THE HISTORICAL DENDROARCHAEOLOGY OF THE XIMÉNEZ-FATIO HOUSE, ST. AUGUSTINE, FLORIDA, U.S.A.

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ABSTRACT

In recent decades, agencies charged with managing historic structures and sites have found dendroarchaeological studies increasingly valuable, given the ability of such studies to verify (or refute) accepted dates of construction. The Ximénez-Fatio House has historical and cultural significance for the state of Florida, as it is one of St. Augustine's oldest, best-preserved, and most studied historic properties. The main house was reportedly built around 1797–1798, and included a one-story wing (giving the house a distinctive "L" shape), while a 2nd story was added above the wing sometime during 1830–1842. However, historical architects believe the entire wing of the house was constructed in the 1850s. Our goals were to: (1) determine the probable construction year for the original structure using tree-ring dating techniques, and (2) verify the probable construction year for the renovation that occurred in the wing section of the house. A total of 74 core samples were extracted from longleaf pine (*Pinus palustris* P. Miller) timbers used to construct the house, 26 of which were used to build a floating tree-ring chronology 185 years in length from series that were confidently crossdated both visually and statistically against each other. A statistically significant ($p < 0.0001$) correlation between our chronology and a longleaf pine chronology from Lake Louise, Georgia anchors our chronology between 1673 and 1857. No cutting dates were found for the main house, but the lack of any tree rings that date post-1798 supports the 1797 construction date. Furthermore, cutting dates obtained from beams in the first floor wing revealed that the entire wing was likely built in the period 1856 to 1858 soon after the house had been purchased by Luisa Fatio in1855.

Keywords: dendroarchaeology, dendrochronology, tree rings, Ximénez-Fatio House, St. Augustine, Florida, Luisa Fatio

INTRODUCTION

First settled in 1565 by the Spanish, St. Augustine, Florida is the oldest continuously occupied European community in the continental United States. Given its extensive history, St. Augustine is a city of particular archaeological (Deagan 1985) and anthropological (Manucy 1985) interest. Situated in the heart of the city's oldest community is the Ximénez-Fatio House (Figure 1), at the corner of Avilés and Cadiz Streets (Figure 2). The Ximénez-Fatio House is one of the oldest standing structures in St. Augustine. It is not only the age, however, that makes this a structure of special interest, but also the excellent condition and state of preservation in which the house exists today. Contrary to other historic structures in the area, much of the original materials (*e.g.*, wood beams, lintels, rafters, and joists) used to construct the house remain unchanged. The condition of the original structural materials makes the house an excellent candidate for dendrochronological analysis.

Many believe the original house was constructed around 1797–1798 and major structural renovations were conducted between 1830 and 1842. Sometime during this latter period, architectural historians believe a second story was added above the original wing located adjacent to Cadiz Street (Waterbury 1985). Tree-ring analysis could provide supporting evidence regarding the construction of the original structure and subsequent renovations. The objectives of this study were to: (1) collect a comprehensive set of cores from both floors of the main house and the wing; (2) crossdate the tree rings from these cores against a regional master reference chronology; and (3) obtain the exact year when any one tree was harvested for inclusion in the Ximénez-Fatio House during construction. If a cutting date was not possible, we used the outermost years represented in the tree rings of all sampled timbers to make inferences on when the house was constructed (i.e. a *terminus post quem*, or the earliest year of construction). Because the house is made largely from squared timbers, the outermost ring that would provide the cutting dates of harvested trees likely will not be preserved, but we hope the range of years in the tree rings from these cores will lend support for both the initial construction date and the dates of renovations.

Dendroarchaeological Research in the Southeastern U.S.

Dendroarchaeological research on historic sites has increased in recent decades (Grissino-Mayer 2009). Bowers and Grashot (1976) attempted to analyze the construction period of President Andrew Jackson's First Hermitage plantation, but were unable to develop cutting dates for the logs used to build the structures. Stahle (1979) standardized dendroarchaeological methods and techniques used in the southeastern United States by successfully dating 24 historic log and frame buildings throughout Arkansas, as well as improving and extending existing modern tree-ring chronologies for the state. Mann (2002) was the first study to combine dendrochronological (tree-ring dating of timbers) and archaeological (dating of artifacts recovered during excavations) principles to accurately date a historic structure in eastern Tennessee. Such complementary studies are becoming desirable because many agencies charged with managing historic sites wish to authenticate the construction date(s) of these structures using as many lines of evidence as possible (Grissino-Mayer 2009).

Occasionally, dendrochronological evidence has questioned the accepted date of construction (Mann 2002; Grissino-Mayer and van de Gevel 2007; Henderson *et al*. 2009), and agencies charged with managing historic structures throughout the Southeastern U.S. recognize the importance of dendrochronological verification (Bortolet *et al*. 2001; Reding 2002; Wight and Grissino-Mayer 2004; Lewis *et al*. 2009; Slayton *et al*. 2009). This verification is accomplished by comparing tree-ring patterns from the historic structure with regional reference tree-ring chronologies that currently exist for many species throughout the southeastern United States. In this process, a reasonable range of years when a structure was built can be determined by assessing the degree of clustering associated with crossdated cutting dates of logs used in the structure (Stahle 1979). In part due to the higher rates of wood decay in subtropical and tropical regions, these techniques have not yet been tested for their effectiveness in dating historic structures in the lower latitudes of the southeastern U.S. (the furthest south a structure has been successfully dated via tree rings currently exists in northern Georgia, see DeWeese Wight and Grissino-Mayer 2004) south of Georgia. Establishing the validity of this approach would greatly expand the capacity of archaeologists and historical architects to accurately define the age of historic structures in question, and to more precisely assess their cultural, societal, and political relevance and meaning within the region.

Background on the Ximénez-Fatio House

The parcel of land on which the Ximénez-Fatio House is located was legally known in the 16th century as Block 34, Lot 2 (Waterbury 1985). Maps and legal documents attest to a long record of occupation on the parcel, but the structures built by the early colonists in the 16th century were not long-lasting (Waterbury 1985). Yet, during this time, archaeologists suggest Block 34, Lot 2 could have been one of the highest economic status sites in St. Augustine (Deagan 1985).

Through the 16th, 17th, and 18th centuries, control of St. Augustine fluctuated between the Spanish and British, as did the ownership of Block 34, Lot 2. The plot was bought, sold, and deeded on multiple occasions throughout this time, usually between merchants or from a merchant to government (Waterbury 1985). During the late 16th century, the Spanish Crown was listed as the owner of Block 34, Lot 2. On April 8, 1791, an auction of the Crown properties left Juan Hernandez the owner of the plot. Hernandez remained the owner for six years until he found a buyer, Andres Ximénez (Waterbury 1985).

A native of Ronda, Spain, Ximénez was already living in St. Augustine for some time before marrying Juana Pellicer in April 1791 (Waterbury 1985). Following his marriage, Ximénez purchased a two-story wooden house on the southeast corner of present-day Cadiz and Aviles streets. This house served as the family's domicile and a successful general store of sorts. Ximénez's store prospered for several years and in November 1797, he was able to purchase the piece of property (Block 34, Lot2) directly across Aviles Street. This new piece of property afforded him the opportunity to expand his business and sometime after November 1797 he began construction on a house/store structure (Waterbury 1985).

The original structure contained a two-story house containing the living quarters and a one-story wing that stretched to the west along present-day Cadiz Street (Figure 3). The Ximénez family, however, did not live at the residence long, as Juana Ximénez died in 1802 and Andres died soon after in 1806. The deed of the property was left to their three children and the contents of the house and store were auctioned. The Ximénez-Fatio House was rented on and off until it was sold in 1830 to Margaret Cook, who started buying shares of the property from the Ximénez children in 1826 (Waterbury 1985).

Cook turned the property into a boarding house and converted the old store rooms into bedrooms for paying customers. Because St. Augustine was now located in a territory of the United States, tourists flocked to the city during the 1830s. Realizing the need for more room in the boarding house, Cook made structural changes to the house. Between 1830 and 1842, architectural historian Herchel Shepard dates the only major renovations to the house in its 200+ years of occupation (Waterbury 1985; Harper and Rogers 1993). During renovations, a second story and balcony were added above the original Andres Ximénez store rooms. The property operated as a boarding house until a death in the family pressed Cook to sell the house to another business person, Sarah Anderson, on July 27, 1838. Anderson turned the property back to a private residence and occupied the house until 1855, at which time she sold the property to an already well-known boarding-house owner and host, Luisa Fatio (Harper and Rogers 1993). Fatio not only accepted traveling tourists, but many of her boarding houses were occupied by invalids suffering from tuberculosis and other pulmonary diseases (Sewall 1849).

For nearly 20 years, Luisa Fatio operated the Ximénez-Fatio House as one of the prime boarding-house destinations in St. Augustine (Waterbury 1985). Business waned during the Civil War (1861–1865), but recovered slowly in the following years. Fatio continued to operate a successful boarding house until her death in 1875. Little is known about the operations and conditions of the property following Fatio's death, however the property was occupied by various individuals, groups, and/or organizations. In 1939, The National Society of The Colonial Dames of America (NSCDA) in The State of Florida purchased the property from then-owner Judge David R. Dunham, who provided a transactional clause that prohibited the buyers from materially changing the "present exterior architectural lines of the building" (Waterbury 1985).

Under NSCDA ownership, the Ximénez-Fatio House was tastefully restored to the historically-accurate condition in which it is found today. This attention to original detail, combined with few structural alterations, makes the Ximénez-Fatio House an excellent historical laboratory for dendrochronological analysis.

METHODS

Field Methods

We extracted at least one core from nearly every accessible timber (which sometimes required the use of an extension ladder or scaffolding) using a 10-inch long hollow drill bit attached to a 0.5″ variable-speed hand drill. Timbers throughout the house and wing had been exposed during major renovations of the house taking place beginning 2007 that had removed the original wall plaster (Oppermann 2009). Each core was labeled by the site code (XF), floor number ("1" or "2"), specific location (e.g. R = rafter and S = stairs) or room number (1 digit), and core letter (e.g. "A" is the first core extracted; "B" is the second, etc.) (e.g. XF2R16A). All rooms were assigned numbers (Figure 4) based on the blueprints of the Ximénez-Fatio House designed by the Works Progress Administration (Official Project No. 265-6907) for the Historic American Buildings Survey (Survey No. FLA-116). Porch rafters on the second floor were numbered sequentially beginning with the northeastern rafter and ending with the westernmost rafter.

