[] Dendrochronology Program Library Run 121 Program COF 09:55 Wed 27 Apr 2011 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 27877

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

File of DATED series: 121\_KIL

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 30 years lagged successively by 15 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 .4226

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 1793 to 2010 218 years

Continuous time span is 1793 to 2010 218 years

Portion with two or more series is 1829 to 2010 182 years

>> 279A 2007 absent in 3 of 26 series, but is not usually narrow: master index is .720

>> 279A 2008 absent in 3 of 26 series, but is not usually narrow: master index is .560

>> 279A 2009 absent in 3 of 26 series, but is not usually narrow: master index is .590

>> 279A 2010 absent in 3 of 26 series, but is not usually narrow: master index is 1.336

>> 279B 1973 absent in 1 of 26 series, but is not usually narrow: master index is .517

>> 551A 2007 absent in 3 of 26 series, but is not usually narrow: master index is .720

>> 551A 2008 absent in 3 of 26 series, but is not usually narrow: master index is .560

>> 551A 2009 absent in 3 of 26 series, but is not usually narrow: master index is .590

>> 551A 2010 absent in 3 of 26 series, but is not usually narrow: master index is 1.336

>> 551B 2007 absent in 3 of 26 series, but is not usually narrow: master index is .720

>> 551B 2008 absent in 3 of 26 series, but is not usually narrow: master index is .560

>> 551B 2009 absent in 3 of 26 series, but is not usually narrow: master index is .590

>> 551B 2010 absent in 3 of 26 series, but is not usually narrow: master index is 1.336

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

\*C\* Number of dated series 26 \*C\*

\*O\* Master series 1793 2010 218 yrs \*O\*

\*F\* Total rings in all series 3200 \*F\*

\*E\* Total dated rings checked 3164 \*E\*

\*C\* Series intercorrelation .450 \*C\*

\*H\* Average mean sensitivity .257 \*H\*

\*A\* Segments, possible problems 89 \*A\*

\*\*\* Mean length of series 123.1 \*\*\*

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

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

279A 5 absent rings: 2006 2007 2008 2009 2010

279B 1 absent rings: 1973

551A 4 absent rings: 2007 2008 2009 2010

551B 4 absent rings: 2007 2008 2009 2010

14 absent rings .438%

PART 2: TIME PLOT OF TREE-RING SERIES: 09:55 Wed 27 Apr 2011 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

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

. . . . . . . . . . . . . . . . . .<=========> . 272A 1 1918 2010 93

. . . . . . . . . . . . . . . . .<==============> . 272B 2 1860 2010 151

. . . . . . . . . . . . . . . . . .<=========> . 274A 3 1916 2010 95

. . . . . . . . . . . . . . . . <=================> . 274B 4 1830 2010 181

. . . . . . . . . . . . . . . . . <===========> . 275A 5 1896 2010 115

. . . . . . . . . . . . . . . . . .<=========> . 275B 6 1911 2010 100

. . . . . . . . . . . . . . . . <==================> . 276A 7 1829 2010 182

. . . . . . . . . . . . . . . . . <===========> . 276B 8 1898 2010 113

. . . . . . . . . . . . . . . . . . <========> . 277A 9 1929 2010 82

. . . . . . . . . . . . . . . . . <==========> . 277B 10 1907 2010 104

. . . . . . . . . . . . . . . . . <==========> . 278A 11 1901 2010 110

. . . . . . . . . . . . . . . . . .<=========> . 278B 12 1911 2010 100

. . . . . . . . . . . . . . . . . . .<====> . 279A 13 1966 2010 45

. . . . . . . . . . . . . . . <=====================> . 279B 14 1793 2010 218

. . . . . . . . . . . . . . . . <=================> . 280A 15 1838 2010 173

. . . . . . . . . . . . . . . . .<==============> . 280B 16 1866 2010 145

. . . . . . . . . . . . . . . . . <============> . 281A 17 1886 2010 125

. . . . . . . . . . . . . . . . . <============> . 281B 18 1883 2010 128

. . . . . . . . . . . . . . . . . <===========> . 551A 19 1897 2010 114

. . . . . . . . . . . . . . . . . <============> . 551B 20 1880 2010 131

. . . . . . . . . . . . . . . . . <===========> . 552A 21 1897 2010 114

. . . . . . . . . . . . . . . . . <===========> . 552B 22 1895 2010 116

. . . . . . . . . . . . . . . . . <===========> . 553A 23 1893 2010 118

. . . . . . . . . . . . . . . . .<==============> . 553B 24 1863 2010 148

. . . . . . . . . . . . . . . . . .<=========> . 554A 25 1911 2010 100

. . . . . . . . . . . . . . . . . .<=========> . 554B 26 1912 2010 99

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

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: 09:55 Wed 27 Apr 2011 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 1.425 1 1850 1.281 4 1900 .587 16 1950 -.670 25 2000 -.542 26

