



Sea-level proxies extracted from GPR reflection data collected across recently formed berm, beach ridge and swale deposits on the island of Anholt, Denmark

L. Nielsen and L. B. Clemmensen

University of Copenhagen, Department of Geography and Geology, Copenhagen K, Denmark (ln@geo.ku.dk)

GPR reflection data have been collected across the most recent part of a berm, beach ridge and swale system formed during the last 130 years on the northern coast of the island of Anholt, the Kattegat, Denmark. The reflected arrivals have a peak frequency of about 250 MHz and they image the subsurface with a vertical resolution of 0.1–0.2 m to a maximum depth of 5 m below the surface. The berm and beach ridges with maximum heights of about 1.8 m and 1.5 m, respectively, appear as mounded features in the GPR sections. The berm ridge also contains low-angle, seaward dipping reflections. Similar sea-ward dipping reflections are also observed below swales, and current swale surfaces appear to constitute erosion surfaces. Reflections downlapping on a package of reflections, which is interpreted to be representative of upper shoreface deposits, are suggested to constitute good proxies of sea level. Tamura et al. (2008) suggested that similar downlapping reflections may represent a depth level of about 1 m below the mean sea level based on investigations of the Kujukuri strand plain in eastern Japan. We have made 17 depth readings of such downlaps along our 159-m-long profile. The average depth of these downlap points is 0.003 m below present mean sea level (pmsl). Individual readings fall in the range of -0.5 m to +0.5 above pmsl, consistent with the majority of current, annual sea-level variations as recorded by the Danish Maritime Safety Administration at a position about 50 km southwest of Anholt. The mean sea level has changed insignificantly in the study area during ridge formation, and we assume that these proxies may form a strong basis for constructing palaeo-sea level curves for fossil (ages of up to about 7500 years), raised beach-ridge systems along the shores of the Kattegat and the Baltic Sea.

Reference

T. Tamura, F. Murakami, F. Nanayama, K. Watanabe, Y. Saito, 2008. Ground-penetrating radar profiles of Holocene raised-beach deposits in the Kujukuri strand plain, Pacific coast of eastern Japan, *Marine Geology*, 248, 11-27.