Detrital layers as a sedimentary record of historical flood events - A case study from Lake Mondsee (Upper Austria)

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The frequency of extreme floods is increasingly discussed under meterological and anthropogenic forcing aspects. Instrumental data are precise but limited to short time scales. In contrast, lacustrine sedimentary archives provide much longer and highly resolved geoarchives. The interpretation of such sediments as records of extreme flood events, however, require detailed knowledge about the depositional processes triggered by extreme discharge events. Here we present a multi-core study from Lake Mondsee (Upper Austria) for the last 100 years comparing detrital layer deposition with historical floods and its controlling meterological circulation pattern. The sediments of Lake Mondsee are characterized by the formation of endogenic calcite varves enabling to establish a varve chronology. Intercalated detrital layers can be clearly distinguished from the autochthonous seasonal components. Within the last 100 years of lake sedimentation, ten historical flood events and three debris flows can be recorded as detrital layers with characteristic geochemical and microfacies signature. Thin and slightly sorted detrital layers ranging from 0.1 mm to 1 mm thickness correlate with spring and summer flood events. Thick unsorted layers with highly variable thickness between 0.5mm and 10mm and abundant organic debris correlate to debris flows events during summer. In contrast, autumn and winter floods are recorded in the instrumental datasets but do not appear in the sedimentological record.

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