1801 2.357 1 1851 1.898 4 1901 -.200 17 1951 .251 25 2001 .236 26

1802 -1.502 1 1852 -1.541 4 1902 -.454 17 1952 .980 25 2002 .800 26

1803 -.276 1 1853 -1.443 4 1903 -.595 17 1953 .291 25 2003 -.810 26

1804 -3.470 1 1854 .359 4 1904 -.060 17 1954 .877 25 2004 -1.515 26

1805 -.035 1 1855 .151 4 1905 .017 17 1955 1.330 25 2005 -.725 26

1806 .696 1 1856 -.012 4 1906 -.287 17 1956 -.686 25 2006 -.931 26 1

1807 .709 1 1857 -1.819 4 1907 -.356 18 1957 .546 25 2007 .720 26 3<<

1808 -.988 1 1858 -.394 4 1908 -.245 18 1958 .616 25 2008 .560 26 3<<

1809 -1.848 1 1859 -.113 4 1909 -.015 18 1959 -.603 25 2009 .590 26 3<<

1810 -.697 1 1860 .237 5 1910 -.405 18 1960 -.632 25 2010 1.336 26 3<<

1811 .857 1 1861 1.393 5 1911 -1.845 21 1961 .470 25

1812 -3.818 1 1862 -.211 5 1912 -.577 22 1962 -.460 25

1813 -1.110 1 1863 -2.277 6 1913 .205 22 1963 -.804 25

1814 -1.149 1 1864 -.995 6 1914 -.336 22 1964 -.742 25

1815 .530 1 1865 .265 6 1915 .528 22 1965 .134 25

1816 -.472 1 1866 -.202 7 1916 .603 23 1966 -.940 26

1817 1.096 1 1867 1.692 7 1917 -.269 23 1967 -1.309 26

1818 -.593 1 1868 1.433 7 1918 -.981 24 1968 -1.041 26

1819 1.464 1 1869 .799 7 1919 -.115 24 1969 -.369 26

1820 .592 1 1870 1.089 7 1920 .321 24 1970 .637 26

1821 .895 1 1871 1.032 7 1921 .616 24 1971 .883 26

1822 .404 1 1872 .863 7 1922 .317 24 1972 .312 26

1823 1.717 1 1873 .755 7 1923 -.225 24 1973 .517 26 1<<

1824 1.356 1 1874 .726 7 1924 .734 24 1974 -.318 26

1825 2.758 1 1875 -.157 7 1925 .237 24 1975 -.088 26

1826 1.842 1 1876 -.626 7 1926 -.274 24 1976 -.007 26

1827 1.175 1 1877 -.861 7 1927 -.147 24 1977 -.587 26

1828 -.669 1 1878 .956 7 1928 .024 24 1978 -.182 26

1829 -2.797 2 1879 -.305 7 1929 -.427 25 1979 -.551 26

1830 .740 3 1880 -.039 8 1930 .148 25 1980 .368 26

1831 .925 3 1881 -.512 8 1931 -.028 25 1981 -.909 26

1832 -1.350 3 1882 -.437 8 1932 .176 25 1982 .699 26

1833 .632 3 1883 -.269 9 1933 -.572 25 1983 -.134 26

1834 .208 3 1884 -.130 9 1934 1.212 25 1984 -.707 26

1835 -.746 3 1885 -.722 9 1935 -.984 25 1985 .207 26

1836 .058 3 1886 -.012 10 1936 -.326 25 1986 .212 26

1837 .040 3 1887 -2.625 10 1937 -.135 25 1987 .895 26

1838 -.525 4 1888 -1.700 10 1938 .385 25 1988 .649 26

1839 -.381 4 1889 -1.192 10 1939 .375 25 1989 -.415 26

1840 -1.044 4 1890 -.391 10 1940 -.545 25 1990 .686 26

1841 -.865 4 1891 .131 10 1941 1.380 25 1991 .924 26

1842 .858 4 1892 .158 10 1942 .365 25 1992 1.676 26

1793 -1.193 1 1843 -.070 4 1893 .924 11 1943 -1.203 25 1993 1.765 26

1794 1.485 1 1844 -2.752 4 1894 1.287 11 1944 -.373 25 1994 .237 26

1795 .776 1 1845 .772 4 1895 .980 12 1945 .173 25 1995 .090 26

1796 .758 1 1846 1.015 4 1896 .831 13 1946 -.519 25 1996 -2.093 26

1797 1.368 1 1847 .258 4 1897 .965 15 1947 -.159 25 1997 -1.244 26

1798 -.298 1 1848 1.312 4 1898 1.308 16 1948 -1.718 25 1998 -.998 26

1799 -1.430 1 1849 1.266 4 1899 .995 16 1949 .197 25 1999 .511 26

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PART 4: Master Bar Plot: 09:55 Wed 27 Apr 2011 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----------F 1850----------E 1900-------B 1950--c 2000--b

1801----------I 1851----------H 1901----a 1951------A 2001------A

1802f 1852f 1902---b 1952---------D 2002--------C

1803----a 1853f 1903--b 1953------A 2003-c

1804n 1854------A 1904-----@ 1954---------D 2004f

1805-----@ 1855------A 1905-----@ 1955----------E 2005--c

1806--------C 1856-----@ 1906----a 1956--c 2006-d

1807--------C 1857g 1907---a 1957-------B 2007--------C

1808-d 1858---b 1908----a 1958-------B 2008-------B

1809g 1859----@ 1909-----@ 1959--b 2009-------B

1810--c 1860------A 1910---b 1960--c 2010----------E

1811--------C 1861----------F 1911g 1961-------B

1812o 1862----a 1912--b 1962---b

1813-d 1863i 1913------A 1963-c

1814-e 1864-d 1914---a 1964--c

1815-------B 1865------A 1915-------B 1965------A

1816---b 1866----a 1916-------B 1966-d

1817---------D 1867----------G 1917----a 1967-e

1818--b 1868----------F 1918-d 1968-d

1819----------F 1869--------C 1919----@ 1969---a

1820-------B 1870---------D 1920------A 1970-------C

1821---------D 1871---------D 1921-------B 1971---------D

1822-------B 1872--------C 1922------A 1972------A

1823----------G 1873--------C 1923----a 1973-------B

1824----------E 1874--------C 1924--------C 1974---a

1825----------K 1875----a 1925------A 1975-----@

1826----------G 1876--c 1926----a 1976-----@

1827---------E 1877-c 1927----a 1977--b

1828--c 1878---------D 1928-----@ 1978----a

1829k 1879---a 1929---b 1979--b

1830--------C 1880-----@ 1930------A 1980------A

1831---------D 1881--b 1931-----@ 1981-d

1832-e 1882---b 1932------A 1982--------C

1833-------C 1883----a 1933--b 1983----a

1834------A 1884----a 1934---------E 1984--c

1835--c 1885--c 1935-d 1985------A

1836-----@ 1886-----@ 1936---a 1986------A

1837-----@ 1887k 1937----a 1987---------D

1838--b 1888g 1938------B 1988-------C

1839---b 1889-e 1939------B 1989---b

1840-d 1890---b 1940--b 1990--------C

1841-c 1891------A 1941----------F 1991---------D

1842--------C 1892------A 1942------A 1992----------G

1793-e 1843-----@ 1893---------D 1943-e 1993----------G

1794----------F 1844k 1894----------E 1944---a 1994------A

1795--------C 1845--------C 1895---------D 1945------A 1995-----@

1796--------C 1846---------D 1896--------C 1946--b 1996h

1797----------E 1847------A 1897---------D 1947----a 1997-e

1798---a 1848----------E 1898----------E 1948g 1998-d

1799f 1849----------E 1899---------D 1949------A 1999-------B

PART 5: CORRELATION OF SERIES BY SEGMENTS: 09:55 Wed 27 Apr 2011 Page 5

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Correlations of 30-year dated segments, lagged 15 years

Flags: A = correlation under .4226 but highest as dated; B = correlation higher at other than dated position

Seq Series Time\_span 1815 1830 1845 1860 1875 1890 1905 1920 1935 1950 1965 1980 1995

1844 1859 1874 1889 1904 1919 1934 1949 1964 1979 1994 2009 2024

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

1 272A 1918 2010 .61 .59 .61 .51 .59 .82 .82

2 272B 1860 2010 .62 .62 .53 .50 .59 .65 .72 .65 .78 .75

3 274A 1916 2010 .54 .55 .49 .54 .57 .48 .46

4 274B 1830 2010 .59 .65 .62 .74 .52 .46 .45B .49 .53 .38A .56 .47

5 275A 1896 2010 .22B .33B .46 .43 .23B .39A .70 .67

6 275B 1911 2010 .39B .64 .66 .57 .71 .67 .69

7 276A 1829 2010 .69 .67 .70 .21B .04B .22B .34B .81 .68 .40A .67 .54 .57

8 276B 1898 2010 -.11B .01B .52 .61 .48 .55 .70 .68

9 277A 1929 2010 .01B .01B .08B .16B .43 .47

10 277B 1907 2010 .31B .50 .60 .41A .12B .26A .30A

11 278A 1901 2010 .15B .26B .39A .50 .50 .56 .75 .75

12 278B 1911 2010 .37A .37A .55 .62 .53 .69 .69

13 279A 1966 2010 .31B .34A .32A

14 279B 1793 2010 .37A .32B .27B .26A .50 .32B .39A .77 .74 .49 .39B .53 .57

15 280A 1838 2010 .25B .25B .22B .46 .36B .25B .21B .44B .59 .33A .49 .52

16 280B 1866 2010 .44 .48 .34B .18B .26B .52 .58 .24B .24A .17B

17 281A 1886 2010 .26B .28B .23B .59 .65 .56 .71 .77 .79

18 281B 1883 2010 .30B .49 .61 .67 .64 .36A .33B .54B .53B

19 551A 1897 2010 .18B-.15B-.36B-.33B-.13B-.13B-.11B-.11B

20 551B 1880 2010 .58 .64 .40A .60 .64 .44 .56 .57 .56

21 552A 1897 2010 .44 .45 .41B .42A .40A .41A .64 .70

22 552B 1895 2010 .14B .30A .69 .61 .35B .38A .70 .72

23 553A 1893 2010 .45 .39A .34A .53 .45 .48 .82 .82

24 553B 1863 2010 .31B .22B .60 .28B .28B .57 .58 .61 .79 .80

25 554A 1911 2010 .37B .39B .47 .34A .48 .74 .75

26 554B 1912 2010 .19B .38B .44 .35A .45 .77 .78

Av segment correlation .53 .46 .47 .38 .42 .34 .33 .44 .50 .44 .44 .58 .59

PART 6: POTENTIAL PROBLEMS: 09:55 Wed 27 Apr 2011 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 30-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

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272A 1918 to 2010 93 years Series 1

