
 Contact: Ted Brockett



Exclusive Provider of SOSI Brand Products

SOSI brand winches, handling systems, and engineered solutions are now available exclusively from Okeanus Science & Technology. Proven, reliable, and cost-effective standard and custom designed winches range from small all-electric instrumentation winches to high horsepower all-electric or hydraulic umbilical and multi-purpose oceanographic systems. SOSI brand winches can be packaged and supplied with skids, A-frames, over-boarding sheaves, HPUs, and other auxiliary equipment.



MARKEY MACHINERY COMPANY

7266 8th Ave. South
 Seattle, WA 98108 USA
 Tel: +1 800 637 3430
 Fax: +1 206 623 9839
 E-mail: info@markeymachinery.com
 Website: www.markeymachinery.com



Preferred by the US fleet, Markey's advanced oceanographic winch systems provide ultimate dependability, reliability and precise performance when and where you want it. Operating within critical windows of opportunity you can count on our custom winches, capstans, windlasses and auxiliary machinery for the successful execution and completion of your research.



**Oceanology International®
2018** 13-15 MARCH 2018, LONDON, EXCEL

THE WORLD'S LEADING EVENT FOR MARINE SCIENCE AND OCEAN TECHNOLOGY

EXHIBIT AT OCEANOLOGY INTERNATIONAL 2018 TO:

- Gain exposure to the global ocean technology and marine science community:
 Meet 1,000s of buyers from markets and regions around the world
- Connect with your target audience:
 Visitors from the oceanography, oil & gas, aquaculture and renewables sectors

- Develop new business relationships:
 VIP networking events help connect you directly with key buyers with an interest in your products and services
- Meet the market face-to-face:
 Three days of business brings the key players in the industry directly to you

OCEANOLOGY INTERNATIONAL 2018 SHOWCASES SOLUTIONS FOR:



UNDERWATER
COMMUNICATIONS



HYDROGRAPHY
AND
GEOPHYSICS



POSITIONING
AND
METROLOGY



MARINE
RENEWABLES



OCEAN
RESEARCH



OIL & GAS



MARITIME
SECURITY



AQUACULTURE



UNMANNED
VEHICLES AND
VESSELS
SHOWCASE



MONITORING
STRUCTURAL
INTEGRITY



HANDLING
BIG DATA

Secure your preferred location at Oceanology International by contacting the sales team today

Tim French +44 (0)20 8910 7108 tim.french@reedexpo.co.uk

Dominic Cole +44 (0)20 8910 7773 dominic.cole@reedexpo.co.uk

Organised by:

Learned Society Patron:

Endorsing associations:

ADVERTISERS INDEX

Advanced Navigation	41	www.advancednavigation.com.au
Ametek	59	www.ametek.com
CSA Ocean Sciences Inc.	4	www.csaocean.com
CSnet International.....	21	www.csnetinternational.com
Clean Gulf	67	www.cleangulf.org
Coastal Ocean Vision.....	30	coastaloceanvision.com
Deep Water Buoyancy	39	www.deepwaterbuoyancy.com
ECA Robotics	56	www.ecagroup.com
EofE Ultrasonic Co., Ltd	35	www.echologger.com
EvoLogics GmbH	79	www.evologics.de
Geometrics	57	www.geometrics.com
Greensea Systems, Inc. ..	36-37	www.greenseainc.com
Hydroid	5	www.hydroid.com
InterOceanSystems, LLC	51	www.interoceansystems.com
JW Fishers Manufacturing, Inc.	28	www.jwfishers.com
L3 OceanServer	27	www.oceanserver.com
Metocean.....	9	www.metocean.com
NKE Instrumentation	15	www.nke-instrumentation.com
Nobska	23	www.nobska.net
Ocean Aero	59	www.oceanaero.us
Ocean News & Technology.....	54	www.oceannews.com
Ocean Sensor Systems.....	58	www.oceansensorsystems.com
Ocean Sonics	59	www.oceansonics.com
Ocean Specialists, Inc.	52	www.oceanspecialists.com
Oceanology International 2018.....	77	www.oceanologyinternational.com
OilComm.....	68	www.oilcomm.com
Okeanus	45	www.okeanus.com
Pacific Petroleum Recovery Alaska.....	69	www.ppralaska.com
Phoenix International.....	42	www.phnx-international.com
RBR	3	www.rbr-global.com
Riptide Autonomous Solutions LLC	31	www.riptideas.com
RJE International	53	www.rjeint.com
ROVSCO, Inc.	20	www.rovoco.com
Sea-Bird.....	80	www.seabird.com
Shark Marine Technologies, Inc.	22	www.sharkmarine.com
Sonardyne	17	www.sonardyne.com
Soundnine.....	53	www.soundnine.com
SubCtech GmbH	53	www.subCtech.com
TDI Brooks.....	18	www.tdi-bi.com
Teledyne Marine	19	www.teledynemarine.com
Valeport	44	www.valeport.co.uk
VideoRay	2	www.videoray.com
Wind Europe	67	www.windeurope.org



