



## **Varved sediments from Lake Czechowskie (Poland) reveal gradual increase in Atlantic influence during the Holocene**

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Detailed micro-facies and geochemical analyses have been carried out for the predominantly varved Holocene sediment record of Lake Czechowskie (north-central Poland). The chronology has been established by a multiple dating approach comprising varve counting, AMS 14C dating, 137Cs activity concentration measurements and tephrochronology. The combination of independent dating techniques revealed well-constrained time scales even in phases lacking annual laminations and allows reliable high-resolution archive synchronization. Quantitative (varve thickness variations) and qualitative (sublayer structure) varve parameters as well as geochemical composition have been obtained to gain a comprehensive view of climatic and environmental evolution during the last 11500 years in northern Poland. Five major sedimentological changes have been identified, encompassing transitions from varved to non-varved sediments (and vice versa) at 10.100 and 7.300 cal a BP, respectively, changes in general varve pattern at 6.500 and 4.200 cal a BP and distinct increase of varve thickness accompanied by increased annual variability since 2.800 cal a BP. These changes reflect large-scale reorganization of the climate system throughout the Holocene with increasing influences of the North Atlantic climate system in Poland. Moreover, the observed changes suggest different thresholds and trigger mechanisms over the investigated time period.

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