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# An interval of high rainfall intensity in the early Holocene of the Southern and Eastern European Alps (ca. 8.2-7.3 ka): integrating speleothem data with evidence from lake sediments, glaciers, subfossil trees and alluvial fans

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Cave and lake isotope records from the circum-Mediterranean realm show anomalously low oxygen isotope values suggesting high precipitation during the time of sapropel 1 deposition in the eastern Mediterranean Sea. Speleothem data from Corchia Cave in northern Tuscany currently provide the most precise terrestrial chronology and constrain the wettest interval to ca. 8.2 to 7.3 ka (Zanchetta et al., QSR 2007). We trace this isotope signal to the north and observe a synchronous isotopic change in stalagmites from southalpine and eastalpine caves, but in opposite direction. We attribute this to a shift in the local moisture balance, i.e. to a higher proportion of moisture advected from the Mediterranean Sea relative to the otherwise dominant northwesterly air masses in the Alps. This isotopic source effect can be traced up to northern rim of the Alps, albeit with decreasing amplitude. Forest density at the timberline in the Central Alps decreased during this time interval indicating short vegetation periods consistent with rainy summers. The glaciers in the Eastern Alps, which did not advance significantly during the preceding 8.2 ka event, responded strongly (positively) to this humid phase. Finally, two of the largest alluvial fans in the Eastern Alps showed a massive accumulation peak radiocarbon-dated between ca. 8.3 to 7.4 ka and thus provide one of the strongest pieces of evidence for anomalously high rainfall intensities coeval with ‘pluvial’ conditions in the Mediterranean region.