EvoLogics®

UNDERWATER COMMUNICATION AND POSITIONING SOLUTIONS

S2C TECHNOLOGY: COMMUNICATION AND TRACKING COMBINED

- time, space and cost-saving solutions
- low power consumption for autonomous operations
- advanced data delivery algorithms, addressing and networking, remotely configurable settings
- extendable platform with multiple configuration options: power-saving Wake Up module, acoustic releaser, additional sensors, custom solutions, OEM versions available

USBL POSITIONING SYSTEMS

simultaneous positioning and communication - no need to switch between positioning mode and modem mode

- flexible SiNAPS positioning software
- reliable data transmissions
- range: up to 8000 m
- accuracy: up to 0.04 degrees

UNDERWATER ACOUSTIC MODEMS

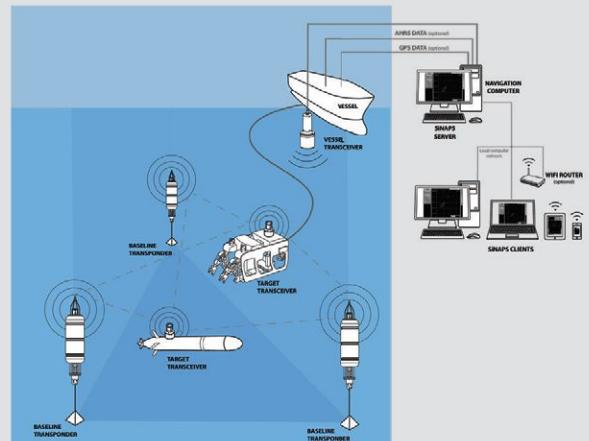
reliable data transmissions even in adverse conditions, customizable R-series modems, light and compact M-series "mini" modems, **new S2CM-HS high-speed modem**, special editions for developers, S2C communication and positioning emulator - remote access or standalone device

- range: up to 8000 m
- depth: up to 6000 m
- data rate: up to 62.5 kbps

LBL POSITIONING SYSTEMS

highly accurate, precise and stable performance, simultaneous positioning and data transmissions

- flexible SiNAPS positioning software
- reliable data transmissions
- range: up to 8000 m
- accuracy: better than 0.01 m



HydroCAT-EP

Multi-Parameter Water Quality Instrument

Scientifically Defensible Data

Multiple anti-fouling systems enable long-term deployments in biologically-rich environments

The HydroCAT-EP measures:

- Conductivity
- Temperature
- Pressure
- Dissolved Oxygen
- Chlorophyll
- Turbidity
- pH



SEA·BIRD
SCIENTIFIC



OCEANS 17 ANCHORAGE
September 18-21
Visit Us in Booth 709

+1 425 643 9866
seabird@seabird.com
seabird.com/hydrocat-ep

