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Morphogenesis of the Czechowskie Lake as inferred from the sedimentological analysis of limnic, colluvial and glacifluvial deposits (Eastern Pomerania, North Central Poland)

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Czechowskie Lake is situated in north-central Poland in Tuchola Forest, about 100 kilometers SW away from Gdańsk. In the deepest parts of the lake bottom, there are hidden laminated sediments which hold the Late Glacial and Holcene climatic record. These deposits are subject of detailled work of the joint German-Polish Virtual Institute of Integrated Climate and Landscape Evolution (ICLEA) of the Helmholtz Association.
It has the area of 76,6 ha. Actual water level is at 109,9 m a.s.l. The average depth is 9,59 m, maximal 32 m. The lake occupies a large subglacial channel, reproduced within the glacifluvial sediments of the Pomeranian Phase of the last glaciation. In the widest place it has the width of 1 kilometer. The maximal depth of the channel (counting from the channel edges to the reconstructed deepest lake mineral floor (after removal of the limnic sediments)) may reach 70 meters. Inside of the channel some throughs and small hills do exist which are built of outwash sediments but, considering internal structures, they bear some similarity to the dead ice moraines and kames. The vicinity of the channel consists of two outwash plain levels. The lower one was created on the dead ice blocks.
The maximum infilling with the limnic and telmatic sediments reaches over 12 m. In the bottom of the lake there is a marked presence of many overdeepenings with the diameter of dozen or several dozen meters and the depth of up to 10 m with numerous, distinct throughs between them. They favoured the preservation of the lamination in the deepest parts of the lake due to waves hampering and stopping of the density circulation in the lake waterbody.
In the colluvial and fluvioglacial deposits there were carried out carefull sedminetological analyses. Limnic sediments were identified by bore holes with preserved undisturbed structure.
All done works revealed that some of the glacifluvial deposits were deposited in subglacial conditions in supercritical flow regime. They were accompanied by periodic decrease of subglacial pressure which led to deposition of thin layers of calcareous sinter. In some outcrops some depositional features do exist interpreted as originated in the permafrost conditions. The analysis of limnic sediments proved considerable spatial and temporal variability mainly in dependance of the area of the water body and actual water level. Increase of colluvial depostion took place about 200 years ago due to transient deforestation of the lake vicinity.

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