During our visual inspections, we found most beams were squared, so we extracted the core as near to the corner of the beam as possible to ensure (1) the maximum number of rings would be obtained, and (2) an outermost ring would be obtained as close to the true cutting date as possible. We closely evaluated each beam to find, if possible, the tree center (pith or near pith), which aided determining from which corner to extract the core. We drilled into the beam about 5 to 7 mm, then removed the bit and placed a large ink dot on the surface of the beam to later verify that the outermost rings remained intact after coring. We then reinserted the bit and continued to drill until we reached the middle of the beam. A specially-designed steel rod with a metal hook was then inserted alongside the suspended core and turned to break the core from the parent beam. As each core was pulled from the beam, we immediately glued them to wooden core mounts with the cells vertically aligned to ensure a transverse view of the wood surface under a microscope when sanded. All cores were appropriately labeled on the core mount itself and detailed information on the location of each core was recorded.

Data Processing

In the Laboratory of Tree-Ring Science at the University of Tennessee, the cores were sanded on a 4″ X 24″ Makita belt sander using progressively finer sandpaper, beginning with ANSI 100-grit (125–149 μm) and ending with ANSI 400-grit (20.6–23.6 μm) sandpaper (Orvis and Grissino-Mayer 2002). This process yielded a wood surface with clearly discernable cellular features under standard 7–10X magnification, which is important when determining boundaries between the annual tree rings. Using a microscope, the innermost complete ring on each sample was assigned the relative year "1" and each subsequent 10th ring was marked with an "X" with a mechanical pencil. We then measured all tree-ring widths to 0.001 mm accuracy using a Velmex measuring stage coupled with MEASURE J2X software.

Internal and External Crossdating

To achieve absolute dating of the samples, we used COFECHA, a computer program that uses segmented time series correlation techniques to assist in crossdating (i.e., absolute dating) of undated tree-ring time series (Grissino-Mayer 2001). When using COFECHA, it is imperative to not completely rely solely on the program as considerable visual and graphical assessments must also be made to support the temporal placement for each core suggested by COFECHA (Holmes 1983). The final suggested temporal placement made by the program had to be convincing graphically (similar temporal patterns in the wide and narrow rings) and statistically (correlation coefficient significant at $p<0.0001$) (Holmes 1983; Grissino-Mayer 2001). We used COFECHA to assist in crossdating the undated ("floating") tree-ring measurement sequences from the Ximénez-Fatio House against an independent reference (i.e., "anchored" in time) tree-ring chronology created from a nearby site in southern Georgia.

The reference chronology was developed from the immediate low-lying, sandy soils that surround Lake Louise (30°43′30″ N, 83°15′21″ W) in southern Georgia, a coalesced sinkhole lake (or *polje*) located in karst topography (Watts 1971; Tepper 1998). The Lake Louise chronology was developed by Dr. Henri Grissino-Mayer then at Valdosta State University (VSU) in 1999, and spans A.D. 1421 to 1999, developed from 94 crossdated series from longleaf pines (*Pinus palustris* P. Miller) with a series intercorrelation of 0.58. The living tree portion of the reference chronology was developed from tree-ring series obtained from pines that had been cut for construction on the VSU campus.

We specifically focused on individual measurement series from the Ximénez-Fatio House that had a statistically significant correlation with the Lake Louise chronology, then used these to build a chronology to date the remaining series from the Ximénez-Fatio House. When all remaining floating series were crossdated, we assigned the correct calendar years to all tree rings using program EDRM ("Edit Ring Measurement"). All individual measurement series were next combined into one file and again processed through COFECHA as dated series to ensure the correct temporal placement for each. Crossdating was verified when the correlation coefficient for the majority of 40-year segments on each series being tested exceeded 0.37 ($p < 0.01$), although coefficients were usually much higher (for example, $r > 0.55$, $p < 0.0001$).

To further ensure statistical accuracy of the final temporal placements of each series, we created a Residual chronology (i.e., all low-frequency trends caused by normal aging and autocorrelation removed) from the crossdated Ximénez-Fatio tree-ring series using program ARSTAN (Cook 1985), a computer program that standardizes tree-ring measurement data to a common mean (1.0). The composite chronology represents information from all contributing series. Each ring measurement for all series was divided by a predicted annual value of growth based on a trend line or curve fit to the measurement data, resulting in a dimensionless index of growth for that year (Fritts 1976; Graybill 1982). In addition, any adverse effects of internal autocorrelation in each series (which also can hinder crossdating attempts) was removed using autoregressive procedures (Meko 1981; Cook 1985; Monserud 1986). Standardization removes individual tree variability, which could mask the climate signal needed for crossdating among tree-ring series. Once each individual series was standardized, a master chronology was created in ARSTAN, which represented all successfully crossdated series from the Ximénez-Fatio House. This Ximénez-Fatio Residual chronology was then tested for crossdating accuracy against the Lake Louise Residual chronology using COFECHA using the techniques described previously. Crossdating was confirmed by a correlation coefficient that was statistically significant ($p < 0.01$).

Establishing Cutting Dates

Once all tree rings from each series of the Ximénez-Fatio chronology were crossdated and assigned calendar years, the outermost dated ring on each core was inspected under high magnification (35X) to determine possible cutting dates for trees used to construct the Ximénez-Fatio House. We assigned standard symbols to help evaluate the possible year of cutting (Bannister 1962; Nash 1999):

B : Bark was present, indicating the outer ring was fully intact (a cutting date).

r : The outermost ring is continuous and intact around a smooth surface, but no bark is present (a cutting date). The evaluation of a smooth outer surface on the beam was made in the field.

v : The date is within a few years of the cutting date, based on presence of sapwood (a near-cutting date).

vv : A cutting date is not possible because we cannot determine how far the outer ring is from the true outer surface (a non-cutting date).

RESULTS

A total of 74 cores were extracted from the structure, but 20 of these cores were too damaged from the coring process to be of any use. We measured the tree-ring widths from 54 cores, but 18 of these series were too short (< 45 years) to be considered suitable for successful graphical and statistical crossdating. Of these remaining 36 cores, 10 could not be confidently crossdated both graphically and statistically, despite some series being exceptionally long (> 100 years). Our final data set consisted of 26 series that were confidently crossdated internally against each other (with interseries correlations > 0.40, with corresponding p-values < 0.001) (Appendix 1). In these 26 series, 1,815 tree rings were accurately measured to 0.001 mm accuracy.

Crossdating

Two of the measurement series from the Ximénez-Fatio House crossdated significantly with the Lake Louise reference chronology. We found correlation coefficients of 0.51 for sample XFH4A (n = 121 years, t = 6.42, p < 0.0001) and 0.56 for sample XF174 (n = 87 years, t = 6.30, p < 0.0001). A Residual chronology created from these two series that spanned 132 years had a correlation of 0.44 (t = 5.54, p < 0.0001) with the Residual chronology from the Lake Louise samples, and a graphical comparison shows a convincing match (Figure 5). These were used to date the remaining samples from the Ximénez-Fatio House. Three additional series from the Ximénez-Fatio House also showed statistically significant correlations with Lake Louise: XFH3AL (r = 0.33, n = 130 years, t = 3.96, p < 0.001); XF1007A (r = 0.37, n = 93 years, t = 3.83, p < 0.0001); and XFH2B (r = 0.35, n = 98 years, t = 3.71, p < 0.0001). A t-value of 3.5 is considered the minimum value needed to indicate a possible statistical match (Baillie 1982; Orton 1984; Wigley *et al*. 1987). We next compared the Residual chronology created from all of the Ximénez-Fatio House measurement series with the Residual chronology from the Lake Louise samples and found an r-value of 0.35 which was statistically significant (n = 185 years, t = 4.97, p < 0.0001).

We are confident that these multiple lines of evidence demonstrate that the Ximénez-Fatio House chronology is anchored from 1673 to 1857.

The average interseries correlation for the Ximénez-Fatio House measurement series was 0.53, indicating successful internal crossdating. A value that approaches 0.50 is considered high for southern pine species (Grissino-Mayer 2001) and attests to the common climatic signal that influences tree growth and facilitates crossdating tree rings among numerous series. The average mean sensitivity, a measure of year-to-year variability (Fritts 1976), was 0.34. A value above 0.20 is considered the minimum needed for extracting climate information from tree species in the southeastern United States. Of 124 40-year segments tested by COFECHA (lagged 10 years), 13 (10.5%) were flagged due to low correlations ($r < 0.37$, $p > 0.01$) (Table 1), but inspection of these segments indicated correct temporal placements.

Cutting and Non-cutting Dates

Three samples provided several firm cutting dates: 1856 on sample XFH2B, 1857 on XFH2AE, and 1858 on sample XFH3A (Table 2). Samples XFH2A and XFH2B represent the same beam, a lintel located above the window next to the door that leads into Room 5 (Table 3). Three samples provided near cutting dates (based on the presence of sapwood): XF174 (1799), XF181A (1790), and XFH4A (1845). The remaining 20 samples had outermost rings that were far from cutting dates (Table 2). The fact that most samples with non-cutting dates have outermost rings in the early, mid-, and late 1700s supports the historical documentation that suggests construction and subsequent renovations of this house occurred in the late 1700s to early 1800s (Table 2).

DISCUSSION

Internal and External Crossdating

The number of flagged segments for our Ximénez-Fatio House data set (13 of 124 40-yr segments tested, or 10.5%) warranted further inspection because this percentage is near the 10% value usually considered the maximum for a crossdated tree-ring data set with a common climate signal. Close visual re-inspection of the tree rings and analyses of the suggested alternate dating adjustments made by COFECHA yielded no indication of any misdated series, however (Appendix 1). We found no systematic dating adjustments that would indicate misdated series (Grissino-Mayer 2001). All alternate placements of the data set suggested by COFECHA were found to be unreasonable (*e.g.*, moving a 40-year segment backward 5 years when segments on either side were dated correctly). Furthermore, all flags were dispersed among a number of cores; hence, no single core sample contained the majority of flags, which would indicate a misdated series.

We noted that most of the flagged segments (8 of 13) occurred near the beginning or near the end of each measurement series. For example, flagged segments are found at the end of the series for samples XF2R15, XFH4A, XF184, XF2R17, XF173, and XF1S1BL (Table 1). This is commonly observed when crossdating many tree species and can be attributed to a lack of common response when a tree is young (juvenile growth, and therefore the earliest formed tree rings, rarely responds to climate but more so to inherent physiological conditions) or when a tree is mature and approaching its maximum life span (i.e., no longer being driven by climatic factors that impart crossdating capability).

Construction Dates for the Ximénez-Fatio House

All timbers in the Ximénez-Fatio House had been squared which made determining the year of construction challenging. This procedure of "squaring" timbers involved the processing of logs either by a two-person pit saw or with a water-driven ("up-and-down") sash saw in a sawmill. During this process, several squared timbers were made from a single log and the removal of bark would often mean the removal of much of the sapwood, which makes it difficult to assign an exact or near-cutting date to a particular timber. A lack of confirmed cutting dates prohibits an exact construction year or years for the main house. Nonetheless, the outermost dates for rings on all cores certainly suggest a late 18th Century construction for the Ximénez-Fatio main house because no tree rings post-date 1798 (sample XF2F1, an exposed floor joist in the stairwell) on any of our dated samples from the main house.

