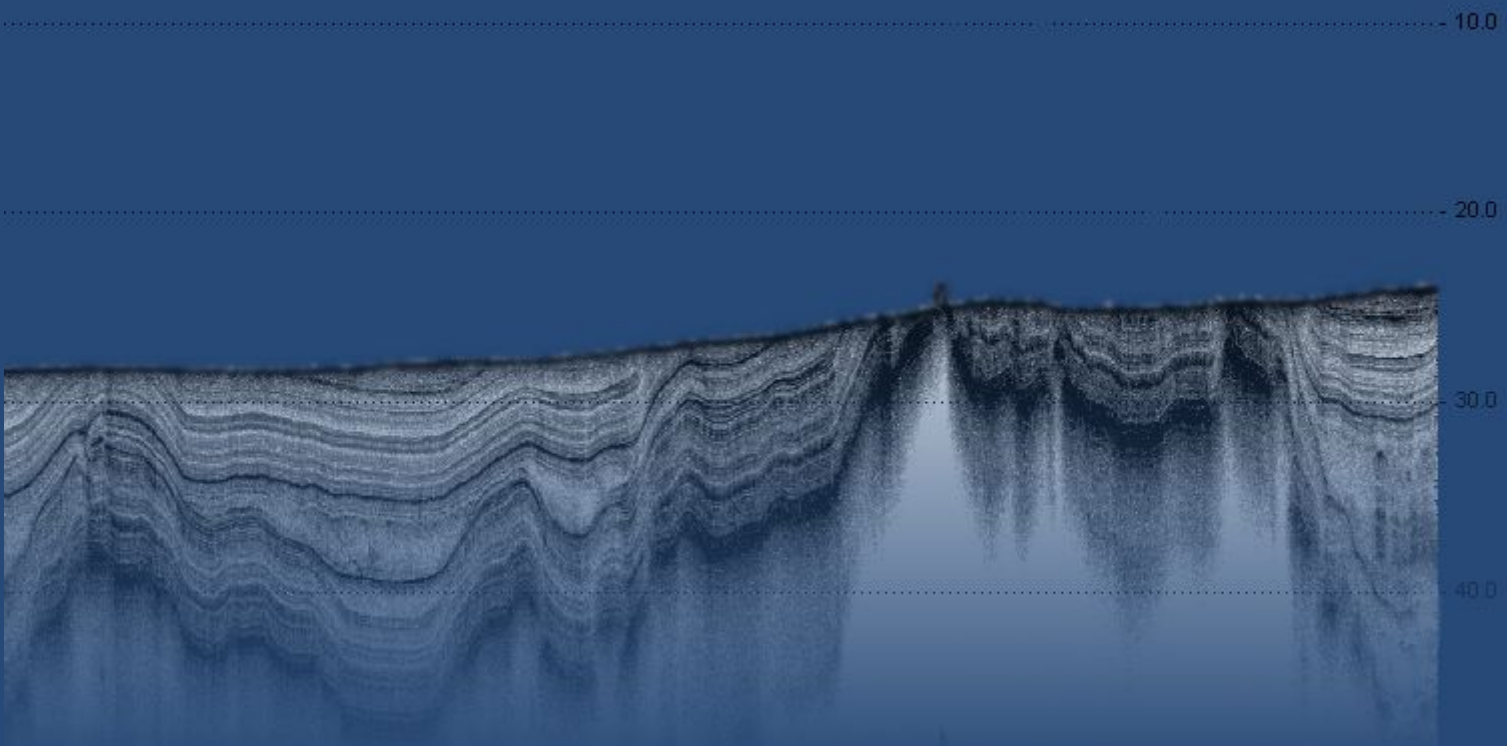




MD DSS

**Multi-mode Sonar System
for
Seismic Data Acquisition,
Sub-bottom Profiling and
Side Scan Sonar Surveys**



Meridata offers geologists, geophysicists, environmental scientists, engineers and hydrographers

MD DSS

the Complete Solution for

- geophysical surveys in rivers, lakes, harbours and offshore sites
- studies of sedimentation, silt deposition and erosion
- sediment properties and bottom structure surveys
- combined seismic and bathymetric surveys

No matter whether your survey is about bedrock profiling, defining volumes of various sub-bottom layers, or determining silt accumulation in basins, MD DSS is the tool for efficient data acquisition, processing and presentation.

