[] Dendrochronology Program Library Run RRTSC Program COF 11:02 Thu 24 Aug 2017 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 30188

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

Title of run: RR\_TSCA

File of DATED series: RR\_TSCA\_all.txt

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 50 years lagged successively by 25 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 .3281

6 Master dating series saved N

7 Ring measurements listed Y

8 Parts printed 1234567

9 Absent rings are omitted from master series and segment correlations (Y)

Time span of Master dating series is 1772 to 2016 245 years

Continuous time span is 1772 to 2016 245 years

Portion with two or more series is 1789 to 2016 228 years

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

\*C\* Number of dated series 39 \*C\*

\*O\* Master series 1772 2016 245 yrs \*O\*

\*F\* Total rings in all series 5885 \*F\*

\*E\* Total dated rings checked 5868 \*E\*

\*C\* Series intercorrelation .591 \*C\*

\*H\* Average mean sensitivity .327 \*H\*

\*A\* Segments, possible problems 66 \*A\*

\*\*\* Mean length of series 150.9 \*\*\*

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

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: RR\_TSCA 11:02 Thu 24 Aug 2017 Page 2

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1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000 2050 Ident Seq Time-span Yrs

: : : : : : : : : : : : : : : : : : : : : -------- --- ---- ---- ----

. . . . . . . . . . . . . . . . <==================> . 40A 1 1829 2016 188

. . . . . . . . . . . . . . . <=======================> . 40B 2 1772 2016 245

. . . . . . . . . . . . . . . . <==================> . 42A 3 1821 2016 196

. . . . . . . . . . . . . . . <====================> . 42B 4 1803 2016 214

. . . . . . . . . . . . . . . . . . <========> . 43A 5 1922 2016 95

. . . . . . . . . . . . . . . . .<==============> . 43B 6 1866 2016 151

. . . . . . . . . . . . . . . <=====================> . 44A 7 1794 2016 223

. . . . . . . . . . . . . . . . <==================> . 44B 8 1825 2016 192

. . . . . . . . . . . . . . . . <==================> . 44C 9 1824 2016 193

. . . . . . . . . . . . . . . . <=================> . 45A 10 1839 2016 178

. . . . . . . . . . . . . . . . <===============> . 45B 11 1855 2016 162

. . . . . . . . . . . . . . . <======================> . 47A 12 1789 2016 228

. . . . . . . . . . . . . . . . <===============> . 47B 13 1851 2016 166

. . . . . . . . . . . . . . . . . <===========> . 48A 14 1891 2016 126

. . . . . . . . . . . . . . . . .<==============> . 48B 15 1863 2016 154

. . . . . . . . . . . . . . . <====================> . 49A 16 1806 2016 211

. . . . . . . . . . . . . . . <====================> . 49B 17 1803 2016 214

. . . . . . . . . . . . . . . . . <==========> . 51A 18 1905 2016 112

. . . . . . . . . . . . . . . . <================> . 51B 19 1841 2016 176

. . . . . . . . . . . . . . . . <================> . 52A 20 1848 2016 169

. . . . . . . . . . . . . . . . <===============> . 52B 21 1858 2016 159

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. . . . . . . . . . . . . . . . . <============> . 55B 27 1887 2016 130

. . . . . . . . . . . . . . . . . . <=====> . 57A 28 1959 2016 58

. . . . . . . . . . . . . . . . . . <=====> . 57B 29 1955 2016 62

. . . . . . . . . . . . . . . . . .<=========> . 58A 30 1918 2016 99

. . . . . . . . . . . . . . . . . . <=======> . 58B 31 1939 2016 78

. . . . . . . . . . . . . . . . .<==============> . 41A 32 1867 2016 150

. . . . . . . . . . . . . . . <====================> . 41B 33 1806 2016 211

. . . . . . . . . . . . . . . . .<==============> . 46A 34 1861 2016 156

. . . . . . . . . . . . . . . . . <============> . 46B 35 1880 2016 137

. . . . . . . . . . . . . . . . . . <=====> . 50A 36 1956 2016 61

. . . . . . . . . . . . . . . . . . <=====> . 50B 37 1958 2016 59

. . . . . . . . . . . . . . . . <================> . 56A 38 1847 2016 170

. . . . . . . . . . . . . . . . .<==============> . 56B 39 1860 2016 157

: : : : : : : : : : : : : : : : : : : : :

1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000 2050

PART 3: Master Dating Series: RR\_TSCA 11:02 Thu 24 Aug 2017 Page 3

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Year Value No Ab Year Value No Ab Year Value No Ab Year Value No Ab Year Value No Ab Year Value No Ab

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1800 -.038 3 1850 -1.145 16 1900 -.650 29 1950 -2.669 35 2000 .928 39

1801 -1.074 3 1851 -.240 17 1901 -.844 29 1951 .193 35 2001 -.642 39

1802 -.238 3 1852 -1.185 17 1902 -.526 29 1952 .074 35 2002 .620 39

1803 .030 5 1853 -.665 17 1903 .322 29 1953 -.607 35 2003 -2.189 39

1804 -.278 5 1854 -.487 17 1904 .529 29 1954 -.217 35 2004 -.553 39

1805 -.362 5 1855 -.303 18 1905 1.006 30 1955 -.813 36 2005 .859 39

1806 -.232 7 1856 -.056 18 1906 1.692 30 1956 .081 37 2006 -.618 39

1807 .876 7 1857 -.324 18 1907 1.377 30 1957 1.512 37 2007 -.726 39

1808 1.093 7 1858 .331 19 1908 .773 30 1958 .779 38 2008 .914 39

1809 .369 7 1859 .163 19 1909 -.032 30 1959 -.374 39 2009 2.248 39

1810 .509 7 1860 -.295 20 1910 -.983 30 1960 -.794 39 2010 .925 39

1811 .876 7 1861 .502 21 1911 -1.043 30 1961 1.452 39 2011 .426 39

1812 -.250 7 1862 .651 21 1912 -1.607 30 1962 .285 39 2012 -.328 39

1813 -.195 7 1863 -.113 22 1913 -.392 30 1963 -2.501 39 2013 .261 39

1814 .205 7 1864 .419 22 1914 .018 30 1964 .230 39 2014 .672 39

1815 -.270 7 1865 .394 22 1915 -.676 30 1965 -.477 39 2015 .831 39

1816 .712 7 1866 1.337 23 1916 -.232 30 1966 -.608 39 2016 -3.431 39

1817 .149 7 1867 .905 24 1917 .310 30 1967 1.252 39

1818 1.063 7 1868 .577 24 1918 .037 31 1968 1.173 39

1819 .083 7 1869 .559 24 1919 .061 31 1969 1.321 39

1820 -.017 7 1870 -.140 24 1920 .368 31 1970 -.952 39

1821 -.787 8 1871 -1.581 24 1921 .056 31 1971 -.772 39

1772 -3.892 1 1822 -1.053 8 1872 -1.122 24 1922 -.167 32 1972 .491 39

1773 -.913 1 1823 -1.269 8 1873 -.466 24 1923 .375 32 1973 2.050 39

1774 -.808 1 1824 -.905 9 1874 .101 24 1924 .339 32 1974 1.607 39

1775 -.189 1 1825 -.805 10 1875 1.092 24 1925 .548 32 1975 -.247 39

1776 .249 1 1826 -1.084 10 1876 .143 24 1926 .639 32 1976 .864 39

1777 2.295 1 1827 -1.443 10 1877 -.763 24 1927 -.179 33 1977 -2.379 39

1778 .002 1 1828 -.509 10 1878 -1.177 24 1928 .286 33 1978 -.392 39

1779 1.277 1 1829 -.586 11 1879 -.238 24 1929 .641 33 1979 -1.545 39

1780 1.327 1 1830 .353 11 1880 -.635 25 1930 .801 33 1980 -1.150 39

1781 .430 1 1831 .932 11 1881 -.740 25 1931 .802 33 1981 -.944 39

1782 -.738 1 1832 1.244 11 1882 -.397 25 1932 .385 33 1982 .454 39

1783 -.941 1 1833 .792 11 1883 .420 25 1933 .301 33 1983 .053 39

1784 .841 1 1834 1.170 11 1884 .316 26 1934 -1.141 33 1984 -.466 39

1785 2.109 1 1835 .481 11 1885 .027 26 1935 -2.879 33 1985 .689 39

1786 .562 1 1836 .667 11 1886 -.221 26 1936 -3.447 33 1986 1.827 39

1787 -2.903 1 1837 .197 11 1887 .505 27 1937 .087 33 1987 1.112 39

1788 .527 1 1838 .620 11 1888 .226 28 1938 .019 33 1988 -1.745 39

1789 .293 2 1839 .784 12 1889 .615 28 1939 .305 35 1989 -.433 39

1790 .821 2 1840 -.370 12 1890 .873 28 1940 .845 35 1990 1.563 39

1791 1.752 2 1841 -.482 13 1891 .470 29 1941 .301 35 1991 -.656 39

1792 -2.469 2 1842 .104 14 1892 .308 29 1942 -.258 35 1992 -.582 39

1793 -.568 2 1843 .314 14 1893 .642 29 1943 1.253 35 1993 .108 39

1794 1.340 3 1844 -.086 14 1894 -.016 29 1944 .852 35 1994 1.345 39

1795 .171 3 1845 .172 14 1895 .102 29 1945 1.182 35 1995 -1.379 39

1796 1.084 3 1846 -.593 14 1896 -.936 29 1946 1.028 35 1996 1.284 39

1797 .845 3 1847 .056 15 1897 -.818 29 1947 1.215 35 1997 -.238 39

1798 -.919 3 1848 .102 16 1898 .496 29 1948 -.422 35 1998 1.176 39

1799 -.096 3 1849 -.496 16 1899 .219 29 1949 -1.882 35 1999 -1.974 39

PART 4: Master Bar Plot: RR\_TSCA 11:02 Thu 24 Aug 2017 Page 4

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Year Rel value Year Rel value Year Rel value Year Rel value Year Rel value Year Rel value Year Rel value Year Rel value

