

Shallow Seismic (Pinger / Chirp) & Sub-Bottom Profiler (SBP)

The SBP family includes various types of systems including 'Pinger' systems which transmit a single frequency (~4 kHz) and 'Chirp' systems which transmit a sweep of frequencies (e.g. 2-10 kHz) in a single pulse. These systems operate in a similar way to SBES but use lower sound frequencies that penetrate further into the sediment and examine sediment layers and the extent of bedrock. This information is crucial when building offshore marine infrastructure such as sustainable energy devices like wind turbines. The extent of penetration depends on the type of seabed. If the bottom is hard and compact like bedrock or thick sand then most of the acoustic energy will be reflected. If the bottom sediments are soft or loose some acoustic energy will continue to travel through the various sub-surface layers.

The result is a series of sound waves returning to the vessel at slightly different times which are displayed as a series of layers. This 'stratigraphic' information can be interpreted to reveal past sedimentation patterns for the area. It is important to note that the SBP doesn't identify sedimentary materials, but rather changes in the acoustic impedance (density) of the subsurface geology between each stratigraphic sequence. Sediment penetration of up to 30-50 m can be achieved in soft sediments in favourable conditions.

SBP data are recorded on each survey line using dedicated software and proprietary formats (*.cod, *.sgy) which can be converted to different formats on request. INFOMAR SBP data can be downloaded [here](#).

Recommended operating guidelines (ROG) for sub-bottom profiling can be downloaded [here](#).

Vessel	SBP systems	Years in service
RV Celtic Explorer	SES 5000 4x4 array	2003-2015
	IXBlue Echo 3500	2015 - present
RV Celtic Voyager	SES 5000 2x2 array	2002 - present
RV Keary	Edgetech CHIRP 3200	2009 - present
RV Mallet	Innomar SES2000 Compact	2017 - present
RV Geo	Innomar SES2000 Compact	2015-present
RV Tonn	n/a	n/a
RV Lirr	n/a	n/a
MV Cosantóir Bradán	n/a	n/a

Sub-Bottom Profilers used by INFOMAR



Installation of the IXBlue Echo3500 system on the keel of the RV Celtic Explorer (2015)

Shallow Seismic Sparker (SSS)

A Sparker is a device used for sub-seabed investigations where deeper acoustic penetration is required. It is generally more powerful than a SBP and used to explore very coarse/compacted seabeds. The sound source is generated by an electrical arc that creates a bubble. As it collapses the bubble produces a broad band (500 Hz – 4 kHz) omnidirectional pulse which penetrates a few hundred meters into the subsurface. Hydrophone arrays towed near the acoustic source receive the returning signals.

The [Geo-Source 200](#) is utilised by the INFOMAR program as it's specially designed for small vessel survey and shallow water operation. The system is towed behind the vessel at relatively low speed (~ 4 knots) while an array of hydrophones (called streamers) are towed either on the port or starboard side of the vessel.

Sparker data are usually not acquired during standard INFOMAR surveys as the deployment of the at very slow vessel speed will reduce survey efficiency. However, these data are acquired under specific requests such as scientific research. Where available, Sparker data can be downloaded [here](#).



Left – Geo-Source 200. Right – Full deployment of INFOMAR acoustic devices from the RV Celtic Voyager.