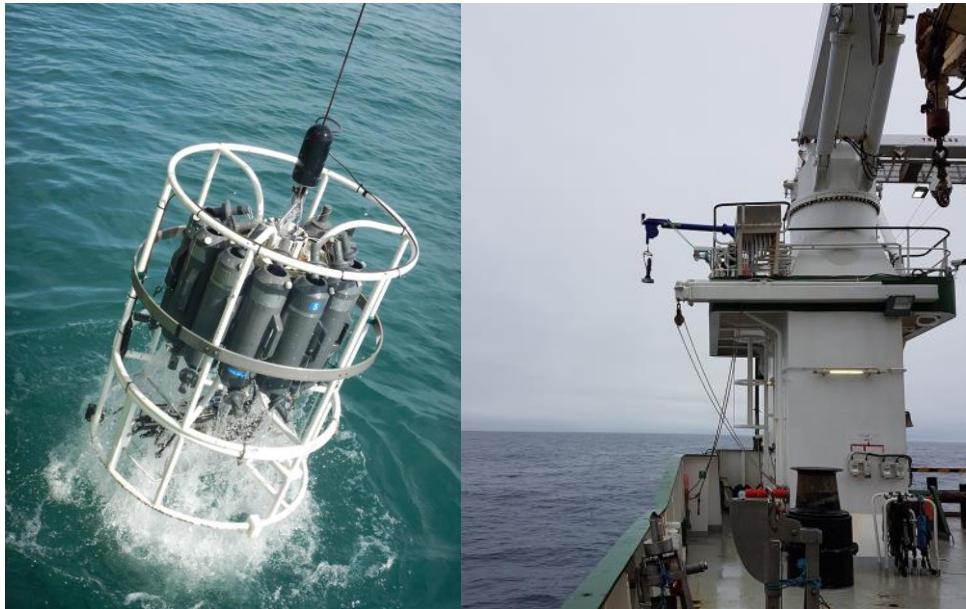


Sound Velocity Profiles

Variable local sound speed conditions are the most common sources of error in underwater acoustics. Density variations in the water column due to changes in the salinity, temperature and/or pressure result in a deviation in the path of the sound wave to/from the sonar equipment. As a consequence, soundings of depth will have an error unless such variations are known and then corrected for. Multibeam technology is particularly affected by sound velocity changes in the water and requires two different sources of sound velocity information to reduce final errors on water depth estimations. These are Sea Surface and Water-column Sound Velocity.

Rapid changes in sea surface sound velocity can occur at ocean fronts or in littoral waters near estuaries. This can produce inaccurate sound speed estimates and generate significant horizontal and vertical errors. For this reason a sound speed sensor is normally mounted near the multibeam transducer and monitors sound velocity in real time.

Sound speed can vary considerably throughout the water column due to factors such as fresh water run-off, daily heating and cooling cycles and upwellings. Instruments such as a CTD (Conductivity, Temperature and Depth) or SVP (Sound Velocity Profiler) are lowered through the water column measuring salinity, temperature and depth at regular intervals. This data generates a calibration profile which is applied to the MBES equipment to correct for the changes in water property with depth.



Left - A CTD deployed from the RV Celtic Explorer. It is held just below the surface to acclimatise before being lowered through the water column. Right - MVP200 sensor deployed from the RV Celtic Explorer.

Moving Vessel Profiler (MVP)

The survey vessel must be stationary to take an SVP but if the water column is unstable multiple, time-consuming SVPs are necessary resulting in loss of valuable survey time. To prevent this a new system, a Moving Vessel Profiler (MVP), was recently employed on the RV Celtic Explorer. The MVP allows the collection of SV profiles while the ship is underway. This has significantly reduced survey downtime and has also improved overall data quality because multiple profiles can be continuously acquired.

Further information on the use of the MVP onboard the RV Celtic Explorer is available [here](#).

Cast Comparison Toolkit - Visualising multiple SVP's

The INFOMAR team has developed an application to record Sound Velocity Profiles. Operational to a depth of 250 m, the application records sound Velocity differences at 1m intervals and reads daily CARIS SVP format files and outputs results to a Microsoft Excel file. For more details see:

Hardy et al. (2015) "[Analysis of SVP variability and its implications on sounding uncertainty, from the INFOMAR multi-annual baseline mapping programme.](#)"

This software is provided without any WARRANTY as a research tool and may contain bugs & errors. INFOMAR assert their copyright on this and simple derivatives - please retain our logo on minor changes. Comments and feedback can be directed to david.hardy@gsi.ie.

