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Innovative acoustic technique for 3D prospection of intertidal areas

Acoustic studies of very shallow and/or intertidal areas along the North Sea coast pose major technological challenges due to the water depth (causing strong multiples), fierce wave action, strong currents, large tidal range, and the presence of biogenic gas in the shallow sediments. As a result these areas on the land-sea boundary are rarely investigated in a structured way. Recently, innovative acoustic investigations have been carried out at Ostend and Raversijde for archaeological and environmental prospection of the sub-seafloor. The beach area of Raversijde is known for its artefacts and structures dating from Neolithic, Roman and medieval times, including old coastal defence structures (e.g. dykes), remnants of drowned fishing villages, and intensive peat exploitation. Due to sand suppletion works in the '70ies all the remains are now covered by a few m of sand. Using a multitransducer echosounder system (containing an array of 4 synchronized parametrical transducers with a total spread of 1 meter) a 3D sub-seafloor volume could be obtained with a grid cell size as small as 25x25x1 cm (x/y/z). This allowed to map the peat and salt excavation pattern at Raversijde in the highest detail (cm/dm resolution). The observed features match perfectly with the old aerial photographs of the area (before the sand accretion). At the test site in the harbour of Ostend a number of small buried objects could be identified within the thick layer of fluid mud sediments. The data also allowed a detailed image of the 3D topography and internal stratification of the mud layer. This opens new perspectives for detailed prospection of the sub-seafloor in nearshore areas.

Keywords: 3D imaging, sub-seafloor, innovative