



## **Early Holocene preliminary results from the annually-laminated record of Diss Mere (UK): chronology, microfacies and pollen analyses**

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This study presents new data from the early Holocene lake record of Diss Mere (UK). New cores from the 17-metre sedimentary record were retrieved in 2016 using a UWITEC piston corer. The upper 9 m are centimetre-thick layers of authigenic calcite and calcite mud with a high organic matter content. From 9- 14 m depth the sediments are annually-laminated (varved) and the lower three metres show a transition from calcite mud to grey sand. Detrital layers of 2 to 7 cm thickness are stratified in the laminated sediments. Preliminary  $^{14}\text{C}$  dating shows the varved sequence spans the majority of the Holocene, from 10,600 to 2000 a BP (Before Present). Here we present a preliminary, independent chronology for the lowermost 1m (12.3 to 13.3m) of laminated sediments based upon annual-layer (varve) counting, radiocarbon dating and tephrochronology. A total of 2257 varve years with a counting error of 2.5% (two counts by two individuals) have been counted. This floating varve chronology is fixed to the calendar time scale by two radiocarbon dates taken at depths of 13.3m (10,560 a BP) and 11.7m (7,152 a BP). The varve chronology has been supported by a discrete Icelandic tephra layer of Hekla origin at 12.4m depth. Microfacies analyses and high-resolution (sub-decadal) pollen analyses provided the opportunity to study the sensitivity of the lake to landscape and climatic changes during the early Holocene. Microscopic analysis of thin sections from the laminated sequence show the varve structure is composed of two distinct sub-layers: (1) a calcite lamina precipitated in the spring-summer; (2) a lamina of organic detritus deposited in autumn-winter. An additional diatom layer is also sometimes visible. Total varve thickness ranged from 0.03 mm to 2.3 mm with an average of 0.3 mm. The transition from non-varved to varved sediments in the record is characterised in the pollen record by low percentages of arboreal Pollen. The temperate woody taxon *Corylus* becomes increasingly dominant in the lowermost pollen zone and is accompanied by a decline in the pioneer tree species *Betula*. These *Corylus*-dominated woodlands transition through the sequence towards a mosaic of deciduous forests with stands of *Quercus*, *Ulmus*, *Tilia* and *Alnus*. This transition from Preboreal to Boreal conditions in East Anglia is further attested by evidence of minor landscape changes within the sediments. The higher frequency of normally-graded detrital layers towards the base of the profile are interpreted as turbidites which suggest the lake catchment was relatively unstable during this phase. Close comparisons can be drawn between this study and pollen stratigraphies from elsewhere in the region, displaying a natural successional profile and providing support for the early Holocene chronology. Whilst the varve chronology has the potential to span the period of climate instability known in other British sequences of the early Holocene, this initial high-resolution investigation at Diss Mere does not provide evidence of short-lived climatic oscillations (i.e. the 10.3 ka and 9.3 ka events) in the sedimentary or vegetation record, although this will be explored in more detail in the future.