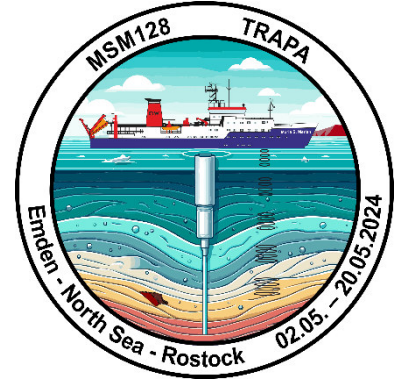


R/V MARIA S. MERIAN

Cruise MSM128 (GPF 22-1/051)

02.05.24 – 20.05.24, Emden – Rostock

Weekly Report No. 3, 13.05. – 19.05.2024

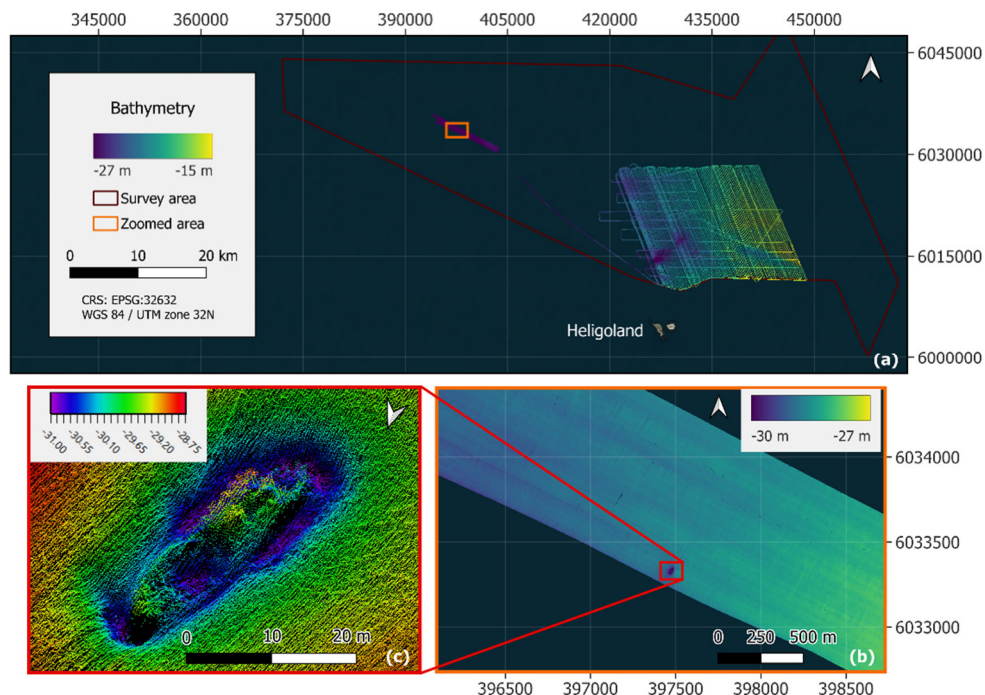


Tracing the Late Pleistocene - Early Holocene landscape of Late Palaeolithic reindeer hunters off the coast of Heligoland (TRAPA)

Weekly Report No. 3

The last week of our expedition to the North Sea was also extremely successful. The constant alternation of detailed hydroacoustic mapping and geological sampling using a vibrocorer was continued.

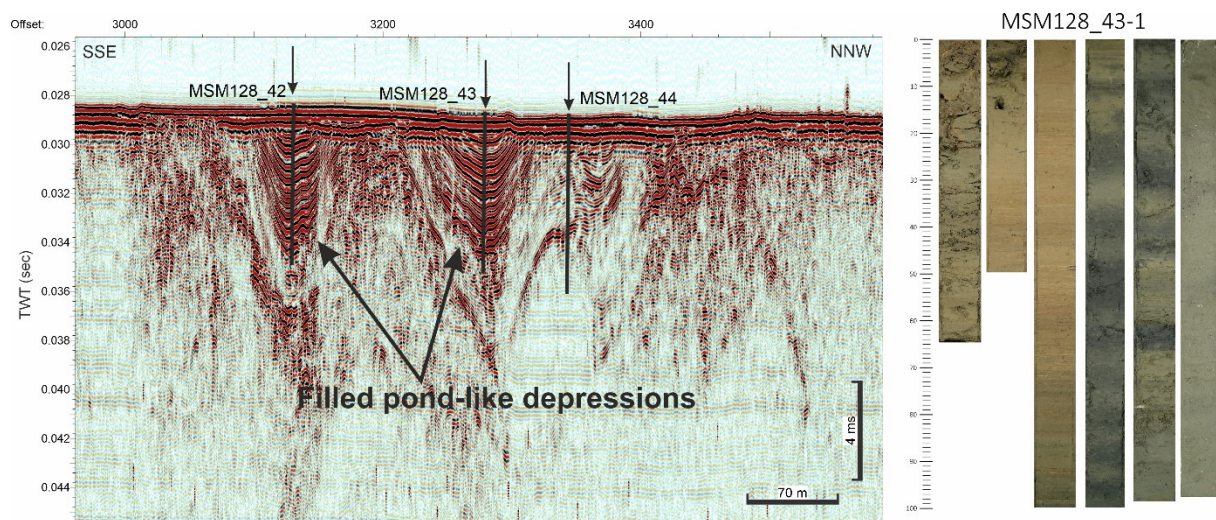
At the beginning of the week we left the central working area north of Heligoland for one day to survey a small part of the seabed about 15 nautical miles to the west. It is assumed that the surveyed area is an important habitat for sand eels. Sand eels are an important prey fish for harbour porpoises. Our aim was to test whether sand eels can be detected by the backscatter signal of the EM712 multibeam echo sounder. We recorded two identical profiles, one at night and the second during the day, as sand eels hide in the sediment at night and feed in the water column during the day. A detailed analysis of the data is required to evaluate the success of this approach. We hypothesise that the differences in backscatter are very small as sand eels do not have a swim bladder that could be easily detected by acoustic data. Three giant box cores were taken in the late evening of 13 May at different locations in the newly mapped area. All three giant box cores contained relatively homogeneous fine sand; a sand eel was swimming in one of the grabs. The sand eel we released after it had been photographed. There is also a wreck in the bathymetrically mapped area, which is clearly recognisable in the multibeam data (see figure below).



