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# Variable flood-related sediment flux in Lake Mondsee: causes and effects for detrital layer formation

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Detrital layers in lake sediments are valuable recorders of extreme river floods and are increasingly exploited to establish continuous long flood chronologies reaching several millennia back in time. The annually laminated sediments of Lake Mondsee (486 m a.s.l., Upper Austria) contain a flood layer chronology over the past 7000 years with seasonal resolution. Despite the great potential of lake sediments for reconstructing long flood time series, there are still some confinements with respect to their interpretation due to a lack in understanding the complex chain of processes leading to the formation of detrital layers.

For this purpose, a comprehensive monitoring network was set up at Lake Mondsee recording suspended sediment dynamics from the catchment to the deposition at the lake floor. Flood and sediment transport related variables are monitored at the outlet of the main tributary, the Griesler Ache River. Samples of suspended sediment were taken automatically during runoff events. Within the lake, sediment is collected continuously by sediment traps, one located 0.9 km off the main inflow (water depth: 55 m) and one in a more distal position about at a distance of 2.8 km in the deepest part of the lake (61 m).

Until now, our monitoring data cover the time from January 2011 to July 2013 including five floods of different amplitudes occurring in January 2011, June and January 2012, in July 2013 as well as the exceptionally strong June 2013 flood. The sediment yield during these events ranges from 1.6-4.2 kg/sqm in the proximal lake basin and 0.2-0.5 kg/sqm in the distal lake basin and exhibits considerable spatial variations pointing to factors different from flood amplitude alone affecting the deposition of flood layers. Most important for the Lake Mondsee flood layer record are (i) preferential sediment transport along the thermocline leading to detrital layer formation mainly in summer and (ii) local sediment sources which episodically contribute considerable amounts of detrital material. Both can be confirmed by micro-facies analyses of flood layers in the sediment record. The interpretation of the long flood layer record of Lake Mondsee is improved by these data providing mechanistic explanations for variations in layer thickness and for missing layers.