The dendrochronological age of ancient timbers of the Casa de la Moneda (Segovia, Spain) and its relationship with historic flood events

Introduction and Regional Setting

In April 2008, during archaeological excavation work in the Segovia Mint (Casa de la Moneda, Segovia, Spain) for its rehabilitation as a museum, an Iron-Medieval hearth appeared in the artificial channel and derived from the Insua River to have a sanitary well. (Insua River)

The wooden floor was located between the old hydraulic channel, built originally in the late 19th Century by Juan de Herrera (ca. 1893-1893) and the Sabater channel, a hydraulic structure that the architect Francisco Sabater built in the late 19th Century (ca. 1897-1898).

Materials and Methods

Accumulated wooden elements during the archaeological works to this study were:
- 4 stopper beams
- 3 locations
- 3 boards

A total of 34 cross sections have been analyzed. In each sample, at least one of the following analyses were performed with key equipment and application (TAMISCAN TRAP), although in some cases it was necessary to measure up to seven radii.

Our working hypothesis is that each analyzed cross section came from different trees, the trees due to the high number and wide range of tree rings, and the different growth periods of the trees.

The cross sections were firstly identified to determine the species and the provenance of each sample. This was done by comparing the study area with the existing dendrochronological maps of the region. The detailed study of each sample was then carried out, and the date of cutting was recorded. The results were then analyzed to determine the age of the trees and the potential correlation with historical events.

Results and Discussion

The main objective of this work was to date the wooden material through dendrochronological techniques. We think that if we know the age distribution of the wood elements used for the building and its repairs, we can estimate the dates of their use, and therefore, the period in which the different events occurred (Díaz et al., 2006). These repairs, which required replacement of wooden elements, are related, in fact, with significant flood events recorded in the Duero River, power source for hydraulic implementation of the Casa de la Moneda. Thus, using dendrochronology as a method, it is possible to determine events of the wainscot timber, as well as the wooden floors used in repairs, since these were located in the central part of the building and are closely related to the events of the Duero River (Díaz et al., 2006).

For several decades, Picea abies have been heavily sampled in order to build a reliable chronology. Actually, we have reconstructed many individual sequences dated for the years 1380-2002 in the said river basin. In this way, our results correspond to the historical records of flooding in the basin and others (Gómez et al., 2006).

The largest individual sequence corresponds with the best preserved beam (B13) of two trees and the exceptional individual elongations, with the same characteristics as the rest of the beams. The individual dry sequence (B15) has been dated between 1600 and 1700, with a high variability.

Catalan ring sequences seem to come, except in two cases, from trees between 28 and 30 years older, which may have been chosen for use in repairs instead of any of the flood events that affected the building.

This is the first time that the dating of medieval timber has been used for dendrochronological analysis, and the authors hope to open new research areas.

Acknowledgments

This work was partially supported by the Spanish project of the “Fundación Caja Madrid, Dendrochronology in Madrid” and “Geological Survey of Spain, Madrid, Spain”.

References