1800----@ 1850-e 1900--c 1950k 2000---------D

1801-d 1851----a 1901-c 1951-----A 2001--c

1802----a 1852-e 1902--b 1952-----@ 2002-------B

1803-----@ 1853--c 1903------A 1953--b 2003i

1804---a 1854--b 1904-------B 1954----a 2004--b

1805---a 1855---a 1905---------D 1955-c 2005--------C

1806----a 1856----@ 1906----------G 1956-----@ 2006--b

1807--------D 1857---a 1907----------F 1957----------F 2007--c

1808---------D 1858------A 1908--------C 1958--------C 2008---------D

1809------A 1859-----A 1909----@ 1959---a 2009----------I

1810-------B 1860---a 1910-d 1960-c 2010---------D

1811--------D 1861-------B 1911-d 1961----------F 2011-------B

1812----a 1862--------C 1912f 1962------A 2012---a

1813----a 1863----@ 1913---b 1963j 2013------A

1814------A 1864-------B 1914-----@ 1964------A 2014--------C

1815---a 1865------B 1915--c 1965---b 2015--------C

1816--------C 1866----------E 1916----a 1966--b 2016n

1817-----A 1867---------D 1917------A 1967----------E

1818---------D 1868-------B 1918-----@ 1968---------E

1819-----@ 1869-------B 1919-----@ 1969----------E

1820-----@ 1870----a 1920------A 1970-d

1821-c 1871f 1921-----@ 1971--c

1772p 1822-d 1872-d 1922----a 1972-------B

1773-d 1823-e 1873---b 1923------B 1973----------H

1774-c 1824-d 1874-----@ 1924------A 1974----------F

1775----a 1825-c 1875---------D 1925-------B 1975----a

1776------A 1826-d 1876-----A 1926--------C 1976--------C

1777----------I 1827f 1877--c 1927----a 1977j

1778-----@ 1828--b 1878-e 1928------A 1978---b

1779----------E 1829--b 1879----a 1929--------C 1979f

1780----------E 1830------A 1880--c 1930--------C 1980-e

1781-------B 1831---------D 1881--c 1931--------C 1981-d

1782--c 1832----------E 1882---b 1932------B 1982-------B

1783-d 1833--------C 1883-------B 1933------A 1983-----@

1784--------C 1834---------E 1884------A 1934-e 1984---b

1785----------H 1835-------B 1885-----@ 1935l 1985--------C

1786-------B 1836--------C 1886----a 1936n 1986----------G

1787l 1837------A 1887-------B 1937-----@ 1987---------D

1788-------B 1838-------B 1888------A 1938-----@ 1988g

1789------A 1839--------C 1889-------B 1939------A 1989---b

1790--------C 1840---a 1890--------C 1940--------C 1990----------F

1791----------G 1841---b 1891-------B 1941------A 1991--c

1792j 1842-----@ 1892------A 1942---a 1992--b

1793--b 1843------A 1893--------C 1943----------E 1993-----@

1794----------E 1844----@ 1894-----@ 1944--------C 1994----------E

1795-----A 1845-----A 1895-----@ 1945---------E 1995-f

1796---------D 1846--b 1896-d 1946---------D 1996----------E

1797--------C 1847-----@ 1897-c 1947---------E 1997----a

1798-d 1848-----@ 1898-------B 1948---b 1998---------E

1799----@ 1849--b 1899------A 1949h 1999h

PART 5: CORRELATION OF SERIES BY SEGMENTS: RR\_TSCA 11:02 Thu 24 Aug 2017 Page 5

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Correlations of 50-year dated segments, lagged 25 years

Flags: A = correlation under .3281 but highest as dated; B = correlation higher at other than dated position

Seq Series Time\_span 1775 1800 1825 1850 1875 1900 1925 1950 1975

1824 1849 1874 1899 1924 1949 1974 1999 2024

--- -------- --------- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ----

1 40A 1829 2016 .33B .32B .49B .67 .76 .86 .85

2 40B 1772 2016 .24B .11B .19B-.04B-.06B .50 .84 .88 .86

3 42A 1821 2016 .49 .55 .70 .60 .55 .62 .75 .73

4 42B 1803 2016 -.06B-.01B .05B .21B .63B .80 .85 .82

5 43A 1922 2016 .71 .74 .87 .86

6 43B 1866 2016 .54 .46 .41B .68 .84 .87

7 44A 1794 2016 .14B .08B .13B-.02B .26B .58 .68 .82 .86

8 44B 1825 2016 -.15B .21B .74 .53 .53 .73 .82

9 44C 1824 2016 .44 .46 .58 .64 .67 .75 .85 .85

10 45A 1839 2016 -.07B-.10B-.03B .45B .70 .84 .77

11 45B 1855 2016 -.11B .12B .64 .76 .74 .76

12 47A 1789 2016 .16B .07B .18B .10B-.02B-.07B-.10B .13B .19B

13 47B 1851 2016 -.02B-.11B-.06B-.21B-.15B .06B

14 48A 1891 2016 .26B .42B .60 .70 .82

15 48B 1863 2016 .68 .71 .76 .72 .77 .87

16 49A 1806 2016 .14B .30B .06B .00B .48 .72 .73 .77

17 49B 1803 2016 .19B .44 .54 .63 .68 .75 .82 .85

18 51A 1905 2016 .68 .72 .80 .88

19 51B 1841 2016 -.16B-.16B .06B .40B .67 .88 .85

20 52A 1848 2016 .41 .47 .54 .76 .83 .79 .82

21 52B 1858 2016 .73 .71 .80 .90 .89 .89

22 53A 1842 2016 .29A .40 .57 .64 .71 .79 .82

23 53B 1884 2016 -.06B .13B .59 .79 .85

24 54A 1927 2016 .78 .80 .70

25 54B 1939 2016 .73 .80 .79

26 55A 1888 2016 .24A .45 .66 .77 .74

27 55B 1887 2016 .54B .68B .81 .84 .82

28 57A 1959 2016 .85 .85

29 57B 1955 2016 .70 .84

30 58A 1918 2016 .59 .65 .76 .86

31 58B 1939 2016 .66 .75 .82

32 41A 1867 2016 .20B .06B .38B .80 .90 .93

33 41B 1806 2016 -.03B .15B .39 .61 .66 .75 .86 .87

34 46A 1861 2016 .58 .50 .58 .72 .75 .72

35 46B 1880 2016 .03B .53B .71 .82 .89

36 50A 1956 2016 .87 .87

37 50B 1958 2016 .84 .87

38 56A 1847 2016 .64 .67 .65 .64 .77 .85 .67

39 56B 1860 2016 .66 .62 .64 .76 .82 .70

Av segment correlation .18 .16 .23 .31 .34 .53 .67 .77 .79

PART 6: POTENTIAL PROBLEMS: RR\_TSCA 11:02 Thu 24 Aug 2017 Page 5

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

[A] Correlations with master dating series of flagged 50-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

Symbol following year indicates value in series is greater (>) or lesser (<) than master series value

[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

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

40A 1829 to 2016 188 years Series 1

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

--------- ---- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---

1829 1878 1 .01 -.31 .04 .11 .07 -.02 -.11 .00 .03 .11 .33| .53\*-.08 .16 .09 -.01 -.12 -.05 -.05 .09 -.04

1850 1899 1 .00 -.24 .16 .20 .01 -.02 -.09 -.11 .03 -.06 .32| .68\*-.02 .06 -.01 -.06 -.21 -.08 -.10 -.02 -.07

1875 1924 1 -.20 -.15 -.08 -.15 -.25 -.23 -.09 -.07 .02 .02 .49| .78\* .25 .20 .17 -.16 -.23 -.26 -.19 -.19 -.04

[B] Entire series, effect on correlation ( .675) is:

Lower 2003> -.010 1850> -.007 1954> -.007 1836< -.007 1857> -.007 1926< -.006 Higher 2016 .041 1936 .014

1829 to 1878 segment:

Lower 1850> -.042 1836< -.035 1857> -.034 1854> -.020 1863> -.020 1844> -.018 Higher 1852 .035 1832 .030

1850 to 1899 segment:

Lower 1850> -.039 1857> -.030 1897> -.029 1854> -.018 1863> -.018 1899< -.017 Higher 1896 .050 1852 .038

1875 to 1924 segment:

Lower 1897> -.034 1914< -.024 1899< -.016 1882> -.014 1893< -.013 1922> -.012 Higher 1906 .043 1896 .035

40A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1829 110

1830 206 206 249 237 171 182 112 111 179 182

1840 78 83 148 81 114 88 78 62 65 56

1850 91 67 49 65 88 94 71 124 109 70

1860 34 127 72 101 67 152 127 80 138 104

1870 40 52 75 67 149 85 43 34 44 49

1880 54 58 90 134 65 58 66 69 83 95

1890 90 68 105 64 71 62 34 90 63 40

1900 23 66 82 94 77 108 116 75 54 37

1910 48 23 40 62 32 45 66 61 65 53

1920 64 46 64 50 43 62 36 49 71 48

1930 76 49 66 38 20 36 9 89 66 100

1940 124 87 81 144 80 117 116 152 97 39

1950 37 95 86 87 250 116 157 215 166 84

1960 72 129 79 34 123 70 68 123 125 107

1970 75 69 100 157 220 92 178 55 117 85

1980 88 101 153 112 98 138 162 120 87 110

1990 219 99 111 131 162 60 203 100 131 49

2000 275 114 184 129 199 189 150 120 211 209

2010 157 151 102 137 134 139 76

40B 1772 to 2016 245 years Series 2

[\*] Early part of series cannot be checked from 1772 to 1788 -- not matched by another series

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

--------- ---- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---

1789 1838 3 -.11 .10 -.30 -.22 .13 .25 -.01 .23 -.16 .17 .24| .08 -.01 .40\*-.16 .30 .12 -.01 .03 -.09 -.34

1800 1849 3 -.26 -.09 -.20 -.18 .02 -.04 .23 .15 .33 .09 .11| .23 .29 .44\* .18 .14 .24 -.03 .00 -.19 -.16

1825 1874 -2 -.08 -.19 -.31 -.33 -.01 -.05 -.01 .31 .49\* .03 .19| .18 .10 .04 .21 .12 .21 .09 .22 -.04 -.33

1850 1899 -2 .17 -.02 -.19 -.18 -.10 .02 -.05 .40 .60\*-.04 -.04| .05 .03 -.18 -.02 .03 .03 -.04 .02 -.13 -.26

1875 1924 -2 -.01 -.02 -.03 .05 -.06 -.13 .04 .51 .52\* .13 -.06|-.04 -.08 -.18 -.38 -.22 -.16 -.13 -.01 .15 .03

[B] Entire series, effect on correlation ( .516) is:

Lower 1801> -.015 1789> -.014 1871> -.014 1877> -.011 1796< -.010 1903< -.010 Higher 2016 .047 1977 .021

1789 to 1838 segment:

Lower 1801> -.064 1789> -.061 1796< -.044 1827> -.032 1800> -.018 1815> -.014 Higher 1792 .169 1798 .017

1800 to 1849 segment:

Lower 1801> -.089 1827> -.044 1843< -.029 1800> -.025 1839< -.023 1841> -.019 Higher 1823 .029 1834 .028

1825 to 1874 segment:

Lower 1871> -.094 1827> -.049 1843< -.035 1839< -.027 1860> -.023 1853> -.023 Higher 1850 .037 1863 .026

1850 to 1899 segment:

Lower 1871> -.077 1877> -.057 1887< -.033 1878> -.027 1853> -.019 1860> -.018 Higher 1850 .052 1863 .041

1875 to 1924 segment:

Lower 1877> -.050 1903< -.034 1900> -.032 1887< -.026 1878> -.023 1919< -.016 Higher 1906 .059 1912 .043

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

1801 +3.5 SD

40B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1772 34 57 64 76 87 136 93 122

1780 128 112 94 92 129 170 124 67 123 164

1790 135 200 56 94 101 90 78 99 59 73

1800 97 99 66 66 53 64 57 59 89 55

1810 59 114 81 84 70 85 81 68 87 50

1820 89 61 69 45 66 73 92 158 135 120

1830 193 218 158 247 232 249 256 180 185 119

1840 129 180 174 74 73 133 67 110 71 72

1850 52 76 63 101 76 56 71 78 77 55

1860 108 123 92 37 79 49 78 83 137 111

1870 65 117 75 24 32 53 46 135 100 46

1880 37 41 48 38 40 73 105 46 59 65

1890 65 66 85 67 55 79 60 73 55 32

1900 86 68 39 24 59 73 100 85 126 125

1910 80 63 40 38 45 53 48 94 18 11

1920 52 66 44 61 26 36 42 31 41 57

1930 34 57 36 32 19 9 10 32 34 51

1940 54 43 51 82 37 73 71 72 53 28

1950 17 50 45 61 111 82 115 187 101 58

1960 56 115 68 38 86 59 69 137 117 113

1970 50 65 99 119 156 72 149 23 64 56

1980 51 65 97 92 84 99 119 83 48 75

1990 165 86 92 97 140 54 144 65 95 43

2000 151 76 174 125 244 211 140 117 206 206

2010 145 135 104 134 129 150 62

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42A 1821 to 2016 196 years Series 3

[B] Entire series, effect on correlation ( .593) is:

Lower 1916< -.017 2016> -.014 1956< -.009 1825> -.008 1991> -.007 1936> -.007 Higher 1977 .019 1935 .019

42A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1821 107 109 102 103 159 117 69 148 124