In St. Augustine, the production of lumber has occurred since the beginning of the colony of Florida. In 1565, the earliest sawmills "… were huge pits where one Negro slave standing at the top and another at the bottom sawed great logs [cypress] into planks" (Kendrick and Walsh 2006). By 1790, several water-driven sawmills existed throughout northern Florida, including Jacksonville (approximately 40 miles north of St. Augustine). Therefore, the timbers used to construct the original house could have been derived from a local sawmill, or from a water-driven sawmill near present-day Jacksonville. In 1801, two citizens from St. Augustine were granted a claim of 2,500 acres by the Governor of East Florida for the purpose of building a water-powered sawmill. The two erected their sawmill at the head of the Creek of Moultrie, which runs into the Matanzas River, and enabled the people of St. Augustine to purchase lumber at a reasonable cost (Kendrick and Walsh 2006). In 1850, the first circular saw in eastern Florida was established near Jacksonville. This mill contained a heavy cast iron blade, which was a part of a sash-saw powered by water, and was able to produce lumber at a higher rate than previous mills (Kendrick and Walsh 2006). Hence, similar to the materials in the original structure, the timbers used to construct the wing of the house might have derived from the mill at Moultrie Creek, or from the circular sawmill in Jacksonville.

Our data suggest that the 1st story wing was not built along with the original 2-story housing structure, and that the 2nd story wing of the structure was not built during the reported construction period between 1830 and 1842 (Waterbury 1985). Based on the cutting dates we were able to assign to two beams found in the wing, our data strongly suggest that the entire wing was constructed in the late 1850s, most likely between 1856 and 1858. The timbers from which each near-cutting and exact cutting date samples were extracted were also squared and processed in a sawmill, but one corner of the squared timbers had retained the sapwood and outermost ring and, in two instances, the bark remained on the beams, XFH2 from Room 5 and XFH3 from Room 6 (Table 2). The 1856 to 1858 construction period places this major renovation of the Ximénez-Fatio House at the very beginning of the period when first purchased by Luisa Fatio in 1855.

Project Limitations

Several limitations were encountered during this project that may inform future dendroarchaeological research on historic structures elsewhere throughout the southeastern U.S. First, squared timbers were used throughout the house and this prevented us from obtaining cutting dates that are more common on hewn log structures. Luckily, we did find bark on two beams, which indicated we would obtain the cutting dates of these trees. We also found curvature on some samples, notably underneath the stairwell leading up to the 2nd floor, but these samples could not be reliably dated. We recommend that a thorough search throughout all rooms and on all exposed timbers be conducted initially to identify beams that should be specifically targeted, to ensure efficient use of time and energy.

Second, the first two trips (September 2007 and December 2007) to the site were of limited success, in terms of sample quality, because we had little experience extracting cores from long-seasoned pines (likely longleaf pine, *Pinus palustris* P. Miller) characterized by extensive amounts of oleoresin-laden heartwood. These pines, although over 100 years old, still exuded pitch during the coring process. The heat of the drill would liquefy the pitch, thus causing the drill bit to become clogged, which caused cores to break into multiple pieces. This breakage rendered many of these samples useless. However, during the final trip in March 2008, we used paint thinner to constantly lubricate the borer, which vastly improved the quality of the cores by keeping them largely intact during extraction.

Finally, this area of the southeastern U.S. has few tree-ring chronologies developed from pines that could be used for a reference when dating the floating chronologies. Several other longleaf pine chronologies do exist in other locations in the Southeast, however these chronologies were either too short or the locations too distant to be used in this project. Nonetheless, we were surprised at the utility of the Lake Louise pine chronology for precisely dating some of the St. Augustine floating tree-ring series, as the locations are separated by a significant distance of about 150 miles. This suggests a common climate signal to which these longleaf pines are responding, which further suggests that these data could eventually be used to reconstruct climate for southern Georgia and northeastern Florida. The fact that the Lake Louise chronology could not date all the samples from the Ximénez-Fatio House is not surprising, given this distance. The beams from the house that could be dated with the Lake Louise chronology may have been cut from trees harvested from an intermediate location between Lake Louise and St. Augustine, while those that could not be dated with the Lake Louise chronology may have been cut from trees that had grown much closer to St. Augustine. The development of the new Ximénez-Fatio House reference chronology for coastal portions of northeastern Florida sets the stage for accurate and precise dating of additional historic structures and artifacts (such as ship timbers) in the region.

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REFERENCES

Baillie, M.G.L., 1982. *Tree-Ring Dating and Archaeology*. University of Chicago Press, Chicago, IL, 274 pp.

Bannister, B. 1962. The interpretation of tree-ring dates. *American Antiquity* 27: 508–514.

Bortolot, Z. J., Copenheaver, C.A., Longe, R.L., and Van Aardt, J.A. 2001. Development of a White Oak Chronology Using Live Trees and a Post-Civil War Cabin in South-central Virginia. *Tree-Ring Research* 57(2): 197–203.

Bowers, L.J., and D.L. Grashot. 1976. Results of the First Hermitage dendrochronological study. Pages 271–281 in S.D. Smith, ed., *An Archaeological and Historical Assessment of the First Hermitage*. Division of Archaeology, Tennessee Department of Conservation, and The Ladies Hermitage Association, Nashville, Tennessee.

Cook, E.R. 1985. A time series analysis approach to tree-ring standardization. Ph.D. Dissertation, The University of Arizona, Tucson, Arizona.

Deagan, K. 1985. The archaeology of sixteenth century St. Augustine. *The Florida Anthropologist* 38(1/2): 6–33.

DeWeese Wight, G., and H.D. Grissino-Mayer. 2004. Dendrochronological dating of an Antebellum Period House, Forsyth County, Georgia, U.S.A. *Tree-Ring Research* 60(2): 91–99.

Fritts, H.C., 1976. *Tree Rings and Climate*. Academic Press, London, 567 pp. Reprinted 2001 by Blackburn Press, Caldwell, NJ.

Graybill, D.A. 1982. Chronology development and analysis. In: M.K. Hughes, P.M. Kelly, J.R. Pilcher, and V.C. LaMarche, Jr. (Eds.), *Climate from Tree Rings*. Cambridge University Press, Cambridge, pp. 21–28.

Grissino-Mayer, H.D. 2001. Evaluating crossdating accuracy: A manual and tutorial for the computer program COFECHA. *Tree-Ring Research* 57(2): 205–221.

Grissino-Mayer, H.D., 2009. An introduction to dendroarchaeology in the Southeastern United States. *Tree-Ring Research* 65(1): 5–10.

Grissino-Mayer, H.D., and S.L. van de Gevel. 2007. Tell-tale trees: The historical dendroarchaeology of log structures at Rocky Mount, Piney Flats, Tennessee. *Historical Archaeology* 41(4): 32–49.

Harper, R.W. and R.Y. Rogers. 1993. *Ximénez-Fatio House*. The National Society of The Colonial Dames of America in the State of Florida. 24 pp.

Henderson, J.P., H.D. Grissino-Mayer, S.L. van de Gevel, and J.L. Hart, 2009. The historical dendroarchaeology of the Hoskins House, Tannenbaum Historic Park, Greensboro, North Carolina, U.S.A. *Tree-Ring Research* 65(1): 37–45.

Holmes, R.L. 1983. Computer-assisted quality control in tree-ring dating and measurement. *Tree-Ring Bulletin* 43: 69–78.

Kendrick, B., and B. Walsh. 2006. *A History of Florida Forests*. University Press of Florida, Gainesville. 585 pp.

Lewis, D.B., W.L. Nelson, H.D. Grissino-Mayer, E.R. Cook, and R.D. Jones, 2009. Dendrochronological dating of eastern red cedar (*Juniperus virginiana* L.) logs from Alfred's Cabin, The Hermitage, Home of President Andrew Jackson. *Tree-Ring Research* 65(1): 47–55.

Mann, D.F. 2002. The Dendroarchaeology of the Swaggerty Blockhouse, Cocke County, Tennessee. M.S. thesis, Department of Geography, The University of Tennessee, Knoxville. 139 pp.

Manucy, A. 1985. The physical setting of sixteenth century St. Augustine. *The Florida Anthropologist* 38(1/2): 34–53.

Meko, D.M. 1981. Applications of Box-Jenkins methods of time series analysis to the reconstruction of drought from tree rings. Ph.D. dissertation, The University of Arizona, Tucson. 149 pp.

Monserud, R.A. 1986. Time-series analyses of tree-ring chronologies. *Forest Science* 32(2): 349–372.

Oppermann, J.K. 2009. The Ximenez-Fatio House, St. Augustine, Florida: Historic Structure Report. Draft Report, National Society of Colonial Dames in America in the State of Florida, St. Augustine, Florida. 137 pp.

Orvis, K.H. and H.D. Grissino-Mayer. 2002. Standardizing the reporting of abrasive papers used to surface tree-ring samples. *Tree-Ring Research* 58(1/2): 47–50.

Nash, S.E. 1999. *Time, Trees, and Prehistory: Tree-Ring Dating and the Development of North American Archaeology, 1914–1950*. University of Utah Press, Salt Lake City, UT.

Orton, C.R., 1983. The use of Student's t-test for matching tree-ring patterns. *Bulletin of the University of London Institute of Archaeology* 20: 101–105.

Reding, W.M. 2002. Assessment of Spatial and Temporal Patterns of Log Structures in East Tennessee. M.S. thesis, Department of Geography, The University of Tennessee, Knoxville.

Sewall, R.K. 1849. *Sketches of St. Augustine*. Martin E. Homestead, Philadelphia, PA. 69 pp.

Slayton, J.D., M.R. Stevens, H.D. Grissino-Mayer, and C.H. Faulkner, 2009. The historical dendroarchaeology of two log structures at the Marble Springs Historic Site, Knox County, Tennessee, U.S.A. *Tree-Ring Research* 65(1): 23–36.

Stahle, D.W. 1979. Tree-ring dating of historic buildings in Arkansas. *Tree-Ring Bulletin* 39: 1–28.

Tepper, J.H. 1998. A window into South Georgia environmental history. *VSU Alumni Bulletin* (Summer): 8–11.

Waterbury, J.P. 1985. Long neglected, now restored: The Ximénez-Fatio House (ca. 1797). *El Escribano* 22: 1–29.

Watts, W.A. 1971. Postglacial and interglacial vegetation history of southern Georgia and central Florida. *Ecology* 52(4): 676–690.

Wigley, T.M.L., Jones, P.D., Briffa, K.R., 1987. Cross-dating methods in dendrochronology. *Journal of Archaeological Science* 14: 51–64.