Multi-mode, wideband operation

Being a genuine multi-mode sonar system, MD DSS is not restricted to operation on a single frequency, on a predetermined sound source or acoustic method, but serves a multitude of active sonar applications:

- **Seismic reflection profiling** using Air gun, Sparker or Boomer from 10 Hz upwards
- **Chirp sub-bottom profiling** with software selectable frequency, bandwidth and pulse windowing
- **Side scan survey** with frequencies from 100 kHz to 1250 kHz

In fact, this system's flexibility allows you to produce and exploit almost any acoustic phenomena within the spectrum of 10 Hz to 40 kHz via appropriate wet-end components. Therefore, novel sonar technologies can easily be embedded in your MD DSS system.

Portraying seabed features and sub-bottom structures

MD DSS's advanced signal processing and image enhancement technology reveal the finest of details within bottom structures. Powerful presentation features allow sub-bottom structures to be visualized as clear-cut profiles, both in real-time and post-mission processing.

Digital data storage on your PC

No paper recorders are required. The MD DSS 'black box' hardware connects with your PC or workstation, allowing full control of sonar operation and all data to be stored on the medium of your choice, be it hardcopy or digital.

The ability to digitally store sub-bottom survey data is of importance whenever there is a need for further processing of the material and for extracting information for various kinds of studies.

The stored survey data is readily available for processing, visualization and analysis.

The very same sounding data can be flexibly used to serve the purposes of, e.g., geological, limnological, engineering and hydrographic investigations.

Each sounding observation is assigned a position

Meridata has long-standing experience in marine survey positioning. The MD DSS system offers full support for any commercial navigation system, e.g., GPS positioning, as well as for shipboard sensors for vessel motion and attitude compensation.

Each observed object and layer is automatically combined with position information, making sub-bottom data access, processing and visualization completely chart-referenced.

Full integration with GIS

The data from MD DSS is easily transferred to virtually any Geographic Information System (GIS), allowing wide use across your organization as geographically-referenced information.

System Configuration

for high resolution sub-bottom profiling and high penetration seismic reflection survey



1. Transmitter electronics
2. PC/workstation with Universal Acoustic Signal Processor

3. Hull-mounted chirp sound source (transducer)



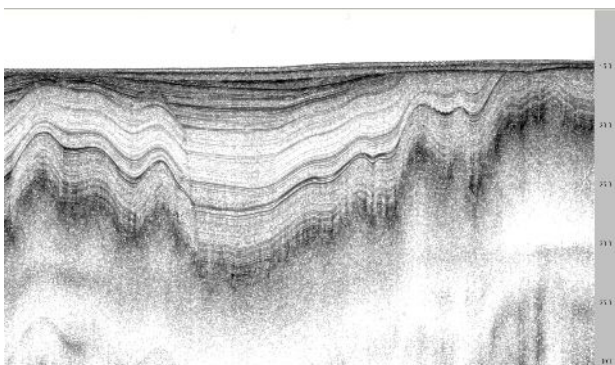
4. Towed seismic source (C-Boom low voltage boomer)



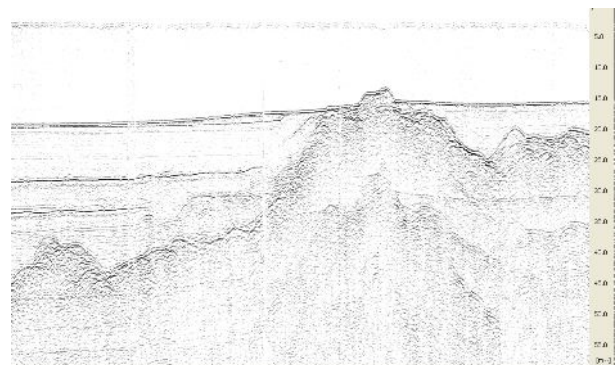
Additionally, a positioning system (GPS) is needed to provide position data. Other sensors such as motion and attitude reference units are easily integrated in the system for enhanced accuracy.

