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Characteristics of the water and dissolved matter circulation in the young-glacial catchment of the Czechowskie lake (Tuchola Pinewood Forest, Poland)

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The studies on the conditions of the water and dissolved matter circulation in the young-glacial catchment of the Czechowskie lake (Tuchola Pinewood Forest) have been conducted since 2012. They are implemented on the basis of an organised network monitoring surface water and groundwater. An important aim of the study is to assess the impact of both modern and fossil lakes on the regime of the outflow and the transformation of the water chemical properties.

A high stability of the first groundwater table was recorded. During the study period the range of the groundwater level ranged from 0.17 to 0.92 m. In comparison with the small fluctuations in the groundwater level within the sandy outwash areas, a relatively high instability was shown by the shallow waters of the lake terraces.

The measurements of the discharge showed that its average value at the outflow from the Czechowskie lake is 30 dm^3s^{-1}. It almost equals the total amount of water flowing into the lake through watercourses. The average specific runoff from the basin of the Czechowskie lake was 3 $dm^3s^{-1}km^{-2}$.

The total water mineralisation expressed as the sum of the ions is in the range from 70 to 750 mg dm^{-3}. Both surface water, i.e. the water in streams and lakes, and underground water from different depths represent the bicarbonate-calcium-sulphate type characteristic of the young- glacial environment.

The results of hydrochemical mapping and the analysis of the ionic composition of the water showed large spatial variability of the physico-chemical properties of the tested waters and, at the same time, high stability of their ionic composition. At the present stage of the research it is possible to identify the water enrichment zones in salts, which are basins of paleolakes filled with the organic-carbonate sediment, and the zones of salt precipitation within the contemporary lakes. The situation described above creates a specific, cascade model of the transformation of chemical properties of water circulating in the catchment.

The presented results are a contribution to the Virtual Institute of Integrated Climate and Landscape Evolution Analysis - ICLEA - of the Helmholtz Association.