[] Dendrochronology Program Library Run CAOVL Program COF 10:40 Fri 04 Sep 2020 Page 1

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

File of DATED series: SCBI\_caovl.rwl

CONTENTS:

Part 1: Title page, options selected, summary, absent rings by series

Part 2: Histogram of time spans

Part 3: Master series with sample depth and absent rings by year

Part 4: Bar plot of Master Dating Series

Part 5: Correlation by segment of each series with Master

Part 6: Potential problems: low correlation, divergent year-to-year changes, absent rings, outliers

Part 7: Descriptive statistics

RUN CONTROL OPTIONS SELECTED VALUE

1 Cubic smoothing spline 50% wavelength cutoff for filtering

32 years

2 Segments examined are 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 N

8 Parts printed 1234567

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

Time span of Master dating series is 1884 to 2015 132 years

Continuous time span is 1884 to 2015 132 years

Portion with two or more series is 1890 to 2010 121 years

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

\*C\* Number of dated series 25 \*C\*

\*O\* Master series 1884 2015 132 yrs \*O\*

\*F\* Total rings in all series 2372 \*F\*

\*E\* Total dated rings checked 2361 \*E\*

\*C\* Series intercorrelation .397 \*C\*

\*H\* Average mean sensitivity .254 \*H\*

\*A\* Segments, possible problems 23 \*A\*

\*\*\* Mean length of series 94.9 \*\*\*

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

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: 10:40 Fri 04 Sep 2020 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

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

. . . . . . . . . . . . . . . . . <===========> . 91385 1 1884 2009 126

. . . . . . . . . . . . . . . . . <=========>. . 60358r 2 1890 1995 106

. . . . . . . . . . . . . . . . . <==========> . 70162 3 1892 2008 117

. . . . . . . . . . . . . . . . . <==========> . 111081 4 1892 2009 118

. . . . . . . . . . . . . . . . . <==========> . 50336 5 1893 2009 117

. . . . . . . . . . . . . . . . . <==========> . 121162 6 1895 2004 110

. . . . . . . . . . . . . . . . . <==========> . 91302 7 1896 2009 114

. . . . . . . . . . . . . . . . . <==========> . 60124 8 1899 2009 111

. . . . . . . . . . . . . . . . . <=========> . 80503 9 1900 2008 109

. . . . . . . . . . . . . . . . . <=========> . 50442 10 1907 2008 102

. . . . . . . . . . . . . . . . . .<========> . 80640A 11 1915 2006 92

. . . . . . . . . . . . . . . . . .<========> . 111190 12 1917 2009 93

. . . . . . . . . . . . . . . . . .<========> . 130788 13 1917 2006 90

. . . . . . . . . . . . . . . . . .<========> . 131091 14 1918 2009 92

. . . . . . . . . . . . . . . . . . <=======> . 90552 15 1920 2009 90

. . . . . . . . . . . . . . . . . . <=======> . 91332 16 1921 2009 89

. . . . . . . . . . . . . . . . . . <=======> . 140810 17 1923 2009 87

. . . . . . . . . . . . . . . . . . <=======> . 131061 18 1925 2007 83

. . . . . . . . . . . . . . . . . . <=======> . 131138 19 1926 2009 84

. . . . . . . . . . . . . . . . . . <=======> . 50356 20 1928 2009 82

. . . . . . . . . . . . . . . . . . <=======> . 190929 21 1930 2015 86

. . . . . . . . . . . . . . . . . . <======> . 121301 22 1931 2009 79

. . . . . . . . . . . . . . . . . . <======> . 50262 23 1940 2010 71

. . . . . . . . . . . . . . . . . . <=====> . 80554 24 1943 2008 66

. . . . . . . . . . . . . . . . . . <====> . 100963 25 1951 2008 58

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

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: 10:40 Fri 04 Sep 2020 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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1900 .672 9 1950 -.697 24 2000 .486 24