Table 1. Internal correlation testing of the Ximénez-Fatio House tree-ring measurement series.

			40-Year Segment Lagged 10 Years														
			1680	1690	1700	1710	1720	1730	1740	1750	1760	1770	1780	1790	1800	1810	1820
	Begin	**End**	1719	1729	1739	1749	1759	1769	1779	1789	1799	1809	1819	1829	1839	1849	1859
	Year	**Year**	**Correlation Coefficient ***														
XFH2AE	1804	1856													0.52	0.47	0.48
XF2R15	1796	1847												0.52	0.53	0.33A	
XFH2B	1758	1855								0.72	0.75	0.64	0.59	0.47	.35A	0.55	0.41
XF181A	1743	1789							0.72	0.71							
XFH3AL	1728	1857					0.56	0.51	0.55	0.68	0.65	0.62	0.61	0.53	0.55	0.62	0.63
XF2F1	1726	1797					0.37	0.38	0.33B	0.41	0.44						
XFH4A	1724	1844					0.46	0.56	0.67	0.67	0.70	0.58	0.56	0.46	0.42	0.41B	
XF184	1724	1785					0.55	0.52	0.46	0.30B							
XF1S5	1724	1770					0.57	0.57	0.56								
XF1007A	1722	1814					0.72	0.69	0.66	0.46	0.31B	0.42	0.48				
XF151A	1721	1803					0.31A	0.35A	0.41	0.65	0.57	0.57					
XF1S3	1719	1774				0.46	0.46	0.56	0.59								
XF2R19	1714	1764				0.81	0.79	0.77									
XF174	1712	1798				0.24A	0.48	0.62	0.69	0.81	0.82						
XF2R17	1705	1779			0.59	0.51	0.37	0.39	0.29B								
XF152	1705	1753			0.67	0.51	0.40										
XF2R16	1704	1771			0.78	0.79	0.72	0.59	0.57								
XF1011A	1704	1751			0.63	0.47	0.44										
XF2R18	1702	1765			0.65	0.65	0.60	0.58									
XF2R7	1696	1754		0.61	0.66	0.64	0.68										
XF2S4	1692	1751		0.51	0.44	0.53	0.54										
XF173	1686	1756	0.50	0.46	0.46	0.38	0.30B										
XF1S1BL	1682	1754	0.58	0.47	0.51	0.30A	0.23B										
XF2R4	1680	1755	0.71	0.86	0.82	0.67	0.66										
XF1010A	1680	1737	0.67	0.60	0.45												
XF2R8	1672	1733	0.42	0.66	0.66												
Average correlation			0.57	0.60	0.61	0.53	0.51	0.55	0.54	0.60	0.61	0.57	0.56	0.49	0.47	0.48	0.51

* "A" or "B" in these columns indicates a 40-year segment flagged by COFECHA.

Table 2. Outermost tree-ring dates for beams sampled from the Ximénez-Fatio House.

Sample ID	Inner Date	Measured Outer Ring	Outermost Ring Date	Ring Type	Cutting Date? *	Comments
XFH2AE	1804	1856	1857	B	CD	1857 could be complete, cut in late 1857
XF2R15	1796	1847	1848	vv	NonCD	No sapwood, far from cutting date
XFH2B	1758	1855	1856	B	CD	1856 could be complete, cut in late 1856
XF181A	1743	1789	1790	v	NearCD	1790 ring present, sapwood present
XFH3AL	1728	1857	1858	B	CD	1858 could be complete, cut in late 1858
XF2F1	1726	1797	1798	vv	NonCD	No sapwood, far from cutting date
XFH4A	1724	1844	1845	v	NearCD	1845 ring present, sapwood present
XF184	1724	1785	1786	vv	NonCD	No sapwood, far from cutting date
XF1S5	1724	1770	1771	vv	NonCD	No sapwood, far from cutting date
XF1007A	1722	1814	1815	vv	NonCD	No sapwood, far from cutting date
XF151A	1721	1803	1804	vv	NonCD	No sapwood, far from cutting date
XF1S3	1719	1774	1775	vv	NonCD	No sapwood, far from cutting date
XF2R19	1714	1764	1765	vv	NonCD	No sapwood, far from cutting date
XF174	1712	1798	1799	v	NearCD	1799 ring present, sapwood present
XF2R17	1705	1779	1780	vv	NonCD	No sapwood, far from cutting date
XF152	1705	1753	1754	vv	NonCD	No sapwood, far from cutting date
XF2R16	1704	1771	1772	vv	NonCD	No sapwood, far from cutting date
XF1011A	1704	1751	1752	vv	NonCD	No sapwood, far from cutting date
XF2R18	1702	1765	1766	vv	NonCD	No sapwood, far from cutting date
XF2R7	1696	1754	1755	vv	NonCD	No sapwood, far from cutting date
XF2S4	1692	1751	1752	vv	NonCD	No sapwood, far from cutting date
XF173	1686	1756	1757	vv	NonCD	No sapwood, far from cutting date
XF1S1BL	1682	1754	1755	vv	NonCD	No sapwood, far from cutting date
XF2R4	1680	1755	1756	vv	NonCD	No sapwood, far from cutting date
XF1010A	1680	1737	1738	vv	NonCD	No sapwood, far from cutting date
XF2R8	1672	1733	1734	vv	NonCD	No sapwood, far from cutting date

* CD = Cutting Date; NearCD = Near Cutting Date; and NonCD = Non-Cutting Date

Table 3. Cutting dates for logs sampled from the Ximénez-Fatio House.

Sample ID	Outermost Ring Date	Location
First Floor		
XF1S3	1775	1st floor under stairwell
XF1S5	1771	1st floor under stairwell
XF1S1BL	1755	1st floor under stairwell
XFH2AE	1857	1st floor, hallway, lintel above window next to door leading into Room 5
XFH2B	1856	1st floor, hallway, lintel above window next to door leading into Room 5
XFH3AL	1858	1st floor, hallway, lintel above window next to door leading into Room 6
XFH4A	1845	1st floor, hallway, lintel above window next to door leading into Room 8
XF1010A	1738	1st floor, Dining Room, lintel above window located on northeast side of room
XF151A	1804	1st floor, Room 5, beam above doorway between Rooms 4 and 5
XF152	1754	1st floor, Room 5, beam to the right of doorway between Rooms 4 and 5
XF1007A	1815	1st floor, Room 5, lintel above window located on southeast side of room
XF1011A	1752	1st floor, Room 5, beam to the right of doorway between Rooms 4 and 5
XF173	1757	1st floor, Room 7, lintel above window facing the street
XF174	1799	1st floor, Room 7, lintel above window facing the courtyard
XF181A	1790	1st floor, Room 8, lintel above window facing the courtyard
XF184	1786	1st floor, Room 8, beam below above window facing the street
Second Floor		
XF2S4	1752	2nd floor step on stairway
XF2F1	1798	2nd floor, exposed floor joist
XF2R4	1756	2nd floor porch rafter number 4
XF2R7	1755	2nd floor porch rafter number 7
XF2R8	1734	2nd floor porch rafter number 8
XF2R15	1848	2nd floor porch rafter number 15
XF2R16	1772	2nd floor porch rafter number 16
XF2R17	1780	2nd floor porch rafter number 17
XF2R18	1766	2nd floor porch rafter number 18
XF2R19	1765	2nd floor porch rafter number 19


Figure 1. The Ximénez-Fatio House as viewed from the courtyard, showing the 2-story main house on the left and the 2-story wing to the right.

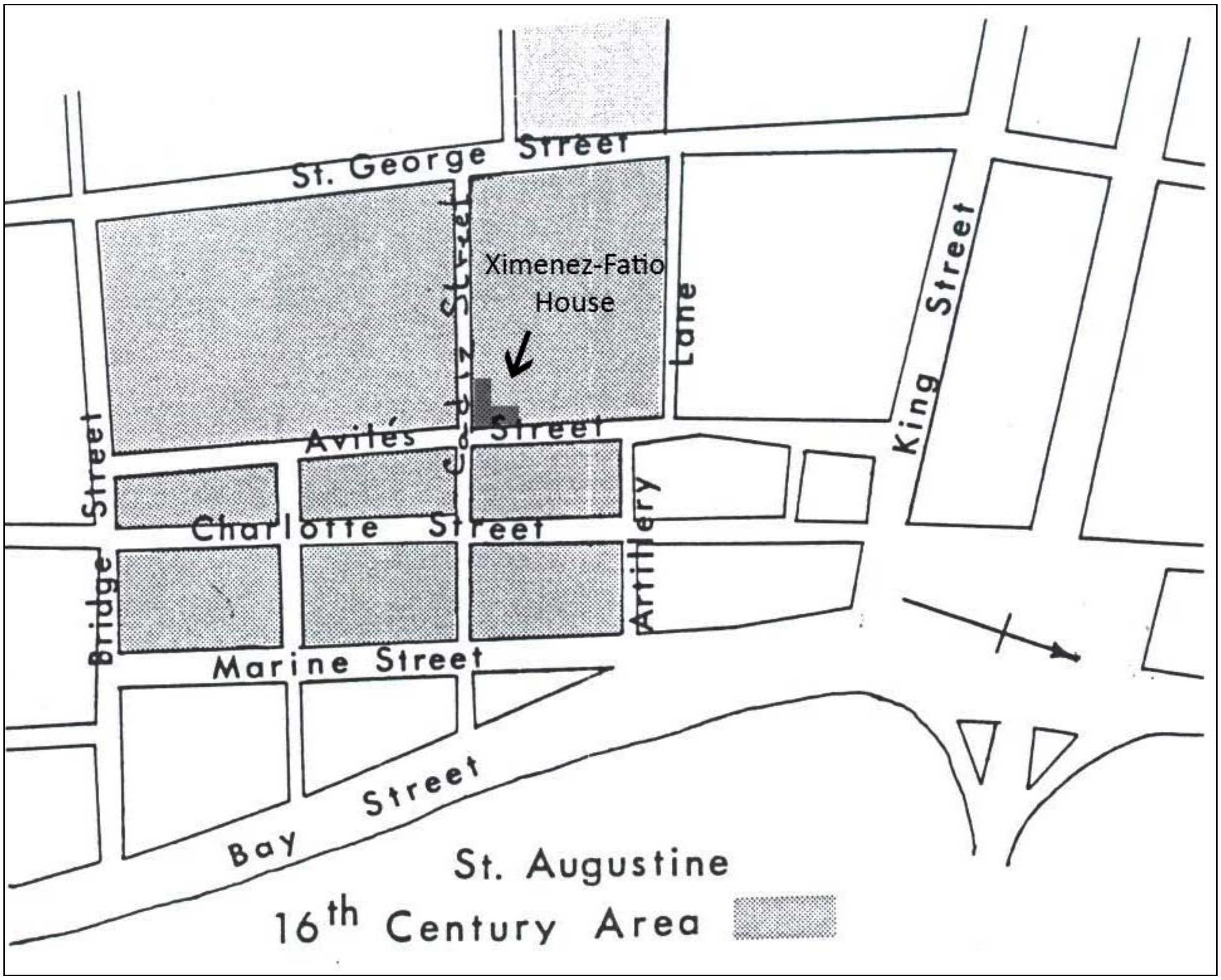

Figure 2. Map showing the location of Block 34, Lot 2 (eventual location of Ximénez-Fatio House) situated in the heart of St. Augustine's oldest community (modified from Waterbury 1985).