A separate hydrophone array (streamer) is used for reception of low-frequency reflections.

Various types of sound sources are available.

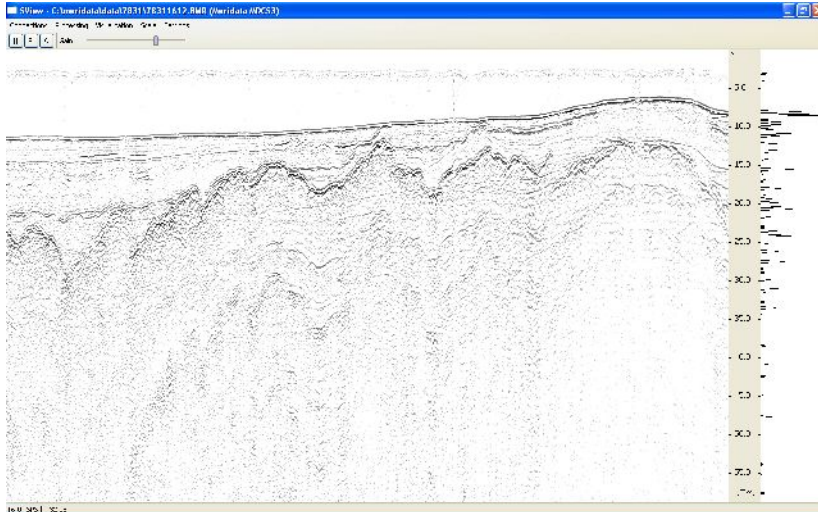


High resolution chirp profile.

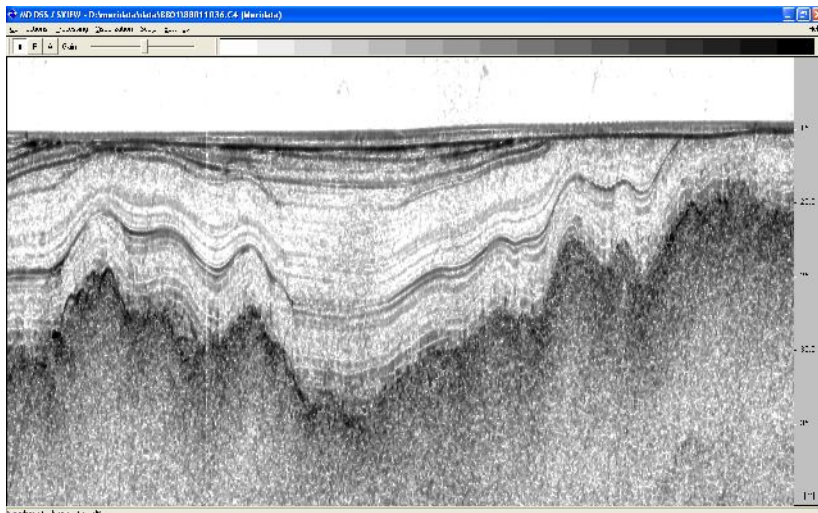


Boomer profile.