1830 154 228 173 147 198 132 201 130 118 147

1840 128 81 86 153 95 93 93 111 84 105

1850 97 92 62 57 71 83 93 72 134 116

1860 62 69 118 50 95 85 96 93 70 86

1870 68 37 46 65 68 127 71 30 46 79

1880 74 68 63 87 78 75 67 85 77 79

1890 101 106 82 141 83 109 92 69 140 127

1900 84 69 83 109 76 104 155 124 113 77

1910 55 77 43 102 88 66 39 69 73 95

1920 101 82 92 102 83 93 112 71 68 68

1930 64 75 62 95 74 29 55 66 65 87

1940 124 85 54 54 51 75 77 83 61 45

1950 28 44 49 49 65 62 33 52 71 49

1960 37 79 61 39 76 65 64 94 92 106

1970 57 53 57 111 93 82 71 40 75 75

1980 64 81 110 114 83 93 108 104 55 82

1990 98 84 49 68 90 55 82 61 88 50

2000 58 61 88 64 72 104 52 81 88 148

2010 122 86 91 87 113 194 98

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42B 1803 to 2016 214 years Series 4

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

--------- ---- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---

1803 1852 2 -.02 -.24 -.21 -.20 -.25 -.12 -.08 -.14 .02 .01 -.06| .17 .46\*-.03 .32 .01 .11 .10 .11 .03 .17

1825 1874 1 .07 -.18 -.10 -.15 -.09 -.11 -.15 -.18 .02 -.05 -.01| .35\* .33 .02 .16 .07 -.07 -.06 .02 -.03 .26

1850 1899 1 -.08 -.11 .04 .04 -.06 .22 -.07 -.09 -.08 -.22 .05| .59\* .09 .05 -.01 .08 -.07 -.17 -.11 .18 .07

1875 1924 1 -.30 -.19 -.17 -.03 -.18 .05 .01 .07 .10 -.04 .21| .74\* .19 -.04 .13 -.06 -.15 -.15 -.17 .06 -.06

1900 1949 1 -.26 -.22 -.05 .04 -.10 -.21 -.14 -.02 .10 .31 .63| .70\* .10 -.13 -.05 -.27 -.26 -.14 -.22 -.21 -.20

[B] Entire series, effect on correlation ( .506) is:

Lower 1876< -.012 1813< -.012 1825< -.011 1839< -.009 1815< -.008 1829> -.007 Higher 1977 .026 1935 .022

1803 to 1852 segment:

Lower 1839< -.036 1813< -.034 1826> -.030 1829> -.028 1852> -.028 1803< -.028 Higher 1834 .039 1832 .038

1825 to 1874 segment:

Lower 1839< -.043 1826> -.030 1829> -.029 1852> -.028 1841> -.025 1833< -.022 Higher 1866 .039 1871 .038

1850 to 1899 segment:

Lower 1893< -.038 1852> -.035 1862< -.026 1897> -.025 1863> -.024 1878> -.023 Higher 1866 .043 1871 .037

1875 to 1924 segment:

Lower 1893< -.038 1897> -.031 1878> -.030 1917< -.024 1876< -.024 1903< -.022 Higher 1911 .048 1906 .043

1900 to 1949 segment:

Lower 1936> -.056 1948> -.027 1917< -.023 1903< -.020 1912> -.013 1902> -.012 Higher 1935 .096 1949 .027

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

1829 +3.0 SD

42B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1803 79 119 116 102 170 119 115

1810 100 90 78 59 93 62 97 88 110 77

1820 92 77 86 120 85 51 130 127 158 213

1830 171 182 188 117 175 120 108 159 152 96

1840 96 146 96 103 79 95 81 89 91 99

1850 76 70 90 86 86 81 112 85 45 31

1860 22 65 34 66 59 80 79 56 57 44

1870 21 24 31 28 75 56 22 37 67 63

1880 58 59 94 108 90 79 111 100 114 166

1890 153 103 179 97 126 95 94 169 150 88

1900 59 101 156 83 139 215 189 153 117 83

1910 92 49 72 93 71 72 81 67 92 93

1920 82 98 108 94 119 144 119 107 131 132

1930 147 123 132 96 48 29 73 104 97 118

1940 142 116 86 159 125 155 182 208 185 83

1950 54 112 137 106 116 83 72 105 127 99

1960 96 171 115 70 134 98 118 141 128 139

1970 88 95 133 206 149 121 142 67 115 98

1980 90 116 160 127 93 143 209 188 78 125

1990 157 120 79 123 128 69 117 74 72 58

2000 88 54 127 76 84 104 73 64 86 236

2010 209 197 150 175 144 168 98

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43A 1922 to 2016 95 years Series 5

[B] Entire series, effect on correlation ( .789) is:

Lower 1927> -.028 1922< -.015 1934> -.015 2004< -.011 1937< -.008 1939< -.008 Higher 2016 .033 1963 .014

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

1927 +3.1 SD

43A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1922 109 121 139 140 130 221 133 146

1930 184 152 165 157 190 91 56 98 102 98

1940 222 222 157 342 296 331 260 325 228 152

1950 68 307 259 173 228 210 208 376 356 230

1960 153 332 284 90 184 199 167 271 307 285

1970 148 188 266 258 192 133 149 101 127 114

1980 150 111 160 144 106 180 244 232 118 153

1990 252 129 143 218 252 140 347 211 218 121

2000 280 192 185 91 98 190 154 152 193 220

2010 192 148 183 164 143 159 87

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

43B 1866 to 2016 151 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

--------- ---- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---

1900 1949 1 -.05 -.22 -.20 -.18 -.17 -.18 -.02 -.15 -.08 .04 .41| .53\* .49 .16 .04 -.15 -.38 -.31 -.32 -.22 .09

[B] Entire series, effect on correlation ( .717) is:

Lower 1915> -.011 1939< -.008 1908< -.007 1912> -.006 1933< -.005 1913> -.005 Higher 2016 .026 2003 .016

1900 to 1949 segment:

Lower 1915> -.041 1939< -.030 1908< -.026 1925< -.019 1933< -.019 1946< -.016 Higher 1935 .044 1934 .038

43B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1866 41 43 20 24

1870 21 8 16 26 44 49 24 20 10 22

1880 20 20 29 34 39 33 39 61 38 47

1890 67 64 51 67 45 59 46 22 57 62

1900 30 30 47 123 94 78 95 71 31 23

1910 12 27 48 121 62 102 96 58 81 83

1920 86 87 99 70 77 55 66 88 109 87

1930 95 76 106 51 12 13 20 71 70 24

1940 104 157 180 375 264 220 131 230 101 111

1950 57 216 185 164 250 185 128 226 243 177

1960 92 175 106 54 109 103 116 151 212 195

1970 116 145 219 280 211 169 182 123 154 132

1980 172 149 207 198 185 288 449 284 155 180

1990 228 193 143 150 199 135 262 182 192 99

2000 196 160 206 102 206 233 123 131 223 267

2010 216 165 192 188 195 218 152

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

44A 1794 to 2016 223 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

--------- ---- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---

1794 1843 1 -.32 .11 .09 -.21 .21 -.14 -.03 .20 .14 .12 .14| .32\* .11 .06 .04 -.01 -.11 -.06 -.15 -.25 -.11

1800 1849 -2 -.31 .10 -.03 .01 .06 -.20 .10 .04 .48\* .14 .08| .26 .11 .17 -.03 .02 .01 -.16 -.13 -.19 -.14

1825 1874 -2 -.12 -.05 -.18 -.29 .03 .03 -.04 .06 .53\* .25 .13| .21 .11 -.10 -.12 .15 .19 -.12 .01 .30 -.15

1850 1899 -2 .09 -.01 -.16 -.22 .06 -.04 .12 -.02 .28\* .18 -.02| .07 .03 -.11 .01 .21 .08 -.14 .09 .20 -.16

1875 1924 -1 -.12 -.32 -.33 -.11 .05 -.12 .17 .26 .15 .37\* .26| .09 .00 -.02 -.05 -.16 -.18 -.11 -.02 -.01 -.02

[B] Entire series, effect on correlation ( .462) is:

Lower 1854< -.017 1801< -.010 1802> -.010 1862< -.010 1890< -.006 1809< -.006 Higher 2016 .023 1963 .014

1794 to 1843 segment:

Lower 1802> -.055 1801< -.036 1827> -.034 1815> -.026 1809< -.025 1807< -.021 Higher 1794 .045 1818 .030

1800 to 1849 segment:

Lower 1802> -.054 1801< -.039 1827> -.034 1809< -.028 1815> -.025 1807< -.022 Higher 1818 .037 1846 .029

1825 to 1874 segment:

Lower 1862< -.037 1827> -.030 1866< -.021 1860> -.020 1843< -.017 1869< -.017 Higher 1872 .034 1834 .022

1850 to 1899 segment:

Lower 1862< -.035 1890< -.026 1898< -.024 1894> -.019 1860> -.018 1896> -.017 Higher 1872 .048 1877 .039

1875 to 1924 segment:

Lower 1890< -.046 1898< -.043 1875< -.036 1894> -.036 1896> -.029 1883< -.026 Higher 1906 .052 1912 .048

[C] Year-to-year changes diverging by over 4.0 std deviations:

1801 1802 4.1 SD

44A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1794 74 51 59 56 40 50

1800 45 34 55 55 43 45 34 34 62 38

1810 40 55 32 45 42 52 61 44 61 38

1820 49 31 35 25 33 31 40 54 24 18

1830 52 74 71 118 97 74 71 63 71 47

1840 37 61 53 29 38 74 35 30 38 49

1850 36 54 47 70 15 27 48 90 88 69

1860 122 122 46 51 113 67 55 95 102 57

1870 83 64 30 40 63 49 58 35 49 57

1880 44 48 56 40 34 59 66 90 43 35

1890 25 43 30 59 93 61 59 35 17 45

1900 44 22 13 22 60 61 87 93 74 65

1910 46 23 16 26 48 20 22 42 37 42

1920 50 53 52 67 62 63 76 45 74 61

1930 45 53 47 73 38 32 66 224 159 202

1940 261 202 156 222 184 141 119 124 39 49

1950 53 138 173 153 155 160 248 232 146 119

1960 77 157 111 48 123 120 117 209 243 379

1970 165 164 265 415 433 257 253 121 138 98

1980 126 126 185 145 186 211 360 232 160 183

1990 365 153 184 144 184 113 212 135 133 82

2000 125 84 103 63 81 142 147 142 207 343

2010 262 280 271 291 302 301 148

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

44B 1825 to 2016 192 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

--------- ---- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---

1825 1874 -6 .07 .12 .09 .05 .25\*-.06 .05 -.03 -.17 -.14 -.15|-.10 -.10 -.06 -.09 .02 -.04 -.10 -.20 .01 -.15

1850 1899 -6 -.05 .06 .06 .06 .27\* .05 .09 .18 .10 .19 .21| .02 .01 .09 .03 .13 -.14 -.17 -.24 -.34 -.27

[B] Entire series, effect on correlation ( .519) is:

Lower 1833< -.024 1948< -.015 1866< -.014 1936> -.011 1827> -.010 1858< -.010 Higher 2016 .049 1963 .020

1825 to 1874 segment:

Lower 1833< -.075 1866< -.048 1872> -.029 1827> -.029 1858< -.027 1863> -.017 Higher 1871 .056 1832 .052

1850 to 1899 segment:

Lower 1866< -.089 1858< -.054 1872> -.053 1863> -.032 1874< -.022 1850> -.020 Higher 1878 .044 1890 .039