Map of the data collected with the EM712 system during Cruise MSM128. Figure (c) shows a wreck in the survey area.

We then continued mapping in our main working area. The mapping was interrupted on the morning of 14 May for two vibrocores about 10 nautical miles west of our main working area. This area was mapped in detail during RV Maria S. Merian Cruise MSM99/2 in 2021. The aim of these cores was to sample ancient tidal flats that can be used to reconstruct sea level after the Last Glacial Maximum, a topic that is also of great importance for the TRAPA cruise. Both cores were successful.

Further analysis of the cores on board showed that small depressions with well-stratified infills below the Holocene transgression horizon are the most promising locations for the recovery of sedimentary sequences that can be used as a late Pleistocene and early Holocene sedimentary archive. Based on the now very dense hydroacoustic data, we were able to identify some of these small depressions. A promising series of depressions is located in the south-western part of the study area at a distance of less than 10 km off Heligoland. Cores were taken in two of these depressions on 15 May. Two cores targeted the thickest stratified sections in the centre of the depressions (MSM128_42 and 43, see figure below). A third core was collected at the edge of the depression to ensure that we also sample the base reflector of the depression (MSM128_44). All three cores seem to show a promising partly laminated sediment sequence with a high organic content. A first analysis of the pollen spectrum indicates a late Pleistocene/early Holocene period for these deposits, which would cover the period of interest of the TRAPA cruise.



Left: Parasound profile imaging small-scale depressions filled by well-stratified sediments. We hypothesise that the depressions were small water bodies/ponds in the late Pleistocene and early Holocene landscape. We have sampled the sedimentary fill of the depression (right); they represent a promising archive for the reconstruction of environmental conditions in the late Pleistocene and early Holocene.

The depressions are small and sometimes only visible on a single profile, although we have now reached a very narrow profile spacing of 100 metres. This indicates that these depressions were pond-like structures in the late Pleistocene and early Holocene, when this area was not yet flooded. Due to the small size of these infilled ponds, we decreased the profile spacing to 50 m in a 5 km x 8 km area. We mainly recorded these profiles during the day, as there were several lobster baskets in this area that are not visible in the dark. The nights were used to fill in small gaps in our existing grid. The data revealed an additional pond-like structure, which was successfully sampled on 16 May. A final set of cores was taken on 17 May in different parts of the working area to sample further prominent reflectors for stratigraphic control. The remaining time was used to complete the 50 m line spacing around the pond-like structures and to extend the study area slightly to the west. The scientific programme of Cruise MSM128 was completed this morning (19.05) at 04:00h, when we started our transit to Rostock.

Thanks to the exceptionally good and stable weather, all work could be carried out as planned. During the cruise, we surveyed an area of approx. 24 km x 20 km with + close line spacing and in one part of the area the profile spacing was condensed to less than 50 metres. We

successfully collected sediment cores with the vibrocorer at 19 locations with a total core length of a ~107 metres. The data will enable us to resolve even very small-scale landscape structures and thus reconstruct the late Pleistocene and early Holocene landscape around Heligoland in order to move from a purely artistic representation of the landscape (see figure below) to a realistic image.



Fig. 2: Artist's impression of Late Palaeolithic reindeer hunters in front of Heligoland (courtesy of the Museum for Archaeology, Stiftung Schleswig-Holsteinische Landesmuseen, Schloss Gottorf).

We are currently travelling through the Kiel Canal and will arrive in Warnemünde tomorrow morning. The Maria S. Merian has served as an excellent platform for our work. Smaller and larger requests were always fulfilled quickly and to our complete satisfaction. We would like to thank Captain Janssen and the entire crew for their great support and the excellent working atmosphere on board. It is always a pleasure to be on board. We all enjoyed our time on the Maria S. Merian a lot.

With best regards from RV Maria S. Merian

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Scientific Team of Cruise MSM128: Photo: Detlef Altmann