[] Dendrochronology Program Library Run STER4 Program COF 11:20 Tue 26 Mar 2013 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 28576

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

Title of run: STER4\_6

File of DATED series: STER4\_6COMP

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 1825 to 2012 188 years

Continuous time span is 1825 to 2012 188 years

Portion with two or more series is 1830 to 2012 183 years

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

\*C\* Number of dated series 22 \*C\*

\*O\* Master series 1825 2012 188 yrs \*O\*

\*F\* Total rings in all series 2008 \*F\*

\*E\* Total dated rings checked 2003 \*E\*

\*C\* Series intercorrelation .610 \*C\*

\*H\* Average mean sensitivity .267 \*H\*

\*A\* Segments, possible problems 15 \*A\*

\*\*\* Mean length of series 91.3 \*\*\*

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

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

41A 1 absent rings: 2004

41B 1 absent rings: 2004

44A 1 absent rings: 2004

3 absent rings .149%

PART 2: TIME PLOT OF TREE-RING SERIES: STER4\_6 11:20 Tue 26 Mar 2013 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

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

. . . . . . . . . . . . . . . . . . <======> . 41A 1 1948 2012 65

. . . . . . . . . . . . . . . . . . <======> . 41B 2 1949 2012 64

. . . . . . . . . . . . . . . . . . <=====> . 42A 3 1957 2012 56

. . . . . . . . . . . . . . . . . . <=====> . 42B 4 1952 2012 61

. . . . . . . . . . . . . . . . . . <========> . 43A 5 1924 2012 89

. . . . . . . . . . . . . . . . . . <========> . 43B 6 1928 2012 85

. . . . . . . . . . . . . . . . . . <=====> . 44A 7 1950 2012 63

. . . . . . . . . . . . . . . . . . <=====> . 44B 8 1956 2012 57

. . . . . . . . . . . . . . . . . <==========> . 45A 9 1905 2012 108

. . . . . . . . . . . . . . . . . . <========> . 45B 10 1925 2012 88

. . . . . . . . . . . . . . . . . . <======> . 46A 11 1945 2012 68

. . . . . . . . . . . . . . . . . . <======> . 46B 12 1943 2012 70

. . . . . . . . . . . . . . . . . . <=======> . 47B 13 1931 2012 82

. . . . . . . . . . . . . . . . <==================> . 48A 14 1825 2012 188

. . . . . . . . . . . . . . . . <=================> . 48B 15 1830 2012 183

. . . . . . . . . . . . . . . . . <==========> . 50A 16 1908 2012 105

. . . . . . . . . . . . . . . . . <===========> . 50B 17 1890 2012 123

. . . . . . . . . . . . . . . . . . <=====> . 51A 18 1952 2012 61

. . . . . . . . . . . . . . . . . . <=====> . 51B 19 1959 2012 54

. . . . . . . . . . . . . . . . . . .<====> . 52B 20 1967 2012 46

. . . . . . . . . . . . . . . . . <=============> . 49A 21 1871 2012 142

. . . . . . . . . . . . . . . . .<==============> . 49B 22 1863 2012 150

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

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: STER4\_6 11:20 Tue 26 Mar 2013 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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1850 .712 2 1900 -.078 5 1950 -.690 16 2000 -.336 22