[B] Entire series, effect on correlation ( .661) is:

Lower 1956> -.023 1976< -.015 1960> -.015 1943> -.010 1936< -.010 1933> -.009 Higher 1996 .048 1935 .039

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272B 1860 to 2010 151 years Series 2

[B] Entire series, effect on correlation ( .635) is:

Lower 1939< -.015 1862> -.015 1861< -.012 1873< -.008 1985< -.007 1975> -.007 Higher 1863 .027 1996 .021

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

1955 +3.1 SD

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274A 1916 to 2010 95 years Series 3

[B] Entire series, effect on correlation ( .472) is:

Lower 1956> -.026 1999< -.019 1998> -.017 2004> -.016 1935> -.013 1994> -.012 Higher 1943 .029 1996 .019

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

1998 +3.1 SD

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

274B 1830 to 2010 181 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

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1920 1949 -8 .04 -.25 .69\*-.16 -.05 -.20 .05 -.06 -.13 -.04 .45|-.20 .06 .15 .08 .25 -.16 .05 -.28 -.10 .07

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

1965 1994 0 .14 -.20 .34 .25 .06 .20 -.11 .29 -.09 .11 .38\* .02 -.21 -.36 -.34 .08 -.22 .32 -.07 .05 .13

[B] Entire series, effect on correlation ( .537) is:

Lower 1862> -.025 2010< -.017 1832< -.011 1981> -.010 1833> -.009 1994> -.009 Higher 1852 .044 1863 .026

1920 to 1949 segment:

Lower 1948> -.058 1940> -.042 1934< -.033 1944< -.021 1945< -.019 1942> -.017 Higher 1943 .120 1941 .031

1965 to 1994 segment:

Lower 1981> -.090 1994> -.076 1979> -.026 1978> -.018 1988< -.016 1977> -.016 Higher 1984 .047 1989 .043

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

1832 1833 4.4 SD

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

1862 +3.2 SD

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

275A 1896 to 2010 115 years Series 5

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

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

1896 1925 8 -.09 -.08 -.04 -.01 -.10 -.29 -.15 .09 -.15 -.16 .22| .07 -.27 -.19 -.15 .01 .24 .01 .37\*-.04 .10

1905 1934 -10 .41\* .03 -.04 .22 .08 -.39 -.14 .19 -.20 -.32 .33|-.29 -.12 -.09 -.21 -.09 .21 .16 -.02 -.10 .26

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

1950 1979 -3 .17 -.07 -.05 .08 .18 .19 .28 .37\*-.03 -.16 .23|-.25 -.24 .12 -.08 -.29 .00 .06 -.16 -.10 .01

1965 1994 0 .10 -.01 -.15 .00 -.10 .33 .21 .01 .12 -.05 .39\* .01 .27 -.15 -.15 -.22 .02 -.05 .13 -.01 -.05

[B] Entire series, effect on correlation ( .432) is:

Lower 1935> -.019 1943> -.015 1974> -.015 1921< -.014 1959> -.013 1910> -.009 Higher 1941 .019 1934 .014

1896 to 1925 segment:

Lower 1921< -.074 1910> -.056 1900< -.026 1907> -.023 1919< -.018 1896< -.016 Higher 1898 .061 1917 .058

1905 to 1934 segment:

Lower 1921< -.100 1910> -.047 1931> -.037 1919< -.030 1907> -.017 1905< -.013 Higher 1934 .113 1917 .036

1950 to 1979 segment:

Lower 1974> -.073 1959> -.061 1970< -.050 1971< -.031 1953< -.028 1979> -.013 Higher 1957 .049 1961 .037

1965 to 1994 segment:

Lower 1974> -.093 1989> -.047 1970< -.045 1975> -.027 1971< -.026 1984> -.020 Higher 1981 .085 1994 .058

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

1948 -5.9 SD

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275B 1911 to 2010 100 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

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1911 1940 -7 -.01 -.17 .10 .54\* .05 -.17 -.08 -.16 .22 -.34 .39|-.20 .10 -.24 -.13 .34 -.31 -.05 .25 -.10 .18

[B] Entire series, effect on correlation ( .520) is:

Lower 1911> -.043 1918< -.028 1913< -.023 1956> -.017 1924< -.012 1963> -.011 Higher 1935 .055 1934 .017

1911 to 1940 segment:

Lower 1911> -.144 1913< -.049 1924< -.028 1925< -.016 1938< -.016 1929> -.009 Higher 1935 .216 1934 .073

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

1911 +3.4 SD; 1918 -5.6 SD

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276A 1829 to 2010 182 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

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1860 1889 10 .11 -.14 .08 -.21 -.05 -.22 -.29 .17 .08 -.21 .21|-.09 -.09 -.15 .03 -.20 .09 -.16 .20 .04 .30\*

1875 1904 8 -.10 -.39 -.17 -.44 -.25 -.41 -.15 -.40 -.28 -.53 .04|-.32 .11 -.16 .16 .05 .25 .18 .56\* .34 .46

1890 1919 5 -.11 -.30 -.17 .13 -.18 -.31 -.10 -.38 -.27 .16 .22| .08 .04 -.04 .08 .32\* .04 .10 .25 .12 .15

1905 1934 -7 -.04 -.09 -.07 .34\* .07 -.33 .14 -.31 -.33 .10 .34|-.30 .00 -.19 .03 .03 .18 -.02 -.04 .05 .05

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

1950 1979 0 .10 -.09 .11 .02 -.23 -.34 -.20 .08 -.23 -.09 .40\*-.08 -.28 -.01 .11 .02 .15 .28 -.20 .24 .09

[B] Entire series, effect on correlation ( .508) is:

Lower 1863> -.020 1887> -.017 1843> -.017 1888> -.014 2009< -.013 1911> -.012 Higher 1852 .045 1935 .026

1860 to 1889 segment:

Lower 1865< -.071 1888> -.052 1889> -.033 1874< -.028 1860< -.021 1871< -.016 Higher 1867 .059 1862 .050

1875 to 1904 segment:

Lower 1888> -.079 1889> -.045 1899< -.025 1900< -.024 1904< -.018 1882> -.011 Higher 1879 .075 1878 .053

1890 to 1919 segment:

Lower 1911> -.139 1914> -.086 1910> -.043 1890> -.019 1899< -.010 1900< -.009 Higher 1918 .145 1917 .028

1905 to 1934 segment:

Lower 1911> -.162 1914> -.077 1910> -.039 1905< -.003 1925> -.003 1922< -.001 Higher 1934 .069 1918 .045

1950 to 1979 segment:

Lower 1964> -.085 1966> -.074 1955< -.041 1957< -.040 1958< -.032 1970< -.011 Higher 1956 .114 1959 .036

[E] Outliers 6 3.0 SD above or -4.5 SD below mean for year

1887 +4.2 SD; 1888 +4.2 SD; 1889 +4.5 SD; 1890 +3.1 SD; 1911 +3.2 SD; 1918 -6.2 SD

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

276B 1898 to 2010 113 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

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

1898 1927 10 -.21 -.23 -.19 -.24 -.23 -.29 -.33 .00 .05 -.14 -.11| .12 -.02 -.15 .09 .25 .15 .12 .00 .22 .39\*

1905 1934 10 .07 -.10 -.10 -.12 -.05 -.36 -.19 .07 .06 -.40 .01|-.30 .17 -.04 .21 .01 .10 .16 -.19 -.07 .38\*

[B] Entire series, effect on correlation ( .481) is:

Lower 1911> -.039 1918> -.017 1914> -.017 1968< -.016 1966> -.015 1984< -.013 Higher 1956 .023 1996 .018

1898 to 1927 segment:

Lower 1911> -.160 1918> -.072 1914> -.066 1921< -.061 1910> -.033 1920< -.021 Higher 1898 .109 1915 .078

1905 to 1934 segment:

Lower 1911> -.162 1918> -.070 1914> -.066 1921< -.066 1910> -.031 1920< -.024 Higher 1934 .189 1915 .060

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

1911 +3.7 SD; 1984 -5.0 SD

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277A 1929 to 2010 82 years Series 9

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

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

1929 1958 -7 .28 -.23 -.26 .49\*-.08 -.13 .04 -.15 .47 -.33 .01| .10 -.12 .04 -.01 -.15 .34 -.35 -.09 .02 -.07

1935 1964 -2 .23 -.25 -.23 .39 -.07 -.09 -.03 -.10 .45\*-.32 .01| .22 -.13 .08 -.03 -.22 .41 -.37 -.09 .05 -.06

1950 1979 6 .19 -.39 -.23 .33 -.04 -.18 -.02 -.18 .37 -.08 .08| .15 -.10 .02 -.02 -.29 .40\*-.30 -.06 -.06 .18

1965 1994 1 .12 -.02 -.37 .18 .02 -.01 -.15 -.12 -.04 .19 .16| .30\* .18 .15 .02 -.23 -.18 -.25 -.06 -.39 .24

[B] Entire series, effect on correlation ( .160) is:

Lower 1973< -.029 1956> -.027 1943> -.024 1935> -.019 1945< -.017 1961< -.012 Higher 2010 .023 2003 .021

1929 to 1958 segment:

Lower 1956> -.047 1943> -.040 1945< -.026 1935> -.024 1948> -.017 1930< -.012 Higher 1950 .071 1941 .039

1935 to 1964 segment:

Lower 1956> -.048 1943> -.041 1945< -.030 1935> -.027 1961< -.022 1948> -.019 Higher 1950 .047 1941 .046

1950 to 1979 segment:

Lower 1956> -.088 1973< -.064 1961< -.027 1968> -.022 1972> -.012 1958< -.007 Higher 1950 .052 1971 .036

1965 to 1994 segment:

Lower 1973< -.134 1993< -.054 1989> -.049 1968> -.037 1972> -.034 1982< -.027 Higher 1992 .075 1981 .039

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

1950 1951 4.5 SD

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

1950 -7.1 SD

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

277B 1907 to 2010 104 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

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1907 1936 7 .08 .05 .07 -.04 -.01 .12 .10 -.09 -.10 -.42 .31| .14 -.18 .02 -.06 -.12 -.16 .33\*-.10 -.09 .11

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1950 1979 0 -.06 -.19 -.20 -.19 -.31 -.11 .17 .16 .00 .01 .41\* .07 .04 .37 -.13 -.10 .18 .00 -.30 -.34 -.10

1965 1994 6 -.08 .21 -.39 -.07 -.17 .02 .01 -.26 .02 -.06 .12| .08 -.11 .07 -.06 .15 .44\* .14 -.01 -.39 .12

1980 2009 0 -.19 .16 .00 .21 -.04 -.13 -.07 -.34 .00 .03 .26\*-.03 - - - - - - - - -

1981 2010 0 -.24 .18 .06 .12 -.10 -.12 -.10 -.25 .03 .05 .30\* - - - - - - - - - -

[B] Entire series, effect on correlation ( .413) is:

Lower 1990< -.076 1971< -.016 1935> -.013 1922< -.013 1993< -.012 2008< -.011 Higher 1948 .034 1943 .027

1907 to 1936 segment:

Lower 1922< -.054 1935> -.032 1929> -.030 1921< -.027 1916< -.025 1925< -.015 Higher 1911 .133 1915 .021

1950 to 1979 segment:

Lower 1971< -.085 1961< -.051 1974> -.028 1959> -.026 1967> -.020 1978< -.019 Higher 1970 .048 1955 .042

1965 to 1994 segment:

Lower 1990< -.271 1971< -.049 1993< -.037 1974> -.019 1967> -.009 1968> -.008 Higher 1992 .065 1987 .049

1980 to 2009 segment:

Lower 1990< -.279 1993< -.031 2008< -.031 2006> -.027 2000> -.013 1984> -.009 Higher 1992 .048 2003 .041

1981 to 2010 segment:

Lower 1990< -.268 1993< -.033 2008< -.031 2006> -.025 2000> -.012 1984> -.008 Higher 2010 .040 1992 .040

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

1990 -5.2 SD

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

278A 1901 to 2010 110 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

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1901 1930 -9 -.02 .25\*-.06 .06 .24 .08 -.15 -.21 -.40 -.08 .15|-.18 .04 -.13 -.21 -.06 -.06 -.12 .15 .20 .01

1905 1934 -6 .11 .25 .00 .15 .31\* .13 .01 -.22 -.36 -.14 .26|-.36 .26 -.18 -.16 -.07 -.07 .01 -.12 .14 .12

1920 1949 0 -.06 .06 -.06 .01 -.01 .06 .14 -.14 -.09 -.15 .39\*-.50 .09 .00 -.03 -.07 .07 .15 .08 .07 .18

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

Lower 1923< -.032 1911> -.028 1948> -.026 1943> -.018 1916< -.017 1952< -.017 Higher 1935 .037 1956 .026

1901 to 1930 segment:

Lower 1911> -.146 1916< -.071 1923< -.033 1907> -.018 1929> -.014 1910> -.012 Higher 1918 .075 1917 .038

1905 to 1934 segment:

Lower 1911> -.137 1916< -.065 1923< -.051 1907> -.019 1929> -.013 1908> -.011 Higher 1934 .078 1918 .062

1920 to 1949 segment:

Lower 1923< -.100 1948> -.077 1943> -.053 1936< -.025 1937< -.011 1946> -.011 Higher 1935 .150 1934 .048

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

1948 +3.3 SD

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278B 1911 to 2010 100 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

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1911 1940 0 -.18 -.15 .10 .20 .18 .18 .02 -.24 -.35 -.10 .37\*-.14 .15 .04 .24 -.43 -.02 .11 -.09 .07 .12

1920 1949 0 -.07 -.28 .16 -.01 -.12 .14 .17 -.03 -.30 -.10 .37\*-.37 .14 .11 .26 -.30 -.11 .08 -.05 -.05 .24

[B] Entire series, effect on correlation ( .557) is:

Lower 1948> -.019 2002< -.017 1936< -.012 1984> -.012 1972< -.010 1911> -.008 Higher 1996 .060 1956 .019

1911 to 1940 segment:

Lower 1936< -.036 1911> -.025 1914> -.023 1931< -.021 1929> -.019 1916< -.015 Higher 1915 .027 1933 .019

1920 to 1949 segment:

Lower 1948> -.047 1936< -.043 1931< -.026 1942> -.018 1934< -.015 1929> -.014 Higher 1941 .043 1935 .042

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279A 1966 to 2010 45 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

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1966 1995 1 .36 -.04 -.28 .01 -.02 -.40 .16 -.30 .15 -.06 .31| .36\* .01 .05 -.16 -.06 .25 -.10 .11 .00 -.09

1980 2009 0 .10 -.23 -.31 .09 -.04 -.31 -.03 -.51 .12 -.14 .34\* .09 - - - - - - - - -

1981 2010 0 .06 -.27 -.31 .07 -.01 -.32 -.04 -.50 .12 -.12 .32\* - - - - - - - - - -

[B] Entire series, effect on correlation ( .296) is:

Lower 2003> -.044 2007< -.039 1984> -.023 1989> -.020 2004> -.018 1990< -.017 Higher 1996 .123 1966 .040

1966 to 1995 segment:

Lower 1984> -.048 1989> -.042 1981> -.034 1990< -.031 1967> -.028 1985< -.021 Higher 1966 .100 1982 .052

1980 to 2009 segment:

Lower 2007< -.060 2003> -.055 1984> -.029 1990< -.027 1989> -.025 2005> -.022 Higher 1996 .227 1982 .043

1981 to 2010 segment:

Lower 2007< -.057 2003> -.057 1984> -.030 1989> -.026 1990< -.025 2005> -.024 Higher 1996 .229 1982 .043

[D] 5 Absent rings: Year Master N series Absent

2006 -.931 26 1

2007 .720 26 3 >> WARNING: Ring is not usually narrow

2008 .560 26 3 >> WARNING: Ring is not usually narrow

2009 .590 26 3 >> WARNING: Ring is not usually narrow

2010 1.336 26 3 >> WARNING: Ring is not usually narrow

>> WARNING: Last ring in series is ABSENT

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

2005 +3.6 SD

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279B 1793 to 2010 218 years Series 14

[\*] Early part of series cannot be checked from 1793 to 1828 -- 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

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1829 1858 0 -.06 -.03 -.28 .03 -.01 .18 .00 .03 -.29 .04 .37\*-.17 -.05 .11 -.28 .33 .22 -.36 .14 .11 -.20

1830 1859 5 -.02 -.03 -.25 .01 .02 .21 .06 .05 -.28 .02 .32|-.13 -.03 .03 -.23 .34\* .23 -.35 .14 .11 -.18

1845 1874 6 -.10 -.13 .03 -.16 -.07 .27 -.18 .11 -.01 -.05 .27|-.22 -.14 .20 -.10 .19 .35\*-.22 -.10 .04 -.03

1860 1889 0 -.09 -.26 .11 -.08 .13 -.04 -.26 -.01 .17 .08 .26\*-.20 -.09 .18 .07 -.21 .09 -.15 -.03 -.24 -.03

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1890 1919 -1 .05 -.29 -.02 .24 .09 .07 .34 .12 .20 .52\* .32|-.02 -.08 .10 .14 -.03 -.35 -.08 -.08 -.21 -.10

1905 1934 0 .14 -.08 .05 .30 .02 -.10 .37 -.21 .01 .35 .39\*-.37 -.05 -.11 .15 -.13 -.01 .05 .15 -.36 .07

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1965 1994 2 -.01 -.22 .17 -.11 -.01 .32 -.13 .35 -.09 .02 .39|-.13 .57\*-.24 .01 -.18 -.38 -.05 -.02 .15 .05

[B] Entire series, effect on correlation ( .397) is:

Lower 1862> -.024 1832> -.017 1833< -.016 1852> -.016 1973< -.014 1915< -.010 Higher 1935 .025 1887 .020

1829 to 1858 segment:

Lower 1833< -.060 1857< -.049 1832> -.048 1839< -.032 1835< -.017 1852> -.014 Higher 1844 .064 1829 .043

1830 to 1859 segment:

Lower 1833< -.063 1832> -.051 1839< -.031 1857< -.028 1840> -.015 1835< -.014 Higher 1844 .081 1845 .036

1845 to 1874 segment:

Lower 1862> -.090 1860< -.045 1868< -.024 1865< -.014 1872< -.011 1871< -.006 Higher 1867 .038 1852 .033

1860 to 1889 segment:

Lower 1862> -.122 1860< -.062 1879> -.046 1868< -.032 1865< -.019 1882> -.018 Higher 1887 .166 1867 .067

1890 to 1919 segment:

Lower 1915< -.088 1901> -.048 1913< -.034 1910> -.032 1917> -.026 1903> -.019 Higher 1911 .173 1918 .090

1905 to 1934 segment:

Lower 1915< -.111 1913< -.047 1926> -.041 1907< -.029 1910> -.025 1917> -.020 Higher 1911 .141 1934 .092

1965 to 1994 segment:

Lower 1973< -.100 1982< -.035 1983> -.028 1978> -.022 1984> -.018 1974> -.017 Higher 1981 .047 1990 .043

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

1832 1833 -4.4 SD

[D] 1 Absent rings: Year Master N series Absent

1973 .517 26 1 >> WARNING: Ring is not usually narrow

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

1862 +3.2 SD; 1863 +3.6 SD; 1948 -6.2 SD; 1973 -5.4 SD

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280A 1838 to 2010 173 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

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1838 1867 1 .14 .04 .05 -.10 .02 .28 -.18 .00 -.02 -.22 .25| .49\*-.25 -.20 .18 -.27 .03 -.06 -.21 .07 -.16

1845 1874 1 .32 .05 -.05 .01 .02 .20 -.15 .03 -.01 -.15 .25| .50\*-.09 -.25 .06 -.14 .07 -.09 -.29 -.23 -.07

1860 1889 1 .47 -.05 -.17 .00 .11 .30 -.07 -.03 .04 -.17 .22| .57\* .12 -.17 .12 -.26 -.17 -.11 .03 -.23 -.15

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1890 1919 -5 -.27 -.16 .06 -.05 .36 .42\* .17 .23 .25 .35 .36| .22 .13 -.02 -.11 -.22 .13 .16 -.28 -.11 .04

1905 1934 2 -.07 -.42 .04 .10 .20 .03 .01 -.12 -.03 .09 .25|-.08 .38\* .01 .15 -.14 .04 .19 -.48 .07 -.01

1920 1949 -8 .16 -.63 .30\* .12 .04 .08 .17 .01 -.21 -.21 .21|-.13 .03 .25 .11 .11 -.18 .11 -.12 -.03 -.06

1935 1964 3 .11 -.54 .31 -.07 .14 .00 .06 .18 -.28 -.18 .44|-.19 -.15 .44\*-.03 .12 -.13 -.05 .06 -.22 -.03

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1965 1994 0 .13 -.32 -.02 .28 .13 .32 -.12 .13 -.19 -.13 .33\*-.07 .00 -.30 -.21 .27 .18 .22 .09 .18 .09

[B] Entire series, effect on correlation ( .353) is:

Lower 1862< -.069 1935> -.016 1863> -.016 1846< -.012 1924< -.007 1923> -.007 Higher 1887 .019 1996 .018

1838 to 1867 segment:

Lower 1862< -.236 1863> -.030 1846< -.029 1839> -.011 1843< -.011 1838> -.004 Higher 1852 .072 1867 .035

1845 to 1874 segment:

Lower 1862< -.338 1846< -.035 1863> -.028 1859< -.003 1847> -.003 1860> -.002 Higher 1852 .117 1867 .032

1860 to 1889 segment:

Lower 1862< -.243 1863> -.087 1881> -.015 1875> -.014 1876> -.005 1886< -.004 Higher 1887 .085 1867 .056

1890 to 1919 segment:

Lower 1893< -.090 1918> -.065 1916< -.044 1903> -.036 1912< -.030 1901> -.021 Higher 1911 .196 1898 .049

1905 to 1934 segment:

Lower 1923> -.080 1924< -.077 1918> -.053 1916< -.033 1912< -.022 1927> -.018 Higher 1911 .148 1933 .055

1920 to 1949 segment:

Lower 1935> -.106 1924< -.047 1939< -.038 1923> -.036 1949< -.015 1945< -.013 Higher 1943 .142 1933 .026

1935 to 1964 segment:

Lower 1935> -.120 1939< -.058 1954< -.028 1949< -.020 1945< -.017 1944> -.011 Higher 1943 .081 1956 .062

1965 to 1994 segment:

Lower 1977> -.053 1991< -.051 1983> -.048 1981> -.042 1988< -.029 1971< -.022 Higher 1966 .058 1982 .050

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

1861 1862 -4.0 SD 1862 1863 5.6 SD

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

1862 -6.2 SD

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280B 1866 to 2010 145 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

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1890 1919 -3 -.26 -.01 -.03 .00 .08 .10 .31 .52\* .05 .17 .34|-.16 .03 .26 .03 -.17 .04 -.07 -.18 -.03 -.31

1905 1934 -3 .04 .05 -.09 .05 .10 -.32 .09 .54\*-.06 .04 .18|-.25 -.08 .35 -.05 -.21 .11 .09 .00 -.05 -.22

