xylem
Let's Solve Water

HydroMet MOTUS Wave Buoy

CASE STUDIES & SOLUTIONS

YSI
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CASE STUDIES BROCHURE
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Case Studies & Solutions

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Monitor Many of the Pressing Conditions in Tough Ocean Waters

Combining low power and field proven solutions, the DB1750, previously known as the SB138-P, is an ideal platform for analyzing and monitoring environmental and meteorological conditions around ports and in coastal waters & open oceans. Custom configurations that include HydroMET and MOTUS sensors allow you to monitor buoy position, current, direction, depth, wind, and waves in real-time, from your laptop or network.

Configure your own DB1750 for:

- Oceanographic research
- Marine traffic
- Docking operations
- Construction and dredging
- Environmental monitoring
- Industrial sites
- Weather forecasting
- Port and harbor monitoring
- Offshore oil and gas operations and environmental monitoring
- Offshore wind farm monitoring

Xylem's leading environmental monitoring brands, Aanderaa, Sontek and YSI are excited to bring you these case studies from around the world. Let us know how the DB1750 buoy can help you achieve great results just like these customers have!

Brazil

HydroMet Wave Buoys Improve Navigation to Paranagua Port

Located in the Southern region of Brazil, Paranaguá port is one of the three most important ports in the country.

The region is affected by strong winds, waves, frequent fog, intense tide currents, and river discharge. There are sand banks around the estuary's inlet due to the high sediment input in the area, narrowing the access channel and causing refraction of incident waves. These factors provoke changes in the local hydrodynamic conditions and create complex and challenging navigation.

The port's navigation channel extends to a long-unprotected area off the coast, which is affected by the incidences of waves from all directions.

Client: Paranaguá Pilots

The Pilots' association is strong in Brazil and around the world, providing safe navigation and maneuvers inside port areas. With real-time monitoring, pilots are more confident in making important decisions during critical situations.

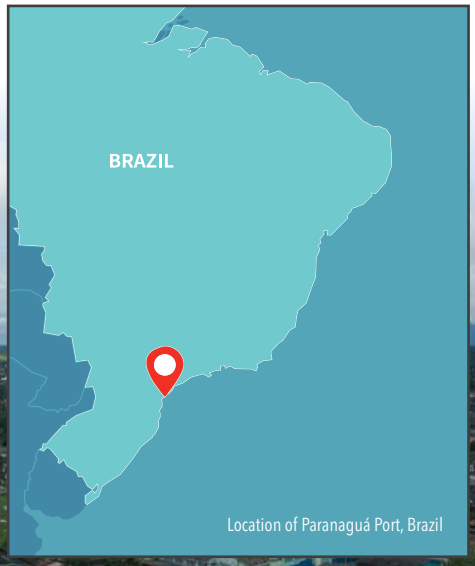
System Configuration

SISMO® is the Real-Time Met-Ocean Information System developed by HidroMares, the representative of Aanderaa in Brazil. The HydroMet Wave Buoy is a crucial component of the Paranaguá project, utilizing a DB1750 buoy equipped with Aanderaa sensors to provide real-time measurement of wave height, period, current speed and direction along with weather parameters, such as visibility and wind speed.

The real-time directional wave spectrum data obtained with the HydroMet Buoy is particularly important for the Paranaguá port due to wave current fluctuations.

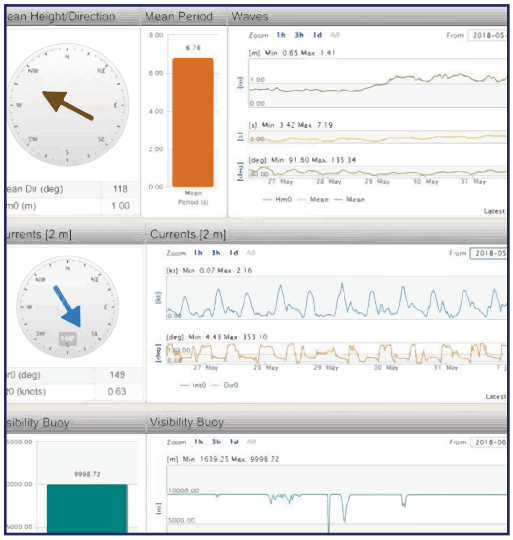
Data

Data is transmitted to HidroMares' cloud server, and quality is evaluated in real-time to be displayed in the network of the Paranaguá Pilots Association through SISMO's web platform integrated with Aanderaa GeoView, or through SISMO®App. This allows the pilots to access important data directly from their smartphones during the maneuver.