1851 -.311 2 1901 -1.285 5 1951 -.477 16 2001 .974 22

1852 -.506 2 1902 -.601 5 1952 -.484 18 2002 .523 22

1853 1.998 2 1903 .720 5 1953 -.486 18 2003 -2.403 22

1854 -.216 2 1904 1.728 5 1954 -.348 18 2004 -2.702 22 3

1855 -.862 2 1905 .423 6 1955 .389 18 2005 -1.725 22

1856 .473 2 1906 1.457 6 1956 -.395 19 2006 -.966 22

1857 .074 2 1907 1.040 6 1957 .820 20 2007 .157 22

1858 -1.260 2 1908 .877 7 1958 1.101 20 2008 .052 22

1859 .183 2 1909 .043 7 1959 1.464 21 2009 -.004 22

1860 -.130 2 1910 .606 7 1960 .299 21 2010 1.539 22

1861 -1.282 2 1911 -.608 7 1961 1.500 21 2011 .274 22

1862 1.717 2 1912 -1.758 7 1962 -.766 21 2012 1.515 22

1863 2.005 3 1913 -.530 7 1963 .478 21

1864 .033 3 1914 -.629 7 1964 .664 21

1865 -.191 3 1915 -.845 7 1965 .295 21

1866 -.704 3 1916 -.735 7 1966 -.776 21

1867 -.476 3 1917 -2.467 7 1967 .350 22

1868 -1.451 3 1918 -1.349 7 1968 -.352 22

1869 -.633 3 1919 -.129 7 1969 -.861 22

1870 .458 3 1920 .234 7 1970 .408 22

1871 -.086 4 1921 .727 7 1971 .731 22

1872 .495 4 1922 .769 7 1972 -.182 22

1873 .876 4 1923 .345 7 1973 -.693 22

1874 1.543 4 1924 1.145 8 1974 -.965 22

1825 -1.083 1 1875 1.163 4 1925 -.124 9 1975 1.045 22

1826 -1.431 1 1876 -1.229 4 1926 1.237 9 1976 -.692 22

1827 1.069 1 1877 -.757 4 1927 .775 9 1977 -.465 22

1828 -.130 1 1878 -.437 4 1928 1.079 10 1978 .603 22

1829 2.202 1 1879 .898 4 1929 .347 10 1979 .503 22

1830 1.706 2 1880 1.284 4 1930 .747 10 1980 1.586 22

1831 -.360 2 1881 -.055 4 1931 .688 11 1981 -.797 22

1832 .499 2 1882 -.300 4 1932 .689 11 1982 -1.580 22

1833 .543 2 1883 -1.157 4 1933 .311 11 1983 -1.493 22

1834 .235 2 1884 -.517 4 1934 .364 11 1984 -1.530 22

1835 .621 2 1885 .054 4 1935 -2.902 11 1985 -.216 22

1836 .556 2 1886 1.316 4 1936 -1.421 11 1986 -.646 22

1837 .156 2 1887 -.747 4 1937 -.770 11 1987 .640 22

1838 -1.503 2 1888 -1.262 4 1938 -.626 11 1988 .934 22

1839 -.242 2 1889 -1.725 4 1939 .280 11 1989 -.750 22

1840 -1.192 2 1890 -.961 5 1940 -.725 11 1990 .320 22

1841 -1.606 2 1891 .346 5 1941 1.012 11 1991 .966 22

1842 -2.004 2 1892 2.003 5 1942 .535 11 1992 .729 22

1843 -1.964 2 1893 -.126 5 1943 .413 12 1993 1.433 22

1844 -.920 2 1894 .755 5 1944 -.277 12 1994 .494 22

1845 .841 2 1895 .080 5 1945 -.122 13 1995 1.260 22

1846 1.801 2 1896 .727 5 1946 -.202 13 1996 -.458 22

1847 1.626 2 1897 -1.034 5 1947 .635 13 1997 .443 22

1848 .641 2 1898 -.722 5 1948 -2.014 14 1998 -.001 22

1849 -.286 2 1899 .400 5 1949 -.222 15 1999 .720 22

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PART 4: Master Bar Plot: STER4\_6 11:20 Tue 26 Mar 2013 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

