

# case study | NOISE MEASUREMENT

## BP • Undisclosed Location • December 2017

An AutoNaut 5m USV was deployed to acquire noise measurement data in proximity to a deep-water mobile offshore drilling unit (MODU). Data was recorded at a range of points from the offshore installation, including at a distance of 140m in a close-pass manoeuvre.



This survey was undertaken by Seiche Ltd for BP to address a data gap for the sound characterisation of offshore drilling facilities and also involved the use of conventional drift buoys.

AutoNaut USV "Islay" was fitted with a Seiche uPAM system: an array of two hydrophones and a depth sensor deployed from the stern via a 27.5m tow cable. The measured low-frequency sensitivity of the ceramics (10-300 Hz) and full frequency response of the preamplifiers (2 Hz - 200 kHz) were combined to obtain the sensitivity response of all hydrophones in the range of 20 Hz to 10 kHz. Raw PAM data was stored onboard for offline analysis.



Data was acquired at points from the MODU ranging in distance from 140 metres to 5,500 metres. The USV conducting a grid-based transect to cover 62nm (at an average speed through water of 1.5kts) to acquire 75 hours of data. For operations outside the 500-metre zone, waypoints were set for the USV to follow under 24-hour remote oversight by operators in the UK via Iridium satellite link. Operation of the USV within the 500-metre radius exclusion zone was conducted in daylight only and under local control over radio and WiFi link to a specialist technician onboard a standby vessel.

For this mission, an AutoNaut USV was launched and recovered to the standby vessel by use of a small crane. A two-point lift of the 5-metre long USV with a system of quick release for deployment and quick latch for recovery was used for safe deployment and retrieval at sea. >>>

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In parallel, a fleet of four drifting buoys acquired data mid-distant from the MODU. Not capable of controlled mobility, the buoys were deployed in upstream currents over the tidal cycle for recovery by standby vessel downstream. Drift buoy operations were conducted in daylight hours only.

The USV and drift buoy operations were coordinated by Seiche in an operationally busy area. A simultaneous operations (SIMOPS) plan was developed and followed through careful planning and close coordination with a range of stakeholders in the planning phase and during the data acquisition.



## Mission Summary

Location: Confidential

Duration: 5-day

Environment:

< Beaufort 6

< 3 metre swells

Operational challenges:

- Busy area of operations, requiring coordinated SIMOPS
- Close-pass manoeuvres to 140 metres of offshore infrastructure

## Technical Specification

### AutoNaut Dimensions

Length: 5 metres

Beam: 0.9 metres

Displacement: 250kg

### Propulsion

Wave foils

Auxiliary thruster

### Power

Batteries: 4x70Ah 12V lead acid batteries

Solar: 300 Wp Photovoltaic panels

### Sensors

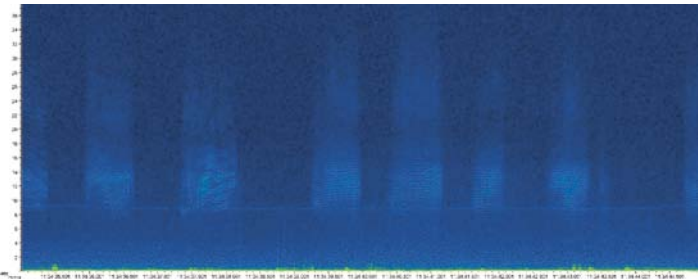
Seiche uPAM:

- 27.5m array

- 2-channel

Airmar wind sensor

Class B AIS



The foremost challenge in this mission was assuring safe operation within a busy working offshore area. Crucial to success was early planning discussions with operations teams for shared understanding of the USV and drift buoy capabilities and the working area. Close ongoing coordination of SIMOPS management was vital. In particular, the 500m radius Safety Exclusion Zone is typically implemented around offshore facilities, with restricted and controlled access for non-essential vessel traffic. Authority for the AutoNaut USV to operate within the 500m exclusion zone was issued by the Offshore Installation Manager (OIM) and an Emergency Response Plan was developed in case of loss of propulsion, steerage or communications. The wave-propelled USV sustained a minimum of 1 knots and precisely followed pre-set waypoints with remote oversight. Navigational track was followed within a track line of <5 metres at all times. Command and control capabilities were maintained throughout with multiple redundant communications systems (Iridium/WiFi).

To meet the project requirements for data quality, AutoNaut proved to be a low self-noise platform with minimal sound contamination from electrical or mechanical sources. To acquire coverage and quantity of data, the controlled mobility of the USV compared favourably to the use of four drift buoys. This also demonstrated logistical advantages and highlighted the potential to complete future work without need for conventional vessels. Further benefits from this possibility include significantly reduced costs, carbon emissions and safety risk.