Application note no. 04
- Signature55, AWAC & Aquadopp Profiler

Providing reliable current and directional wave data for the energy industry

Challenge

Environmental consulting firm Coastal Dynamics Limited needed to investigate the strong current conditions off the coast of Trinidad – as well as high wave conditions – to make sure this insight was incorporated into operations and numerical model development. Access to this data was essential to ensure safety on offshore installations and efficiency in operations, and to enable accurate environmental assessments.

Solution

Mounting the **Signature55** on a customized subsurface buoy, together with the **AWAC** and the **Aquadopp** instruments. Additional consultancy services helped meet the special needs related to this demanding deployment.

End user value

"Nortek's willingness to share information and assist us in making decisions has helped us win projects for deployments in deeper waters. The deployment off the coast of Trinidad for an oil and gas client was successful, and the data gathered from the field campaign provided excellent data quality for our client's study."

- Nazeer Gopaul
Director, Coastal Dynamics Limited

Enabling novel design and operational efficiency for offshore installations in Trinidad and Tobago

The often threatening current and wave conditions off the east coast of Trinidad – the North Brazil Current Rings – can be strong and can affect rig moves, drilling operations and riser designs. Why did environmental consulting firm Coastal Dynamics Limited choose Nortek instruments when they needed to observe these conditions?

Recently a renowned energy company contracted environmental consulting firm Coastal Dynamics Limited to obtain reliable current and directional wave data to improve their numerical models.

These data were also important in investigating environmental conditions that adversely affect drilling operations. It was essential to incorporate these into project planning.

Setting up a functional solution

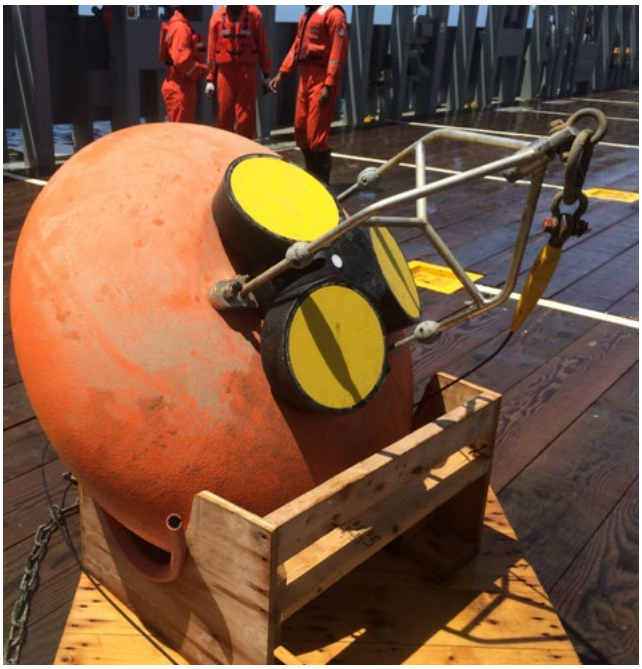
Here, Coastal Dynamics Limited chose Nortek's Signature55 to collect high-resolution current data in the water column, as well as the Nortek AWAC with patented SUV wave processing for near-surface currents and directional waves. Both are robust systems, optimized for operational users, which also produce scientific quality data.

"In this project, **Nortek** provided us with a complete solution: from the sourcing of acoustic releases and flotation to important contact with mooring experts to advise on all details for the mooring," says Nazeer Gopaul, Director at Coastal Dynamics Limited in Trinidad and Tobago.

