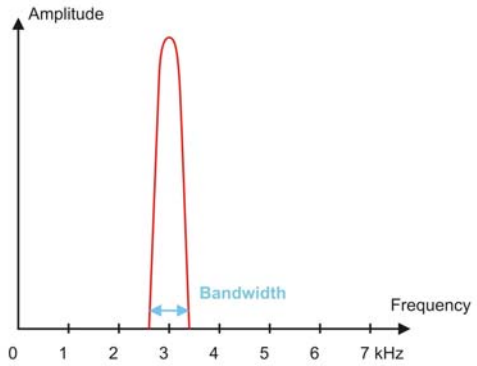
Conventional echosounders

Principle: The conventional echosounders (also called ‘pingers’) are single frequency subbottom-profilers. They employ a signal with a narrow bandwidth (= a narrow ‘peak') normally within the range 3-10 kHz.



Basic features: The transmitting transducer acts typically also as receiving hydrophone (if no separate hydrophone or hydrophone array is used). This means that the vibration from the last signal transmitted must be stopped before the transducer-unit is able to receive the reflected signal. Therefore such systems must have a couple of meters of water under the transducer to obtain proper results. This is a significant restriction in shallow water seismic. In recent years however specific echosounder types have been constructed that are marked by a very short pulse length and therefore can be used specifically for shallow water surveys.

Resolution and horizontal precision: Vertical resolution is typically 20-50 cm, with a maximum penetration between 30 and 60 m depending on the sediment type. The fact that the transducer is also used as receiver allows for a higher precision in the horizontal positioning of features observed than if the reflected signal was picked up by a separate hydrophone array located some distance away from the source.

Platforms: Echsounders can be operated from small (sometimes even semi-inflatable) vessels. The transducer unit (‘fish’) is normally attached to the side of the ship (but in some cases towed), and only a seismic recording system is needed on board.

Advantages:

- Imaging of sandy, silty and clayey sediments
- Quite high resolution, good penetration
- Simple to use
- Operated from very small vessels
- High potential for landscape reconstruction
- In some cases also fit for very shallow water

Disadvantages:

- Difficult penetration in hard sandy sediments
- Signal repeatability is highly variable
- 2D image of the subbottom, no 3D
- Small features (meter range) can most likely not be detected
- Image distorted by gas in sediments

Literature:

Andel van, T.H., Lianos, N. 1984: High-Resolution Seismic Reflection Profiles for the Reconstruction of Postglacial Transgressive Shorelines: An Example From Greece. Quaternary Research 22 (1984), 31-45.

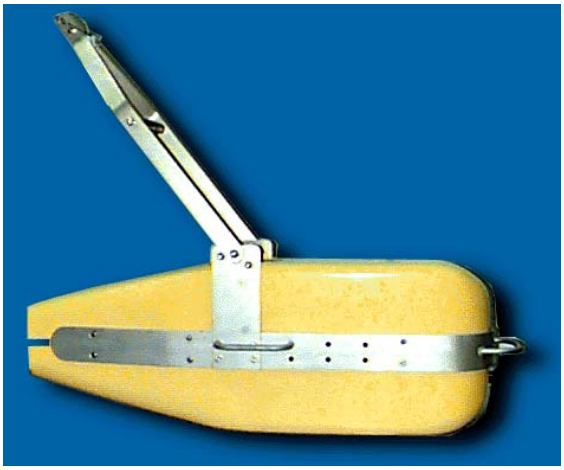


Fig. 1 Typical echosounder towfish.

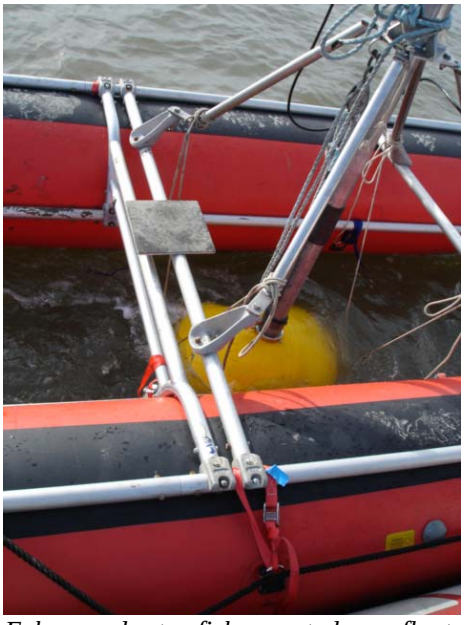


Fig. 2 Echosounder towfish mounted on a floatable platform.