44B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1825 48 42 50 40 42

1830 63 44 62 30 36 32 48 40 50 66

1840 39 25 62 64 59 85 58 72 73 56

1850 56 44 41 60 39 30 42 66 30 31

1860 37 64 48 74 47 88 39 45 73 86

1870 79 42 95 103 40 66 51 38 19 42

1880 28 33 29 41 47 42 44 52 48 47

1890 67 52 40 48 32 46 25 12 40 35

1900 19 20 20 52 45 59 51 49 32 28

1910 6 22 18 35 61 27 33 48 42 34

1920 47 46 46 60 63 62 72 44 104 134

1930 120 123 119 185 115 50 91 185 107 110

1940 142 112 85 90 86 73 82 112 22 49

1950 75 156 157 141 99 88 101 91 91 81

1960 63 124 90 22 81 67 67 111 172 312

1970 167 172 282 393 355 224 306 158 160 108

1980 153 120 167 175 178 185 228 186 134 136

1990 247 127 130 118 184 141 223 142 192 134

2000 231 159 159 137 226 284 198 164 186 262

2010 200 212 168 185 167 146 86

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44C 1824 to 2016 193 years Series 9

[B] Entire series, effect on correlation ( .671) is:

Lower 1927< -.024 1882< -.007 1988> -.006 1825> -.006 1849> -.006 1860< -.005 Higher 2016 .028 1935 .011

44C Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1824 86 99 56 36 83 77

1830 77 138 107 92 88 71 85 56 56 79

1840 54 40 52 96 57 47 67 93 57 76

1850 57 78 46 40 68 67 70 41 75 72

1860 27 37 70 21 47 49 105 78 74 99

1870 75 21 43 73 60 102 64 56 34 47

1880 43 36 26 40 41 42 54 55 51 47

1890 61 60 35 69 38 63 40 24 51 58

1900 33 24 26 75 82 78 98 93 63 49

1910 9 39 44 65 104 62 83 110 107 102

1920 124 121 94 115 92 86 119 57 122 117

1930 122 129 124 112 70 40 61 242 196 230

1940 289 209 138 253 211 185 204 176 124 77

1950 61 252 258 159 102 163 209 501 425 240

1960 242 384 387 139 270 247 235 365 376 419

1970 183 126 277 420 452 273 295 155 180 106

1980 146 124 162 150 165 178 284 230 146 116

1990 281 117 136 138 184 108 180 144 178 100

2000 141 99 118 94 167 162 118 105 113 148

2010 102 114 95 87 109 87 58

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

45A 1839 to 2016 178 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

--------- ---- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---

1839 1888 -5 -.13 .07 -.15 -.21 .12 .40\* .15 .10 -.03 .24 -.07| .01 .17 .25 .18 .06 .03 -.17 -.31 -.17 .12

1850 1899 -5 -.11 .01 -.22 -.21 .14 .33\* .21 .07 -.04 .26 -.10| .04 .18 .20 .10 .12 .06 -.10 -.27 -.04 .13

1875 1924 -4 -.17 -.15 -.21 -.25 .08 .24 .34\* .23 .22 .22 -.03| .02 -.04 -.09 -.08 -.13 -.04 -.12 -.16 .13 .04

1900 1949 -1 -.34 -.15 -.21 -.08 .01 -.05 .12 .18 .25 .55\* .45| .07 -.03 -.30 -.28 -.18 -.10 -.06 -.02 -.20 -.16

[B] Entire series, effect on correlation ( .486) is:

Lower 1882< -.029 1935> -.011 1875< -.011 1863> -.010 1880> -.009 1853< -.009 Higher 2003 .031 1936 .025

1839 to 1888 segment:

Lower 1875< -.040 1863> -.032 1880> -.029 1868< -.025 1854> -.019 1881> -.018 Higher 1850 .057 1849 .027

1850 to 1899 segment:

Lower 1875< -.039 1863> -.032 1880> -.029 1868< -.023 1854> -.018 1881> -.018 Higher 1850 .067 1867 .019

1875 to 1924 segment:

Lower 1875< -.042 1880> -.036 1881> -.023 1883< -.016 1901> -.012 1891< -.011 Higher 1900 .062 1907 .049

1900 to 1949 segment:

Lower 1935> -.059 1928< -.022 1909> -.017 1906< -.014 1901> -.014 1903< -.011 Higher 1936 .166 1907 .018

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

1850 -5.3 SD

45A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1839 253

1840 185 220 175 177 198 155 109 127 134 81

1850 55 77 84 52 92 81 94 82 62 87

1860 80 92 85 111 108 96 70 86 51 57

1870 67 58 41 50 49 27 21 28 28 36

1880 55 50 6 7 17 12 20 15 29 29

1890 25 13 27 16 17 13 16 17 19 21

1900 8 16 19 13 11 16 17 38 39 49

1910 30 21 16 8 14 25 24 19 10 15

1920 37 63 103 76 117 110 145 104 49 60

1930 89 105 101 109 85 81 17 47 89 73

1940 78 59 68 111 166 145 191 145 75 55

1950 45 131 101 106 94 87 136 254 236 211

1960 207 316 280 165 250 213 205 272 261 278

1970 207 209 191 282 248 196 179 128 143 97

1980 109 97 116 152 172 217 226 191 110 131

1990 164 124 134 148 166 127 133 114 120 109

2000 146 97 134 69 118 188 97 111 123 177

2010 174 141 129 114 174 182 99

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

45B 1855 to 2016 162 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

--------- ---- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---

1855 1904 -3 -.01 -.03 -.24 -.18 -.13 -.15 .06 .46\* .30 .08 -.11| .10 -.09 -.03 .11 .25 .01 .05 -.10 -.14 -.32

1875 1924 -3 -.19 -.07 -.12 -.16 -.24 -.03 .06 .43\* .28 .17 .12| .10 .01 -.07 -.19 .07 -.05 -.05 -.19 -.06 -.10

[B] Entire series, effect on correlation ( .604) is:

Lower 1856< -.015 1878> -.013 1889< -.011 1899< -.010 1905< -.009 1866< -.007 Higher 2016 .035 2003 .021

1855 to 1904 segment:

Lower 1878> -.047 1889< -.036 1900> -.025 1877> -.022 1866< -.020 1856< -.018 Higher 1880 .044 1861 .042

1875 to 1924 segment:

Lower 1878> -.057 1889< -.046 1905< -.043 1900> -.031 1877> -.028 1903< -.022 Higher 1912 .093 1906 .066

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

1878 +3.1 SD

45B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1855 167 100 136 134 128

1860 152 216 214 144 122 150 120 124 120 123

1870 110 90 76 51 36 56 58 80 104 72

1880 29 26 41 36 48 45 65 67 48 21

1890 28 20 25 26 35 27 22 23 20 10

1900 22 26 17 10 33 20 33 48 32 29

1910 23 23 8 19 33 19 17 22 25 36

1920 54 75 68 111 128 129 118 66 55 100

1930 130 96 63 115 117 42 11 88 142 129

1940 109 116 99 146 145 157 156 130 96 65

1950 57 111 114 127 156 93 213 299 297 198

1960 214 279 263 133 278 249 168 218 192 227

1970 197 158 119 195 201 157 141 86 94 80

1980 82 77 92 127 176 195 161 193 135 133

1990 203 117 123 117 184 124 167 145 175 139

2000 246 161 172 91 119 180 152 155 154 177

2010 178 165 180 166 168 146 100

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

47A 1789 to 2016 228 years Series 12

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

--------- ---- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---

1789 1838 -5 .08 -.13 .03 .22 -.01 .51\*-.04 .07 .15 .13 .16| .11 -.29 .13 -.24 -.35 -.08 -.16 -.39 .01 -.28

1800 1849 -5 -.02 -.06 .25 .22 .08 .44\* .36 .27 .33 .32 .07| .22 -.02 -.07 -.21 -.20 -.39 -.21 -.32 -.25 -.36

1825 1874 -4 -.23 -.08 .09 .14 .24 .34 .64\* .34 .47 .36 .18| .04 .09 -.05 .00 -.09 -.19 -.14 -.37 -.36 -.45

1850 1899 -4 .15 -.02 -.06 -.06 -.11 .19 .64\* .14 .21 .20 .10|-.12 -.02 -.09 .23 .10 -.04 -.03 -.20 -.35 -.11

1875 1924 -4 .32 .01 -.16 -.06 -.22 .11 .54\* .09 .11 .14 -.02|-.18 -.27 -.19 -.03 .07 .00 -.10 -.09 -.15 .06

1900 1949 -4 .16 -.08 -.25 .02 .00 .19 .58\* .15 .08 .10 -.07|-.23 -.30 -.11 -.03 -.10 -.26 -.13 -.02 .04 .28

1925 1974 -4 .06 -.01 -.16 -.01 -.09 .13 .72\* .16 -.18 -.05 -.10|-.03 -.11 .06 -.07 .01 -.30 -.02 -.01 -.05 .25

1950 1999 -4 -.02 -.07 .03 -.07 -.10 -.15 .82\*-.02 -.10 -.16 .13|-.21 .00 .02 .02 -.11 .00 .15 .06 -.24 .07

1967 2016 -4 -.08 -.23 -.01 .00 .10 -.24 .76\*-.06 .19 -.22 .19| - - - - - - - - - -

[B] Entire series, effect on correlation ( .084) is:

Lower 1977> -.021 1950> -.016 1798> -.014 2005< -.013 1940< -.013 1974< -.010 Higher 1792 .027 1999 .017

1789 to 1838 segment:

Lower 1798> -.076 1789< -.053 1813> -.019 1831< -.018 1819> -.016 1830< -.014 Higher 1792 .172 1794 .027

1800 to 1849 segment:

Lower 1840> -.042 1831< -.033 1846> -.030 1813> -.030 1819> -.030 1830< -.024 Higher 1827 .051 1826 .046

1825 to 1874 segment:

Lower 1840> -.046 1863> -.039 1871> -.038 1831< -.035 1846> -.034 1848< -.028 Higher 1827 .042 1866 .040

1850 to 1899 segment:

Lower 1875< -.085 1894> -.041 1863> -.033 1871> -.032 1897> -.024 1874< -.018 Higher 1866 .042 1881 .041

1875 to 1924 segment:

Lower 1910> -.062 1875< -.052 1906< -.050 1894> -.029 1915> -.028 1897> -.019 Higher 1912 .082 1881 .043

1900 to 1949 segment:

Lower 1940< -.049 1910> -.040 1931< -.033 1906< -.033 1934> -.028 1915> -.018 Higher 1912 .060 1936 .029

1925 to 1974 segment:

Lower 1950> -.063 1940< -.037 1974< -.033 1967< -.032 1931< -.024 1934> -.023 Higher 1963 .063 1961 .037

1950 to 1999 segment:

Lower 1977> -.083 1950> -.062 1974< -.038 1967< -.035 1985< -.020 1958< -.019 Higher 1999 .053 1995 .041

1967 to 2016 segment:

Lower 1977> -.075 2005< -.049 1974< -.037 1967< -.034 2016> -.027 1985< -.020 Higher 1999 .047 1995 .036