1901 .327 9 1951 -.428 25 2001 .719 24

1902 .290 9 1952 -1.216 25 2002 .461 24

1903 1.207 9 1953 -1.541 25 2003 -.449 24

1904 .785 9 1954 -.029 25 2004 -.699 24

1905 .981 9 1955 .502 25 2005 -.149 23

1906 .653 9 1956 1.216 25 2006 .615 23

1907 .510 10 1957 .463 25 2007 .387 21

1908 .231 10 1958 2.144 25 2008 .401 20

1909 -.711 10 1959 .565 25 2009 .502 15

1910 -.693 10 1960 1.535 25 2010 .245 2

1911 -1.484 10 1961 1.060 25 2011 1.983 1

1912 -2.866 10 1962 .024 25 2012 1.118 1

1913 -2.153 10 1963 .318 25 2013 .061 1

1914 -2.233 10 1964 -1.176 25 2014 -.826 1

1915 -.721 11 1965 -.624 25 2015 -2.555 1

1916 .273 11 1966 -2.099 25

1917 .354 13 1967 -.302 25

1918 -.977 14 1968 .939 25

1919 -.390 14 1969 .428 25

1920 -.340 15 1970 .806 25

1921 .371 16 1971 .103 25

1922 1.196 16 1972 .137 25

1923 .293 17 1973 .317 25

1924 1.001 17 1974 -.033 25

1925 .535 18 1975 .734 25

1926 1.122 19 1976 .714 25

1927 1.178 19 1977 -2.093 25

1928 .862 20 1978 .208 25

1929 .949 20 1979 -.461 25

1930 -.429 21 1980 -.863 25

1931 .248 22 1981 .033 25

1932 -.437 22 1982 .396 25

1933 -.527 22 1983 -.122 25

1884 -3.573 1 1934 -.862 22 1984 -.719 25

1885 -.422 1 1935 -1.239 22 1985 .271 25

1886 -.653 1 1936 -.321 22 1986 .733 25

1887 .770 1 1937 -.091 22 1987 -.188 25

1888 -.242 1 1938 1.236 22 1988 .587 25

1889 -1.084 1 1939 -.563 22 1989 .359 25

1890 -2.247 2 1940 .423 23 1990 1.957 25

1891 -.173 2 1941 1.232 23 1991 -.707 25

1892 -.643 4 1942 .604 23 1992 -.527 25

1893 -.423 5 1943 .217 24 1993 1.226 25

1894 .093 5 1944 -.764 24 1994 1.118 25

1895 .406 6 1945 .362 24 1995 -.595 25

1896 1.143 7 1946 -.615 24 1996 -.535 24

1897 2.223 7 1947 -1.740 24 1997 -.901 24

1898 1.574 7 1948 .321 24 1998 -.524 24

1899 .801 8 1949 -.293 24 1999 -.350 24

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PART 4: Master Bar Plot: 10:40 Fri 04 Sep 2020 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

1900--------C 1950--c 2000-------B

1901------A 1951---b 2001--------C

1902------A 1952-e 2002-------B

1903---------E 1953f 2003---b

1904--------C 1954----@ 2004--c

1905---------D 1955-------B 2005----a

1906--------C 1956---------E 2006--------B

1907-------B 1957-------B 2007------B

1908-----A 1958----------I 2008------B

1909--c 1959-------B 2009-------B

1910--c 1960----------F 2010-----A

1911f 1961---------D 2011----------H

1912k 1962----@ 2012---------D

1913i 1963------A 2013-----@

1914i 1964-e 2014-c

1915--c 1965--b 2015j

1916-----A 1966h

1917------A 1967---a

1918-d 1968---------D

1919---b 1969-------B

1920---a 1970--------C

1921------A 1971-----@

1922---------E 1972-----A

1923------A 1973------A

1924---------D 1974----@

1925-------B 1975--------C

1926---------D 1976--------C

1927---------E 1977h

1928--------C 1978-----A

1929---------D 1979---b

1930---b 1980-c

1931-----A 1981----@

1932---b 1982------B

1933--b 1983----@

1884n 1934-c 1984--c

1885---b 1935-e 1985-----A

1886--c 1936---a 1986--------C

1887--------C 1937----@ 1987----a

1888----a 1938---------E 1988-------B

1889-d 1939--b 1989------A

1890i 1940-------B 1990----------H

1891----a 1941---------E 1991--c

1892--c 1942--------B 1992--b

1893---b 1943-----A 1993---------E

1894-----@ 1944-c 1994---------D

1895------B 1945------A 1995--b

1896---------E 1946--b 1996--b

1897----------I 1947g 1997-d

1898----------F 1948------A 1998---b

1899--------C 1949---a 1999---a

PART 5: CORRELATION OF SERIES BY SEGMENTS: 10:40 Fri 04 Sep 2020 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 1875 1900 1925 1950 1975

1924 1949 1974 1999 2024

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

1 91385 1884 2009 .39B .35 .48 .60 .55

2 60358r 1890 1995 .36 .31A .19A .35

3 70162 1892 2008 .50 .62 .64 .53 .43

4 111081 1892 2009 .39 .49 .48 .52 .41

5 50336 1893 2009 .42 .35 .38 .56 .55

6 121162 1895 2004 .63 .64 .62 .44 .42

7 91302 1896 2009 .53 .44 .52 .60 .20B

8 60124 1899 2009 .24A .24A .32A .33 .24A

9 80503 1900 2008 .47 .45 .31A .26A

10 50442 1907 2008 .20B .21B .45 .43

11 80640A 1915 2006 .51 .62 .59 .54

12 111190 1917 2009 .55 .55 .48 .36

13 130788 1917 2006 .33 .50 .34 .28B

14 131091 1918 2009 .54 .52 .44 .24A

15 90552 1920 2009 .47 .48 .51 .47

16 91332 1921 2009 .43 .44 .54 .45

17 140810 1923 2009 .56 .57 .44 .33B

18 131061 1925 2007 .52 .50 .46

19 131138 1926 2009 .33B .68 .61

20 50356 1928 2009 .50 .56 .59

21 190929 1930 2015 .33 .28A .36

22 121301 1931 2009 .29A .41 .19B

23 50262 1940 2010 .22B .34 .22B

24 80554 1943 2008 .70 .78 .64

25 100963 1951 2008 .21A .20B

Av segment correlation .43 .44 .45 .47 .39

PART 6: POTENTIAL PROBLEMS: 10:40 Fri 04 Sep 2020 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