Location of Paranaguá Port, Brazil

On the right you can see coastal data on waves, currents, and visibility to help navigation. Paranaguá Port Authority expects that SISMO's data will help with port efficiency, better maneuvers, and less downtime due to bad weather.



Paranaguá nautical chart

Result

The Real-time data system allows for operational decisions to be planned according to sea and weather conditions, to ensure safe navigation, leading to shorter maneuver time, better efficiency, and therefore, an increase in productivity.

In the near future, the plan is to include two other stations (with currents and water level monitoring) inside the estuary and use the acquired data in software that calculates under-keel clearance. Due to the success of this project in Paranaguá, two other ports have also acquired this buoy solution.

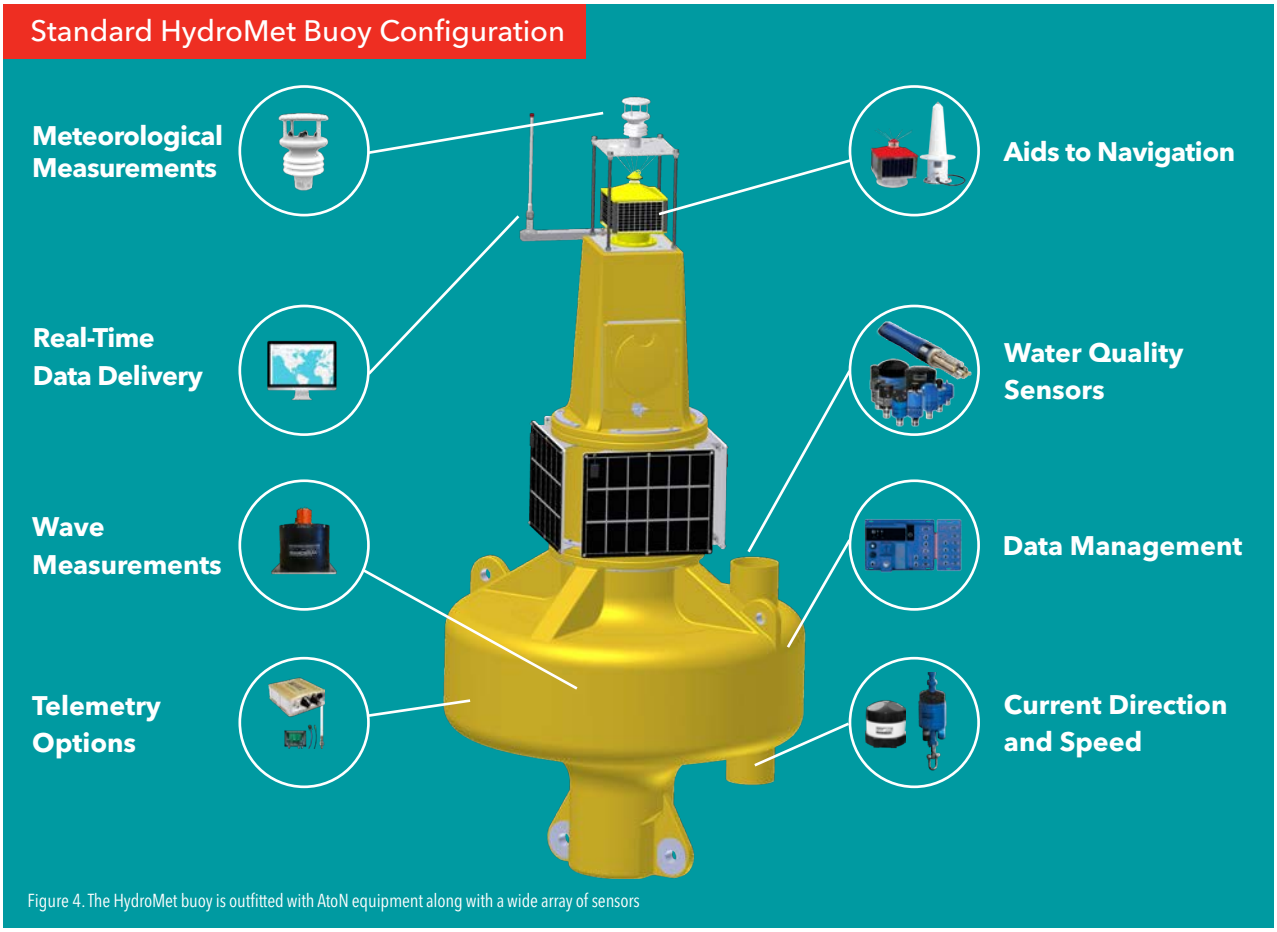
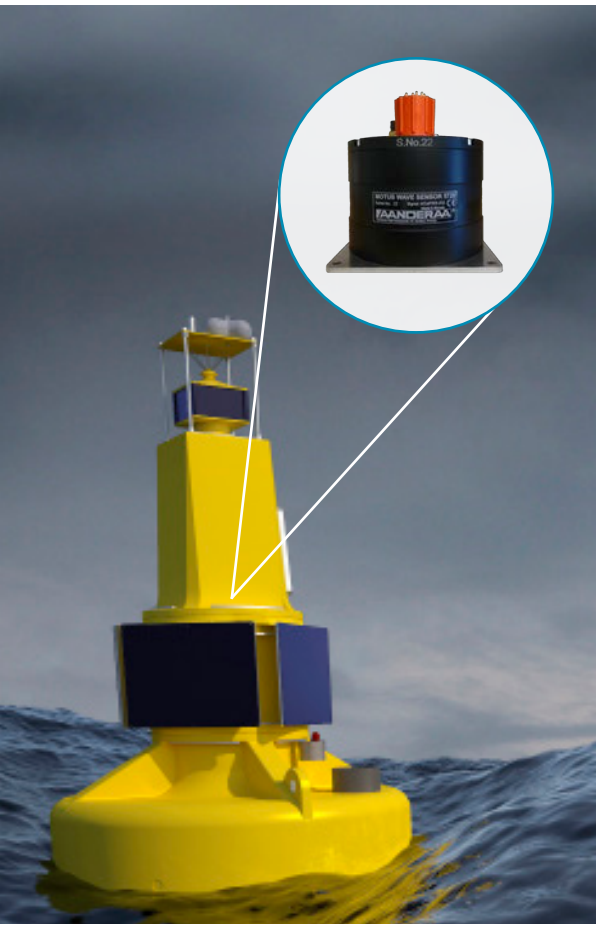


