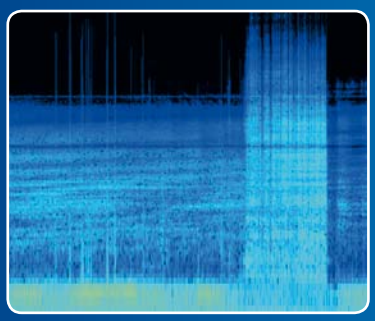
Seiche
Marine Acoustic Solutions

UNDERWATER SOUND MEASUREMENT

UNDERWATER SOUND MEASUREMENT OVERVIEW

Assessment of ambient sound and noise levels from anthropogenic sources has become standard practice across all industry sectors. The need for high quality measurement is also now widely acknowledged along with an increase in regulatory targets and international requirements.



OUR APPROACH

In partnership with Bath University and ZCAT Science, Seiche have expertise through the entire process of sound measurement. Our knowledge of equipment, field operation and data analysis enables our collaborative team to provide a complete suite of measurement services. We have technicians/ acousticians on standby to complete in-field operations to a commercial time frame. Data analysts work in-house under expert guidance.

ZCAT Science

Dr Paul Lepper of ZCAT Science has extensive experience in underwater acoustics and bioacoustics including sound field measurements and modelling, source characterisation, noise assessments and physiological and behavioural biological studies into hearing and noise impact. He is a co-author of National Physical Laboratory's (NPL) "Good Practice Guide for Underwater Noise Measurement".

UNIVERSITY OF BATH

Dr Philippe Blondel of Bath University is an expert in the acoustics of complex marine environments. He has field experience all over the world including deep oceans and very shallow lagoons.

TECHNICAL METHODOLOGY

Seiche designs and manufactures to the precise requirements of a project. We work to the most appropriate guidance, drawing on recommendations from NPL and ISO PAS 17028. Our systems are configured for optimum signal to noise performance across all frequencies of interest for any particular application.

The means of deployment must suit the environment to reduce interference noise and ensure a quality dataset. Information on current, temperature, depth, salinity and GPS location is recorded as is any further supplementary data. Analysis assesses ambient noise and/or specified noise sources. Our focus is on appropriate metrics and bandwidths, typically; 1/3 octave bands, Spectral Density, RMS Sound Pressure Level (SPL), tonal component analysis, peak-to-peak and Sound Exposure Level (SEL). This is conducted using a range of software, including MATLAB, PAMGuard and Raven software. Quick turnaround time of results is often required and Seiche can complete within 72 hours of data receipt.

MEASUREMENT PLATFORMS

Seiche offers a range of technology for high quality sound measurement.

The best approach is closely tailored to the project and environment and meets the relevant regulatory standards.

DRIFT BUOYS

A set of drift buoys enables the collection of thousands of data-points over a large area and within a short term deployment. A key advantage is the very low self noise and motion noise including flow noise as the buoys run with the current. The buoys are small, GPS tracked and can be manually handled at sea.

UNMANNED SURFACE VEHICLES (USVs)

We collaborate with MOST to utilise an exciting new platform for sound measurement. The AutoNaut is a near silent platform with a mission duration of up to several months. It has station-keeping capabilities for data-point collection and/or can transect a large area. The AutoNaut operates wholly remotely - reducing the costs and safety concerns of personnel offshore.

SUB-SEA RECORDER

The sub-sea data recorder is ideal for long term data acquisition. Seiche's highly configurable system means sampling rates, dataset space, duty cycles and power budget can be adjusted to suit. Variable gain stages and configurable Low Cut and High Cut filters are also incorporated. The recorders are designed for assured recovery by acoustic release.

VERTICAL PAM

The vertically deployed system provides a simple and flexible approach suited to over-the-side operations, especially when depth profiling is required. The system is lightweight and easy to transport, including by helicopter.

TOWED PAM SYSTEM

Our most extensively used PAM system is robust, reliable and available at short notice. The system is available in a number of configurations and is supported by PAMGuard software. Deployed as part of a long term survey, such as from a support vessel throughout a seismic survey, extensive data can be acquired.

FIXED BUOY

A fixed buoy enables measurement in the longer term at a specific position. The buoy operates in harsh marine environments and has been designed for ease of transport and manual handling at sea.

PAM-CAT

The PAM-CAT was specially designed for operations in challenging environments such as very shallow transition zones and complex lagoon waterways. The rafts can be moored on a long term basis or towed behind a vessel.

DIGITAL HYDROPHONE

Our new generation of digital hydrophones improves signal to noise ratio and enables advanced control of configuration of gain and filter – in real-time. Integrated sensors simultaneously record environmental data, including salinity and temperature.

CALIBRATION PROCEDURE

Equipment is routinely calibrated at the manufacture stage at our in-house test facility at Seiche HQ. Piston phones are used in the field for further checks. Additionally, Loughborough University tanks are also available and certified calibration can be conducted at the National Physical Laboratory (NPL).

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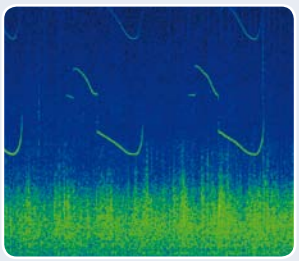

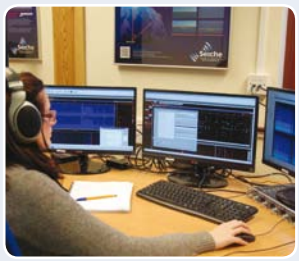

MODELLING

In partnership with Plymouth University and ZCAT Science, Seiche provides comprehensive services in underwater acoustic modelling. We combine an in-depth knowledge of computational algorithms with practical knowledge of the marine environment. Our bespoke approach enables us to deliver consistently high quality results in quick turnaround on a range of projects:

- Predictive sound source modelling
- Sound Source Verification (SSV)
- Propagation modelling
- Mitigation zone determination

SCIENCE & ENGINEERING WITH PLYMOUTH UNIVERSITY

ZCAT Science

Institute of Marine Engineering, Science & Technology
IMAREST

MITIGATION

Regulatory requirements for effective noise mitigation have increased – particularly for the protection of whales and dolphins. It has become standard practice across several industry sectors for Passive Acoustic Monitoring (PAM) to detect vocalising marine mammals – in real-time – to ensure none are within close vicinity of an active sound source.

TRAINING

Seiche provides highly regarded training for individuals and companies in the UK and around the globe. The courses cover all aspects of Underwater Acoustics and include:

- Underwater Acoustic Modelling
- Introduction to Underwater Acoustics
- Underwater Acoustics in the Marine Environment
- Underwater Acoustics and Sonar Systems

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