[E] Outliers 7 3.0 SD above or -4.5 SD below mean for year

1798 +3.4 SD; 1910 +3.3 SD; 1922 -5.4 SD; 1940 -6.0 SD; 1950 +4.7 SD; 1977 +4.1 SD; 2016 +3.9 SD

47A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1789 17

1790 33 34 16 20 52 47 95 46 65 31

1800 18 18 14 16 31 15 16 27 50 54

1810 88 79 72 110 80 71 92 80 66 81

1820 44 52 39 50 43 41 17 11 18 40

1830 32 34 82 85 121 201 286 207 190 152

1840 212 109 121 170 138 94 137 149 54 35

1850 42 68 36 85 71 97 67 59 49 61

1860 100 176 539 519 316 241 380 255 429 329

1870 333 286 192 217 125 82 102 157 120 259

1880 167 88 83 128 125 116 88 121 147 114

1890 115 143 107 126 209 159 103 142 119 121

1900 93 66 120 119 58 51 33 103 247 174

1910 293 189 69 106 75 143 86 128 152 117

1920 127 83 45 87 116 96 105 119 102 147

1930 213 105 132 176 190 134 106 144 99 63

1940 20 72 98 154 289 159 140 239 225 203

1950 330 158 171 88 63 185 157 134 64 79

1960 69 165 148 93 87 164 128 77 169 113

1970 99 238 188 196 94 109 179 277 238 174

1980 244 91 132 82 126 85 154 142 125 159

1990 229 164 95 104 181 95 142 107 127 67

2000 160 103 106 76 56 25 16 28 39 51

2010 40 39 40 43 26 31 19

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

47B 1851 to 2016 166 years Series 13

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

--------- ---- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---

1851 1900 -2 .12 .04 .03 -.01 -.09 -.05 -.11 .29 .66\* .06 -.02| .02 -.06 -.07 -.04 -.02 .16 .03 -.01 -.11 -.33

1875 1924 -2 .27 .09 .12 .12 -.10 -.17 -.23 .14 .59\*-.02 -.11|-.01 -.25 -.16 -.25 -.23 .01 -.02 .03 -.02 .02

1900 1949 -2 .17 -.04 -.02 -.07 -.13 .03 .02 .20 .62\* .14 -.06| .01 -.16 -.25 -.15 -.14 -.16 -.25 -.16 .03 .13

1925 1974 -2 .14 .01 -.05 -.13 -.13 .04 -.15 .16 .77\* .07 -.21| .11 .07 -.19 -.01 -.01 -.20 -.20 -.22 -.08 -.11

1950 1999 -2 .03 .15 -.09 -.07 .06 -.16 -.12 -.11 .78\*-.11 -.15| .06 .13 -.21 -.08 .07 -.16 .02 -.15 .11 -.17

1967 2016 -2 -.09 .21 -.26 .00 -.05 .00 .00 .00 .55\* .03 .06| - - - - - - - - - -

[B] Entire series, effect on correlation ( -.041) is:

Lower 1990< -.046 1950> -.013 1961< -.012 1963> -.012 1877> -.010 2002< -.009 Higher 2016 .041 1979 .020

1851 to 1900 segment:

Lower 1877> -.075 1900> -.041 1887< -.032 1860> -.019 1858< -.014 1871> -.012 Higher 1861 .037 1866 .035

1875 to 1924 segment:

Lower 1877> -.063 1907< -.039 1910> -.038 1900> -.035 1887< -.023 1915> -.022 Higher 1912 .079 1911 .035

1900 to 1949 segment:

Lower 1937< -.036 1935> -.034 1907< -.030 1910> -.028 1900> -.026 1915> -.016 Higher 1912 .055 1936 .055

1925 to 1974 segment:

Lower 1950> -.037 1961< -.034 1963> -.025 1937< -.019 1953> -.017 1935> -.016 Higher 1965 .051 1936 .048

1950 to 1999 segment:

Lower 1990< -.097 1950> -.029 1961< -.024 1963> -.024 1986< -.012 1953> -.011 Higher 1979 .050 1981 .029

1967 to 2016 segment:

Lower 1990< -.126 2002< -.021 2008< -.018 2003> -.018 1986< -.016 1975> -.015 Higher 2016 .078 1979 .038

[C] Year-to-year changes diverging by over 4.0 std deviations:

1936 1937 -4.2 SD 1950 1951 -4.1 SD 1962 1963 4.3 SD 1989 1990 -4.9 SD 1990 1991 4.6 SD

[E] Outliers 4 3.0 SD above or -4.5 SD below mean for year

1877 +3.6 SD; 1935 +3.2 SD; 1950 +4.0 SD; 1990 -5.7 SD

47B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1851 141 112 128 86 50 47 98 98 127

1860 430 585 352 307 468 314 370 342 354 273

1870 167 241 157 97 118 186 238 428 240 123

1880 97 158 132 123 133 147 193 109 88 147

1890 139 131 224 152 107 203 104 117 97 70

1900 158 143 50 46 71 122 121 62 147 122

1910 163 71 48 174 82 132 179 101 146 107

1920 92 76 83 87 83 117 100 159 218 162

1930 138 180 205 172 123 165 117 71 70 127

1940 110 148 289 179 145 238 140 210 184 179

1950 229 107 72 233 162 151 113 111 79 123

1960 107 68 54 107 77 39 110 99 79 132

1970 111 102 70 63 102 142 106 83 96 41

1980 68 34 53 46 65 66 53 68 65 76

1990 32 63 94 71 84 68 79 52 76 48

2000 94 60 29 48 20 30 37 40 27 46

2010 39 48 38 39 33 26 19

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

48A 1891 to 2016 126 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

--------- ---- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---

1891 1940 -1 -.01 .12 -.15 -.03 .00 -.17 -.17 -.07 .10 .48\* .26| .15 .09 -.05 -.12 -.06 .09 -.14 -.22 -.25 -.15

1900 1949 -1 -.21 -.16 -.20 -.06 .00 -.11 -.15 -.03 .17 .51\* .42| .22 .13 -.06 -.20 -.19 .01 -.23 -.25 -.26 -.10

[B] Entire series, effect on correlation ( .602) is:

Lower 1912> -.029 1955< -.016 1895< -.013 1963> -.012 1927> -.012 1894> -.012 Higher 1977 .019 1936 .019

1891 to 1940 segment:

Lower 1912> -.093 1927> -.032 1894> -.029 1895< -.023 1896> -.015 1928< -.015 Higher 1936 .148 1935 .040

1900 to 1949 segment:

Lower 1912> -.095 1927> -.036 1928< -.016 1930< -.014 1906< -.013 1929< -.013 Higher 1936 .114 1949 .030

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

1912 +3.7 SD

48A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1891 133 161 115 202 83 109 76 92 122

1900 97 48 35 80 129 106 72 82 64 45

1910 28 39 98 44 75 50 40 53 43 32

1920 67 28 34 35 67 37 63 84 32 29

1930 29 49 45 43 49 33 12 42 34 86

1940 100 100 104 162 218 241 218 158 137 64

1950 39 100 118 136 112 47 95 152 143 104

1960 133 198 163 134 200 161 142 250 190 172

1970 94 110 117 171 162 100 141 68 94 71

1980 68 116 107 126 165 142 114 105 55 88

1990 137 89 99 81 109 74 148 124 138 79

2000 181 86 114 53 88 140 65 75 116 110

2010 85 86 84 102 129 138 62

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48B 1863 to 2016 154 years Series 15

[B] Entire series, effect on correlation ( .749) is:

Lower 1954< -.015 1963> -.013 1865< -.009 1948> -.009 1937< -.006 1956< -.004 Higher 2016 .023 1935 .011

48B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1863 206 146 99 235 235 193 240

1870 185 107 97 145 118 215 136 90 85 80

1880 68 72 117 137 119 93 90 135 114 91

1890 106 117 79 149 84 105 86 78 99 112

1900 60 65 67 156 126 99 134 112 79 70

1910 47 58 33 54 91 51 67 71 60 67

1920 48 66 43 78 74 75 93 63 50 59

1930 54 73 66 85 56 17 16 58 123 178

1940 186 169 136 228 185 209 223 218 240 115

1950 80 182 175 156 69 95 106 237 162 123

1960 151 252 203 167 238 212 203 394 278 273

1970 147 164 243 329 218 131 217 124 149 135

1980 103 134 150 169 171 186 176 157 97 141

1990 248 133 163 179 173 135 196 163 231 99

2000 328 145 295 125 242 272 179 146 198 238

2010 163 172 107 125 149 152 73

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

49A 1806 to 2016 211 years Series 16

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

--------- ---- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---

1806 1855 -2 .07 -.16 .10 .09 .08 .35 .21 .33 .41\* .38 .14| .34 .00 .06 .10 -.09 -.09 -.23 -.35 -.10 -.40

1825 1874 -2 -.19 -.14 .06 -.13 .17 .22 .31 .25 .52\* .49 .30| .19 .02 -.04 -.13 -.01 .11 .02 -.11 .01 -.17

1850 1899 -1 .00 -.01 .05 -.07 -.07 -.12 .10 -.10 .36 .57\* .06| .10 .02 -.02 -.15 .01 .16 .31 -.10 .05 -.14

1875 1924 -1 .01 -.03 -.05 .07 -.12 -.13 -.06 -.12 .39 .70\* .00| .10 .05 -.19 -.18 -.19 -.14 .19 -.05 -.06 -.05

[B] Entire series, effect on correlation ( .525) is:

Lower 1808< -.015 1900> -.012 1915> -.011 1807> -.008 1980> -.007 1860> -.007 Higher 2016 .034 2003 .026

1806 to 1855 segment:

Lower 1808< -.083 1819> -.034 1844> -.023 1831< -.023 1817> -.019 1816< -.018 Higher 1834 .039 1827 .039

1825 to 1874 segment:

Lower 1863> -.046 1860> -.042 1844> -.029 1831< -.029 1830< -.018 1841> -.016 Higher 1871 .093 1827 .035

1850 to 1899 segment:

Lower 1863> -.035 1898< -.031 1889< -.029 1887< -.028 1860> -.028 1876> -.025 Higher 1871 .126 1878 .031

1875 to 1924 segment:

Lower 1900> -.057 1915> -.057 1898< -.028 1889< -.026 1887< -.026 1876> -.025 Higher 1906 .078 1907 .049

[E] Outliers 2 3.0 SD above or -4.5 SD below mean for year

1807 +3.2 SD; 1900 +3.1 SD

49A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1806 54 93 53 41

1810 50 40 31 33 31 25 21 31 29 35

1820 23 19 11 17 14 21 40 23 19 40

1830 48 56 90 155 218 205 183 210 221 236

1840 191 182 138 161 199 141 82 83 100 87

1850 97 112 115 122 54 85 93 109 116 205

1860 288 206 141 213 165 178 166 199 213 149

1870 137 44 38 35 42 52 114 77 42 33

1880 52 45 43 38 50 43 37 29 37 29

1890 26 51 47 37 43 34 29 33 24 40

1900 54 32 17 18 29 31 43 47 33 31

1910 23 15 17 13 14 31 23 19 20 22

1920 27 26 22 22 34 38 38 28 22 27

1930 32 54 41 26 24 22 10 35 30 51

1940 64 45 36 67 61 55 48 48 40 30

1950 19 53 47 39 68 55 122 177 132 156

1960 146 279 246 139 296 257 185 425 366 302

1970 169 120 165 310 212 181 197 106 165 137

1980 203 132 176 164 100 134 211 158 82 73

1990 94 79 72 69 67 52 68 64 68 66

2000 96 82 113 56 83 122 88 113 137 142

2010 151 124 105 108 127 133 74

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

49B 1803 to 2016 214 years Series 17

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

--------- ---- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---

1803 1852 2 -.25 .08 -.22 .02 -.10 -.11 .28 .10 .19 .29 .19| .16 .37\*-.09 .12 .22 .04 -.13 .15 -.27 -.02

[B] Entire series, effect on correlation ( .639) is:

Lower 1844< -.032 1807< -.018 1806> -.015 1915< -.010 1886< -.008 1803> -.007 Higher 2016 .028 2003 .016

1803 to 1852 segment:

Lower 1807< -.092 1844< -.081 1806> -.068 1803> -.031 1812> -.022 1852> -.014 Higher 1832 .040 1818 .037

[E] Outliers 2 3.0 SD above or -4.5 SD below mean for year

1806 +3.5 SD; 1859 +3.0 SD

49B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1803 101 67 58 97 59 50 53