1850--------C 1900-----@ 1950--c 2000----a

1851----a 1901-e 1951---b 2001---------D

1852---b 1902---b 1952---b 2002-------B

1853----------H 1903--------C 1953---b 2003j

1854----a 1904----------G 1954---a 2004k

1855--c 1905------B 1955------B 2005g

1856-------B 1906----------F 1956---b 2006-d

1857-----@ 1907---------D 1957--------C 2007-----A

1858-e 1908--------D 1958---------D 2008-----@

1859-----A 1909-----@ 1959----------F 2009-----@

1860----a 1910-------B 1960------A 2010----------F

1861-e 1911--b 1961----------F 2011------A

1862----------G 1912g 1962--c 2012----------F

1863----------H 1913---b 1963-------B

1864-----@ 1914--c 1964--------C

1865----a 1915--c 1965------A

1866--c 1916--c 1966--c

1867---b 1917j 1967------A

1868f 1918-e 1968---a

1869--c 1919----a 1969--c

1870-------B 1920------A 1970------B

1871----@ 1921--------C 1971--------C

1872-------B 1922--------C 1972----a

1873--------D 1923------A 1973--c

1874----------F 1924---------E 1974-d

1825-d 1875---------E 1925----@ 1975---------D

1826f 1876-e 1926---------E 1976--c

1827---------D 1877--c 1927--------C 1977---b

1828----a 1878---b 1928---------D 1978-------B

1829----------I 1879--------D 1929------A 1979-------B

1830----------G 1880---------E 1930--------C 1980----------F

1831---a 1881-----@ 1931--------C 1981--c

1832-------B 1882----a 1932--------C 1982f

1833-------B 1883-e 1933------A 1983f

1834------A 1884---b 1934------A 1984f

1835-------B 1885-----@ 1935l 1985----a

1836-------B 1886---------E 1936f 1986--c

1837-----A 1887--c 1937--c 1987--------C

1838f 1888-e 1938--c 1988---------D

1839----a 1889g 1939------A 1989--c

1840-e 1890-d 1940--c 1990------A

1841f 1891------A 1941---------D 1991---------D

1842h 1892----------H 1942-------B 1992--------C

1843h 1893----a 1943------B 1993----------F

1844-d 1894--------C 1944----a 1994-------B

1845--------C 1895-----@ 1945----@ 1995---------E

1846----------G 1896--------C 1946----a 1996---b

1847----------G 1897-d 1947--------C 1997-------B

1848--------C 1898--c 1948h 1998-----@

1849----a 1899------B 1949----a 1999--------C

PART 5: CORRELATION OF SERIES BY SEGMENTS: STER4\_6 11:20 Tue 26 Mar 2013 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 1830 1845 1860 1875 1890 1905 1920 1935 1950 1965 1980 1995

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

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

1 41A 1948 2012 .39A .58 .62 .77 .74

2 41B 1949 2012 .67 .69 .54 .62 .59

3 42A 1957 2012 .40A .48 .78 .78

4 42B 1952 2012 .73 .63 .67 .71

5 43A 1924 2012 .55 .62 .59 .71 .74 .72

6 43B 1928 2012 .39A .53 .62 .70 .79 .78

7 44A 1950 2012 .53 .66 .71 .66

8 44B 1956 2012 .65 .76 .73 .76

9 45A 1905 2012 .27B .35A .35A .41A .77 .79 .77

10 45B 1925 2012 .39A .54 .46 .63 .83 .89

11 46A 1945 2012 .45 .74 .69 .60 .55

12 46B 1943 2012 .40A .60 .48 .63 .62

13 47B 1931 2012 .74 .75 .61 .33A .50 .55

14 48A 1825 2012 .44 .51 .59 .67 .63 .54 .81 .75 .51 .61 .73 .77

15 48B 1830 2012 .44 .50 .46 .40A .47 .55 .80 .79 .55 .66 .76 .74

16 50A 1908 2012 .26B .40A .43 .46 .65 .74 .84

17 50B 1890 2012 .34A .49 .62 .61 .47 .67 .81 .83

18 51A 1952 2012 .58 .40B .60 .68

19 51B 1959 2012 .57 .48 .71 .70

20 52B 1967 2012 .46 .64 .57

21 49A 1871 2012 .53 .55 .73 .54 .82 .82 .63 .73 .79 .77

22 49B 1863 2012 .56 .64 .60 .51 .67 .73 .70 .84 .85 .83

Av segment correlation .44 .50 .53 .56 .55 .45 .60 .59 .57 .61 .72 .72

PART 6: POTENTIAL PROBLEMS: STER4\_6 11:20 Tue 26 Mar 2013 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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41A 1948 to 2012 65 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

