



Comparison of extreme flood events stratigraphy from two nearby sediment records, Western French Alps

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Recent works showed Alpine lake sediment records can be used to reconstruct past extreme flood events chronologies. Reaching such a goal is crucial as the evolution of torrential flood patterns in the context of global warming is still poorly understood. In this study, we compare flood chronicles (frequency and intensity) acquired from two adjacent watershed-lake systems in the western French Alps. We hence aim at investigating the influence of local geomorphic and sedimentological settings on reconstructed chronicles. We studied sediment cores sampled from lake Lauvitel (1500 m a.s.l.) and lake Muzelle (2200 m a.s.l.) spanning the last 3500 and ca. 2000 last years, respectively. Their catchment areas are just separated by a ridge (3000 m a.s.l.). Despite the vicinity of the lakes, their systems differ a lot from one to the other. Lauvitel catchment (15.1 km²) is more than three times larger than Muzelle one (5 km²); as well as lake surfaces. The surrounding vegetation is also greatly contrasting. However, the precipitation pattern is considered to be the same in both systems.

Here, we focus on the most recent deposits covering the last 100 years, when sediment dating tie points and historical data are numerous, allowing to compare written archives and geological records. Flood deposits documented in sediment cores from both lakes have been dated through radionuclide-based geochronology (²¹⁰Pb, ¹³⁷Cs, ²⁴¹Am). They were then investigated using high resolution sedimentological and geochemical analyses.

The comparison of flood deposits with historical data of extreme precipitations in the nearby Vénéon river valley, allow us to determine the cause and effect of such events. We found that most sediment deposits are simultaneous with torrential floods or debris flows that impacted villages down in the valley. In total, five extreme events were recorded in both lakes and synchronous to historical records down the valley. However, some flood deposits are proper in each lakes. They certainly reflect the contrast between torrential activity and sediment sources of each catchment. The distinction of extreme and common deposits in the lake is imperative in order to extend the methodology to the whole sediment sequence.