

Influence of late Pleistocene to early Holocene development on recent sediment distribution patterns in the southern part of Lübeck Bay, western Baltic Sea

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In this study, we surveyed approximately 10 km² in the southern part of Lübeck Bay (western Baltic Sea), between Timmendorfer Strand in the west, and Brodten in the east, in order to investigate the influences of late Pleistocene to early Holocene development on recent sediment distribution patterns.

Sidescan sonar mosaic data were recorded and combined with grab-sampling to create a map of the surface sediment distribution. Boomer records, penetrating the shallow subsurface to approximately 40 m bsl were combined with two sediment cores, 3-4 m in length, which allowed identification of different sedimentary units. Sedimentological and geochemical properties were analyzed at intervals of ≤ 10 cm within the sediment cores. Grain size analyses were performed using a laser particle sizer, and geochemical analyses for total inorganic carbon and total organic carbon (TIC/TOC) were performed using a coulomat.

From the hydroacoustic surveys, a high resolution map of the surface sediment distribution pattern as well as maps of the top of the Pleistocene basement, and the thickness of the overlying Holocene sediments were produced. Our single beam bathymetric data are complemented by a multibeam echo sound data set prepared by the AG Küstengeologie, Universität Kiel. The seismostratigraphic results show that the Pleistocene unit, which is probably glacial till, is overlain by postglacial peat, calcareous gyttja, and marine mud.

Marine mud recovered in sediment cores is separated from the underlying calcareous gyttja by a layer of fine to medium sand, which may represent the onset of the Littorina Transgression. This interpretation is supported by a sudden decrease in TIC, indicating increasing marine influence. Core 12281, taken close to the actively eroding Brodten cliff, shows a decreasing ratio of silt to fine sand towards the top, which may indicate the onset of marine-influenced erosion. Our detailed

map of the surface sediment distribution suggests that longshore sediment transport is taking place across an exposed Pleistocene structure in front of Niendorf harbour. The map of the top of the Pleistocene basement supports the theory that the landscape was dominated by a network of small interconnected lakes during the late Pleistocene and early Holocene.