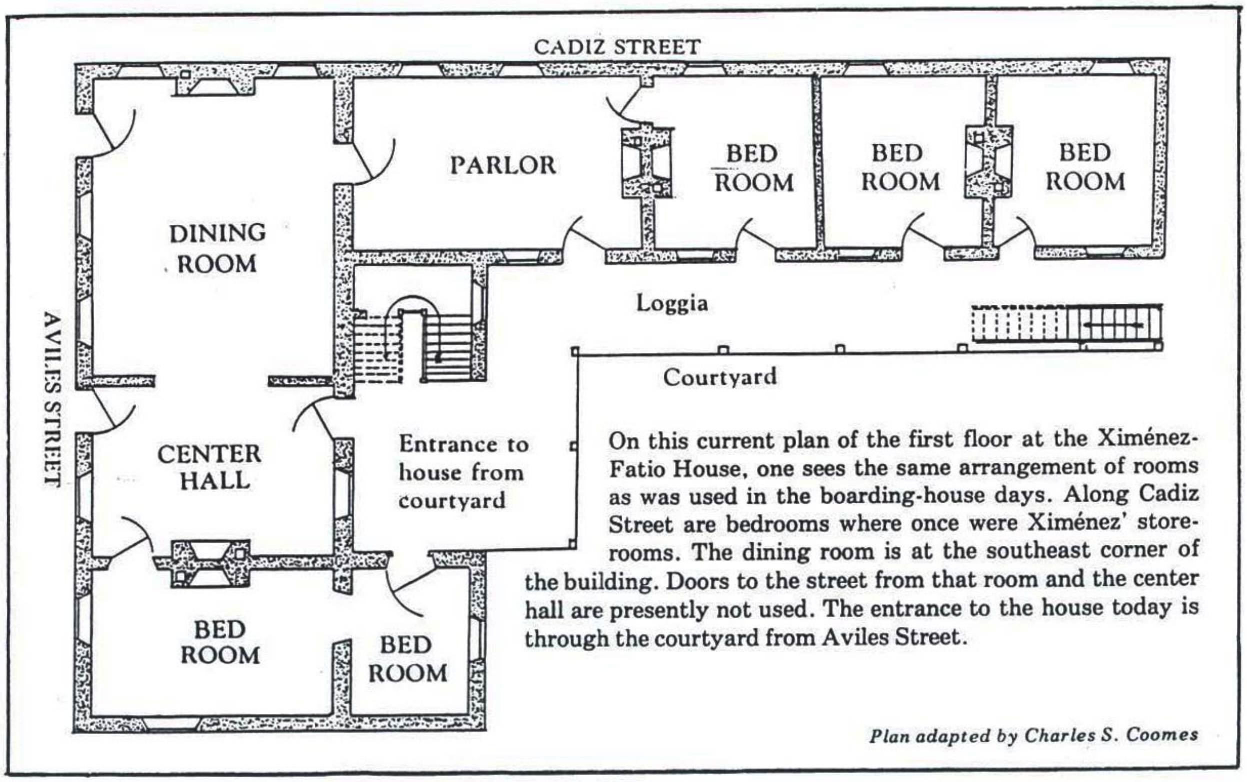

Figure 3. Map of the 1st story floor plan of the Ximénez-Fatio House (Waterbury 1985).

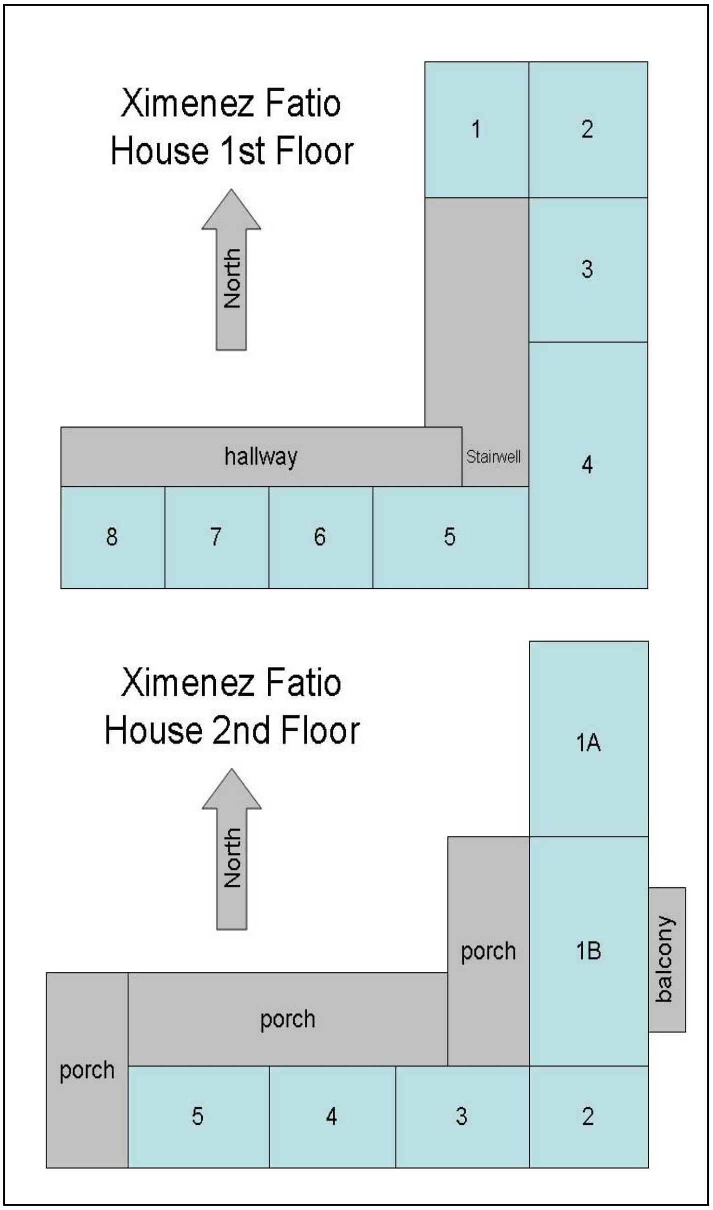

Figure 4. Schematic of the numbers assigned to individual rooms when sampling the timbers from the Ximénez-Fatio House.

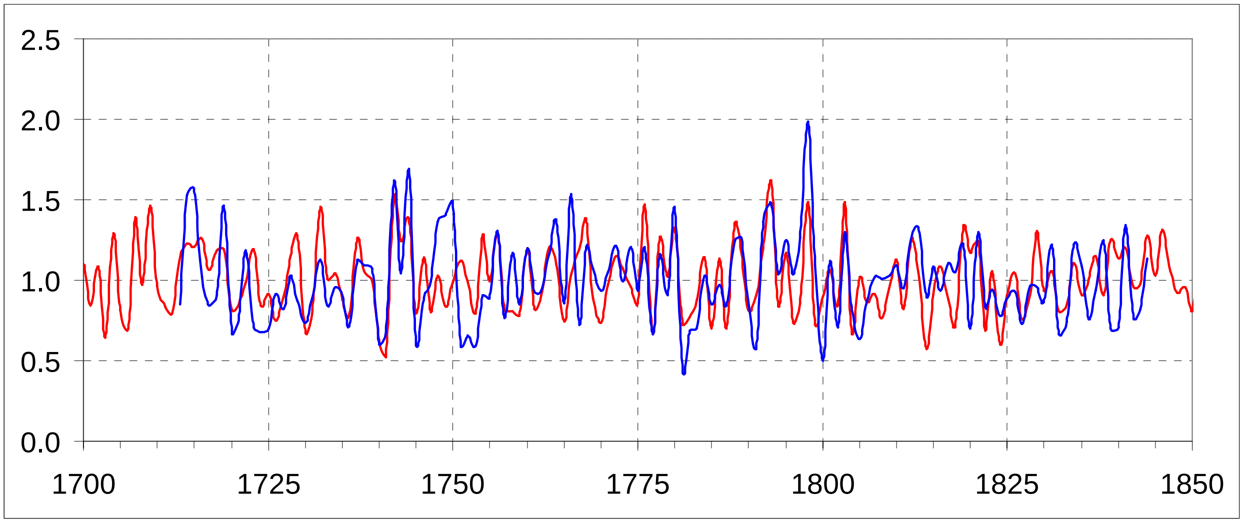

Figure 5. Crossdating between the Lake Louise Residual chronology (red) and a Residual chronology created from samples XFH4A and XF174 from the Ximénez-Fatio House ($r = 0.44$, $n = 132$ years, $t = 5.54$, $p < 0.0001$), demonstrating exceptional crossdating, and thereby anchoring the tree rings from the Ximénez-Fatio House absolutely in time.

