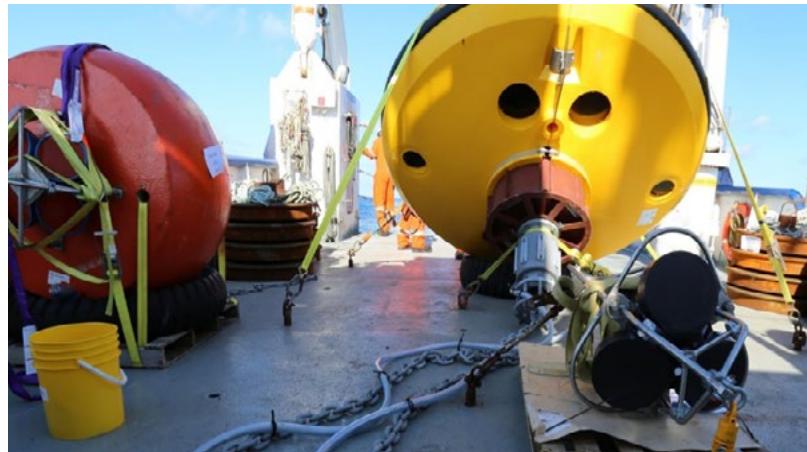


Real-time Surface Buoy

Stones MetOcean Observatory Project

Customer: Shell/Fugro



Signature55 integrated onto Fugro's Wavescan buoy. Photo courtesy of Fugro.

Long-range (> 600 m) Acoustic Doppler Current Profilers (ADCPs) have been heavily used in the Gulf of Mexico since the early 2000s to monitor currents surrounding oil and gas operations. Historically, these ADCPs have been mounted almost exclusively on large, stable offshore platforms. The Shell Stones MetOcean Observatory Project has set a new path for the design of such projects by mounting the ADCP on a dynamically moving surface buoy. This mooring, which sits in ~2940m in the Gulf of Mexico's Walker Ridge Block 552, is operated by Shell E&P as part of the Shell Stones Field.

Unlike installations on stable platforms, surface buoys present additional challenges to ADCP data given their dynamic motion's negative impact on the quality of velocity data. The Signature55 is a dual-frequency ADCP, capable of operating at either 55 kHz or 75 kHz, and is powered by Nortek's AD2CP platform (US Patent 7,911,880).

This dual-bandwidth platform allows the instrument to deliver both long-range current profiles (up to 1000 m) and high-resolution (5m cells) profiles, all in a self-contained configuration using battery power.

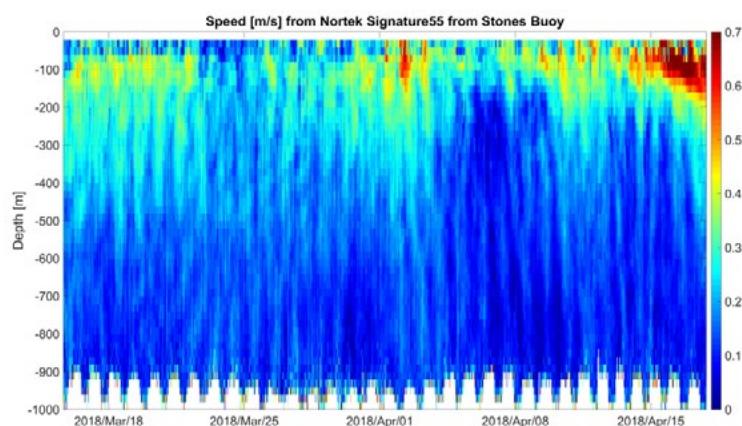
Since January 2016, the Nortek Signature55 has been deployed on the Fugro Wavescan buoy in the Shell Stones field. It acts as the primary ADCP to deliver currents to satisfy both the NTL requirement and those of Shell.

“ Since January 2016, the Nortek Signature55 has been deployed on the Fugro Wavescan buoy in the Shell Stones field ”



Marcus Ogle M.Sc.
Senior Oceanographer, Fugro

The Signature 55 data is transmitted in 20-minute intervals to the National Data Buoy Center, where it is publicly accessible via their website (NDBC Station 42395). The Shell Stones Metocean Observatory will act as a model for data collection for other oil and gas operators, ultimately resulting in safer operations and a broader network of ocean observatory systems in the Gulf of Mexico for decades to come.