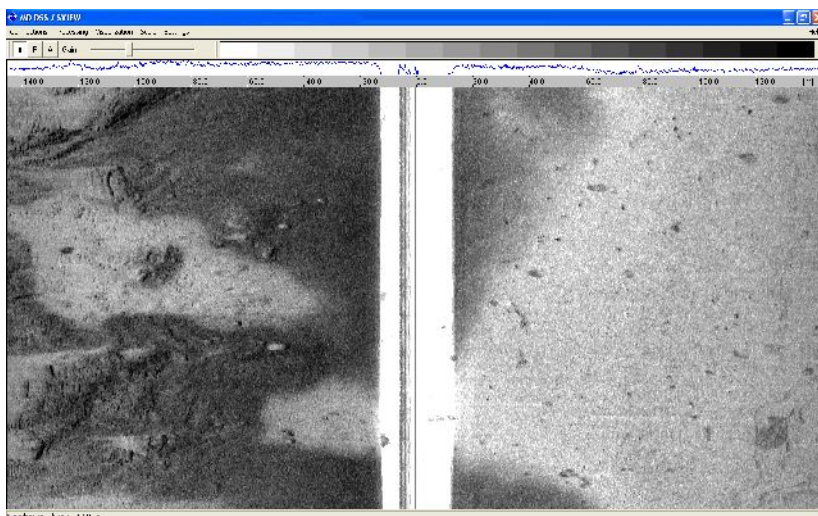
Seabed and Sub-seabed Imaging



1.5 kHz boomer seismic reflection profile.



3-8 kHz chirp profile.



400 kHz side-scan sonogram.

Seismic reflection profiling

Accurate, full-wave acquisition and digital signal processing using a low-frequency seismic source (air gun, sleeve gun, sparker or boomer).

Applications:

- bedrock profiling
- drill site investigations
- dredgeability assessment

Frequency range: 10 Hz .. 40 kHz.

Chirp sub-bottom profiling

Utilizes wideband FM waveforms to obtain a high signal-to-noise ratio and sharp layer resolution via pulse compression and matched filter correlation processing.

Applications:

- pipeline and cable route surveys
- pre- and post-dredging surveys
- surficial sediment studies

Frequency: 500 Hz .. 40 kHz.

Side-scan sonar survey

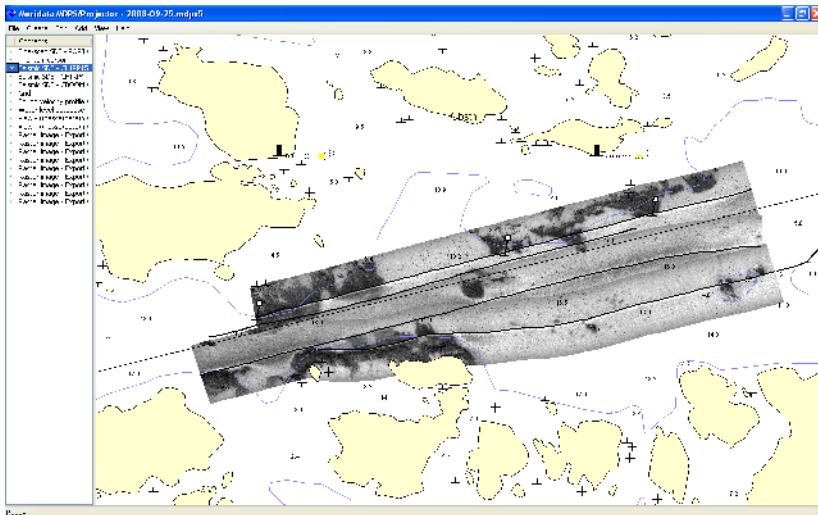
Acquisition of seafloor images using a side-scan sonar.

Applications:

- underwater search operations
- mapping of surficial seabed features
- mapping of man-made underwater structures

Frequency: 100 kHz .. 1250 kHz.