1920 1949 -7 .08 .03 -.13 .40\*-.18 .02 -.23 .31 .07 -.10 .26|-.21 -.09 .12 -.19 -.13 .23 .06 .30 -.30 .15

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1965 1994 10 .32 .05 -.05 -.01 -.13 .10 -.13 .05 -.15 .03 .24| .06 .24 -.16 -.05 -.08 .04 -.08 .12 .32 .34\*

1980 2009 0 -.10 .12 -.14 .19 -.12 -.09 -.27 -.14 -.37 .03 .24\* .10 - - - - - - - - -

1981 2010 -7 -.10 .07 -.17 .22\*-.05 -.09 -.25 -.16 -.38 .02 .17| - - - - - - - - - -

[B] Entire series, effect on correlation ( .325) is:

Lower 1888> -.018 1981> -.018 1870< -.018 2010< -.011 2009< -.010 1923> -.010 Higher 1887 .047 1911 .019

1890 to 1919 segment:

Lower 1918> -.070 1914< -.051 1894< -.040 1917> -.029 1915< -.026 1903> -.021 Higher 1911 .158 1898 .045

1905 to 1934 segment:

Lower 1918> -.051 1923> -.047 1924< -.040 1920< -.035 1933> -.031 1915< -.024 Higher 1911 .170 1934 .055

1920 to 1949 segment:

Lower 1923> -.047 1924< -.035 1920< -.035 1933> -.027 1935> -.023 1936< -.023 Higher 1941 .072 1934 .049

1965 to 1994 segment:

Lower 1981> -.181 1983> -.079 1973< -.029 1987< -.026 1989> -.024 1965< -.023 Higher 1982 .080 1994 .050

1980 to 2009 segment:

Lower 1981> -.079 2009< -.066 1995< -.035 1983> -.032 2006> -.029 1987< -.021 Higher 2003 .066 1996 .048

1981 to 2010 segment:

Lower 1981> -.078 2010< -.054 2009< -.054 1983> -.033 2006> -.030 1995< -.025 Higher 2003 .069 1996 .053

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

1887 1888 5.7 SD

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

1887 -7.3 SD

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281A 1886 to 2010 125 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

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1886 1915 -1 -.03 .32 .17 .15 .01 .07 .12 .16 .19 .41\* .26| .16 -.20 -.15 .00 -.35 -.16 .07 -.01 -.26 -.39

1890 1919 1 .14 .26 .09 .07 .07 .08 .10 .17 .09 .06 .28| .42\*-.22 -.10 .09 -.21 .06 .09 .07 -.10 -.28

1905 1934 -3 .09 .28 .05 -.15 .06 -.09 .06 .30\* .19 -.18 .23| .14 -.31 -.17 .16 -.27 .17 .22 .19 -.28 -.25

[B] Entire series, effect on correlation ( .508) is:

Lower 1910< -.032 1887> -.029 1933> -.020 1959> -.016 1918> -.014 1920< -.011 Higher 1935 .051 1996 .015

1886 to 1915 segment:

Lower 1887> -.113 1910< -.045 1903> -.020 1907> -.009 1915< -.007 1906> -.007 Higher 1911 .085 1888 .022

1890 to 1919 segment:

Lower 1910< -.080 1918> -.077 1903> -.030 1915< -.017 1907> -.014 1913< -.013 Higher 1911 .155 1917 .023

1905 to 1934 segment:

Lower 1933> -.087 1918> -.064 1920< -.045 1926> -.043 1910< -.039 1915< -.015 Higher 1911 .133 1934 .104

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

1887 1888 -4.5 SD

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

1887 +3.6 SD; 1933 +3.3 SD

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281B 1883 to 2010 128 years Series 18

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

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1883 1912 -1 .13 .16 .15 .09 .11 .29 .21 .15 .43 .44\* .30|-.04 -.33 -.06 -.27 -.37 -.12 -.02 -.21 -.49 -.32

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1950 1979 0 .33 -.38 -.15 .16 -.13 -.03 .19 -.01 -.11 .00 .36\*-.25 .06 .26 .05 .04 .03 -.15 -.19 -.04 .02

1965 1994 -2 .33 -.18 -.19 .17 .04 .23 .03 -.21 .39\*-.34 .33|-.10 .16 .00 -.19 .22 .10 -.22 -.19 -.08 .18

1980 2009 -2 .31 .14 .02 -.07 -.26 -.20 -.15 -.16 .58\* .02 .54| .01 - - - - - - - - -

1981 2010 -2 .26 .10 .03 -.11 -.25 -.21 -.17 -.10 .61\* .04 .53| - - - - - - - - - -

[B] Entire series, effect on correlation ( .480) is:

Lower 1889< -.027 1967> -.013 1989> -.012 1981> -.010 1887> -.010 2003> -.010 Higher 1935 .060 1911 .022

1883 to 1912 segment:

Lower 1889< -.108 1885> -.027 1887> -.023 1903> -.022 1901> -.022 1883> -.016 Higher 1911 .154 1888 .034

1950 to 1979 segment:

Lower 1967> -.068 1950> -.048 1959> -.042 1971< -.034 1977> -.030 1962> -.022 Higher 1952 .054 1955 .034

1965 to 1994 segment:

Lower 1967> -.070 1989> -.061 1981> -.050 1971< -.035 1977> -.030 1991< -.023 Higher 1992 .047 1966 .044

1980 to 2009 segment:

Lower 1989> -.051 1981> -.039 2003> -.036 1983< -.027 1991< -.026 2005< -.015 Higher 1996 .052 1992 .028

1981 to 2010 segment:

Lower 1989> -.056 1981> -.042 2003> -.038 1983< -.028 1991< -.023 2005< -.014 Higher 1996 .055 1992 .030

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

1889 -5.6 SD

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551A 1897 to 2010 114 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

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1897 1926 1 -.36 -.26 -.04 -.10 .12 .08 .24 .23 .03 .12 .18| .30\* .02 .15 -.03 -.01 .06 -.09 .03 .10 -.29

1905 1934 1 -.24 .10 -.14 -.17 .19 .18 -.04 .23 -.08 .12 -.15| .51\*-.28 .24 .05 -.13 .11 -.24 .14 .18 -.29

1920 1949 1 -.09 .19 -.13 -.07 .22 -.09 -.13 .27 -.02 .10 -.36| .61\*-.10 -.15 .12 .04 -.06 -.16 -.01 .23 -.16

1935 1964 1 .00 .12 -.33 .07 .08 -.16 .00 .23 .23 -.05 -.33| .65\*-.06 -.48 .31 .19 -.19 -.10 -.20 .14 -.16

1950 1979 1 -.14 .26 -.31 .07 -.25 -.06 .03 .12 .34 .05 -.13| .66\*-.15 -.20 .17 -.13 -.06 -.23 .09 -.13 -.14

1965 1994 1 -.03 .26 -.21 -.05 -.37 -.05 .30 -.25 -.09 -.03 -.13| .56\* .04 .49 -.05 -.15 -.09 .03 -.02 -.14 .18

1980 2009 1 -.01 -.07 -.19 .00 -.17 -.06 .28 -.25 -.20 -.12 -.11| .43\* - - - - - - - - -

1981 2010 -4 -.01 -.06 -.19 .00 -.18 -.06 .28\*-.26 -.20 -.12 -.11| - - - - - - - - - -

[B] Entire series, effect on correlation ( -.161) is:

Lower 1993< -.065 1956> -.037 1934< -.028 2007< -.018 1940> -.015 1941< -.014 Higher 1992 .030 1996 .020

1897 to 1926 segment:

Lower 1900< -.063 1901> -.060 1913< -.032 1916< -.030 1923> -.029 1915< -.025 Higher 1897 .057 1924 .034

1905 to 1934 segment:

Lower 1934< -.231 1933> -.046 1932< -.031 1923> -.024 1913< -.017 1916< -.016 Higher 1924 .057 1911 .057