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

1948 1977 0 .18 -.26 .30 -.18 .04 .10 .25 .06 .05 -.06 .39\*-.12 -.04 -.02 .01 .02 .18 -.11 -.18 .16 .13

[B] Entire series, effect on correlation ( .591) is:

Lower 1948> -.071 1969> -.035 1953< -.022 1989> -.011 1949< -.010 2011> -.008 Higher 2003 .050 1981 .027

1948 to 1977 segment:

Lower 1948> -.167 1969> -.067 1953< -.033 1949< -.018 1970< -.011 1965> -.007 Higher 1976 .076 1961 .040

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

2004 -2.702 22 3

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

1948 +3.1 SD; 1969 +3.3 SD

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41B 1949 to 2012 64 years Series 2

[B] Entire series, effect on correlation ( .645) is:

Lower 1989> -.024 1984> -.023 1990< -.021 1953> -.010 2011> -.010 1958< -.009 Higher 2003 .045 1962 .018

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

2004 -2.702 22 3

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

42A 1957 to 2012 56 years Series 3

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

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

1957 1986 0 .08 -.04 -.12 .23 -.19 -.06 .09 .21 -.02 .01 .40\*-.39 -.07 .09 .13 -.13 -.26 .24 .05 -.46 -.06

[B] Entire series, effect on correlation ( .563) is:

Lower 1969< -.103 1958< -.028 1970< -.014 1976> -.014 1972> -.014 1996> -.008 Higher 2003 .028 2004 .021

1957 to 1986 segment:

Lower 1969< -.114 1958< -.046 1976> -.029 1972> -.025 1970< -.022 1974> -.015 Higher 1961 .047 1980 .037

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

1969 -5.4 SD

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42B 1952 to 2012 61 years Series 4

[B] Entire series, effect on correlation ( .695) is:

Lower 1986< -.031 1982> -.022 1984< -.019 1956> -.013 1992< -.011 2000> -.010 Higher 1962 .020 2003 .017

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43A 1924 to 2012 89 years Series 5

[B] Entire series, effect on correlation ( .645) is:

Lower 1955< -.024 1943> -.023 1979< -.012 1996> -.011 1948> -.010 2004> -.009 Higher 1935 .054 2003 .023

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43B 1928 to 2012 85 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

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

1928 1957 0 .18 -.06 -.23 -.22 -.18 .04 .12 -.14 .31 -.03 .39\* .11 .10 .15 .34 -.33 -.09 -.28 .06 .03 .10

[B] Entire series, effect on correlation ( .645) is:

Lower 1943> -.024 1947< -.022 2005> -.011 2004> -.011 1929> -.009 1969> -.008 Higher 2003 .070 2010 .012

1928 to 1957 segment:

Lower 1947< -.085 1943> -.081 1929> -.026 1951> -.019 1939< -.014 1931< -.012 Higher 1935 .148 1948 .068

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

1943 +3.0 SD

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44A 1950 to 2012 63 years Series 7

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

Lower 1966< -.030 2003> -.020 1976> -.020 1984> -.017 1973> -.012 2002< -.012 Higher 1981 .030 2004 .023

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

2004 -2.702 22 3

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44B 1956 to 2012 57 years Series 8

[B] Entire series, effect on correlation ( .703) is:

Lower 1961< -.051 2002< -.017 2006> -.008 1982> -.007 1976> -.007 1964< -.007 Higher 2003 .027 1962 .018

