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Integrative investigations on sediments in the Belauer See catchment (northern Germany)

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The Holocene history of lake development, catchment vegetation, soil formation and human impact since the onset of the Neolithic period was reconstructed via the analysis of sediment sequences at Lake Belau (northern Germany). The chronology of the annually laminated lake sediment sequence was established via varve counts, radiocarbon dating and tephra analysis. Sequences of colluvial sediments and buried soils studied in 19 large exposures and supplementing auger cores within the lake catchment area were dated via radiocarbon dating and archaeological dating of embedded artifacts.

The long term development of the lake status was found to be strongly influenced by local human activity. This is indicated by coincidence of phases of landscape openness deduced from pollen data with input of detritus and solutes into the lake. A comparison with palaeo-climate reconstructions reveals that calcite precipitation in the lake reflects climate variability at least to a certain degree.

Calibrating the sediment record of the sub-recent lake sediments (micro-facies) on limnological and meteorological records discovered the influence of the NAO as well as solar activity on the limnological processes during the last century reflected by distinguished sedimentation patterns. A comparative study of additional laminated surface sediment sequences from northern Germany corroborates the results. A high resolution reconstruction of Neolithic weather conditions in northern Germany based on the varves of Lake Belau and Lake Poggensee was facilitated by the calibration.

The quantitative records of sediments originating from soil erosion (colluvial sediments, allochthonous input into the lake) illustrate the dominance of short distance surface processes (slopes) acting in Holocene mid-latitude landscapes. Coincidence of gully incision in the lake catchment area and increased allochthonous input into the lake indicates the former occurrence of hydrological high energy runoff events (e. g. in the 14th century or at ca. 200 cal BC) whose regional significance is testable via comparative investigations in additional lake catchments.