1810 44 40 45 35 29 26 50 38 60 37

1820 25 19 32 21 28 39 24 18 49 56

1830 63 114 204 211 231 178 160 138 140 179

1840 147 105 137 179 53 60 63 102 95 90

1850 82 115 130 76 102 108 126 131 367 391

1860 160 140 158 109 185 150 186 182 110 90

1870 65 53 52 82 115 158 101 67 47 58

1880 63 52 48 74 70 60 34 51 43 52

1890 72 77 58 99 71 65 51 33 61 72

1900 51 30 42 78 55 66 92 91 71 41

1910 35 39 32 33 54 26 40 50 49 48

1920 47 42 43 60 53 63 59 32 32 52

1930 75 72 52 52 42 36 15 70 59 88

1940 76 64 73 98 76 78 81 78 46 40

1950 28 62 68 68 93 94 202 279 176 162

1960 112 180 136 62 169 143 126 215 266 214

1970 129 106 118 153 160 125 99 75 112 97

1980 106 78 125 149 155 176 278 198 108 102

1990 148 103 92 90 125 77 108 107 153 98

2000 163 126 161 89 95 162 118 146 166 165

2010 143 137 118 124 154 136 87

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51A 1905 to 2016 112 years Series 18

[B] Entire series, effect on correlation ( .800) is:

Lower 1955> -.009 1968< -.008 1912< -.005 1933> -.005 1951< -.005 2006> -.005 Higher 2016 .026 2003 .010

51A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1905 133 160 159 103 90

1910 64 90 49 112 121 73 91 128 109 122

1920 131 143 106 161 134 126 147 104 99 142

1930 146 172 154 188 110 59 27 67 54 66

1940 73 48 46 67 84 109 89 120 56 44

1950 32 69 90 78 243 318 314 415 407 337

1960 312 420 323 187 332 228 233 398 246 298

1970 173 197 302 402 327 178 245 145 171 119

1980 114 114 170 149 176 204 245 213 125 146

1990 243 151 175 155 221 107 152 153 229 77

2000 166 105 133 70 83 114 116 99 136 183

2010 124 113 111 114 116 109 60

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

51B 1841 to 2016 176 years Series 19

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

--------- ---- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---

1841 1890 -4 .02 .04 .04 .04 -.16 .21 .37\* .05 .08 -.06 -.16|-.10 -.11 -.03 -.08 -.08 .03 -.18 -.09 -.26 -.22

1850 1899 -4 .02 .00 -.06 .01 -.17 .14 .31\* .02 .07 -.08 -.16|-.15 -.11 .04 -.01 -.06 .15 -.11 -.07 -.25 -.24

1875 1924 -1 .06 .03 -.28 -.32 -.32 -.12 .13 .02 .17 .30\* .06| .12 .16 -.03 -.03 -.01 .01 -.11 -.16 -.23 -.24

1900 1949 -1 -.11 -.01 -.07 -.17 -.15 -.16 -.04 .13 .37 .59\* .40| .17 -.09 -.23 -.22 -.13 -.03 -.09 -.29 -.34 -.22

[B] Entire series, effect on correlation ( .475) is:

Lower 1857< -.063 1864< -.015 1875< -.013 1871> -.012 1934> -.012 1846> -.010 Higher 2003 .028 1999 .016

1841 to 1890 segment:

Lower 1875< -.038 1864< -.037 1846> -.027 1871> -.026 1850> -.022 1877> -.022 Higher 1866 .069 1852 .042

1850 to 1899 segment:

Lower 1875< -.033 1871> -.033 1864< -.032 1850> -.026 1877> -.025 1853> -.022 Higher 1866 .071 1852 .040

1875 to 1924 segment:

Lower 1875< -.064 1877> -.048 1900> -.041 1883< -.028 1893< -.021 1879> -.020 Higher 1906 .077 1907 .061

1900 to 1949 segment:

Lower 1934> -.060 1927> -.038 1900> -.032 1937< -.028 1920< -.020 1913< -.016 Higher 1936 .096 1949 .038

[C] Year-to-year changes diverging by over 4.0 std deviations:

1856 1857 -5.2 SD

[E] Outliers 2 3.0 SD above or -4.5 SD below mean for year

1857 -7.1 SD; 1879 +3.4 SD

51B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1841 36 49 96 102 82 119 109 76 45

1850 85 63 38 98 68 79 71 11 40 41

1860 52 47 61 49 24 43 77 45 63 50

1870 68 66 51 53 46 21 25 48 40 75

1880 26 13 15 8 14 12 12 21 22 20

1890 17 9 9 7 12 15 15 10 12 67

1900 117 83 56 55 164 163 203 245 180 117

1910 89 54 81 41 74 86 59 78 106 73

1920 55 53 85 67 106 113 109 139 81 74

1930 102 81 119 105 117 63 23 27 33 38

1940 87 65 71 103 68 108 116 131 72 39

1950 40 99 70 43 194 209 288 460 385 210

1960 180 259 186 82 233 180 189 354 290 350

1970 177 179 330 490 434 235 303 126 189 161

1980 156 157 248 208 211 238 329 233 128 127

1990 175 118 161 214 313 124 182 148 182 86

2000 187 123 161 64 112 107 80 66 96 110

2010 105 83 69 88 94 102 67

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52A 1848 to 2016 169 years Series 20

[B] Entire series, effect on correlation ( .682) is:

Lower 1850< -.038 1886< -.018 1968< -.009 1849> -.009 1922< -.009 1977> -.008 Higher 2016 .019 1963 .018

52A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1848 97 106

1850 72 101 93 77 85 89 93 76 93 75

1860 60 74 108 59 72 72 86 85 55 58

1870 55 26 37 47 65 107 60 41 29 30

1880 26 27 41 52 35 34 16 28 26 32

1890 32 41 36 40 38 51 35 30 59 60

1900 45 39 31 75 60 64 101 72 56 57

1910 31 39 27 47 72 60 49 60 50 51

1920 46 54 39 62 73 67 70 54 72 105

1930 104 134 90 122 80 52 31 94 99 97

1940 96 95 93 155 127 161 177 160 125 71

1950 60 161 154 103 140 102 146 237 167 138

1960 145 249 150 28 147 98 87 117 84 107

1970 100 88 134 230 216 171 195 134 172 152

1980 163 159 183 165 136 168 270 218 124 138

1990 178 100 120 125 184 110 156 129 155 105

2000 216 110 143 99 124 132 125 120 152 196

2010 140 152 122 136 137 118 76

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52B 1858 to 2016 159 years Series 21

[B] Entire series, effect on correlation ( .820) is:

Lower 2003> -.007 1863< -.007 1915> -.007 1894< -.004 1960> -.004 1904< -.004 Higher 2016 .015 1963 .010

52B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1858 106 98

1860 85 82 130 77 102 79 122 105 93 91

1870 79 43 61 78 76 139 81 55 41 43

1880 45 45 63 86 74 62 55 72 69 68

1890 70 65 56 66 36 40 33 24 60 83

1900 46 36 33 72 42 71 93 65 59 52

1910 29 35 21 50 73 70 69 77 55 62

1920 53 57 45 68 85 81 85 55 67 103

1930 102 114 79 80 39 20 17 62 72 101

1940 94 72 65 94 103 171 167 166 119 69

1950 44 111 123 113 213 197 244 382 302 220

1960 280 424 299 129 273 249 227 382 325 293

1970 197 205 315 366 287 148 161 85 119 122

1980 97 114 136 140 91 153 186 153 85 105

1990 155 103 101 121 189 87 136 88 116 70

2000 103 90 126 97 116 164 110 121 115 188

2010 171 174 114 125 124 133 82

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53A 1842 to 2016 175 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

--------- ---- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---

1842 1891 0 .01 .03 .23 .06 -.18 -.10 -.30 -.14 -.02 .24 .29\* .25 .05 .29 -.02 -.05 .07 .02 .12 .19 .06

[B] Entire series, effect on correlation ( .652) is:

Lower 1862< -.009 1940< -.008 1888< -.007 1851< -.007 1911> -.006 1849< -.006 Higher 1977 .022 1936 .013

1842 to 1891 segment:

Lower 1862< -.048 1861< -.030 1863> -.029 1851< -.027 1868< -.027 1888< -.025 Higher 1871 .107 1866 .045

53A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1842 56 106 101 70 61 48 75 15

1850 27 14 44 31 34 50 57 65 78 126

1860 69 34 15 65 70 39 85 39 27 57

1870 44 16 34 46 51 85 74 55 45 50

1880 62 60 90 90 112 98 105 106 66 109

1890 128 123 90 111 87 117 72 66 183 158

1900 64 71 104 253 98 135 242 221 123 92

1910 82 160 93 130 133 65 85 147 118 175

1920 128 165 204 215 182 173 262 159 197 203

1930 157 132 175 97 60 65 25 228 153 148

1940 94 126 82 220 211 262 296 400 194 127

1950 121 432 294 201 67 131 137 378 388 239

1960 186 409 322 176 202 160 194 271 275 282

1970 150 214 301 344 222 165 264 102 202 146

1980 203 201 173 183 143 193 262 200 102 174

1990 256 168 107 179 223 109 234 109 144 70

2000 205 121 179 101 103 148 131 112 200 218

2010 183 147 141 149 118 106 79

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53B 1884 to 2016 133 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

--------- ---- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---

1884 1933 1 -.04 -.09 -.01 -.10 -.23 -.12 -.21 -.25 .05 -.11 -.06| .50\* .16 .09 .09 -.07 -.15 -.16 -.05 .04 -.08

1900 1949 1 -.16 -.10 .12 .16 -.02 -.10 -.13 -.24 -.11 -.05 .13| .40\* .13 -.01 -.01 -.23 -.15 -.05 -.02 .03 .02

[B] Entire series, effect on correlation ( .533) is:

Lower 1923< -.059 1926< -.016 1936> -.015 1910> -.012 1912> -.009 1893< -.009 Higher 2016 .030 1988 .025

1884 to 1933 segment:

Lower 1923< -.067 1910> -.040 1926< -.028 1897> -.022 1893< -.019 1912> -.019 Higher 1896 .093 1905 .036

1900 to 1949 segment:

Lower 1923< -.100 1926< -.032 1910> -.029 1936> -.021 1912> -.018 1933< -.012 Higher 1935 .080 1934 .041

[E] Outliers 2 3.0 SD above or -4.5 SD below mean for year

1923 -4.7 SD; 1936 +3.6 SD

53B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1884 88 107 81 92 99 102

1890 108 77 94 60 92 52 38 167 148 77

1900 94 145 219 116 192 204 156 88 65 56

1910 188 100 134 120 67 118 187 104 111 102

1920 110 103 138 51 85 117 82 104 151 144

1930 169 155 147 68 56 74 176 324 241 168

1940 134 161 109 175 224 247 239 264 204 138

1950 104 220 278 196 185 119 126 191 188 126

1960 122 238 246 137 238 155 165 260 253 249

1970 115 96 182 288 235 149 246 92 182 112

1980 160 155 164 143 131 141 163 151 81 136

1990 226 147 147 198 186 118 248 105 184 104

2000 218 147 215 107 143 165 167 149 222 338

2010 242 206 167 208 191 212 134

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54A 1927 to 2016 90 years Series 24

[B] Entire series, effect on correlation ( .712) is:

Lower 2000< -.083 1977> -.017 1927> -.010 1961< -.010 1948< -.008 2012> -.008 Higher 2016 .031 1988 .010

[C] Year-to-year changes diverging by over 4.0 std deviations:

1999 2000 -4.0 SD

54A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1927 54 65 85

1930 63 86 83 90 45 36 25 69 111 119

1940 227 248 212 481 302 257 250 218 82 82

1950 69 250 239 182 223 186 281 311 269 176

1960 134 157 134 91 228 216 167 382 443 358

1970 173 178 338 424 425 240 418 269 225 139

1980 187 209 236 190 139 178 265 223 123 194

1990 344 147 132 157 335 176 271 133 241 115

2000 37 88 184 86 91 103 75 75 150 174

2010 114 96 148 144 146 143 79

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54B 1939 to 2016 78 years Series 25

