



6-kyr record of flood frequency and intensity in the western Mediterranean Alps - Interplay of solar and temperature forcing

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The high-resolution sedimentological and geochemical analysis of a sediment sequence from Lake Savine (Western Mediterranean Alps, France) led to the identification of 220 event layers for the last 6000 years. 200 were triggered by flood events and 20 by underwater mass movements possibly related to earthquakes that occurred in 5 clusters of increase seismicity. Because human activity could influence the flood chronicle, the presence of pastures was reconstructed through ancient DNA, which suggested that the flood chronicle was mainly driven by hydroclimate variability. Weather reanalysis of historical floods allow to identify that mesoscale precipitation events called “East Return” events were the main triggers of floods recorded in Lake Savine. The first part of this palaeoflood record (6-4 kyr BP) was characterized by increases in flood frequency and intensity in phase with Northern Alpine palaeoflood records. By contrast, the second part of the record (i.e. since 4 kyr BP) was phased with Southern Alpine palaeoflood records. These results suggest a palaeohydrological transition at approximately 4 kyr BP, as has been previously described for the Mediterranean region. This may have resulted in a change of flood-prone hydro-meteorological processes, i.e. in the balance between occurrence and intensity of local convective climatic phenomena and their influence on Mediterranean mesoscale precipitation events in this part of the Alps. At a centennial timescale, increases in flood frequency and intensity corresponded to periods of solar minima, affecting climate through atmospheric changes in the Euro-Atlantic sector.