1920 to 1949 segment:

Lower 1934< -.086 1941< -.038 1940> -.031 1938< -.020 1933> -.015 1949< -.010 Higher 1948 .040 1924 .035

1935 to 1964 segment:

Lower 1956> -.095 1941< -.040 1938< -.024 1940> -.022 1952< -.020 1958< -.017 Higher 1954 .066 1957 .043

1950 to 1979 segment:

Lower 1956> -.218 1971< -.051 1952< -.037 1965< -.037 1958< -.030 1974> -.022 Higher 1954 .077 1970 .071

1965 to 1994 segment:

Lower 1993< -.312 1971< -.027 1974> -.022 1983> -.021 1984> -.021 1965< -.018 Higher 1992 .107 1970 .046

1980 to 2009 segment:

Lower 1993< -.260 2007< -.051 1985< -.017 1984> -.014 1983> -.013 2006> -.011 Higher 1992 .084 1996 .064

1981 to 2010 segment:

Lower 1993< -.269 2007< -.052 1985< -.017 1983> -.013 1984> -.013 2006> -.011 Higher 1992 .078 1996 .061

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

1933 1934 -4.4 SD 1934 1935 4.3 SD 1939 1940 4.7 SD

[D] 4 Absent rings: Year Master N series Absent

2007 .720 26 3 >> WARNING: Ring is not usually narrow

2008 .560 26 3 >> WARNING: Ring is not usually narrow

2009 .590 26 3 >> WARNING: Ring is not usually narrow

2010 1.336 26 3 >> WARNING: Ring is not usually narrow

>> WARNING: Last ring in series is ABSENT

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

1940 +3.0 SD; 1956 +3.7 SD

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551B 1880 to 2010 131 years Series 20

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

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1905 1934 0 -.08 -.28 -.12 .07 -.01 -.21 .13 .18 .01 .20 .40\*-.14 -.01 -.21 .18 .07 .21 .09 .12 -.16 -.22

[B] Entire series, effect on correlation ( .508) is:

Lower 2007< -.046 1982< -.016 1959> -.014 1943> -.014 2004> -.011 1977> -.009 Higher 1935 .044 1996 .014

1905 to 1934 segment:

Lower 1933> -.074 1923> -.063 1912< -.032 1928< -.018 1930< -.017 1926> -.017 Higher 1934 .073 1911 .072

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

2006 2007 -4.2 SD

[D] 4 Absent rings: Year Master N series Absent

2007 .720 26 3 >> WARNING: Ring is not usually narrow

2008 .560 26 3 >> WARNING: Ring is not usually narrow

2009 .590 26 3 >> WARNING: Ring is not usually narrow

2010 1.336 26 3 >> WARNING: Ring is not usually narrow

>> WARNING: Last ring in series is ABSENT

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

2010 +4.4 SD

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552A 1897 to 2010 114 years Series 21

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

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1920 1949 -8 -.03 -.18 .60\*-.13 -.24 .12 .07 -.04 -.26 -.01 .41|-.33 .03 .36 -.13 .22 -.08 .02 -.18 .07 -.02

1935 1964 0 .04 -.32 .41 -.13 -.20 -.03 -.05 -.05 -.19 -.06 .42\*-.21 -.04 .38 -.10 .28 .16 -.02 -.06 -.18 -.04

1950 1979 0 -.01 -.23 -.06 -.05 .12 -.22 -.24 -.08 -.22 -.10 .40\*-.02 .08 .25 .22 -.19 .32 .14 -.11 -.08 .01

1965 1994 0 -.16 -.05 -.01 .21 .29 .08 -.08 -.17 -.06 .01 .41\* .21 -.15 -.12 -.08 -.21 -.01 -.18 -.12 -.03 -.10

[B] Entire series, effect on correlation ( .459) is:

Lower 1918> -.020 1935> -.017 1961< -.016 1948> -.015 1998> -.012 1946> -.012 Higher 1943 .028 1996 .026

1920 to 1949 segment:

Lower 1935> -.068 1948> -.046 1946> -.031 1932< -.024 1942> -.018 1925> -.017 Higher 1943 .131 1934 .030

1935 to 1964 segment:

Lower 1935> -.063 1948> -.048 1961< -.036 1946> -.034 1942> -.021 1947< -.007 Higher 1943 .087 1956 .056

1950 to 1979 segment:

Lower 1961< -.082 1979> -.041 1955< -.025 1968> -.019 1973< -.018 1976> -.016 Higher 1956 .149 1970 .034

1965 to 1994 segment:

Lower 1980< -.081 1979> -.052 1985< -.040 1976> -.031 1973< -.029 1978> -.024 Higher 1981 .057 1992 .047

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

552B 1895 to 2010 116 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

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1895 1924 1 -.17 -.20 -.43 -.44 -.32 -.16 -.24 -.32 .16 .24 .14| .36\* .01 .02 .02 .27 .19 .22 -.05 .10 .27

1905 1934 0 .17 .01 -.13 -.18 -.07 -.17 .00 -.20 .12 .07 .30\*-.14 -.06 .04 .04 .02 .12 .20 -.03 -.17 .09

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1950 1979 4 -.15 -.30 -.16 -.22 .05 .01 -.31 .05 -.14 .00 .35| .00 .27 .07 .36\* .02 .19 -.02 -.40 -.18 -.20

1965 1994 0 -.04 -.08 -.10 -.14 .04 .31 -.33 -.11 .03 .01 .38\*-.18 .20 -.12 -.16 -.24 -.12 .20 -.02 .12 -.01

[B] Entire series, effect on correlation ( .549) is:

Lower 1914> -.025 1966> -.023 1984> -.016 1944< -.016 1961< -.015 1943> -.012 Higher 1935 .055 1948 .020

1895 to 1924 segment:

Lower 1914> -.167 1913< -.061 1918> -.037 1917> -.036 1900< -.024 1922< -.009 Higher 1911 .168 1915 .050

1905 to 1934 segment:

Lower 1914> -.159 1913< -.082 1932< -.036 1918> -.033 1917> -.030 1922< -.018 Higher 1934 .163 1911 .124

1950 to 1979 segment:

Lower 1966> -.104 1961< -.090 1954< -.028 1973< -.021 1950> -.016 1967> -.014 Higher 1952 .056 1971 .035

1965 to 1994 segment:

Lower 1966> -.108 1984> -.073 1987< -.042 1986< -.025 1982< -.025 1973< -.018 Higher 1981 .093 1992 .090

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553A 1893 to 2010 118 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

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1905 1934 0 .17 .19 .17 .15 .03 -.22 .04 .00 -.42 .06 .39\*-.27 -.18 .14 -.16 -.20 .05 -.01 .20 -.10 -.11

1920 1949 0 -.10 -.37 .30 -.03 -.11 .07 .10 -.09 -.46 -.11 .34\*-.16 -.04 .19 -.13 -.02 -.16 -.14 .09 -.25 .13

[B] Entire series, effect on correlation ( .539) is:

Lower 1935> -.029 1977< -.021 1898< -.014 1924< -.012 1897< -.010 1907> -.008 Higher 1996 .051 1911 .022

1905 to 1934 segment:

Lower 1924< -.074 1907> -.045 1910> -.041 1932< -.031 1906> -.027 1934< -.022 Higher 1911 .241 1918 .024

1920 to 1949 segment:

Lower 1935> -.070 1924< -.063 1932< -.034 1922< -.019 1947< -.018 1942> -.017 Higher 1943 .124 1941 .045

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553B 1863 to 2010 148 years Series 24

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

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1863 1892 -6 -.11 -.18 .03 -.20 .37\* .03 -.06 -.14 -.15 .19 .31| .23 .11 .16 -.24 .16 .15 -.06 -.22 -.15 -.07

