



## **Climatic variability in the XVI<sup>th</sup> and XVII<sup>th</sup> century in northern France.**

### **Contribution of wood rings isotopic analyses.**

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The aim of this study is to establish a reconstruction of climatic variability in France during the XVI and XVII<sup>th</sup> century. Meteorological and isotopic composition ( $\delta^{13}\text{C}$  and  $\delta^{18}\text{O}$ ) of tree cellulose records from Rennes, Fontainebleau and Annecy are compared to evaluate inland climatic and isotopic gradients.

The calibration is obtained by comparing the late wood cellulose carbon and oxygen isotopic inter-annual variability measured on living oaks to meteorological and hydrological data. Isotopes cellulose at these sites provides reliable proxies of summer temperatures, relative humidity and water stress (e.g. summer water deficit causes 43% of cellulose  $\delta^{18}\text{O}$  variability in Fontainebleau). The calibration period extend from 1971 to 2000 shows a common variability between  $\delta^{18}\text{O}$  isotopic records of Rennes and Fontainebleau, summer mean temperatures and  $\delta^{18}\text{O}$  of Thonon-les-Bains (near Annecy) precipitations. Moreover, we dispose of comparison period thanks to ancient meteorological data (beginning in 1883). This calibration and the  $\delta^{18}\text{O}$  and  $\delta^{13}\text{C}$  records of tree ring stable isotopes measured in living trees and timber wood allow us to reconstruct past climatic variability over 400 years.

For the XVI<sup>th</sup> and the XVII<sup>th</sup> century, where we have samples from Rennes and

Fontainebleau, we show a common decadal  $\delta^{18}\text{O}$  variability and a cold episode (about  $0,9^{\circ}\text{C}\pm 0,3^{\circ}\text{C}$ ) for 1630s to 1730s during the “Little Ice Age” only in Fontainebleau.