Appendix 1

FULL COFECHA OUTPUT FOR THE 21MEASUREMENT SERIES ANALYZED FOR THE XIMÉNEZ-FATIO HOUSE

```
[]  Dendrochronology Program Library                                       Run TEST   Program COF  11:54  Wed 25 Mar 2009  Page   1
[]
[]  P R O G R A M     C O F E C H A                                                                          Version 6.02P    27114
-----------------------------------------------------------------------------------------------------------------------------------

QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

File of DATED series:   xfall.rwl

CONTENTS:

   Part 1:  Title page, options selected, summary, absent rings by series
   Part 2:  Histogram of time spans
   Part 3:  Master series with sample depth and absent rings by year
   Part 4:  Bar plot of Master Dating Series
   Part 5:  Correlation by segment of each series with Master
   Part 6:  Potential problems: low correlation, divergent year-to-year changes, absent rings, outliers
   Part 7:  Descriptive statistics

RUN CONTROL OPTIONS SELECTED                             VALUE

        1  Cubic smoothing spline 50% wavelength cutoff for filtering
                                                           32 years
        2  Segments examined are                           40 years lagged successively by  10 years
        3  Autoregressive model applied                     A  Residuals are used in master dating series and testing
        4  Series transformed to logarithms                 Y  Each series log-transformed for master dating series and testing
        5  CORRELATION is Pearson (parametric, quantitative)
           Critical correlation, 99% confidence level   .3665
        6  Master dating series saved                       N
        7  Ring measurements listed                         N
        8  Parts printed                               1234567
        9  Absent rings are omitted from master series and segment correlations  (Y)

Time span of Master dating series is  1672 to  1857   186 years
Continuous time span is               1672 to  1857   186 years
Portion with two or more series is    1680 to  1856   177 years

                                       ****************************************
                                       *C* Number of dated series        26 *C*
                                       *O* Master series 1672 1857  186 yrs *O*
                                       *F* Total rings in all series   1815 *F*
                                       *E* Total dated rings checked   1806 *E*
                                       *C* Series intercorrelation     .534 *C*
                                       *H* Average mean sensitivity    .338 *H*
                                       *A* Segments, possible problems   13 *A*
                                       *** Mean length of series       69.8 ***
                                       ****************************************

ABSENT RINGS listed by SERIES:            (See Master Dating Series for absent rings listed by year)

              No ring measurements of zero value
```

```
PART 2:  TIME PLOT OF TREE-RING SERIES:                                                     11:54  Wed 25 Mar 2009  Page   2
-----------------------------------------------------------------------------------------------------------------------------------
                                                                                                                     Beg  End
1000      1100      1200      1300      1400      1500      1600      1700      1800      1900      2000 Ident    Seq year year  Yrs
  :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    : -------- --- ---- ---- ----
  .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    <====>    .    .    . XF2AE      1 1804 1856   53
  .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .   <====>.    .    .    . XF2R15     2 1796 1847   52
  .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    <=========>    .    .    . XFH2B      3 1758 1855   98
  .    .    .    .    .    .    .    .    .    .    .    .    .    .    .   <===> .    .    .    .    . XF181A     4 1743 1789   47
  .    .    .    .    .    .    .    .    .    .    .    .    .    .    . <============>    .    .    . XFH3AL     5 1728 1857  130
  .    .    .    .    .    .    .    .    .    .    .    .    .    .    . <======>.    .    .    .    . XF2F1      6 1726 1797   72
  .    .    .    .    .    .    .    .    .    .    .    .    .    .    . <===========>.    .    .    . XFH4A      7 1724 1844  121
  .    .    .    .    .    .    .    .    .    .    .    .    .    .    . <=====> .    .    .    .    . XF184      8 1724 1785   62
  .    .    .    .    .    .    .    .    .    .    .    .    .    .    . <====>  .    .    .    .    . XF1S5      9 1724 1770   47
  .    .    .    .    .    .    .    .    .    .    .    .    .    .    . <========>   .    .    .    . XF1007A   10 1722 1814   93
  .    .    .    .    .    .    .    .    .    .    .    .    .    .    . <=======>    .    .    .    . XF151A    11 1721 1803   83
  .    .    .    .    .    .    .    .    .    .    .    .    .    .    .<=====>  .    .    .    .    . XF1S3     12 1719 1774   56
  .    .    .    .    .    .    .    .    .    .    .    .    .    .    .<====>   .    .    .    .    . XF2R19    13 1714 1764   51
  .    .    .    .    .    .    .    .    .    .    .    .    .    .    .<=======>.    .    .    .    . XF174     14 1712 1798   87
  .    .    .    .    .    .    .    .    .    .    .    .    .    .    <======>  .    .    .    .    . XF2R17    15 1705 1779   75
  .    .    .    .    .    .    .    .    .    .    .    .    .    .    <====>    .    .    .    .    . XF152     16 1705 1753   49
  .    .    .    .    .    .    .    .    .    .    .    .    .    .    <======>  .    .    .    .    . XF2R16    17 1704 1771   68
  .    .    .    .    .    .    .    .    .    .    .    .    .    .    <====>    .    .    .    .    . XF1011A   18 1704 1751   48
  .    .    .    .    .    .    .    .    .    .    .    .    .    .    <=====>   .    .    .    .    . XF2R18    19 1702 1765   64
  .    .    .    .    .    .    .    .    .    .    .    .    .    .   <=====>    .    .    .    .    . XF2R7     20 1696 1754   59
  .    .    .    .    .    .    .    .    .    .    .    .    .    .   <=====>    .    .    .    .    . XF2S4     21 1692 1751   60
  .    .    .    .    .    .    .    .    .    .    .    .    .    .  <======>    .    .    .    .    . XF173     22 1686 1756   71
  .    .    .    .    .    .    .    .    .    .    .    .    .    .  <======>    .    .    .    .    . XF1S1BL   23 1682 1754   73
  .    .    .    .    .    .    .    .    .    .    .    .    .    .  <======>    .    .    .    .    . XF2R4     24 1680 1755   76
  .    .    .    .    .    .    .    .    .    .    .    .    .    .  <====> .    .    .    .    .    . XF010A    25 1680 1737   58
  .    .    .    .    .    .    .    .    .    .    .    .    .    . <=====> .    .    .    .    .    . XF2R8     26 1672 1733   62
```

Year	Value	No Ab
1672	2.153	1
1673	.476	1
1674	-1.398	1
1675	-.167	1
1676	2.027	1
1677	-.328	1
1678	-2.250	1
1679	1.123	1
1680	1.406	3
1681	.299	3
1682	-.481	4
1683	.096	4
1684	-1.090	4
1685	-2.321	4
1686	.462	5
1687	-1.442	5
1688	.523	5
1689	-1.434	5
1690	.187	5
1691	1.253	5
1692	1.364	6
1693	1.513	6
1694	1.724	6
1695	.572	6
1696	.034	7
1697	-1.243	7
1698	.271	7
1699	-.546	7

PART 3: Master Dating Series:

Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab
1700	-1.062	7	1750	.920	21	1800	-.211	6	1850	.744	3						
1701	-.048	7	1751	.748	21	1801	.654	6	1851	-.640	3						
1702	-.636	8	1752	-1.264	19	1802	-.912	6	1852	-.075	3						
1703	.806	8	1753	-1.853	19	1803	.146	6	1853	1.025	3						
1704	1.296	10	1754	-.473	18	1804	-.859	6	1854	-1.776	3						
1705	.192	12	1755	-.592	16	1805	-.087	6	1855	-.219	3						
1706	-2.956	12	1756	.152	15	1806	-2.791	6	1856	.144	2						
1707	.174	12	1757	.156	14	1807	.534	6	1857	1.757	1						
1708	.488	12	1758	-.144	15	1808	-.424	6									
1709	-.646	12	1759	.075	15	1809	-.365	6									
1710	-.611	12	1760	.003	15	1810	.292	6									
1711	1.043	12	1761	-.207	15	1811	-1.108	6									
1712	.813	13	1762	-.106	15	1812	-.219	6									
1713	-.313	13	1763	.528	15	1813	1.165	6									
1714	.492	14	1764	.669	15	1814	.038	6									
1715	-.406	14	1765	.354	14	1815	.656	5									
1716	1.260	14	1766	1.081	13	1816	.234	5									
1717	-.401	14	1767	-1.113	13	1817	-.142	5									
1718	1.686	14	1768	.632	13	1818	-.710	5									
1719	-.967	15	1769	.208	13	1819	1.188	5									
1720	-.265	15	1770	-.681	13	1820	.141	5									
1721	-.317	16	1771	.559	12	1821	1.797	5									
1722	-.827	17	1772	-.145	11	1822	.926	5									
1723	.171	17	1773	.033	11	1823	.457	5									
1724	-.611	20	1774	.659	11	1824	-.142	5									
1725	-.491	20	1775	.389	10	1825	-.265	5									
1726	.244	21	1776	.554	10	1826	.757	5									
1727	-.685	21	1777	-1.118	10	1827	-1.630	5									
1728	-.929	22	1778	.247	10	1828	-.462	5									
1729	-.306	22	1779	.508	10	1829	-.661	5									
1730	.673	22	1780	1.331	9	1830	-.671	5									
1731	1.094	22	1781	-2.857	9	1831	.369	5									
1732	.691	22	1782	-1.815	9	1832	-1.657	5									
1733	.075	22	1783	-1.261	9	1833	-2.438	5									
1734	.390	21	1784	.522	9	1834	.530	5									
1735	.042	21	1785	.149	9	1835	.132	5									
1736	-.016	21	1786	-.281	8	1836	-.424	5									
1737	.537	21	1787	-.201	8	1837	1.033	5									
1738	1.167	20	1788	.847	8	1838	1.394	5									
1739	.180	20	1789	1.097	8	1839	.784	5									
1740	-1.225	20	1790	-.901	7	1840	-.007	5									
1741	-3.374	20	1791	-2.516	7	1841	1.473	5									
1742	-.370	20	1792	.117	7	1842	-.433	5									
1743	.172	21	1793	.873	7	1843	-1.810	5									
1744	.563	21	1794	-.228	7	1844	.873	5									
1745	.084	21	1795	.449	7	1845	.651	4									
1746	.369	21	1796	.273	8	1846	-.880	4									
1747	.458	21	1797	.277	8	1847	.909	4									
1748	.537	21	1798	2.754	7	1848	.227	3									
1749	.542	21	1799	.304	6	1849	-.280	3									

```
------------------------------------------------------------------------------------------------------------------------------------
  Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value
                                  1700-d          1750---------D  1800---a        1850--------C
                                  1701----@       1751--------C   1801--------C   1851--c
                                  1702--c         1752-e          1802-d          1852----@
                                  1703--------C   1753g           1803-----A      1853---------D
                                  1704----------E 1754--b         1804-c          1854g
                                  1705-----A      1755--b         1805----@       1855---a
                                  1706l           1756-----A      1806k           1856-----A
                                  1707-----A      1757-----A      1807-------B    1857----------G
                                  1708-------B    1758----a       1808---b
                                  1709--c         1759-----@      1809---a
                                  1710--b         1760----@       1810------A
                                  1711---------D  1761---a        1811-d
                                  1712--------C   1762----@       1812---a
                                  1713---a        1763-------B    1813---------E
                                  1714-------B    1764--------C   1814-----@
                                  1715---b        1765------A     1815--------C
                                  1716---------E  1766---------D  1816------A
                                  1717---b        1767-d          1817----a
                                  1718----------G 1768--------C   1818--c
                                  1719-d          1769-----A      1819---------E
                                  1720---a        1770--c         1820-----A
                                  1721---a        1771-------B    1821----------G
                  1672----------I 1722--c         1772----a       1822---------D
                  1673-------B    1723-----A      1773-----@      1823-------B
                  1674-f          1724--b         1774--------C   1824----a
                  1675----a       1725--b         1775------B     1825---a
                  1676----------H 1726------A     1776-------B    1826--------C
                  1677---a        1727--c         1777-d          1827g
                  1678i           1728-d          1778------A     1828--b
                  1679---------D  1729---a        1779-------B    1829--c
                  1680----------F 1730--------C   1780----------E 1830--c
                  1681------A     1731---------D  1781k           1831------A
                  1682--b         1732--------C   1782g           1832g
                  1683-----@      1733-----@      1783-e          1833j
                  1684-d          1734------B     1784-------B    1834-------B
                  1685i           1735-----@      1785-----A      1835-----A
                  1686-------B    1736----@       1786---a        1836---b
                  1687-f          1737-------B    1787---a        1837---------D
                  1688-------B    1738---------E  1788---------C  1838----------F
                  1689-f          1739-----A      1789---------D  1839--------C
                  1690-----A      1740-e          1790-d          1840----@
                  1691---------E  1741m           1791j           1841----------F
                  1692----------E 1742---a        1792-----@      1842---b
                  1693----------F 1743-----A      1793---------C  1843g
                  1694----------G 1744-------B    1794---a        1844---------C
                  1695-------B    1745-----@      1795-------B    1845--------C
                  1696-----@      1746------A     1796------A     1846-d
                  1697-e          1747-------B    1797------A     1847---------D
                  1698------A     1748-------B    1798----------K 1848------A
                  1699--b         1749-------B    1799------A     1849---a
```