Figure 4. The HydroMet buoy is outfitted with AtoN equipment along with a wide array of sensors

Norway

HydroMet MOTUS Wave Buoy Passes the Ultimate Test While Storm Aina Strikes the Norwegian coast



HydroMet MOTUS Wave Buoys measure record high waves during the extreme weather system Aina.

On December 7th, 2017, the storm Aina hit the West Coast of Norway with heavy winds of over 30m/s producing waves of 11 meter Significant Wave Height.

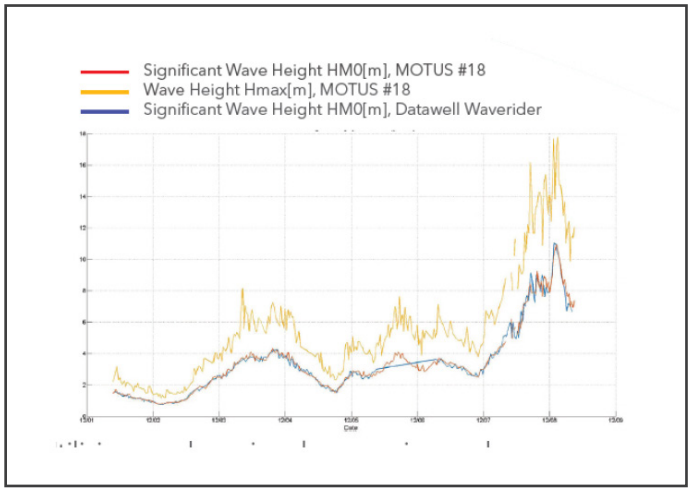
Two test buoys equipped with the Aanderaa MOTUS Directional Wave Sensor have been tested at Hywind Demo site in the North Sea off the coast of Karmøy since February.

Both the DB1750 and EMM2.0 buoys were equipped with the Motus Wave sensor, providing valuable live data on for navigation and research.