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45A 1905 to 2012 108 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

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

1905 1934 -2 -.16 -.45 .03 .29 -.12 .22 .35 .33 .35\*-.17 .27| .06 .14 .16 -.08 -.26 .07 -.14 -.09 -.60 -.11

1920 1949 0 .10 -.07 .23 .20 -.06 -.20 -.06 -.03 -.19 -.13 .35\* .08 .22 .04 .02 .27 .11 -.08 -.25 -.46 .01

1935 1964 0 -.16 .11 .33 .14 .03 -.17 .07 .20 -.20 -.05 .35\* .15 .00 .03 -.22 .12 -.03 -.16 -.31 .03 -.05

1950 1979 0 -.02 -.18 -.01 .02 .26 -.12 .29 .28 .06 -.38 .41\* .21 -.10 .03 -.43 .11 -.09 -.14 -.06 .03 .24

[B] Entire series, effect on correlation ( .543) is:

Lower 1940> -.027 1948> -.019 1962> -.017 1919< -.014 1977> -.013 1918> -.011 Higher 2004 .016 1935 .016

1905 to 1934 segment:

Lower 1919< -.067 1918> -.059 1921< -.041 1911> -.033 1928< -.017 1932< -.016 Higher 1926 .082 1906 .061

1920 to 1949 segment:

Lower 1940> -.112 1921< -.038 1943< -.032 1948> -.021 1937> -.016 1932< -.016 Higher 1935 .264 1926 .042

1935 to 1964 segment:

Lower 1940> -.093 1962> -.043 1943< -.033 1959< -.031 1948> -.022 1951< -.015 Higher 1935 .207 1941 .036

1950 to 1979 segment:

Lower 1962> -.098 1977> -.067 1959< -.036 1969> -.036 1973> -.012 1955< -.012 Higher 1976 .108 1975 .039

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

1940 +3.4 SD

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45B 1925 to 2012 88 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

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

1925 1954 0 .37 -.18 .23 -.03 -.09 -.21 -.09 -.20 .22 -.33 .39\*-.04 .02 -.01 -.10 .12 -.03 -.27 .20 -.27 -.15

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

Lower 1927< -.050 1940> -.028 1969< -.028 1962> -.024 1981> -.014 1931< -.010 Higher 2003 .045 1935 .031

1925 to 1954 segment:

Lower 1927< -.148 1940> -.083 1931< -.026 1943< -.022 1936> -.012 1944> -.010 Higher 1935 .219 1926 .049

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

1940 +3.4 SD

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46A 1945 to 2012 68 years Series 11

[B] Entire series, effect on correlation ( .578) is:

Lower 1949< -.043 2003> -.040 1948> -.027 1945< -.011 1967< -.010 1956> -.009 Higher 1981 .032 1962 .023

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46B 1943 to 2012 70 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

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

1943 1972 0 -.26 -.04 .05 -.15 .14 -.06 -.04 .17 .02 .16 .40\*-.36 .11 .11 .18 -.10 .17 .14 -.24 -.14 -.14

[B] Entire series, effect on correlation ( .536) is:

Lower 1948> -.053 1977< -.040 1970< -.023 2003> -.016 1989> -.009 1951< -.009 Higher 1962 .021 2004 .020

1943 to 1972 segment:

Lower 1948> -.175 1970< -.070 1951< -.022 1967< -.018 1952> -.015 1949< -.014 Higher 1962 .098 1961 .055

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

1948 +3.5 SD; 1990 +3.5 SD

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47B 1931 to 2012 82 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

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

1965 1994 0 .12 .10 .14 .01 -.44 -.14 -.12 -.02 .06 .12 .33\*-.26 -.25 .10 .03 .08 -.06 -.02 .17 -.27 .13

[B] Entire series, effect on correlation ( .613) is:

Lower 2004> -.036 1940< -.023 1989> -.016 1991< -.013 1981> -.012 1982> -.010 Higher 2003 .079 1935 .057