Correlations of 40-year dated segments, lagged 10 years
Flags: A = correlation under .3665 but highest as dated; B = correlation higher at other than dated position

Seq	Series	Time_span	1680 1719	1690 1729	1700 1739	1710 1749	1720 1759	1730 1769	1740 1779	1750 1789	1760 1799	1770 1809	1780 1819	1790 1829	1800 1839	1810 1849	1820 1859
1	XF2AE	1804 1856													.52	.47	.48
2	XF2R15	1796 1847												.52	.53	.33A	
3	XFH2B	1758 1855								.72	.75	.64	.59	.47	.35A	.55	.41
4	XF181A	1743 1789							.72	.71							
5	XFH3AL	1728 1857					.56	.51	.55	.68	.65	.62	.61	.53	.55	.62	.63
6	XF2F1	1726 1797					.37	.38	.33B	.41	.44						
7	XFH4A	1724 1844					.46	.56	.67	.67	.70	.58	.56	.46	.42	.41B	
8	XF184	1724 1785					.55	.52	.46	.30B							
9	XF1S5	1724 1770					.57	.57	.56								
10	XF1007A	1722 1814					.72	.69	.66	.46	.31B	.42	.48				
11	XF151A	1721 1803					.31A	.35A	.41	.65	.57	.57					
12	XF1S3	1719 1774				.46	.46	.56	.59								
13	XF2R19	1714 1764				.81	.79	.77									
14	XF174	1712 1798				.24A	.48	.62	.69	.81	.82						
15	XF2R17	1705 1779			.59	.51	.37	.39	.29B								
16	XF152	1705 1753			.67	.51	.40										
17	XF2R16	1704 1771			.78	.79	.72	.59	.57								
18	XF1011A	1704 1751			.63	.47	.44										
19	XF2R18	1702 1765			.65	.65	.60	.58									
20	XF2R7	1696 1754		.61	.66	.64	.68										
21	XF2S4	1692 1751		.51	.44	.53	.54										
22	XF173	1686 1756	.50	.46	.46	.38	.30B										
23	XF1S1BL	1682 1754	.58	.47	.51	.30A	.23B										
24	XF2R4	1680 1755	.71	.86	.82	.67	.66										
25	XF010A	1680 1737	.67	.60	.45												
26	XF2R8	1672 1733	.42	.66	.66												
Av segment correlation			.57	.60	.61	.53	.51	.55	.54	.60	.61	.57	.56	.49	.47	.48	.51

```
---------------------------------------------------------------------------------------------------------------------------------

For each series with potential problems the following diagnostics may appear:

[A] Correlations with master dating series of flagged  40-year segments of series filtered with  32-year spline,
    at every point from ten years earlier (-10) to ten years later (+10) than dated

[B] Effect of those data values which most lower or raise correlation with master series

[C] Year-to-year changes very different from the mean change in other series

[D] Absent rings (zero values)

[E] Values which are statistical outliers from mean for the year
=================================================================================================================================

XF2AE     1804 to  1856      53 years                                                                                    Series   1

[B] Entire series, effect on correlation (  .482) is:
      Lower   1843  -.032   1852  -.026   1831  -.024   1808  -.019  Higher   1806   .105   1833   .052   1827   .016   1821   .010

=================================================================================================================================

XF2R15    1796 to  1847      52 years                                                                                    Series   2

[A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
   ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
   1808 1847    0    .33 -.08  .05  .05 -.19  .11 -.15  .14 -.20  .24  .33* .05  .08  .22 -.08 -.16 -.01 -.29  .01 -.17 -.07

[B] Entire series, effect on correlation (  .463) is:
      Lower   1841  -.054   1816  -.051   1846  -.034   1834  -.033  Higher   1806   .093   1832   .031   1798   .025   1833   .022
    1808 to 1847 segment:
      Lower   1841  -.073   1816  -.067   1834  -.044   1846  -.043  Higher   1832   .059   1843   .056   1833   .054   1827   .043

=================================================================================================================================

XFH2B     1758 to  1855      98 years                                                                                    Series   3

[A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
   ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
   1800 1839    0   -.35  .13  .02 -.14  .17  .11  .02  .17  .35  .01  .35* .05 -.03 -.02 -.04 -.20  .08 -.08 -.30 -.09 -.12

[B] Entire series, effect on correlation (  .533) is:
      Lower   1852  -.029   1806  -.029   1808  -.023   1783  -.019  Higher   1781   .068   1791   .033   1798   .027   1843   .015
    1800 to 1839 segment:
      Lower   1808  -.059   1826  -.043   1806  -.041   1825  -.023  Higher   1821   .047   1833   .038   1832   .031   1813   .016

[E] Outliers     1   3.0 SD above or -4.5 SD below mean for year
      1852 +3.6 SD
=================================================================================================================================
```

```
XF181A    1743 to  1789      47 years                                                                                    Series   4

[B] Entire series, effect on correlation (  .701) is:
      Lower   1782  -.020   1768  -.013   1769  -.011   1789  -.010  Higher   1753   .030   1777   .012   1752   .011   1766   .010

====================================================================================================================================

XFH3AL    1728 to  1857     130 years                                                                                    Series   5

[*] Later part of series cannot be checked from 1857 to 1857 -- not matched by another series

[B] Entire series, effect on correlation (  .584) is:
      Lower   1746  -.023   1806  -.020   1790  -.015   1769  -.015  Higher   1781   .036   1791   .023   1741   .018   1798   .017

[E] Outliers     1   3.0 SD above or -4.5 SD below mean for year
      1826 +3.3 SD
====================================================================================================================================

XF2F1     1726 to  1797      72 years                                                                                    Series   6

[A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
   ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
   1740 1779    1   -.31 -.04 -.18 -.12 -.14  .04  .06 -.23 -.12  .14  .33| .35*-.09  .10 -.14  .22  .01  .01 -.27 -.31 -.01

[B] Entire series, effect on correlation (  .442) is:
      Lower   1776  -.046   1790  -.030   1731  -.026   1782  -.021  Higher   1781   .117   1791   .069   1741   .027   1740   .015
    1740 to 1779 segment:
      Lower   1776  -.098   1773  -.029   1771  -.028   1761  -.024  Higher   1741   .100   1740   .045   1753   .045   1767   .018

====================================================================================================================================

XFH4A     1724 to  1844     121 years                                                                                    Series   7

[A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
   ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
   1805 1844    3   -.05 -.06 -.20 -.21 -.09 -.16 -.13 -.02 -.10 -.17  .41| .24 -.12  .46* .15  .02  .33  .19 -.07  .15 -.03

[B] Entire series, effect on correlation (  .509) is:
      Lower   1805  -.031   1730  -.024   1728  -.016   1757  -.011  Higher   1781   .019   1798   .016   1791   .016   1741   .015
    1805 to 1844 segment:
      Lower   1805  -.095   1820  -.029   1839  -.027   1840  -.023  Higher   1806   .060   1827   .038   1821   .037   1833   .035

[E] Outliers     1   3.0 SD above or -4.5 SD below mean for year
      1728 +3.2 SD
====================================================================================================================================

XF184     1724 to  1785      62 years                                                                                    Series   8

[A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
   ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
```

```
   1746 1785    1    .08  .06 -.15 -.14 -.21 -.01 -.10 -.13 -.23  .06  .30| .31*-.01  .03 -.08  .19 -.27 -.04 -.17  .15 -.07

[B] Entire series, effect on correlation (  .399) is:
      Lower   1781  -.034   1767  -.021   1780  -.018   1725  -.018  Higher   1741   .082   1753   .024   1752   .014   1782   .008
    1746 to 1785 segment:
      Lower   1781  -.037   1767  -.030   1780  -.022   1761  -.018  Higher   1752   .067   1753   .040   1770   .015   1782   .015

==================================================================================================================================

XF1S5     1724 to  1770      47 years                                                                                  Series   9

[B] Entire series, effect on correlation (  .517) is:
      Lower   1768  -.047   1724  -.034   1736  -.022   1757  -.021  Higher   1741   .163   1752   .031   1740   .028   1767   .019

==================================================================================================================================

XF1007A   1722 to  1814      93 years                                                                                  Series  10

[A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
   ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
   1760 1799   -5    .01  .06 -.16 -.31  .03  .40* .10 -.23 -.23  .16  .31|-.17 -.39 -.14  .28  .13 -.10 -.24  .35  .32 -.05

[B] Entire series, effect on correlation (  .513) is:
      Lower   1791  -.038   1781  -.019   1795  -.013   1790  -.013  Higher   1741   .075   1806   .052   1753   .011   1740   .008
    1760 to 1799 segment:
      Lower   1791  -.051   1795  -.032   1773  -.029   1764  -.027  Higher   1798   .046   1782   .036   1781   .033   1777   .027

[E] Outliers     1   3.0 SD above or -4.5 SD below mean for year
      1741 -5.3 SD
==================================================================================================================================

XF151A    1721 to  1803      83 years                                                                                  Series  11

[A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
   ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
   1721 1760    0   -.31 -.06 -.17  .09  .00  .10 -.32 -.10 -.01  .10  .31*-.02 -.23 -.19 -.03  .13  .20  .00 -.04 -.07 -.16
   1730 1769    0   -.12 -.21 -.16  .06  .12  .13 -.16 -.12  .09  .06  .35*-.07 -.14 -.11 -.03  .11  .23  .02 -.15 -.18  .07

[B] Entire series, effect on correlation (  .471) is:
      Lower   1799  -.036   1791  -.025   1731  -.015   1746  -.015  Higher   1781   .090   1798   .042   1790   .013   1782   .010
    1721 to 1760 segment:
      Lower   1731  -.041   1746  -.039   1737  -.028   1732  -.025  Higher   1741   .047   1753   .031   1728   .026   1750   .021
    1730 to 1769 segment:
      Lower   1731  -.039   1746  -.037   1737  -.026   1732  -.023  Higher   1741   .045   1753   .033   1767   .023   1752   .017

==================================================================================================================================

XF1S3     1719 to  1774      56 years                                                                                  Series  12