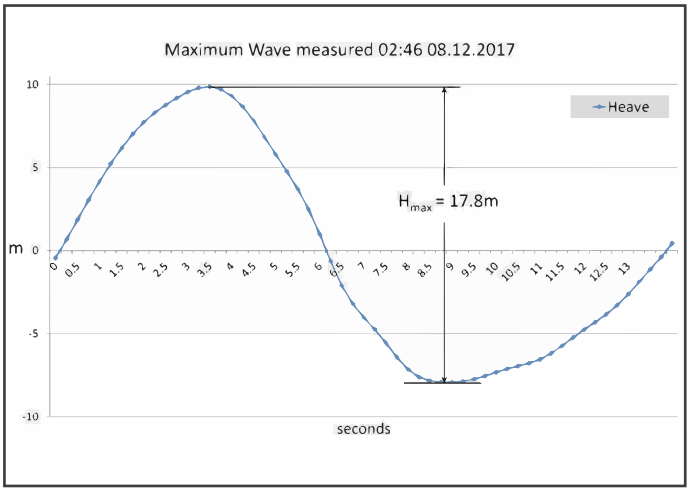
The MOTUS Directional Wave Sensor is a compact, low power accelerometer designed to accurately measure multi-spectrum directional waves from standard hydrography and navigation buoys.

Utilizing modern signal processing and communication solutions, the MOTUS buoy provides a comprehensive set of sea state data in real-time, even the characterization of single extreme waves.

The HydroMet MOTUS Wave Buoys withstood the extreme weather system and thus gathered useful data that will help us in our commitment to develop reliable solutions to the research and marine industry.



MOTUS sensor accurately measures multi-spectrum directional waves



MOTUS buoys provide a comprehensive set of sea state data in real time, even the characterization of single extreme waves:

Spain

HydroMet MOTUS Wave Buoy Wave Buoy deployed in the Mediterranean Sea

Inhabited for over two millennia and founded by the Fenicians, the city of Cartagena has always been a crucial base for commerce from the West to the East of the Mediterranean. It is a major naval station and a commercial harbor on the South Eastern Coast of Spain.

The Cartagena Port Authority is a member of Puertos del Estado (Spanish Port Authorities) which operates two networks of oceanographic buoys: coastal and deepwater. The buoys are equipped with meteorological (MET) and current wave sensors that provide real-time data to help navigation. They also produce weather forecasts that are made available to vessel traffic, Spanish MET agencies, and universities.

The Cartagena Port Authority chose Xylem to provide them with a new buoy equipped with directional wave sensors. With the support of our Spanish partner SIDMAR, Xylem delivered a DB1800 HydroMet buoy along with SISMO® (Real-Time Met-Ocean Information System) equipped with an Aanderaa MOTUS wave sensor, GMX200 weather sensor, Aanderaa DCPS and AIS Type 3. The buoy was successfully deployed at the end of May 2018 and represents the first HydroMet MOTUS Wave Buoy in the Mediterranean Sea.

The capabilities of the MOTUS wave sensor and our expertise in integrating a variety of sensors provided a wide encompassing monitoring solution for the Cartagena Port.

Data from the buoy off Cartagena has been integrated into the network of Puertos del Estado, who has required a specific software to integrate the data into the network. Real-time data can be seen on the PCs of the Cartagena Port Authority using Aanderaa Geoview. The data is also integrated in the data network of Puertos del Estado, and available to the general public.

HydroMet MOTUS Wave Buoy

Norway

HydroMet MOTUS wave buoys Chosen by Major Dredging Operator

Dredging, breakwater building, and coastal construction, all depend on up-to-date information about the sea state and environmental conditions on-site. However, each job has slightly different monitoring criteria.

