



Floods and sediment transport into the pre-Alpine Lake Mondsee: A dual monitoring of detrital layer deposition in the lake and sediment dynamics in the catchment

L. Kämpf (1), P. Müller (2), T. Swierczynski (1), A. Güntner (2), B. Plessen (1), P. Dulski (1), R. Naumann (3), and A. Brauer (1)

(1) Helmholtz Centre Potsdam GFZ German Research Centre for Geosciences, Sec. 5.2 Climate Dynamics and Landscape Evolution, (2) Sec. 5.4 Hydrology, (3) Sec. 4.2 Inorganic and Isotope Geochemistry

Lakes form ideal traps in the landscape, continuously recording land surface processes in the catchment. The clastic-detrital fraction of lake sediments is controlled by runoff processes that deliver suspended sediment particles from the catchment (source) to the lake (sink). Discrete detrital layers intercalated within annually laminated (varved) sediments of the pre-Alpine Lake Mondsee (481 m above sea level, Upper Austria) coincide with instrumental records of runoff events in spring and summer and, thus, provide a seasonal archive of floods in pre-instrumental time. A reliable interpretation of the flood layer record, however, especially of variations in layer characteristics and of floods without a coinciding layer, necessitates knowledge about hydrological and sedimentary processes during recent runoff events.

For this purpose, a comprehensive monitoring network was set up in the catchment of Lake Mondsee in 2011 following a nested catchment approach. Two chains of sediment traps within the lake, one located 900 m off the main inflow (water depth: 55 m) and one in the deepest part of the lake (61 m), collect sediment on a monthly and 3-day basis. Along the main tributary and its sub-catchments, five monitoring stations were installed, which continuously record precipitation, river water level, water temperature, electric conductivity and turbidity. Samples of suspended sediment were taken automatically during runoff events.

Until now, our monitoring data cover the last year from January 13th 2011 to January 3rd 2012 and show considerable variations in hydrological conditions and sedimentation within the lake. Regarding the transport of suspended sediment into Lake Mondsee, four flood events were recorded in January, March, May and August 2011 generated by melting of snow (winter) or intense rainfall (summer). Most of the detrital matter was deposited in the delta area where flux rates exceed values in the deepest part of the lake by up to a factor of 30. The comparison of hydrological data with measured sediment flux and flood layers preserved in the lake sediments allows detailed insights into processes of detrital layer deposition and reveals potential attempts for an advanced interpretation of the flood layer record of Lake Mondsee.