Speed in m/s from a buoy-mounted Signature55 at the Shell Stones field. Data is reported to the National Data Buoy Center to satisfy NTL requirements.

CASE STUDY



Fugro's Wavescan buoy featuring a Signature55 as well as a Nortek Aquadopp Z-cell profiler mounted in the buoy's hull to capture surface currents.

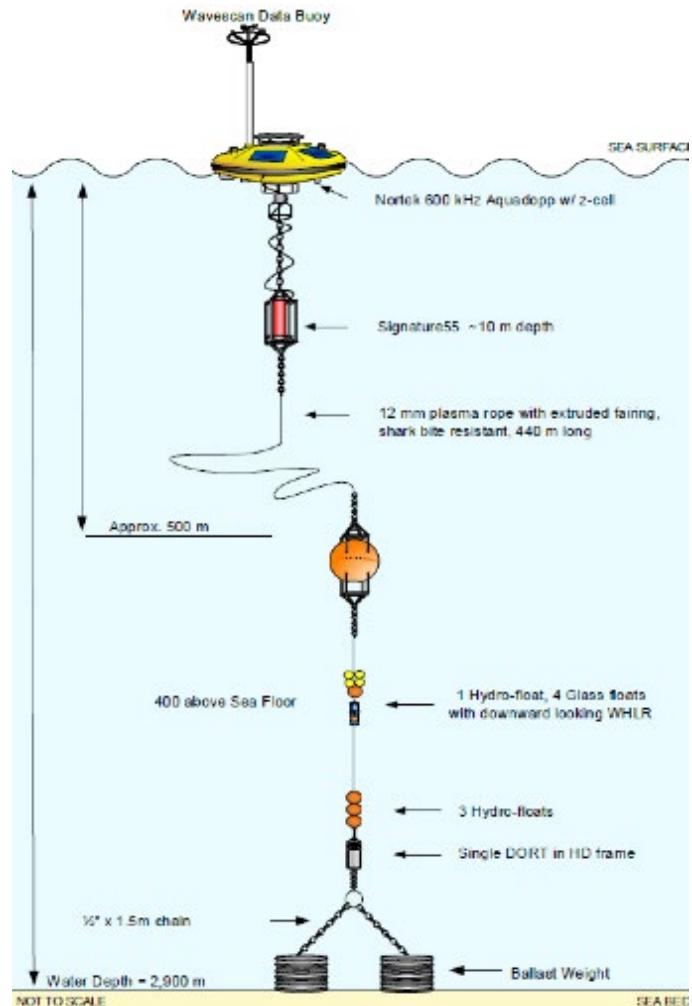


Diagram of Fugro's mooring at the Shell Stones field. This mooring has been operational since January 2016.

Pak Leung, Ph.D, MBA, C.Sci.
Technology Portfolio Advisor, Shell



Dr. Pak Leung has 20 years of experience in operational oceanography and ocean observations. Pak has a Ph.D in Physical Oceanography, Master's degrees in Engineering (Fluid Mechanics) and Business Administration, and two Bachelor's degrees (Physics and Mechanical Engineering). In 2009, he joined Fugro GEOS as Senior Oceanographer where he was exposed to different aspects of the oceanography business in the Oil & Gas industry, which includes data collection and analysis, offshore maintenance, mooring design, and commercial management. Pak is a Shell metocean technical authority on operational metocean to provide technical support for engineering designs, metocean data collection, marine instrumentation, and operation support. In his current role as Technology Portfolio Advisor, Pak is supporting Shell's technology development efforts and innovation opportunities in deepwater and other upstream areas.

Marcus Ogle M.Sc.
Senior Oceanographer, Fugro



Marcus Ogle received his B.Sc. in Meteorology from Texas A&M University in 2009, and an M.Sc. in Oceanography from Texas A&M University in 2012. Since completing his graduate degree, Marcus has been employed by Fugro as a Senior Oceanographer where he manages various metocean projects throughout the Americas region. During his time at Fugro, Marcus has become skilled with multiple instrument packages and performed nearly 500 days in the field. Marcus has managed the Shell Stones project since its award in 2014.