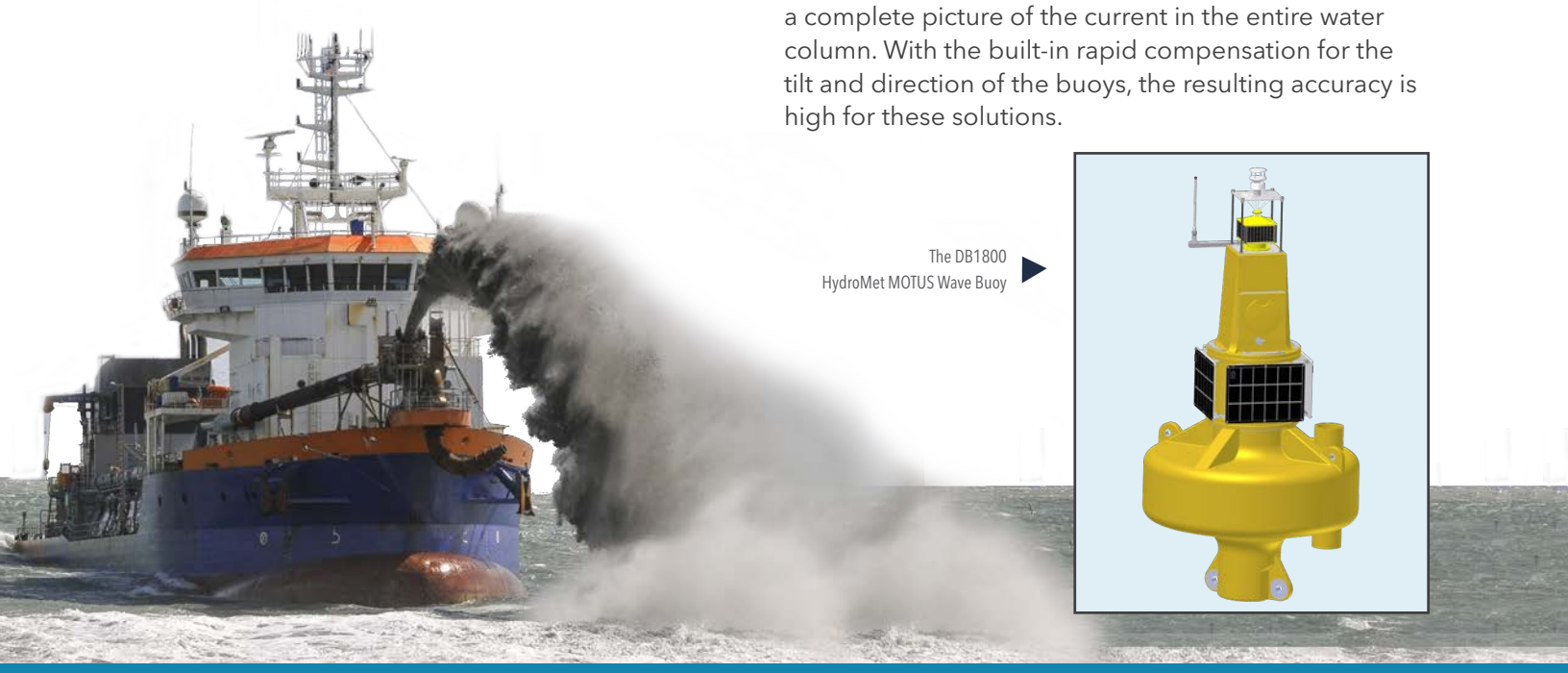
Major dredging companies have long used different buoys for measuring directional waves, currents and environmental data such as turbidity and oxygen. Dredgers are finding their monitoring needs covered by one HydroMet buoys solution. Designed to vary the payload while compensating the buoy motion with built-in parameters, the HydroMet MOTUS Wave Buoys can be configured with different sensor packages without jeopardizing the accuracy of the wave and current measurements.

MOTUS for Dredging Operations

Using the Motus Wave sensor solves a number of challenges for the dredging industry. Waves limit the type of operations that can be executed during building of breakwater constructions. When large rocks are positioned to form the breakwater, vessels depend on a calm sea with limited wave activity. Both the wave height and the wave direction will play a role in planning the daily operations in the field.

The HydroMet Motus wave buoy also provided them with an overview of both the swell and the wind-driven wave spectrum, which influence their operations in different ways. Dredgers monitor the waves in the area continuously with their real-time data solution, providing the local conditions at the breakwater building sites in different user interfaces and devices. Crew and vessels are then dispatched when the conditions are favorable, and the operations can occur with a high focus on health, environment, and safety.

Major dredging companies now utilize the HydroMet buoy for both the environmental parameters and the currents. For water quality parameters, the YSI EXO3 with a built-in wiper has become the preferred solution. It can be positioned on the HydroMet MOTUS Wave buoy in one of the moonpools that are included in the buoy. For currents, there are two options: a Single Point Aanderaa Current Meter measuring close to the surface, or an Aanderaa DCPS Profiler Sensor measuring from the buoy and down. Using a combination of the two, it was also possible to provide a complete picture of the current in the entire water column. With the built-in rapid compensation for the tilt and direction of the buoys, the resulting accuracy is high for these solutions.



The DB1800
HydroMet MOTUS Wave Buoy

Costa Rica

HydroMet Oceanographic Research Buoy for University of Costa Rica

In the past, oceanographic and climate data in Costa Rica were gathered from large scale, low-resolution global models. The issue, however, is that this data did not cover Costa Rican ocean activity accurately.

So what CIMAR (Centro de Investigación en Ciencias del Mar y Limnología) of the University of Costa Rica set out to do was change how they gathered high-quality oceanographic data for further research, thru the use of the DB1800 HydroMet Motus wave buoy.

