Recent drilling and new investigations at the Baumkirchen site of Western Austria (Middle Würmian)

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The thick (>200m) succession of laminated lacustrine sediments at the Baumkirchen site in the Inn Valley (Austria) has been known for over a century. Recent OSL and existing radiocarbon dating place most of the sequence in Marine Isotope Stage 3, spanning several Dansgaard Oeschger climate fluctuations observed in the Greenland ice core and alpine speleothem records. The motivation of investigating the environmental response of the Eastern Alps to these climate fluctuations has inspired further drilling and the application of new methods to tease new insights out of the well-known sequence. An overview of the new methods and findings is presented.

New drilling has shown the non-varve laminations to extend through almost the entire known sequence. No new pattern has been found macroscopically. Thin sections, however, have exposed a semi-regular pattern of very thin clay layers. These are suspected to represent winter deposition and thereby allow a varve-like chronology to be established. While these clay layers cannot be identified macroscopically, X-ray fluorescence core scanning has revealed that they are uniquely high in Zinc compared to the surrounding sediment and therefore can be readily identified over long sections of core. Data for other elements also allows consistent identification of different types of laminations and the quantification of their abundance and distribution in the sequence. Laser diffraction grain size measurements combined with X-ray diffraction mineralogical analysis (Rietveld) have provided quantitative information on the mineral makeup of different grain size fractions. Together these methods provide new insights into the sedimentology of the sequence and thereby the environmental conditions of the Eastern Alps across millennial-scale climate fluctuations.