[B] Entire series, effect on correlation (  .466) is:
      Lower   1728  -.046   1721  -.025   1730  -.022   1768  -.017  Higher   1741   .051   1767   .026   1753   .024   1752   .024
```

```
[E] Outliers     1   3.0 SD above or -4.5 SD below mean for year
      1728 -5.2 SD
==================================================================================================================================

XF2R19    1714 to  1764      51 years                                                                                    Series  13

[B] Entire series, effect on correlation (  .783) is:
      Lower   1752  -.047   1762  -.020   1744  -.011   1730  -.009  Higher   1741   .086   1753   .020   1718   .009   1716   .008

==================================================================================================================================

XF174     1712 to  1798      87 years                                                                                    Series  14

[A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
   ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
   1712 1751    0   -.11 -.46 -.05  .03  .14  .07  .11 -.08 -.05  .08  .24* .22 -.06 -.16  .05  .02 -.01 -.03 -.19 -.27 -.22

[B] Entire series, effect on correlation (  .603) is:
      Lower   1719  -.045   1718  -.019   1715  -.018   1722  -.014  Higher   1781   .055   1791   .042   1753   .014   1798   .013
    1712 to 1751 segment:
      Lower   1719  -.097   1715  -.039   1718  -.030   1722  -.030  Higher   1741   .147   1750   .026   1740   .023   1724   .020

==================================================================================================================================

XF2R17    1705 to  1779      75 years                                                                                    Series  15

[A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
   ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
   1740 1779    9   -.15 -.43 -.10 -.08  .11  .04 -.08  .07  .20  .13  .29|-.11 -.18 -.20  .06 -.10 -.24 -.15  .26  .36* .32

[B] Entire series, effect on correlation (  .495) is:
      Lower   1773  -.083   1741  -.027   1740  -.018   1739  -.016  Higher   1706   .048   1718   .020   1731   .012   1711   .012
    1740 to 1779 segment:
      Lower   1773  -.136   1740  -.029   1743  -.024   1741  -.017  Higher   1752   .033   1766   .029   1750   .025   1777   .023

[E] Outliers     1   3.0 SD above or -4.5 SD below mean for year
      1773 -6.0 SD
==================================================================================================================================

XF152     1705 to  1753      49 years                                                                                    Series  16

[B] Entire series, effect on correlation (  .538) is:
      Lower   1752  -.040   1753  -.029   1720  -.020   1750  -.019  Higher   1706   .169   1741   .026   1718   .026   1719   .025

==================================================================================================================================

XF2R16    1704 to  1771      68 years                                                                                    Series  17

[B] Entire series, effect on correlation (  .640) is:
      Lower   1761  -.031   1767  -.022   1756  -.013   1715  -.011  Higher   1741   .077   1740   .011   1753   .009   1718   .008
```

```
===================================================================================================================================

XF1011A   1704 to  1751      48 years                                                                                    Series  18

[B] Entire series, effect on correlation (  .575) is:
      Lower   1704  -.034   1716  -.028   1727  -.020   1717  -.019  Higher   1706   .167   1718   .026   1719   .019   1741   .017

===================================================================================================================================

XF2R18    1702 to  1765      64 years                                                                                    Series  19

[B] Entire series, effect on correlation (  .618) is:
      Lower   1714  -.023   1739  -.021   1727  -.019   1706  -.016  Higher   1741   .035   1718   .020   1752   .019   1719   .018

===================================================================================================================================

XF2R7     1696 to  1754      59 years                                                                                    Series  20

[B] Entire series, effect on correlation (  .622) is:
      Lower   1743  -.020   1714  -.017   1733  -.013   1708  -.012  Higher   1718   .023   1741   .020   1716   .014   1738   .013

===================================================================================================================================

XF2S4     1692 to  1751      60 years                                                                                    Series  21

[B] Entire series, effect on correlation (  .487) is:
      Lower   1744  -.051   1705  -.044   1706  -.034   1739  -.019  Higher   1741   .079   1719   .033   1718   .024   1697   .015

===================================================================================================================================

XF173     1686 to  1756      71 years                                                                                    Series  22

[A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
   ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
   1717 1756   -8   -.26 -.04  .37* .08  .20 -.06 -.16 -.28 -.06  .11  .30|-.18 -.18 -.08  .22  .23  .03  .06 -.02 -.26 -.23

[B] Entire series, effect on correlation (  .451) is:
      Lower   1718  -.040   1752  -.034   1693  -.023   1748  -.022  Higher   1706   .100   1741   .091   1687   .037   1694   .012
    1717 to 1756 segment:
      Lower   1718  -.082   1752  -.064   1748  -.045   1749  -.036  Higher   1741   .286   1719   .029   1731   .026   1728   .017

===================================================================================================================================

XF1S1BL   1682 to  1754      73 years                                                                                    Series  23

[A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
   ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
   1710 1749    0   -.26 -.01 -.05  .05 -.41  .25  .06  .10  .27  .11  .30*-.13 -.06 -.25  .02 -.11  .12 -.10 -.07  .02 -.02
   1715 1754   -5   -.18  .13 -.13  .00 -.31  .30* .05  .11  .20  .01  .23|-.15 -.03 -.09 -.06 -.02 -.03 -.05 -.08  .04  .03
```

```
[B] Entire series, effect on correlation (  .420) is:
      Lower   1750  -.045   1697  -.024   1744  -.017   1741  -.014  Higher   1706   .057   1687   .034   1685   .026   1738   .014
    1710 to 1749 segment:
      Lower   1728  -.035   1744  -.034   1739  -.034   1741  -.025  Higher   1738   .040   1716   .038   1722   .023   1731   .022
    1715 to 1754 segment:
      Lower   1750  -.084   1744  -.030   1728  -.028   1739  -.021  Higher   1738   .044   1716   .041   1731   .025   1722   .019

==================================================================================================================================

XF2R4     1680 to  1755      76 years                                                                                   Series  24

[B] Entire series, effect on correlation (  .661) is:
      Lower   1684  -.042   1682  -.034   1748  -.023   1752  -.012  Higher   1706   .045   1687   .024   1741   .019   1718   .012

==================================================================================================================================

XF010A    1680 to  1737      58 years                                                                                   Series  25

[B] Entire series, effect on correlation (  .515) is:
      Lower   1730  -.048   1685  -.041   1724  -.026   1726  -.021  Higher   1706   .089   1718   .027   1687   .019   1694   .016

==================================================================================================================================

XF2R8     1672 to  1733      62 years                                                                                   Series  26

[*] Early part of series cannot be checked from 1672 to 1679 -- not matched by another series

[B] Entire series, effect on correlation (  .422) is:
      Lower   1687  -.138   1715  -.023   1685  -.022   1729  -.016  Higher   1706   .045   1718   .028   1719   .028   1694   .015

[E] Outliers     1   3.0 SD above or -4.5 SD below mean for year
      1687 +3.9 SD
==================================================================================================================================
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						Corr	//-------- Unfiltered --------\\				//---- Filtered -----\\				
			No.	No.	No.	with	Mean	Max	Std	Auto	Mean	Max	Std	Auto	AR
Seq	Series	Interval	Years	Segmt	Flags	Master	msmt	msmt	dev	corr	sens	value	dev	corr	()
1	XF2AE	1804 1856	53	3	0	.482	.35	.84	.128	.172	.343	2.70	.491	.040	2
2	XF2R15	1796 1847	52	3	1	.463	1.25	2.04	.401	.282	.324	2.52	.539	-.027	1
3	XFH2B	1758 1855	98	8	1	.533	.40	1.03	.185	.338	.394	2.90	.465	.020	1
4	XF181A	1743 1789	47	2	0	.701	.69	1.27	.239	.535	.252	2.57	.515	.148	1
5	XFH3AL	1728 1857	130	11	0	.584	.54	1.39	.291	.610	.351	2.92	.495	.080	1
6	XF2F1	1726 1797	72	5	1	.442	.73	1.38	.264	.357	.306	2.73	.523	-.063	1
7	XFH4A	1724 1844	121	10	1	.509	.74	1.64	.228	.455	.244	2.82	.625	.090	1
8	XF184	1724 1785	62	4	1	.399	1.79	3.51	.694	.716	.234	2.47	.399	.042	1
9	XF1S5	1724 1770	47	3	0	.517	1.02	2.12	.422	.013	.421	2.89	.589	.154	1
10	XF1007A	1722 1814	93	7	1	.513	1.18	2.94	.568	.660	.329	2.52	.347	.053	1
11	XF151A	1721 1803	83	6	2	.471	.55	1.69	.290	.491	.317	3.11	.544	.005	1
12	XF1S3	1719 1774	56	4	0	.466	1.29	2.77	.549	.503	.349	2.52	.434	-.010	1
13	XF2R19	1714 1764	51	3	0	.783	.89	2.39	.396	.342	.368	2.81	.494	.016	1
14	XF174	1712 1798	87	6	1	.603	.81	2.24	.345	.599	.274	2.68	.503	.048	1
15	XF2R17	1705 1779	75	5	1	.495	.67	1.77	.354	.409	.429	2.78	.533	-.013	1
16	XF152	1705 1753	49	3	0	.538	1.19	2.11	.346	.141	.281	2.63	.433	.013	1
17	XF2R16	1704 1771	68	5	0	.640	1.00	1.74	.357	.255	.350	2.68	.524	.100	2
18	XF1011A	1704 1751	48	3	0	.575	1.14	1.98	.363	.260	.301	2.61	.461	-.007	1
19	XF2R18	1702 1765	64	4	0	.618	.71	1.91	.351	.351	.423	2.82	.614	.014	1
20	XF2R7	1696 1754	59	4	0	.622	.95	2.61	.578	.496	.459	2.81	.534	.039	1
21	XF2S4	1692 1751	60	4	0	.487	1.41	3.69	.772	.500	.429	2.88	.648	-.055	1
22	XF173	1686 1756	71	5	1	.451	.60	1.09	.186	.508	.236	2.63	.555	.037	1
23	XF1S1BL	1682 1754	73	5	2	.420	1.05	3.18	.698	.833	.300	2.72	.496	-.084	2
24	XF2R4	1680 1755	76	5	0	.661	1.04	2.33	.510	.553	.406	2.64	.564	-.081	1
25	XF010A	1680 1737	58	3	0	.515	1.04	3.60	.594	.710	.301	2.94	.652	-.038	1
26	XF2R8	1672 1733	62	3	0	.422	1.59	4.52	.879	.618	.414	2.81	.623	-.090	2
Total or mean:			1815	124	13	.534	.91	4.52	.409	.471	.338	3.11	.522	.019	

- = [COFECHA TEST COF] = -