

Multi-scale hydrological variability in N Iberia during the mid to late Holocene from speleothem Mg/Ca

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Although proxy records for the Holocene climate are becoming abundant, the interval between 5 ka BP and the Middle Age has been only scarcely investigated. In this work we present a paleohydrological series for that period in N Spain, based in Mg/Ca ratios of stalagmites from Kaite Cave (Ojo Guareña Karst Complex). Because long-term monitoring in that cave shows inverse relationship between rainfall and drip-water Mg/Ca, the speleothem record is thought to provide a high-resolution proxy of regional changes in precipitation. Speleothems were dated by ²³⁰Th, and the Mg/Ca ratios were obtained by laser induced breakdown spectroscopy (LIBS), a usefull technique only timidly used in speleothem research.

The paleohydrological record shows significant variations which outline five main intervals defined by consistent trends of precipitation. Significantly, the intervals of maximum precipitation of the whole record (around 4.9-4.65, 2.6-2.45, and 1.3-1.1 ka BP) can be related with Grand Solar Minima (GSM), and correlated with cold climatic events elsewhere. At shorter scales, the record shows noticeable variability, which should be understood in the framework of the North Atlantic climate and global teleconnections. The record is compared with other regional records and correlated with state-of-the-art time series of natural forcings. The short-term, quite noisy variability is interpreted in terms of ENSO-NAO teleconections, whereas the decadal changes in precipitation are discussed in the framework of the Atlantic Multidecadal Oscilation (AMO).