Recent process studies to calibrate sedimentological tracers in Silvaplaner See (Switzerland)

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In Silvaplaner See, an alpine proglacial lake (area 2.7 km^2, max. depth 77 m, altitude 1798 a.s.l.) located in the Engadin (southeastern Switzerland), 256 sediment samples have been collected by sediment traps between May 2001 and November 2002. Our aim was to determine different sediment sources and their pathways for Silvaplaner See. Lake water temperatures have been recorded with high time resolution thermistors since December 2001 at 10 different water depths. In addition, turbidity, water temperature and water level of Fexbach, a proglacial stream contributing most of the sediment input, have been measured continuously. Meteorological observations (precipitation, air temperature and cloudiness) from the catchment area together with analyses of the sediment trap material (mineral analysis and grain size distribution) have been used to distinguish between different sediment sources.

The comparison of meteorological data with sediment fluxes shows that higher precipitation and higher mean air-temperatures are related to higher sediment fluxes, which was very clear in 2001, whereas in 2002 this relationship is less obvious because of data gaps. Turbidity and water level data from Fexbach suggest that the main amount of sediment originates from glacial meltwater. Intense precipitation events influence sediment transport in the proglacial stream and thus sedimentation in the lake, but to a lesser extent. The temperatures of Fexbach and of the water column of Silvaplaner See as well as the sediment distribution between the traps reveal that lake sedimentation is controlled mainly by underflows in spring and by interflows in summer. The hydrological data of Fexbach shows that wide symmetrical turbidity peaks are related to glacial meltwater events, whereas narrow asymmetrical turbidity peaks characterize precipitation events.

A distinction between sediment mobilised by precipitation and sediment of glacial meltwater is possible based on the comparison of hydrological data, grain size distribution and precipitation data. Ratios of chlorite/mica and quartz/mica are used to identify different sediment sources in the catchment area. Due to these mineral ratios of the sediment trap material, we were able to reconstruct the influence of intense precipitation events (> 20 mm*d^{-1}). When precipitation has strong influence on sediment input, glacial influence is very low in Silvaplaner See. The correlation between mineral ratios and sediment source can be used to reconstruct glacier and precipitation influence on the sedimentation in Silvaplaner See during the Holocene from sediment cores.