



Correlating a documentary record of historical floods with the dendrochronological dating of a wooden decking in the old mint of Segovia (Spain)

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The Old Mint of Segovia (Casa de la Moneda de Segovia) is a complex of historic buildings placed on the floodplain of Eresma River which crossing this city (declared a UNESCO World Heritage Site) located at the central part of Spain, only 90 km from Madrid. Recently, during its archaeological work, a wooden decking covering the hydraulic channels that supplied power to the minting machinery have been revealed.

This wooden decking, which it is covering the ancient rock channels originally built in the late 16th century (Juan de Herrera c.1583-1590), is edged in brick and overlaid with a masonry structure corresponding to the 'Sabatini' channel, named after the famous Italian architect who built the upper channel in the late 18th century (c.1771). In fact, simply by applying the principle of superposition, the wooden planking could be dated approximately to between 1583-90 and 1771.

However, based on documentary records, we think that some of the repairs carried out on the woody decking over the hydraulic channel were as a result of intense river floods at the Segovia Mint. So, the aim of this study is to apply an integrated methodological approximation where dendrochronology and documentary analysis allow us to reconstruct the historical flood record of the Segovia Mint. Our hypothesis is that differences between the dendrochronological data of the wooden decking pieces can be related to historical floods and, therefore, they could be used as proxy-source data in future palaeoflood research.

The dendrochronological analyses carried out on different wood sections and a proposed cut down-age model, allowed us to estimate the dates when the trees used for successive repair work on this channel were felled after extraordinary flood events. By comparing the dendrochronological data with both documentary records of repair work in the building and with the inventory of historical floods, the dates of the main floods that affected the building between 1583 and 1771 have been identified. At least three tree- date populations have been found: the oldest in the third quarter of the 17th century (1677 and 1678); the next oldest at the end of the 17th century (1690, 1698 and 1700); and the most recent in the first half of the 18th century (1713, 1720, 1721 and 1742).

These dates show a high correlation with well-documented repair works in 1678, the reforms carried out by José Vallejo y Vivanco; and other minor changes made in 1690, 1701, 1706, 1716, 1728, and 1740-1752. All these repairs were carried out after some of the main extraordinary flood events (1626-1629 and 1681/1695), which must have damaged the building and its channels. The earliest tree-date population could be associated with the felling period 1733-1742, related to the hypothetical repairs after the catastrophic flood in 1733.

These results have three main applications: validating documented flood dates, estimating their relative magnitude, and locating new non-documented flood events or previously unknown historical repair work. These validated flood dates could also be included in the flood frequency analysis and risk assessment for the projected Segovia Mint Museum.