[B] Entire series, effect on correlation ( .719) is:

Lower 1942< -.019 1963> -.017 2016> -.016 1965< -.015 2003> -.011 1940< -.009 Higher 1977 .022 1988 .014

54B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1939 122

1940 125 127 88 256 387 305 296 439 305 148

1950 147 450 447 261 315 258 306 374 266 211

1960 206 419 274 181 214 143 169 249 302 289

1970 157 186 286 347 312 156 237 96 140 97

1980 106 123 152 124 91 150 157 150 68 128

1990 281 152 121 164 222 114 217 169 276 102

2000 112 125 211 131 123 139 102 98 153 166

2010 113 106 102 135 139 185 102

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55A 1888 to 2016 129 years Series 26

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

--------- ---- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---

1888 1937 0 .11 -.03 -.19 -.30 -.09 -.21 -.19 .17 .22 .20 .24\*-.07 -.08 -.32 -.29 -.05 .13 .10 .16 .11 .08

[B] Entire series, effect on correlation ( .607) is:

Lower 1894< -.045 1972< -.013 1935> -.010 1909> -.009 1901> -.009 1903< -.008 Higher 1963 .025 1977 .020

1888 to 1937 segment:

Lower 1894< -.056 1901> -.025 1903< -.021 1909> -.019 1935> -.015 1926< -.015 Higher 1936 .091 1912 .028

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

1909 +3.0 SD

55A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1888 280 328

1890 257 230 194 251 144 182 193 218 270 193

1900 203 253 162 106 150 137 154 153 284 329

1910 143 83 53 63 100 68 88 134 128 125

1920 88 49 47 46 45 41 32 30 31 44

1930 58 70 69 90 63 53 31 45 69 85

1940 99 74 72 111 118 122 139 90 61 37

1950 35 79 67 74 89 115 110 235 125 143

1960 110 182 161 78 149 141 103 154 141 190

1970 164 165 115 181 195 182 146 99 120 124

1980 101 127 141 149 130 130 149 159 98 129

1990 151 104 106 134 159 100 165 176 284 114

2000 223 134 174 128 108 146 94 98 123 167

2010 150 106 100 96 119 127 85

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55B 1887 to 2016 130 years Series 27

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

--------- ---- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---

1887 1936 1 -.22 -.29 -.24 -.17 -.23 -.23 -.02 .01 .21 .32 .54| .74\* .12 -.03 -.09 -.29 -.27 -.24 -.25 -.03 -.18

1900 1949 1 -.31 -.31 -.23 -.16 -.18 -.18 -.11 -.03 .06 .32 .68| .71\* .09 .00 -.09 -.28 -.23 -.19 -.21 -.11 -.20

[B] Entire series, effect on correlation ( .740) is:

Lower 1902> -.010 1897> -.010 1926< -.007 1887< -.006 1893< -.006 1910> -.006 Higher 1963 .014 1999 .012

1887 to 1936 segment:

Lower 1897> -.032 1902> -.030 1926< -.024 1910> -.023 1887< -.020 1893< -.020 Higher 1935 .165 1934 .020

1900 to 1949 segment:

Lower 1902> -.031 1926< -.025 1910> -.021 1914< -.016 1948> -.010 1903< -.009 Higher 1935 .091 1949 .020

55B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1887 131 145 412

1890 275 223 214 131 163 124 121 269 168 123

1900 85 110 306 182 223 360 269 225 158 137

1910 146 83 58 75 53 55 56 67 87 99

1920 73 69 80 78 71 80 57 63 84 98

1930 87 73 102 74 47 13 25 83 82 111

1940 115 82 94 131 146 150 143 123 113 60

1950 34 65 75 92 109 125 140 208 129 123

1960 98 158 125 53 106 129 144 240 281 320

1970 171 175 163 302 293 174 214 123 139 137

1980 141 160 249 229 168 188 247 235 155 215

1990 253 152 176 224 191 117 178 169 207 106

2000 239 137 180 140 221 344 215 210 242 328

2010 296 286 234 286 237 190 118

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57A 1959 to 2016 58 years Series 28

[B] Entire series, effect on correlation ( .854) is:

Lower 1995< -.018 2006> -.009 1979> -.007 1959> -.007 2007> -.006 2015< -.005 Higher 1977 .014 1988 .008

57A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1959 390

1960 305 488 349 220 296 236 189 302 294 256

1970 174 186 272 343 276 135 166 70 112 109

1980 101 87 116 113 69 104 125 117 55 80

1990 86 61 66 77 90 45 124 76 130 74

2000 172 123 229 103 146 188 187 216 352 330

2010 206 180 157 217 200 176 127

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57B 1955 to 2016 62 years Series 29

[B] Entire series, effect on correlation ( .753) is:

Lower 1958< -.055 1981> -.016 1979> -.012 1965> -.010 1980> -.008 1990< -.007 Higher 2016 .053 1977 .021

57B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1955 287 434 325 55 253

1960 183 264 160 77 189 311 199 501 384 351

1970 134 179 194 229 210 137 195 101 180 188

1980 202 234 242 173 154 204 254 166 87 113

1990 153 104 150 159 197 101 276 218 320 119

2000 283 153 235 104 147 157 166 180 291 294

2010 229 201 161 184 171 184 104

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58A 1918 to 2016 99 years Series 30

[B] Entire series, effect on correlation ( .720) is:

Lower 1953< -.032 1955< -.030 1929< -.015 2006> -.007 1987< -.006 1918> -.005 Higher 1999 .012 1977 .012

58A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1918 51 56

1920 44 31 53 79 60 58 57 49 51 26

1930 49 59 55 80 69 38 18 71 210 237

1940 435 421 440 451 359 316 303 471 393 224

1950 168 358 361 187 337 187 291 384 389 319

1960 234 406 340 232 351 317 255 474 375 335

1970 178 167 342 385 263 148 207 104 139 90

1980 89 103 152 123 103 130 157 108 87 88

1990 141 99 79 150 184 95 166 127 177 86

2000 124 114 108 68 139 254 208 121 267 361

2010 232 176 122 118 144 129 63

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58B 1939 to 2016 78 years Series 31

[B] Entire series, effect on correlation ( .701) is:

Lower 1939< -.025 1962< -.018 1953< -.008 1950> -.008 2003> -.008 2005< -.007 Higher 1963 .017 2016 .016

58B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1939 430

1940 490 435 438 526 418 370 335 409 349 195

1950 253 408 300 162 289 155 210 224 200 138

1960 112 168 97 89 169 158 181 290 229 224

1970 129 161 185 266 223 127 212 116 150 101

1980 98 134 146 132 135 181 237 184 130 155

1990 270 144 153 267 485 183 443 261 428 126

2000 379 209 191 142 121 139 127 113 163 164

2010 102 103 83 80 83 69 41

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

41A 1867 to 2016 150 years Series 32

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

--------- ---- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---

1867 1916 1 -.03 -.17 -.20 .06 -.16 -.21 -.30 -.07 .00 -.01 .20| .77\* .17 .08 .01 -.01 -.14 -.11 -.13 -.07 -.21

1875 1924 1 -.11 -.03 -.17 -.13 -.14 -.17 -.25 .01 .01 -.11 .06| .51\* .11 .27 .07 -.05 -.22 -.19 -.20 -.08 .00

1900 1949 1 -.16 -.01 -.06 -.10 -.16 -.27 -.27 -.18 -.09 .02 .38| .49\* .22 .15 .03 -.15 -.14 -.10 -.19 -.22 .04

[B] Entire series, effect on correlation ( .657) is:

Lower 1924< -.060 1884< -.008 1936> -.007 1878> -.007 1875< -.007 1870< -.007 Higher 2016 .034 2003 .018

1867 to 1916 segment:

Lower 1875< -.030 1878> -.026 1884< -.025 1893< -.021 1883< -.020 1895< -.017 Higher 1896 .047 1906 .040

1875 to 1924 segment:

Lower 1924< -.094 1878> -.023 1875< -.021 1884< -.015 1893< -.015 1883< -.014 Higher 1896 .053 1906 .046

1900 to 1949 segment:

Lower 1924< -.170 1916> -.014 1907< -.010 1902> -.009 1927> -.009 1922> -.009 Higher 1935 .060 1934 .038

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

1924 -5.4 SD

41A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1867 61 74 54

1870 17 28 22 25 51 31 33 20 35 29

1880 30 34 45 29 19 24 49 36 45 52

1890 57 34 48 30 33 19 13 39 43 29

1900 26 42 61 54 82 78 80 57 66 38

1910 49 35 45 62 47 52 86 71 67 72

1920 57 60 76 60 28 64 55 70 72 62

1930 81 65 57 55 19 17 50 165 165 137

1940 171 165 118 169 161 206 230 230 134 95

1950 58 147 149 125 121 97 103 170 186 93

1960 104 270 258 96 234 199 212 452 346 324

1970 169 186 289 373 370 184 249 99 167 104

1980 127 132 198 143 135 192 303 214 127 124

1990 182 115 148 139 195 121 155 126 148 72

2000 162 101 139 62 157 242 153 132 207 302

2010 197 164 136 149 148 156 73

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41B 1806 to 2016 211 years Series 33

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

--------- ---- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---

1806 1855 7 -.05 -.27 -.11 -.20 -.11 -.19 -.30 .20 .02 .00 -.03| .19 .13 .18 .11 .12 .09 .20\* .05 .12 .05

1825 1874 1 .04 -.25 -.04 -.17 -.04 -.14 -.20 .08 .14 .02 .15| .36\* .09 .32 .02 .02 -.05 .03 -.03 .07 -.05

[B] Entire series, effect on correlation ( .600) is:

Lower 1843< -.027 1925< -.011 1850> -.011 1816< -.008 1836< -.007 1862< -.007 Higher 2016 .025 2003 .021

1806 to 1855 segment:

Lower 1843< -.061 1850> -.040 1816< -.028 1836< -.027 1829> -.023 1821> -.022 Higher 1852 .094 1832 .044

1825 to 1874 segment:

Lower 1843< -.084 1850> -.048 1836< -.032 1862< -.029 1829> -.028 1863> -.019 Higher 1866 .084 1852 .071

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

1852 -5.2 SD

41B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1806 90 136 106 140

1810 83 63 41 30 47 36 28 20 29 46

1820 39 49 26 34 51 28 20 38 66 81

1830 65 66 77 60 51 41 27 35 39 50

1840 39 49 64 23 31 36 32 30 48 32

1850 46 29 7 22 41 31 29 48 48 32

1860 13 49 23 57 42 54 200 86 48 35

1870 41 18 27 28 35 71 39 34 14 22

1880 20 30 26 38 71 36 15 33 21 35

1890 43 42 32 40 35 37 32 14 50 70

1900 46 31 32 63 68 74 86 83 53 49

1910 33 34 27 38 44 23 24 49 41 32

1920 49 46 40 49 34 16 27 33 40 38

1930 30 62 61 56 51 22 43 139 167 144

1940 242 208 147 227 168 198 218 262 177 112

1950 52 163 199 144 171 204 260 403 327 104

1960 106 247 216 73 145 152 159 240 239 188

1970 84 88 160 194 256 133 189 85 158 108

1980 121 111 183 124 106 152 200 185 101 115

1990 168 151 169 182 266 164 195 172 159 91

2000 193 101 145 52 110 162 107 98 130 244

2010 183 136 124 123 120 106 59

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46A 1861 to 2016 156 years Series 34

[B] Entire series, effect on correlation ( .627) is:

Lower 1918< -.034 1994< -.015 2001> -.010 1957< -.009 1868< -.007 1911> -.007 Higher 1963 .023 1977 .023

46A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1861 200 262 293 316 220 256 178 104 109

1870 107 52 85 137 159 223 142 97 74 91

1880 85 96 94 114 125 78 73 106 110 105

1890 120 110 81 137 106 145 98 85 227 175

1900 61 42 72 160 103 124 176 233 163 104

1910 63 113 64 85 102 42 58 79 25 38

1920 54 54 66 58 52 54 125 82 92 105

1930 91 99 63 104 63 46 37 117 133 128

1940 141 130 81 129 106 117 109 103 36 34

1950 35 68 81 81 45 16 36 38 67 49

1960 55 104 83 18 78 53 59 56 85 133

1970 75 57 63 99 85 58 61 23 50 37

1980 30 38 51 39 43 52 82 94 43 49

1990 51 54 51 56 46 47 81 56 104 58

2000 96 113 88 71 70 129 107 117 158 156

2010 122 108 117 85 91 77 55

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46B 1880 to 2016 137 years Series 35

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

--------- ---- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---

1880 1929 1 -.19 -.11 .05 .08 -.11 -.15 .02 .00 .05 -.23 .03| .58\* .21 .08 .13 -.07 -.16 -.21 -.14 -.05 .07

1900 1949 1 -.32 -.26 -.19 -.04 -.20 -.29 -.19 -.18 -.06 .17 .53| .70\* .34 .25 .15 -.13 -.23 -.20 -.25 -.31 -.24

[B] Entire series, effect on correlation ( .650) is:

Lower 1884< -.033 1891< -.014 1897> -.013 1902> -.010 1962> -.010 1899< -.007 Higher 2016 .029 1977 .025

1880 to 1929 segment:

Lower 1884< -.048 1897> -.038 1891< -.026 1902> -.023 1890< -.023 1881> -.015 Higher 1906 .067 1911 .043

1900 to 1949 segment:

Lower 1902> -.035 1933< -.025 1914< -.023 1908< -.019 1912> -.019 1917< -.018 Higher 1935 .071 1949 .027

46B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1880 76 93 104 144 89 103 112 113 125 135

1890 113 84 179 148 187 165 175 317 202 82

1900 64 111 337 204 191 283 316 177 111 75

1910 131 87 132 152 101 143 149 114 153 147

1920 152 152 168 144 132 217 125 140 185 142

1930 133 79 63 35 20 4 29 101 108 133

1940 218 151 98 224 236 212 214 198 119 49

1950 58 199 204 135 77 63 50 117 153 101

1960 136 328 394 99 189 147 122 144 158 145

1970 85 78 124 179 153 90 130 53 93 74

1980 74 105 113 108 97 122 146 148 66 89

1990 204 111 128 163 173 102 179 119 173 89

2000 145 106 100 67 69 115 96 78 111 138

2010 112 101 86 95 97 117 65

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50A 1956 to 2016 61 years Series 36

[B] Entire series, effect on correlation ( .863) is:

Lower 2006> -.022 1964< -.010 1971< -.010 1988> -.010 2012< -.008 2004> -.005 Higher 2016 .024 1999 .010

50A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1956 340 323 339 219

1960 252 355 255 182 241 200 235 383 366 308

1970 194 172 343 454 424 197 352 132 218 158

1980 195 190 300 228 204 238 267 201 164 197

1990 333 128 141 153 244 100 238 125 209 78

2000 197 119 171 93 187 172 163 110 140 169

2010 111 123 85 121 121 132 57

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50B 1958 to 2016 59 years Series 37

[B] Entire series, effect on correlation ( .852) is:

Lower 1959< -.018 2012< -.015 2013< -.009 2006> -.008 1964< -.006 2001> -.005 Higher 2016 .030 1963 .008

50B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1958 372 320

1960 363 445 368 267 331 294 324 471 492 407

1970 232 231 480 608 500 202 420 140 215 146

1980 161 181 287 214 195 237 261 183 149 169

1990 283 132 181 216 301 130 242 173 382 117

2000 350 172 229 115 192 171 175 135 192 258

2010 155 152 93 105 119 131 59

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56A 1847 to 2016 170 years Series 38

[B] Entire series, effect on correlation ( .642) is:

Lower 2000< -.047 1877< -.011 1863< -.009 1927< -.008 1921< -.007 2001> -.007 Higher 1977 .016 1935 .014

[C] Year-to-year changes diverging by over 4.0 std deviations:

1999 2000 -5.5 SD 2000 2001 4.4 SD

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

2000 -5.7 SD

56A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1847 162 322 225

1850 156 134 97 107 166 144 165 131 168 163

1860 119 112 111 65 76 80 99 88 70 66

1870 43 24 37 40 43 79 49 12 16 33

1880 42 29 27 37 41 39 43 54 49 50

1890 72 73 54 66 36 46 29 21 55 87

1900 52 31 104 122 76 81 136 107 98 76

1910 42 56 50 46 76 55 71 77 63 58

1920 64 45 54 51 50 45 38 27 35 45

1930 47 42 31 35 29 16 17 54 38 34

1940 48 48 29 27 47 75 75 62 40 30

1950 17 61 59 52 23 45 108 209 177 106

1960 103 158 106 34 101 109 99 136 163 184

1970 114 118 144 254 229 146 142 67 103 87

1980 66 87 110 120 104 120 135 149 77 105

1990 188 102 96 106 137 83 149 150 158 94

2000 35 96 97 79 85 130 91 120 129 150

2010 111 94 95 100 116 103 88

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56B 1860 to 2016 157 years Series 39

[B] Entire series, effect on correlation ( .650) is:

Lower 2000< -.028 1863< -.017 2016> -.013 1954< -.009 1877< -.008 2002< -.008 Higher 1977 .024 1935 .012

[C] Year-to-year changes diverging by over 4.0 std deviations:

1999 2000 -4.7 SD

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

2000 -4.7 SD

56B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1860 144 115 161 85 137 144 158 121 86 99

1870 65 36 45 61 57 122 89 26 31 59

1880 76 57 60 78 82 68 56 85 88 88

1890 109 106 78 102 67 59 41 38 123 121

1900 73 46 62 113 72 85 151 110 88 66

1910 36 57 57 51 79 60 70 52 52 53

1920 63 50 41 53 57 58 62 49 60 67

1930 77 62 47 49 39 22 23 48 43 59

1940 57 37 35 48 45 75 94 66 55 39

1950 27 63 65 63 23 59 154 254 304 284

1960 204 345 230 90 225 225 151 250 293 317

1970 197 205 245 371 292 179 182 76 110 120

1980 106 132 152 152 82 148 180 176 87 100

1990 179 107 97 136 179 101 150 154 200 107

2000 33 112 99 84 108 234 155 148 245 332

2010 220 116 116 94 139 141 103

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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 ()

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1 40A 1829 2016 188 7 3 .675 .99 2.75 .514 .495 .390 2.56 .373 .011 1

2 40B 1772 2016 245 9 5 .516 .87 2.56 .478 .645 .366 2.64 .397 -.002 1

3 42A 1821 2016 196 8 0 .593 .86 2.28 .328 .550 .284 2.78 .480 -.002 2

4 42B 1803 2016 214 8 5 .506 1.06 2.36 .422 .607 .293 2.82 .524 .023 1

5 43A 1922 2016 95 4 0 .789 1.87 3.75 .723 .396 .321 2.74 .445 .031 1

6 43B 1866 2016 151 6 1 .717 1.19 4.49 .818 .771 .364 2.89 .532 -.025 1

7 44A 1794 2016 223 9 5 .462 .98 4.33 .817 .816 .336 2.78 .430 -.013 1

8 44B 1825 2016 192 7 2 .519 .94 3.93 .706 .819 .328 2.59 .429 .002 1

9 44C 1824 2016 193 8 0 .671 1.21 5.01 .919 .775 .340 2.68 .464 .034 1

10 45A 1839 2016 178 7 4 .486 1.03 3.16 .720 .883 .290 2.55 .435 -.026 1

11 45B 1855 2016 162 6 2 .604 1.11 2.99 .679 .837 .286 2.67 .373 -.009 2

12 47A 1789 2016 228 9 9 .084 1.19 5.39 .840 .729 .371 2.85 .498 .022 1

13 47B 1851 2016 166 6 6 -.041 1.27 5.85 .897 .743 .352 2.73 .435 .013 1

14 48A 1891 2016 126 5 2 .602 1.00 2.50 .500 .658 .360 2.70 .531 .022 1

15 48B 1863 2016 154 6 0 .749 1.39 3.94 .688 .604 .313 2.72 .496 .079 1

16 49A 1806 2016 211 8 4 .525 .90 4.25 .753 .852 .279 2.85 .360 -.012 2

17 49B 1803 2016 214 8 1 .639 .96 3.91 .598 .761 .282 2.79 .439 -.042 2

18 51A 1905 2016 112 4 0 .800 1.56 4.20 .905 .770 .300 2.62 .449 -.079 1

19 51B 1841 2016 176 7 4 .475 1.11 4.89 .917 .802 .359 2.64 .328 -.029 1

20 52A 1848 2016 169 7 0 .682 .98 2.70 .530 .746 .274 2.67 .398 -.025 1

21 52B 1858 2016 159 6 0 .820 1.14 4.24 .779 .821 .284 2.84 .537 .004 1

22 53A 1842 2016 175 7 1 .652 1.41 4.32 .842 .631 .383 2.61 .399 -.011 1

23 53B 1884 2016 133 5 2 .533 1.53 3.38 .609 .453 .336 2.66 .448 -.003 3

24 54A 1927 2016 90 3 0 .712 1.84 4.81 1.023 .613 .358 2.90 .618 .071 1

25 54B 1939 2016 78 3 0 .719 1.97 4.50 .955 .560 .329 2.81 .575 -.006 2

26 55A 1888 2016 129 5 1 .607 1.29 3.29 .630 .708 .258 2.75 .441 -.049 1

27 55B 1887 2016 130 5 2 .740 1.56 4.12 .794 .684 .290 2.65 .465 .037 1

28 57A 1959 2016 58 2 0 .854 1.77 4.88 .982 .744 .324 2.75 .566 -.149 1

29 57B 1955 2016 62 2 0 .753 2.03 5.01 .850 .284 .390 2.62 .450 -.075 1

30 58A 1918 2016 99 4 0 .720 1.90 4.74 1.261 .790 .339 2.67 .539 -.039 1

31 58B 1939 2016 78 3 0 .701 2.14 5.26 1.178 .631 .316 2.71 .561 -.019 1

32 41A 1867 2016 150 6 3 .657 1.14 4.52 .842 .774 .335 2.66 .434 -.020 1

33 41B 1806 2016 211 8 2 .600 .89 4.03 .714 .790 .367 3.02 .437 -.025 2

34 46A 1861 2016 156 6 0 .627 .94 3.16 .525 .741 .321 2.66 .456 -.006 1

35 46B 1880 2016 137 5 2 .650 1.33 3.94 .622 .489 .343 2.75 .478 -.004 1

36 50A 1956 2016 61 2 0 .863 2.11 4.54 .911 .484 .357 2.75 .615 -.065 1

37 50B 1958 2016 59 2 0 .852 2.48 6.08 1.209 .526 .361 2.78 .564 -.043 1

38 56A 1847 2016 170 7 0 .642 .86 3.22 .512 .761 .303 2.80 .567 .004 2

39 56B 1860 2016 157 6 0 .650 1.10 3.71 .730 .771 .316 2.66 .458 -.016 2

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Total or mean: 5885 226 66 .591 1.20 6.08 .721 .702 .327 3.02 .459 -.007

- = [ COFECHA RRTSCCOF ] = -