1965 to 1994 segment:

Lower 1991< -.050 1989> -.048 1982> -.030 1970< -.028 1976> -.024 1990< -.024 Higher 1980 .096 1987 .041

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

2004 +3.6 SD

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48A 1825 to 2012 188 years Series 14

[\*] Early part of series cannot be checked from 1825 to 1829 -- not matched by another series

[B] Entire series, effect on correlation ( .624) is:

Lower 1850< -.011 2004> -.009 1839< -.009 1962> -.009 1881> -.007 1837> -.006 Higher 2003 .031 1935 .023

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

1948 -6.0 SD

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48B 1830 to 2012 183 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

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

1875 1904 0 -.17 -.41 .40 -.10 -.01 -.10 .10 -.19 -.20 .16 .40\*-.06 -.23 -.12 .16 .06 .12 .14 -.13 -.06 .03

[B] Entire series, effect on correlation ( .588) is:

Lower 1893> -.013 2004> -.010 1880< -.009 1839> -.008 1850> -.008 1884< -.007 Higher 1935 .035 2003 .028

1875 to 1904 segment:

Lower 1893> -.053 1884< -.051 1880< -.050 1902> -.026 1901< -.025 1900> -.010 Higher 1904 .043 1892 .038

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

1850 +3.2 SD; 1946 +3.0 SD

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50A 1908 to 2012 105 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

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

1908 1937 5 .04 -.30 -.26 .06 -.16 .04 .00 .15 .11 .20 .26|-.03 -.01 .24 -.21 .30\* .11 -.17 -.12 -.21 -.12

1920 1949 0 -.06 -.26 -.01 -.26 -.20 .21 .19 .19 .28 -.10 .40\*-.11 -.01 .23 -.30 .03 .01 -.28 .12 -.13 .03

[B] Entire series, effect on correlation ( .505) is:

Lower 1912< -.056 1922< -.022 1957< -.022 1935> -.020 1981> -.019 1914> -.011 Higher 2003 .033 1948 .033

1908 to 1937 segment:

Lower 1922< -.050 1912< -.040 1935> -.033 1914> -.024 1932< -.016 1923> -.011 Higher 1917 .048 1928 .025

1920 to 1949 segment:

Lower 1922< -.081 1935> -.042 1939< -.026 1932< -.023 1949> -.021 1923> -.017 Higher 1948 .183 1941 .024

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

1911 1912 -4.2 SD

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

1912 -6.5 SD

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50B 1890 to 2012 123 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

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

1890 1919 0 .09 -.03 -.05 .04 -.05 -.18 .20 .04 -.09 -.15 .34\* .08 -.21 -.22 -.03 -.14 -.26 -.21 .19 -.12 .09

[B] Entire series, effect on correlation ( .572) is:

Lower 1893> -.034 1904< -.027 1957< -.024 1923< -.012 1967< -.010 1963< -.009 Higher 2003 .034 1948 .026

1890 to 1919 segment:

Lower 1893> -.146 1904< -.097 1890> -.026 1895> -.019 1913> -.018 1900< -.011 Higher 1917 .111 1892 .088

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

51A 1952 to 2012 61 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

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

1965 1994 -7 -.05 -.04 -.16 .43\*-.17 .12 -.01 .03 -.01 -.29 .40| .12 -.04 -.14 -.42 .01 -.18 -.25 .15 .08 .18

[B] Entire series, effect on correlation ( .595) is:

Lower 1982> -.038 1988< -.027 1953< -.020 1990< -.017 1998> -.015 1968> -.013 Higher 2003 .071 2004 .027

1965 to 1994 segment:

Lower 1982> -.094 1988< -.067 1990< -.042 1968> -.031 1977> -.030 1971< -.021 Higher 1981 .043 1975 .043

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

51B 1959 to 2012 54 years Series 19

[B] Entire series, effect on correlation ( .624) is:

