

3D Chirp

Developed by the University of Southampton and Kongsberg GeoAcoustics, the 3D Chirp is a surface-towed sub-bottom profiling system capable of producing 3D seismic volumes of the upper tens of metres of sediment and imaging buried structures and objects with decimetric resolution.

The 60 hydrophone array records the full 3D wavefield, significantly enhancing the signal to noise ratio over a standard single channel profiler.

Thanks to the ± 3 cm RTK/MRU accuracy, all “out-of-plane” energy can be correctly focused to the real sub-surface location. This provides accurately located, geometrically correct images of buried objects, such as UXO, with no gaps within which UXO can hide.



Features

- Wide bandwidth 1.5kHz to 13.0kHz
- Up to 12.5cm horizontal resolution
- Vertical resolution dependent on the substrate;
 - Fine-grained clays/silty clays ~ 5cm
 - Sands/gravels ~ 10-15cm
- Tens of meters penetration
- Standard SEGY data output
- 3D geometrically corrected imaging

Data Processing

3D Chirp data is processed using bespoke QSI-3D processing software.

Utilises a new approach to handling the source bandwidth, providing significant improvements over industry standard 3D seismic processing software when applied to 3D Chirp data:

- 60x faster processing;
- Higher fidelity imaging of high frequencies.

Standard outputs include:

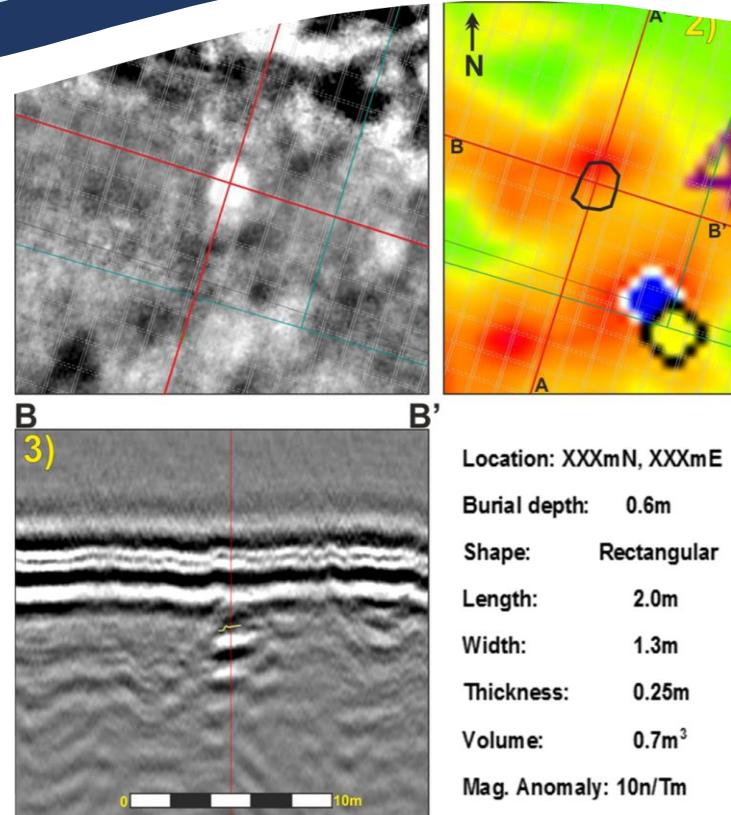
- NMO stacked volumes;
- Pre-stack frequency approximated Kirchhoff migrated volumes.

All outputs are in industry 3D SEGY format, meaning interpretation can be done in a range of industry packages.

Buried Object Detection

NMO stacked volumes are ideal for interpreting the location of buried objects thanks to their diffraction signatures.

Pre-stack migrated volumes focus the seismic energy and reveal the true target shape. Target analysis provides a plan view, as well as profiles at any angle, through a target allowing accurate characterisation.



Above: Target analysis of buried object, 0.6m below the seabed: 1) Horizontal slice through buried object, 2) Buried object shape overlaid gradiometer data, 3) Profile through buried object.

Below: Horizontal slice and profile through a large 14m x 1.2m target within a 3D CHIRP volume, 1.5m below seabed.

