



Multiple drivers of Holocene lake level changes at a lowland lake in northeastern Germany

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Many northeastern German lakes experienced significant water level drops in the recent past, which were attributed to global climate change, but due to the short observation period not fully understood. At lake Fürstenseer See, a groundwater-fed lake with complex basin morphology within the Müritz national park, an acoustic sub-bottom profile was analyzed together with a transect of four sediment cores to assess full Holocene water level amplitudes and the evolution of lake level changes during the Holocene.

At core sites in 10 and 15 m water depth, past shifts in the sediment limit, i.e. the limit between preferential sand and mud deposition depending on absolute lake level, allowed to quantify an 8 m maximum Holocene amplitude of lake level changes (+4 m higher to -4 m lower stands), which clearly exceeded the observed fluctuations of 1.3 m between 1973 and 2013. At sites in 20 and 23 m water depth, changes in sediment facies reflected lake level changes qualitatively. During high lake stands massive organic muds were deposited in the deepest part of the lake basin, whereas during lower lake levels sub-basins became isolated causing an exceedance of the thresholds for carbonate accumulation.

The highly-resolved continuous m-XRF-Calcium record of the longest core resembles these sediment facies shifts and allows to determine a relative Holocene lake level history. However, temporal interpretation of the causes and conditions that link carbonate preservation with local water level changes was rather complex and non-stationary. Apart from glaciological and climatic reasons also eco-hydrological feedbacks (i.e. vegetation composition affecting groundwater recharge) and anthropogenic triggers will be discussed in detail.

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