Geo-archaeological prospection of the intertidal area: case study of Ostend-Raversijde

Tine MISSIAEN[1,*], Dimitris EVAGELINOS[1], Marnix PIETERS[2], Ine DEMERRE[2], Chloë CLAERHOUT[1]

[1] Ghent University, Renard Centre of Marine Geology, Department of Geology and Soil Science, Krijgslaan 281/S8, 9000 Ghent, BELGIUM
[2] Agentschap Onroerend Erfgoed – Maritiem en Onderwater Erfgoed, Koning Albert II-laan 19, 1210 Brussels, BELGIUM

*Corresponding author: tine.missiaen@ugent.be, +32 (0) 9 2644571

Keywords: intertidal zone, geo-archaeology, acoustic techniques

Abstract

The contact zone between land and sea is known to be rich in archaeological remnants, yet at the same time it is often subject to large infrastructural works which form an important threat to the heritage. However this zone is rarely studied due to the technological challenges posed by the extreme shallow water depth, wave action (surf zone), strong currents and large tidal range. In recent years geophysical investigations have been carried out at Ostend-Raversijde aimed at efficient geo-archaeological and palaeogeographical prospection of the intertidal zone. The Holocene landscape is highly dynamical and marked by a succession of tidal flats and marshes, tidal channels and small islands/peninsulas. The site is also known for archaeological artefacts and structures dating from Roman and medieval times, including an old dyke, remnants of a drowned fishing village, and intensive peat and salt exploitation. Due to the construction of breakwaters in the seventies and regular sand suppletion works the archaeological remains are now buried beneath 1-2 m of sediment. Marine 2D acoustic profiling evidenced a highly complex system of buried palaeogullies, some of which are likely related to past islands and coastal defense structures. A number of the observed acoustic features also could clearly be linked to former trench systems and peat digging; these data correlated well with electromagnetic (EMI) maps obtained on the beach at low tide. Recent 3D acoustic measurements have allowed to map the peat and salt excavation pattern in the highest detail (cm/dm resolution). Using a multitransducer echosounder system a 3D volume could be obtained with a grid cell size as small as 20x20x1 cm. Cross sections through the volume show the characteristic pattern of peat strips, rectangular and circular excavation pits, and long (often diagonal) trenches. They match perfectly with the features observed on old aerial photographs of the area (before the sand accretion). These results show that the integrated use of complementary geophysical methods (marine and terrestrial) is highly efficient to map the intertidal sedimentary environment and the archaeological heritage buried within. The multitransducer echosounder system thereby sets a new standard for ultra-high resolution geo-archaeological research in shallow water areas.