Post-processing and Results

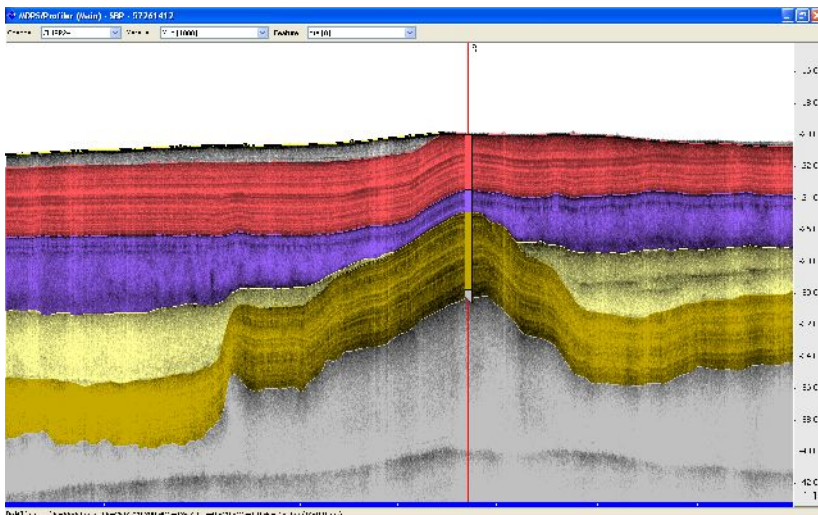


Survey lines and side-scan sonar mosaic portrayed in a post-processing chart window providing point-and-click access to acoustic profiling data.

Chart-based access to sub-bottom data

The MDPS post-processing software package for MD DSS allows chart-based survey data management and sonar data analysis.

Automatic and interactive data processing tools form a solid environment for extracting the relevant information from various sources of survey data.

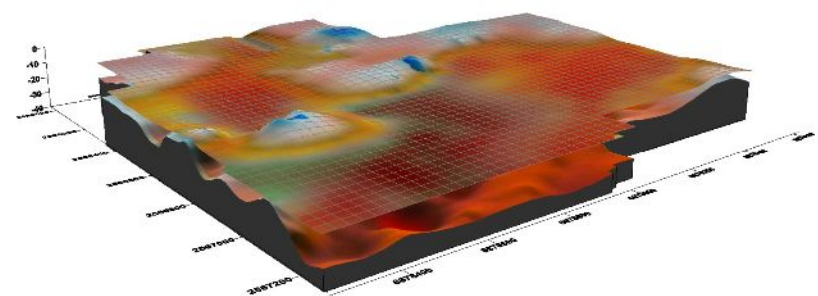


Geological layers interpreted from stored acoustic reflection data.

Acoustic data processing and layer interpretation

Acoustic reflection data can be subjected to post-survey signal processing, including filtering, thresholding and gain functions, exactly as during survey operations.

The Profiler tool for semi-automatic interpretation allows materials, layers and their properties to be flexibly defined.



3D view of interpreted bedrock surface underneath unconsolidated sediments whose top is shown as a mesh overlay.

Presentation

Resulting 3D information allows for extensive analysis of geological structures and sedimentation.

The data from MD DSS is conveniently transferred to surface modelling packages for 3D visualization of the data.

It also provides easy interfacing to GIS, and thereby is suited for countless applications.

System Specifications

Hardware

Control and data acquisition	Industrial PC with Pentium-class processor UASP active sonar/data acquisition unit
Acoustic subsystems	Seismic profiling subsystem (power supply, sound source, hydrophone) Chirp profiling subsystem (transmit amplifier, transducer) Side-scan sonar subsystem (surface electronics, towfish)
Operating voltage	24 V DC or 230 V AC
Number of sonar channels	1 to 8

Functional specifications

Operating modes	Full wave seismic, chirp, side scan
Frequency ranges	10 Hz .. 40 kHz (seismic), 500 Hz .. 40 kHz (chirp), 100 .. 1250 kHz (side scan)
Acoustic transmission	Software controllable waveform generator, frequency up to 40 kHz Software controllable transmission pulse length, windowing, FM bandwidth, and main transmission frequency Trigger for external sound source Software controllable ping rate and trigger pulse width
Acoustic signal reception	16-bit signal sampling at up to 96 kSPS Internal or external trigger Software controllable trace length, high-pass filter, low-pass filter, band-stop filter, gain, TVG, signal stacking, edge detection, phase inversion and full wave rectification
Visualization	Acoustic reflection data can be visualized in scaleable gray shade or color histogram/echogram, oscilloscope and signal spectrum displays
Data logging	Reception, time-tagging and storage of all observations (acoustic reflection data, position, attitude, motion data and event marks), in MD format (conversion to SEG Y available)
Options	Post-processing software package



R/V ARANDA (Institute of Marine Research) in the Antarctic with MD DSS.



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