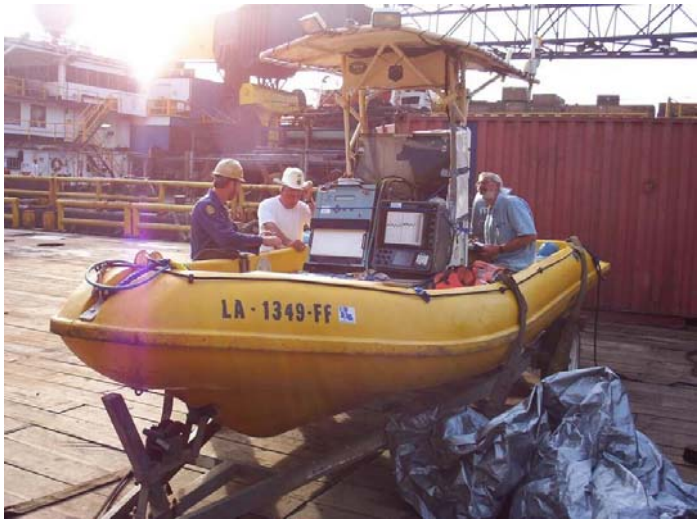


Fig. 3 Typical small boat used for echosounder survey.

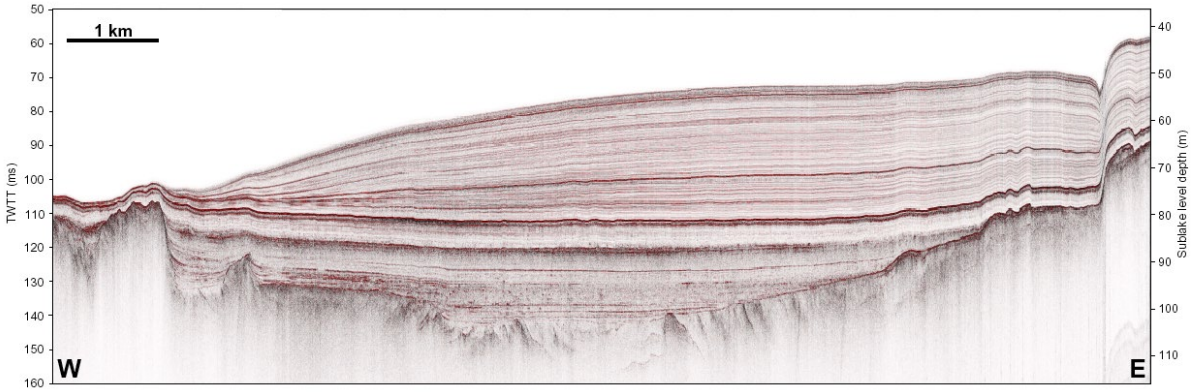


Fig. 4 Low-frequency echosounder subbottom profile (3.5 kHz central frequency) with penetration up to 70 ms bsf (52 m). © RCMG Universiteit Gent.

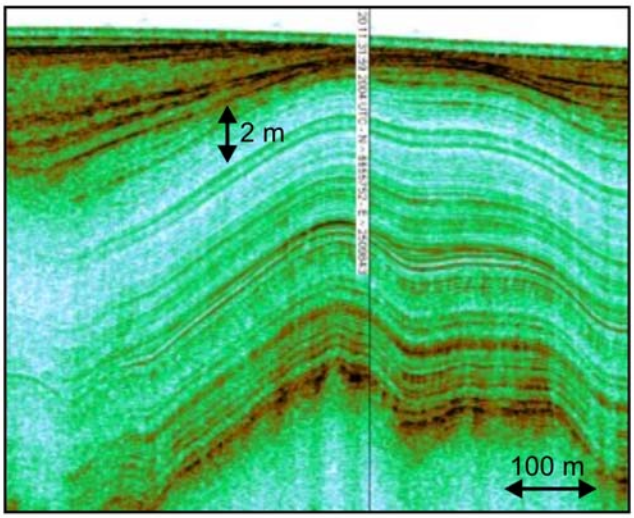


Fig. 5 High-frequency echosounder subbottom profile (24 kHz central frequency) with penetration up to 16 m bsf. © Sensomarine.