Geophysical Research Abstracts,
Vol. 11, EGU2009-5926, 2009
EGU General Assembly 2009

A record of historical runoff events in annually laminated sediments of Lake Mondsee (Upper Austria)

T. Swierczynski (1,3), S. Lauterbach (1), P. Dulski (1), U. Frank (1), R. Naumann (2), B. Merz (3), and A. Brauer (1)

German Research Centre for Geosciences (GFZ), (1) Section 5.2 Climate Dynamics and Landscape Evolution; (2) Section 4.2 Inorganic and Isotope Geochemistry; (3) Section 5.4 Hydrology, Potsdam, Germany (swier@gfz-potsdam.de)

Since lakes are ideal recorders of different aspects of past environmental conditions, detrital layers intercalated within seasonally deposited lake sediments can be used as proxies for discrete flood events. Here, we present a 2000 year- sedimentary record from the pre-alpine Lake Mondsee reflecting extreme runoff events, and an additional set of 11 short cores providing a spatial view of the distribution of detrital material in the lake basin during runoff events of the last 100 years. Based on microscopic counts of annual layers a precise varve chronology has been established. In combination with 137-Cs and AMS radiocarbon dating as well as historical documentation we constructed a robust chronology. The combination of microfacies analysis, geophysical and geochemical methods (μ-XRF, XRD, magnetic susceptibility) as well as instrumental data reveals two mechanisms of short-term detrital sediment fluxes into the lake: (1) local debris flows and (2) regional flood events, with the seasonality of the events deduced from the relative position of the detrital layers within the varve cycle.

The frequency and magnitude of runoff events was highly fluctuating throughout the time, thus suggesting significant natural variability. Within the last 2000 years, several periods of increased abundance of flood event layers coincide with phases of cooler climate. Most significantly, during the coldest phases of the Little Ice Age a higher number of flood event layers indicates more frequent spring and summer floods, probably caused by intense snowmelt and extreme precipitation events. In contrast, during the Roman climate optimum the number of flood event layers has been the lowest within the last 2000 years. For a comprehensive understanding of flood events as recorded in lake sediments, sedimentological investigations are combined with hydrological and erosional modelling on instrumental data.