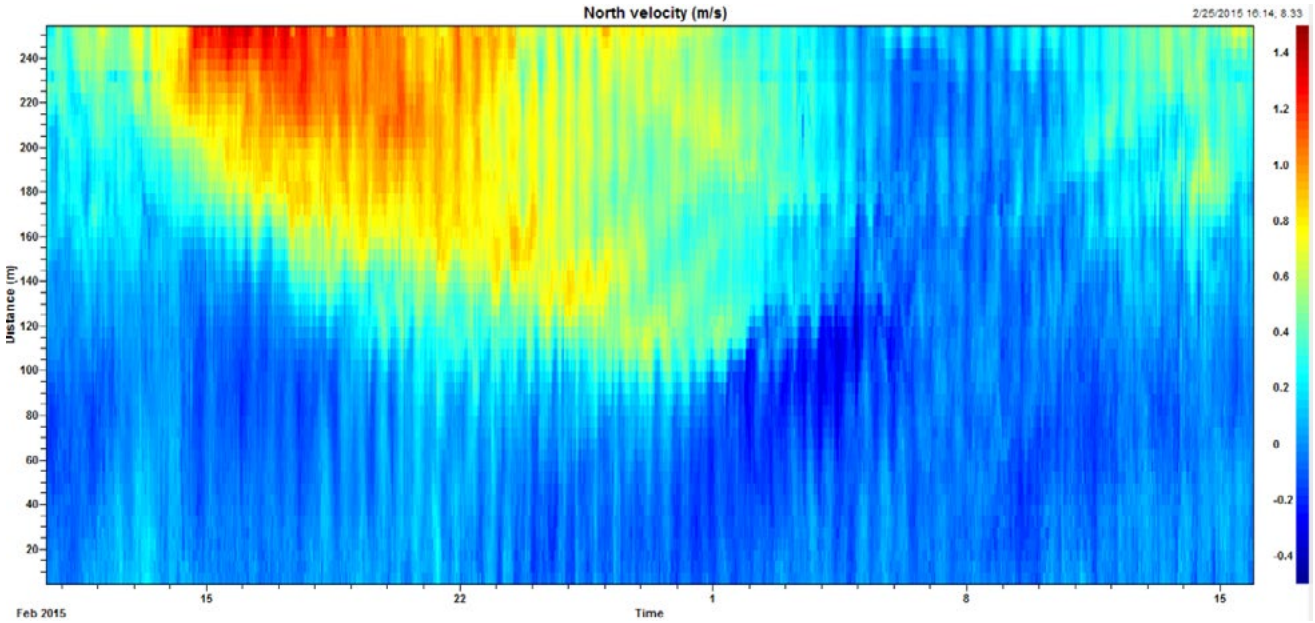
Coastal Dynamics Limited was able to satisfy the specific needs of their client by placing a higher-frequency AWAC near the sea surface and an Aquadopp Profiler down-looking in the near-bed Signature55 buoy to observe waves, near-surface currents, and bottom conditions. Most users often give up measuring currents close to the surface and bottom due to operational and instrument limitations. But Nortek's form factor and patented data processing of the **Aquadopp Profiler** and **AWAC** allowed them to easily capture this often missed data for their client.

"We were able to collect high-resolution water column [current] profiles, which not only provided excellent information for our client but simultaneously gathered very useful scientific data that could be used to glean further information on a previously undocumented water column structure," says Nazeer Gopaul.

"The deployment was successful and the data gathered from the field campaign provided excellent data quality for our study," Gopaul adds.



Coastal Dynamics Limited chose Nortek's Signature55 to collect high-resolution current data in the water column off the coast of Trinidad.



Color contour plot showing current data (as a function of depth and time) from a deployment off the coast of Trinidad. A ring current spinning off the North Brazil Current (and impacting the project area) was clearly visible in the data.

A reliable system delivering high-quality data

The Signature55 is a dual-frequency, broadband instrument. This means that the user may select 75 kHz, 55 kHz, or alternate both, providing high-resolution measurements near the instrument, and larger cell average currents out to > 1000 m.

The dual-frequency nature of the instrument is inherent to all Signature55 systems, so users do not have to choose which frequency to use at time of purchase. This gives users the flexibility to adapt to different conditions based on the project at hand.

In this shallower location (~400 m), Coastal Dynamics Limited opted to utilize only the 75 kHz mode, taking advantage of the high-resolution data at incredibly low power.

"The Ethernet connection allows us to download data rapidly so that we can deploy on tight schedules in deeper water deployments. We are also able to obtain full water column profiles with high-resolution data that can then be used for several applications such as dispersion studies, environmental assessments, operational oceanography and research," Nazeer Gopaul explains.

The mechanical design of the Signature55 is suitable for applications on platforms, drilling rigs, bottom frames and subsurface buoys.

