**Shallow Water Surveys Using the GeoAcoustics GeoSwath**

Good knowledge of shallow water bathymetry is vital to a wide range of marine activities.

Surveys for navigation channels, ports and harbours, lake and dam management,

environmental mapping, marine archaeology, marine construction, cable landfalls and

hydrodynamic modelling all rely on accurate and detailed information on the water depth.

Such surveys are mainly in waters less than 50m deep, with many in the zone from 20m water

depth to the shoreline. High resolution, complete coverage, high accuracy, and detection of all

significant features are particularly important in these circumstances. Recently published

survey specifications emphasise these points, and pay particular attention to the shallow water

regime. Examples of this include the International Hydrographic Organisation (IHO) Special

Publication S-44 Edition 4 and the United States Army Core of Engineers (USACE)

Hydrographic Surveying Standards. A sonar system for shallow water surveys must also be

able to operate from shallow draft vessels, be easy to deploy and use, and reduce the time to

produce a deliverable chart. Wide swath sonars are particularly suitable for shallow water

surveys, and the application of new interferometric multibeam technology to shallow waters

has developed rapidly in recent years. In 1999 GeoAcoustics launched the GeoSwath, a fully

integrated wide swath survey tool, which made this technology available in a system designed

for the commercial user. This paper describes how the data from the GeoSwath meets the

requirements of high quality bathymetric surveys, and examples from survey datasets are included which demonstrate the sonar’s advantages in shallow water.

**Surveying with the GeoSwath**

Small boat mounted sonar surveys are the best solution for high resolution full coverage

bathymetry around coastal regions, harbours, rivers and lakes. Here a small boat has the

shallow draft and manoeuvrability needed to operate around shorelines and hazards, and sonar

has the penetration to cope with turbulent conditions and the deeper parts of the survey. These

surveys are typically done at speeds of between 5 and 10 knots. Many overlapping survey

lines are run to give complete coverage of the survey area, with data often required up to the

waters edge.

The GeoSwath is a fully integrated sonar survey tool designed for high resolution surveys, especially from small survey craft. The GeoSwath uses phase measuring (interferometric)

technology to provide the advantages of wide swath and high resolution in a compact and robust system which is suitable for deployment in shallow waters, an area where a beamforming

multibeam or towed side-scan have particular problems. The GeoSwath is available in two frequency versions, 125 kHz (for up to 200m water depth) and 250 kHz (for up to 100m water depth). The higher frequency version has smaller transducers and higher resolution, so is more appropriate for smaller vessels in shallow deployments.

A 250kHz GeoSwath sonar includes a pair of transducers (35cm by 15cm by 6cm) mounted on a V bracket, cables up to 40m long and a sonar control computer which contains all the sonar electronics. The V bracket also houses the heave/pitch/roll sensor, or motion reference unit (MRU). GeoAcoustics manufactures a transducer bow mount system designed to make the most of the transportability of the GeoSwath. This bow mount is quick to deploy and requires

no vessel modification, and is suitable for short surveys (up to 1 week or so). It weighs about 75kg and is rapidly deployable on a locally sourced small vessel. Alternatively the transducers can be mounted on a side pole mount or permanently hull mounted on dedicated survey vessel.



*Side pole mount on a dedicated*

*survey vessel*



*Temporary side pole mount deployed*

*on a vessel of opportunity*



*Transducer bow pole mount*