1875 1904 4 -.31 -.16 -.08 -.21 -.07 .00 -.11 -.24 .23 .26 .22| .23 .25 .11 .40\* .30 .34 .09 -.14 -.03 -.05

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1905 1934 8 -.22 -.02 .04 .08 .04 -.20 .06 .11 -.41 .02 .28|-.10 -.11 .14 .03 -.09 .10 -.19 .34\*-.07 -.13

1920 1949 8 -.33 -.11 .14 -.23 -.12 .25 -.10 -.15 -.13 -.05 .28|-.20 -.08 .03 .02 .01 .11 -.37 .31\*-.34 .08

[B] Entire series, effect on correlation ( .484) is:

Lower 1879> -.031 1935> -.022 1874< -.022 1934< -.014 1878< -.011 1984> -.010 Higher 1863 .039 1956 .019

1863 to 1892 segment:

Lower 1879> -.104 1874< -.065 1878< -.027 1864> -.024 1876> -.018 1888> -.008 Higher 1863 .293 1867 .026

1875 to 1904 segment:

Lower 1879> -.196 1878< -.045 1876> -.030 1884< -.016 1883< -.007 1882< -.007 Higher 1898 .066 1887 .064

1905 to 1934 segment:

Lower 1934< -.085 1926> -.048 1930< -.038 1909< -.033 1910> -.026 1933> -.023 Higher 1911 .130 1918 .031

1920 to 1949 segment:

Lower 1935> -.084 1934< -.070 1930< -.044 1926> -.034 1932< -.021 1940> -.017 Higher 1948 .121 1941 .092

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

1863 1864 4.8 SD

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

1863 -5.8 SD; 1959 -4.9 SD

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554A 1911 to 2010 100 years Series 25

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

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1911 1940 7 -.01 .29 .29 -.34 -.24 .17 -.16 -.08 .12 -.10 .37|-.22 .00 .04 -.15 -.03 .01 .37\*-.02 .11 -.03

1920 1949 -8 -.06 .00 .44\*-.26 -.31 .10 -.09 .06 .03 -.24 .39|-.36 .13 -.01 -.08 .18 -.12 .11 .02 .10 .12

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1950 1979 0 .30 .06 .07 -.32 -.10 -.30 -.31 -.08 -.20 -.14 .34\*-.07 -.18 .14 .15 .01 .21 .19 .30 -.22 .03

[B] Entire series, effect on correlation ( .510) is:

Lower 1935> -.028 1928< -.019 1917> -.013 1966> -.010 1974> -.010 1958< -.010 Higher 1956 .028 1911 .024

1911 to 1940 segment:

Lower 1935> -.115 1928< -.047 1917> -.038 1920< -.021 1938< -.018 1929> -.016 Higher 1911 .177 1934 .049

1920 to 1949 segment:

Lower 1935> -.079 1928< -.062 1920< -.025 1938< -.021 1929> -.016 1927< -.014 Higher 1943 .065 1934 .050

1950 to 1979 segment:

Lower 1966> -.048 1974> -.044 1963> -.036 1958< -.034 1950> -.028 1978< -.026 Higher 1956 .220 1959 .045

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554B 1912 to 2010 99 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

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1912 1941 -8 -.08 .07 .39\*-.13 -.28 .16 -.20 -.13 .13 .11 .19|-.31 .18 -.21 .25 -.14 -.16 .26 -.17 -.12 .15

1920 1949 -8 -.01 -.25 .41\*-.18 -.11 .06 -.06 .05 -.14 -.12 .38|-.35 .30 -.19 .14 .04 -.35 .26 -.12 -.17 .26

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1950 1979 0 .16 .11 .21 -.23 .10 -.15 -.35 .14 -.40 -.29 .35\*-.21 -.12 .20 -.02 -.04 .09 .31 .23 .21 .11

[B] Entire series, effect on correlation ( .451) is:

Lower 1919< -.026 1963> -.017 1929> -.016 1917> -.015 1994> -.014 1977> -.013 Higher 1996 .041 1956 .036

1912 to 1941 segment:

Lower 1919< -.065 1929> -.050 1917> -.049 1918> -.032 1931< -.023 1940> -.017 Higher 1935 .089 1933 .044

1920 to 1949 segment:

Lower 1931< -.057 1929> -.050 1922< -.031 1936< -.026 1942> -.018 1940> -.014 Higher 1943 .060 1935 .051

1950 to 1979 segment:

Lower 1963> -.058 1977> -.047 1957< -.032 1974> -.025 1962> -.021 1972< -.019 Higher 1956 .194 1959 .058

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

1963 +3.2 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 ()

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1 272A 1918 2010 93 7 0 .661 2.08 4.08 .681 .707 .192 2.60 .472 -.024 1

2 272B 1860 2010 151 10 0 .635 1.48 4.13 .746 .824 .207 2.86 .406 -.083 1

3 274A 1916 2010 95 7 0 .472 1.68 5.15 1.131 .879 .263 2.64 .435 -.064 1

4 274B 1830 2010 181 12 2 .537 1.28 4.56 1.195 .929 .297 2.70 .411 -.006 1

5 275A 1896 2010 115 8 4 .432 1.41 2.87 .539 .716 .216 2.52 .306 -.050 1

6 275B 1911 2010 100 7 1 .520 1.72 3.84 .796 .757 .228 2.75 .423 -.011 1

7 276A 1829 2010 182 13 5 .508 .66 2.43 .565 .924 .281 2.62 .371 -.047 1

8 276B 1898 2010 113 8 2 .481 1.31 3.20 .622 .824 .244 2.69 .460 -.008 1

9 277A 1929 2010 82 6 4 .160 .74 2.58 .489 .627 .366 2.59 .350 -.130 1

10 277B 1907 2010 104 7 5 .413 1.11 3.16 .576 .591 .341 2.68 .528 .043 1

11 278A 1901 2010 110 8 3 .462 1.35 4.52 .801 .816 .250 2.70 .474 -.045 1

12 278B 1911 2010 100 7 2 .557 1.71 4.54 .888 .777 .260 2.83 .459 -.094 1

13 279A 1966 2010 45 3 3 .296 1.10 2.42 .557 .760 .252 2.70 .579 .089 1

14 279B 1793 2010 218 13 7 .397 .60 2.53 .488 .893 .298 2.57 .378 -.048 1

15 280A 1838 2010 173 12 8 .353 1.34 4.47 1.232 .943 .258 2.54 .322 -.044 1

16 280B 1866 2010 145 10 6 .325 1.48 4.13 .966 .898 .231 2.37 .288 -.070 2

17 281A 1886 2010 125 9 3 .508 1.46 5.03 .896 .817 .269 2.61 .451 -.049 1

18 281B 1883 2010 128 9 5 .480 1.40 2.64 .489 .671 .236 2.59 .359 -.002 1

19 551A 1897 2010 114 8 8 -.161 1.37 4.02 1.005 .879 .273 2.68 .372 -.093 1

20 551B 1880 2010 131 9 1 .508 1.26 3.99 1.020 .935 .239 3.87 .532 .120 1

21 552A 1897 2010 114 8 4 .459 1.14 4.65 .739 .914 .203 2.59 .403 -.005 1

22 552B 1895 2010 116 8 4 .549 .89 2.50 .547 .882 .217 2.53 .325 -.074 1

23 553A 1893 2010 118 8 2 .539 1.30 5.27 .993 .882 .268 2.66 .457 -.056 1

24 553B 1863 2010 148 10 4 .484 .85 3.58 .642 .866 .304 2.59 .354 -.030 1

25 554A 1911 2010 100 7 3 .510 1.49 2.84 .647 .840 .225 2.59 .441 .010 1

26 554B 1912 2010 99 7 3 .451 1.53 3.31 .720 .891 .200 2.61 .531 -.022 1

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Total or mean: 3200 221 89 .450 1.26 5.27 .780 .839 .257 3.87 .408 -.033

- = [ COFECHA 121 COF ] = -