The elliptical shape of the Nortek subsurface buoy minimizes the drag and an integrated frame holds the instrument in place. The instrument can also be placed on bottom-mounted frames. This means that users are not dependent on structures on the surface to perform measurements – offering greater flexibility, and a wider area of use.

Winning projects and expanding capabilities through knowledge sharing

Nazeer Gopaul emphasizes that Nortek's willingness to share technical knowledge and assist his organization in making decisions has helped Coastal Dynamics Limited win projects for deployments in deeper waters.

"We are now exclusively using Nortek ADCPs mainly because of the extensive support we receive and the connections to Nortek's partners. The referrals and contacts we establish through Nortek have allowed us to offer our clients the best available technology while being cost-effective," Nazeer Gopaul adds.

Retrieval of the Signature55 following a deployment near Trinidad.

Explaining the technology

Aquadopp Profiler

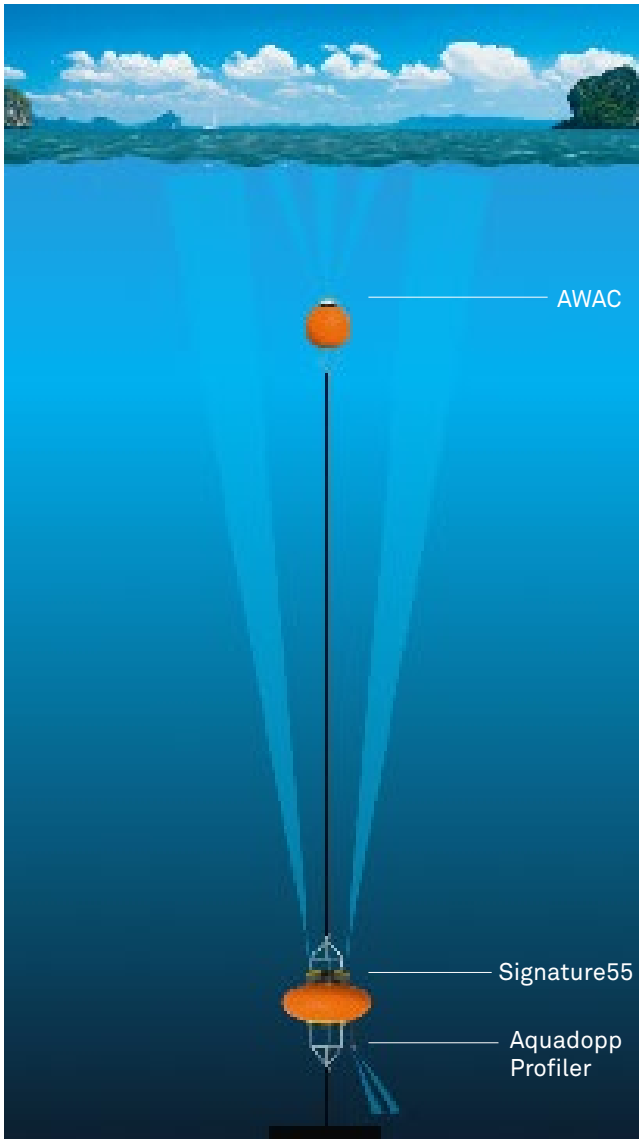
The Aquadopp Profiler, designed with flexibility in mind, is the ideal tool for shorter-range, higher-frequency measurements in shallow water or near boundaries. Its low cost and small form factor allowed the integrator to easily mount it in the Signature buoy to collect bottom currents usually lost in the distance between the anchor and the cell from the first instrument.

AWAC

The Nortek AWAC features a patented SUV mode. This gave the client the unique ability to collect higher-resolution current profiles at the surface, usually lost to side-lobe effects in long-range profiling, as well as directional wave measurements. The spherical buoy, modified to fit the AWAC and up to two battery canisters, was also provided.

The Signature55

The Signature55 used in high-resolution mode in this project featured incredibly power-efficient electronics and broadband processing, which revealed in detail the complex currents affecting this project area at the time. The Signature Buoy, custom designed for the Signature55, allowed quick and easy deployment as well as the ability to include additional instruments and sensors.



Signature55 mounted on an elliptical buoy. This buoy has an optional pocket where users can integrate the Aquadopp Profiler for higher-resolution current profiling. The AWAC is mounted on top of the spherical buoy.