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Ground penetrating radar study of a thickness of biogenic sediments in the vicinity of the Czechowskie Lake

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The paper present results of investigations, which have made on a biogenic plain in the north-east part of the vicinity of the Czechowskie Lake. The basin of Lake Czechowskie occupies a deep depression located in the immediate hinterland of the maximum range of the Pomeranian Phase ice sheet in the northern part of Poland (Błaszkiewicz 2005). Drillings carried out within the peat plain in the western part of the lake basin indicate that there are relatively diversified lake sediments of up to 12 m in thickness.
The ground penetrating radar profiling method (GPR) was used to determine a thickness of biogenic sediments. To tests was used GSS'I SIR SYSTEM-2000^{TM} radar device with two antennae - the high resolution 400 MHz central frequency – for shallow prospecting of the subsurface layers and the low resolution 35 MHz – for determining the shape of the mineral bedrock.
Overall, 33 GPR profiles was made all in all more than 3000 meters along and crosswise the longer axis of the biogenic plain. The range of radar penetration was set to 200 ns for 400 MHz antenna and 600 ns for the 35 MHz one, what is the equivalent respectively 4 m and 12,5 m in depth of biogenic sediments thickness. Horizontal scaling was made by GSSI survey wheel device.
The thickness of biogenic sediments recognized by GPR reaches 10 meters only using 35 MHz antenna. In the case of the 400 MHz antenna, relatively high conductivity water-saturated peat and gyttia did not allow for the achievement of greater thickness than 3-4 meters testing. In a large part of the profiles was able to see the shape of the mineral bedrock in the form of a former lake basin. Also observed elevations and thresholds in the bedrock. Depth of the mineral deposits forming former lake bottom was confirmed by drillings.

This study is a contribution to the Virtual Institute of Integrated Climate and Landscape Evolution Analysis –ICLEA– of the Helmholtz Association.

References:
Błaszkiewicz M, 2005. Późnoglacjalna i wczesnoholoceńska ewolucja obniżeń jeziornych na Pojezierzu Kociewskim (wschodnia część Pomorza). (Late Glacial and early Holocene evolution of the lake basins in the Kociewskie Lakeland – eastern part of the Pomeranian Lakeland). Prace Geograficzne, 201.