



SEAMAP-3D: A tool for very high resolution 3d seismic prospection in shallow water

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The objective of the SEAMAP-3D project (SEismo Acoustic Marine Archaeological Prospection in 3D) is to develop a marine, 3D high resolution seismic acquisition system for archaeological prospection. The system can be applied for fast and large scale exploration of sedimented settlements, locating archaeological objects or mapping the paleolandscape in shallow water (0.5-10m water depth). So far the system is built-on as follows: A high frequency seismic source (boomer) and the data acquisition unit are mounted on a catamaran towing a rigid hydrophone array (8-32 hydrophones) for area-wide data acquisition. For very high accuracy in positioning a DGPS is used. Acquired data is processed in an automated way and visualized on site by use of a mobile Linux cluster. Both development and testing of the acquisition system and the processing software are part of the project.

In addition to the above-mentioned system structure, we present the solution to technical difficulties, such as array reverberations and direct wave distortion due to small offsets (1-2 wavelength), which appear by using a rigid hydrophone array in a shallow water environment. Hull and array reverberations were studied by computer simulation and compared to field data. The investigation confirmed a simple convolution model. Direct wave distortions are efficiently removed by subtracting an averaged seismic trace; hull reverberations are removed by shaping deconvolution, using an averaged auto-correlation trace as signal to be shaped. We attribute the success of filtering in part to the high dynamic range (24 bit) and high sampling accuracy (100 kHz), but also to the repeatability of the seismic source. Sample data from different sites are presented.