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Frequency and intensity of palaeofloods at the interface of Atlantic and Mediterranean climate domains

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The long-term response of the flood activity to both Atlantic and Mediterranean climatic influences was explored by studying a lake sequence (Lake Foréant) of the Western European Alps. High-resolution sedimentological and geochemical analysis revealed 171 event layers, 168 of which result from past flood events over the last millennium. The layer thickness was used as a proxy of intensity of past floods. Because the Foréant palaeoflood record is in agreement with the documented variability of historical floods resulting from local and mesoscale, summer-to-autumn convective events, it is assumed to highlight changes in flood frequency and intensity related to such events typical of both Atlantic (local events) and Mediterranean (meso-scale events) climatic influences. Comparing the Foréant record with other Atlantic-influenced and Mediterranean-influenced regional flood records highlights a common feature in all flood patterns that is a higher flood frequency during the cold period of the Little Ice Age (LIA, AD 1300-1900). In contrast, high-intensity flood events are apparent during both, the cold LIA and the warm Medieval Climate Anomaly (MCA, AD 950-1250). However, there is a tendency towards higher frequencies of high-intensity flood events during the warm MCA. The MCA extremes could mean that under the global warming scenario, we might see an increase in intensity (not in frequency). However, the flood frequency and intensity in course of 20th century warming trend did not change significantly. Uncertainties in future evolution of flood intensity lie in the interpretation of the lack of 20th century extremes (transition or stable?) and the different climate forcing factors between the two periods (greenhouse gases vs. solar/volcanic eruptions).