



High-resolution microfacies analysis and tephrochronology of varved sediments from Lake Tiefer See (NE Germany)

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Annually laminated (varved) lake sediments represent unique archives in continental areas providing both, precise chronologies and up to seasonally resolving proxy data. Lake Tiefer See in NE Germany provides such an archive that permits an integrated multi-proxy study based on high-resolution sediment analyses and monitoring of lake condition and deposition of subannual laminae.

Lake Tiefer See is located within the terminal moraine of the Pommeranian ice advance of the last glaciation and is part of the Klocksinn Lake Chain which acted as a glacial gully system. Coring campaigns at the deepest part of the lake (~60 m depth) yielded 7 sediment profiles, 3 of which reached glacial sand deposits at the base. From these individual profiles a ~11 m long continuous composite profile has been established. The chronology of the core sequence is based on varve counting, AMS ¹⁴C dating of terrestrial plant remains and identification of cryptotephra. Tephra layers of Eifel- and Icelandic provenance in the lowermost part of the core sequence suggest an onset of lake sedimentation in the late Allerød at about 13 000 years BP and an onset of varve preservation at the beginning of the Holocene.

A combined approach of microfacies analyses on thin sections and μ -XRF analyses on split sediment cores has been carried out. In the first place we identified well and poorly varved or even homogeneous intervals. Poorly and non-varved intervals are characterised by higher Ti and K count rates suggesting increased detrital matter flux into the lake by surface runoff and/or aeolian transport. The occurrence of poorly varved intervals increases towards the top probably triggered by either climate and environmental changes or anthropogenic influences leading to intensified lake mixing.

The overarching goal within the ICLEA objective is to compare the sediment record from Lake Tiefer See with another varved record from Lake Czechowskie, located ca 400 km to the East in central northern Poland based on independent and high precision chronologies in order to investigate regional differences in lake responses to climatic and environmental changes and test the hypothesis of maritime influences of the North Atlantic decreasing towards more continental regions in the East.

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