Lower 1979< -.044 1993< -.030 1994< -.023 1972> -.014 1975< -.013 1961< -.011 Higher 2003 .110 1981 .028

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

52B 1967 to 2012 46 years Series 20

[B] Entire series, effect on correlation ( .532) is:

Lower 1975< -.029 1976> -.024 1984> -.019 2011< -.015 1989< -.013 1971< -.013 Higher 1981 .036 2003 .025

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

49A 1871 to 2012 142 years Series 21

[B] Entire series, effect on correlation ( .683) is:

Lower 1875< -.037 1977< -.010 2000< -.008 1883> -.008 1934< -.007 1879< -.007 Higher 1935 .032 1981 .010

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

1948 -6.5 SD

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49B 1863 to 2012 150 years Series 22

[B] Entire series, effect on correlation ( .676) is:

Lower 1893< -.025 1875> -.014 1864> -.011 1940> -.008 1926< -.006 1895< -.006 Higher 2003 .032 1935 .022

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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 41A 1948 2012 65 5 1 .591 2.08 5.27 1.453 .858 .372 2.72 .582 .075 1

2 41B 1949 2012 64 5 0 .645 2.09 5.71 1.416 .905 .306 2.77 .534 .004 1

3 42A 1957 2012 56 4 1 .563 1.07 2.74 .559 .635 .346 2.53 .419 .077 1

4 42B 1952 2012 61 4 0 .695 1.50 3.56 .790 .869 .232 2.70 .646 -.018 1

5 43A 1924 2012 89 6 0 .645 1.39 3.53 .727 .840 .244 2.95 .559 -.051 1

6 43B 1928 2012 85 6 1 .645 1.86 4.06 .950 .830 .266 2.68 .387 -.035 3

7 44A 1950 2012 63 4 0 .642 1.51 4.83 1.422 .969 .283 2.51 .517 -.022 1

8 44B 1956 2012 57 4 0 .703 1.71 4.88 1.058 .872 .243 2.50 .460 .008 1

9 45A 1905 2012 108 7 4 .543 .74 2.68 .610 .840 .323 2.89 .467 .006 1

10 45B 1925 2012 88 6 1 .600 .86 2.71 .631 .830 .323 2.88 .524 -.017 1

11 46A 1945 2012 68 5 0 .578 1.68 4.09 1.207 .948 .206 2.78 .529 .044 3

12 46B 1943 2012 70 5 1 .536 1.93 4.82 1.155 .870 .245 3.01 .581 .004 1

13 47B 1931 2012 82 6 1 .613 .74 1.95 .435 .842 .236 2.61 .417 -.083 1

14 48A 1825 2012 188 12 0 .624 .54 1.90 .284 .695 .267 2.65 .346 -.045 1

15 48B 1830 2012 183 12 1 .588 .71 2.30 .408 .845 .231 2.55 .370 -.026 1

16 50A 1908 2012 105 7 2 .505 .95 1.68 .335 .598 .255 2.44 .351 .054 1

17 50B 1890 2012 123 8 1 .572 .85 2.14 .459 .805 .249 2.71 .383 -.010 7

18 51A 1952 2012 61 4 1 .595 1.20 3.16 .599 .728 .292 3.13 .660 .119 1

19 51B 1959 2012 54 4 0 .624 .80 1.73 .362 .722 .256 2.73 .507 -.030 1

20 52B 1967 2012 46 3 0 .532 1.48 3.43 .852 .872 .254 2.54 .455 -.036 1

21 49A 1871 2012 142 10 0 .683 .83 2.29 .457 .835 .259 2.52 .363 -.004 3

22 49B 1863 2012 150 10 0 .676 1.29 3.61 .691 .810 .258 2.72 .434 -.062 1

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Total or mean: 2008 137 15 .610 1.14 5.71 .679 .810 .267 3.13 .451 -.009

- = [ COFECHA STER4COF ] = -