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New paleoclimatic database for the Iberian Peninsula since AD 1700 inferred from tree-ring records and documentary evidence: advances in temperature and drought variability reconstructions

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A substantial increase of surface air temperatures in the upcoming decades, particularly significant in the Mediterranean basin, has been reported by the IPCC (IPCC, 2013). It is therefore particularly important to study past climate extremes and variability in this region, which will in turn support the accuracy of future climate scenarios. Yet, our knowledge of past climate variability and trends is limited by the shortage of instrumental data prior to the twentieth century, which prompts to the need of discovering new sources with which to reconstruct past climate. We here present a new paleoclimatic database for the northeast of the Iberian Peninsula based on tree-ring records, documentary evidence and instrumental data. The network includes 774 tree-ring, earlywood and latewood width series from Pinus uncinata, Pinus sylvestris and Pinus nigra trees in the Pyrenees and Iberian Range reaching back to AD 1510. Three reconstructions are developed using these samples; an annual drought reconstruction since AD 1694, a summer drought reconstruction since AD 1734, and a maximum temperature reconstruction since AD 1604. Additionally, the documentary records from 16 locations in the Ebro Valley are examined focusing on climate-related 'rogations'. We differentiated three types of rogations, considering the importance of religious acts, to identify the severity of drought and pluvial events. Finally, an attempt to explore the links between documentary and tree-ring based reconstructions is presented.