The DB1750 HydroMet Motus wave buoy is the first system in the region to deliver high-quality oceanographic data in real-time. With the assistance of the data generated by the buoy, CIMAR will be able to validate and fine-tune their numerical models to improve their capabilities to forecast oceanographic phenomena.

The data from the buoy will be used to study the circulation and wave climate in the Central Pacific sector of Costa Rican waters and to validate numerical models they run at the University. To achieve their desired results, the HydroMet buoy will collect high-quality data on marine currents, directional waves, and meteorological parameters in real-time, which they will use to feed their models.

This particular HydroMet buoy was equipped with a Doppler Current Profiling Sensor, a MOTUS Directional Wave sensor, and a compact Gill weather station GMX501, which measures air temperature, atmospheric pressure, wind speed, direction, and solar radiation.

In March of 2020, the HydroMet Oceanographic Research Buoy was deployed alongside on-site field support by YSI field service engineers.

HydroMet MOTUS Wave Buoy

Onsite Field Service and deployment of Hydromet MOTUS Wave Buoy

Sweden

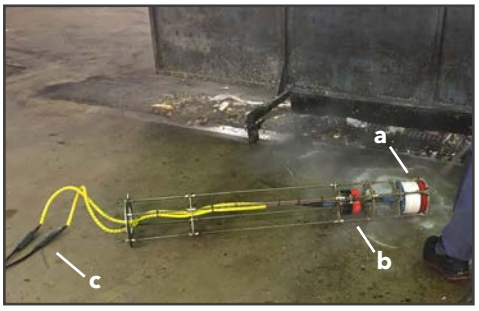
Navigational Buoy Serving a Dual Purpose: Safety & Water Exchange Data Between Two Seas

Aanderaa DCPS Doppler Current Profiler Sensor

After almost three years in the water, the "current measuring buoy" of the port of Helsingborg in Sweden was serviced. It took one day to complete the cleaning and system check, add new sacrificial anodes, change a GSM modem, upgrade the SmartGuard logger software, and replace a lantern with a Solamax-65 lantern with stronger light and better energy capacity.

The HydroMet buoy reports temperature and currents every 10 minutes from the surface to 18 meters and internally records currents, acoustic backscatter, and other useful information from the surface to the bottom at approximately 30 meters depth.

Real-time data is openly available and reported directly to the electronic charts on-board ships over AIS. The stored data are downloaded separately and contain information about the water exchange between the Baltic Sea and the North Sea through the straight, the mixing in the water column, the migration of zooplankton, quality control, and more.



Cleaning of sensors, placed in PVC tube for mechanical and bio-fouling protection (Image to the left).

a- Doppler Current Profiling Sensor (DCPS) measures currents from three meters below the surface to the bottom. "Autobeam" function automatically compensates if buoy anchoring chain disturbs.

b- Doppler Current Sensor (DCS) measures temperature and currents one meter below the surface.

C- Both sensors receive compass information from separate compasses mounted on top of buoy.

Safe Water HydroMet Buoy Deployed in Mexico

Mexico

Surrounded by rock shoals on either side of the Narrow Port entrance, oncoming vessels were routinely having to wait to enter the port or be required to turn around and back in safely. This was being done for the safety of the vessels due to the unknown surface and subsurface currents around the port.

To increase traffic and vessel safety, the port wanted to provide port and bridge personnel with real-time current and wind information via the DB1750 HydroMet Motus Wave buoy.

This particular safe water buoy was outfitted with DCS (surface current sensor) and DCPS (sub-surface current profiler), all-in-one MET sensor, Motus Wave Sensor, along with AIS and RF communications.

The DB1750 HydroMet buoy was additionally equipped with water quality sensors, including refined fuels and turbidity. These sensors were used by the port to monitor for spills and industrial runoff.

The fully-integrated system was deployed by YSI's field services team, who did installation and data support. Almost immediately, port efficiency increased and vessel traffic was managed more effectively and safely.

Deployment of HydroMet MOTUS Wave Buoy

Xylem |'zīləm|

1) The tissue in plants that brings water upward from the roots;
2) a leading global water technology company.

We're a global team unified in a common purpose: creating advanced technology solutions to the world's water challenges. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. Our products and services move, treat, analyze, monitor and return water to the environment, in public utility, industrial, residential and commercial building services settings. Xylem also provides a leading portfolio of smart metering, network technologies and advanced analytics solutions for water, electric and gas utilities. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise with a strong focus on developing comprehensive, sustainable solutions.

For more information on how Xylem can help you, go to www.xylem.com

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