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Holocene lake level changes at a lowland lake in northeastern Germany inferred from acoustic sub-bottom profiling and a transect of sediment cores

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Holocene lake level changes were studied at Lake Fürstenseer See, a typical lake with complex basin morphology in northeastern German sandur area. An acoustic sub-bottom profile and a transect of four long sediment cores in the deepest lake sub-basin were analyzed. The cores were dated with AMS-14C and correlated with multiple proxies (sediment facies, μ-XRF, macrofossils, subfossil Cladocera, carbonate isotopes). At sites in 10 and 15 m water depth, shifts in the sand-mud boundary, i.e. sediment limit sensu Digerfeldt (1986), allowed quantitative estimates of the absolute amplitude of lake level changes. At sites in 20 and 23 m water depth, the negative correlation of Ca and Ti reflect lake level changes qualitatively. During high lake stands massive organic muds were deposited. Lower lake levels isolated the lake sub-basins which reduced the overall water circulation and lead to the deposition of Ti-poor carbonate muds. Furthermore, macrofossil and subfossil Cladocera analyses were used as proxies for the intense reworking at the slope and for the trophic state of the lake, respectively.
Lake levels were up to 4 m higher, e.g. around 5000 cal. yrs BP and during the Medieval time period (see also Kaiser et al., 2014). During the early to mid-Holocene (between 9400 and 6400 cal. yrs BP), Lake Fürstenseer See fluctuated at an at least 3-m lower level. Further water level changes can be related to known climatic events and regional human impact.

Digerfeldt, G., 1986. Studies on past lake-level fluctuations. In Berglund, B. (ed.), Handbook of Holocene Palaeoecology and Palaeohydrology: 127-144. John Wiley & Sons, New York.
Kaiser, K., Küster, M., Fülling, A., Theuerkauf, M., Dietze, E., Graventein, H., Koch, P.J., Bens, O., Brauer, A., 2014. Littoral landforms and pedosedimentary sequences indicating late Holocene lake-level changes in northern central Europe — A case study from northeastern Germany. Geomorphology 216, 58-78.