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91385 1884 to 2009 126 years Series 1

[\*] Early part of series cannot be checked from 1884 to 1889 -- 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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1890 1939 2 - - - - .01 -.17 -.11 -.09 .26 .38 .39| .02 .40\* .31 .20 .17 .00 -.05 .08 .05 -.12

[B] Entire series, effect on correlation ( .452) is:

Lower 1891< -.023 1977> -.023 1918> -.019 1931< -.017 2006< -.014 1893> -.012 Higher 1912 .024 1990 .015

1890 to 1939 segment:

Lower 1891< -.061 1918> -.052 1931< -.050 1893> -.034 1934> -.025 1924< -.018 Higher 1912 .096 1890 .042

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

1918 +3.0 SD

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60358r 1890 to 1995 106 years Series 2

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

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1900 1949 0 -.42 -.19 -.12 .14 .12 .28 .24 .31 .29 .20 .31\* .19 .19 .04 -.02 .09 .04 -.11 -.20 -.26 -.20

1925 1974 0 -.14 -.14 -.25 .10 -.01 -.14 .08 .11 .01 .13 .19\* .01 .11 -.20 .03 -.07 .07 -.04 -.05 -.09 -.04

[B] Entire series, effect on correlation ( .316) is:

Lower 1993< -.042 1952> -.028 1941< -.022 1891> -.016 1970< -.013 1990< -.013 Higher 1977 .068 1953 .013

1900 to 1949 segment:

Lower 1941< -.072 1944> -.023 1932> -.023 1937< -.018 1916< -.018 1934> -.016 Higher 1939 .036 1922 .026

1925 to 1974 segment:

Lower 1952> -.071 1941< -.051 1970< -.031 1944> -.023 1932> -.022 1934> -.016 Higher 1939 .048 1953 .046

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

1952 +3.6 SD

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70162 1892 to 2008 117 years Series 3

[B] Entire series, effect on correlation ( .512) is:

Lower 1987> -.025 1998> -.018 1939> -.015 2003> -.015 1979> -.013 1968< -.013 Higher 1977 .065 1947 .022

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111081 1892 to 2009 118 years Series 4

[B] Entire series, effect on correlation ( .429) is:

Lower 1895< -.023 1960< -.017 1979> -.014 1941< -.012 2004> -.012 1940< -.011 Higher 1990 .023 1958 .022

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50336 1893 to 2009 117 years Series 5

[B] Entire series, effect on correlation ( .449) is:

Lower 1900< -.034 1947> -.031 1938< -.018 1904< -.015 1998> -.012 1979> -.011 Higher 1977 .042 1912 .039

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121162 1895 to 2004 110 years Series 6

[B] Entire series, effect on correlation ( .534) is:

Lower 1997> -.020 1983< -.017 1980> -.014 1940< -.012 1993< -.011 1974< -.009 Higher 1912 .032 1947 .021

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91302 1896 to 2009 114 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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1960 2009 6 -.01 -.20 -.06 -.02 .02 .08 .10 -.07 -.01 -.15 .20| .14 -.33 -.03 .03 -.03 .21\* - - - -

[B] Entire series, effect on correlation ( .319) is:

Lower 2009< -.187 1947> -.030 1939> -.019 1992> -.009 2004> -.007 1912> -.006 Higher 1958 .024 1991 .019

1960 to 2009 segment:

Lower 2009< -.302 1992> -.014 2004> -.012 1981< -.009 1998> -.008 1987> -.007 Higher 1991 .038 1966 .033

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

2008 2009 -6.6 SD

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

2009 -6.6 SD

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60124 1899 to 2009 111 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

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1899 1948 0 .09 -.06 -.13 .00 -.05 -.08 -.11 -.03 .15 .16 .24\* .13 .02 .10 -.33 -.16 .03 -.11 -.11 -.14 -.18

1900 1949 0 .09 -.06 -.12 .01 -.05 -.08 -.11 -.03 .13 .16 .24\* .13 .02 .09 -.34 -.16 .04 -.10 -.11 -.12 -.18

1925 1974 0 .08 -.23 -.41 .07 -.33 .11 -.08 .00 .04 -.02 .32\* .00 .25 -.12 -.22 -.02 -.17 -.08 .06 -.06 -.24

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

1960 2009 0 .05 -.14 -.50 .12 -.12 .01 -.15 .22 .00 -.20 .24\* .17 .20 -.03 -.12 .03 -.14 - - - -

[B] Entire series, effect on correlation ( .259) is:

Lower 1994< -.030 1914> -.024 1924< -.022 1910> -.018 1939> -.017 1969< -.014 Higher 1912 .081 1958 .025

1899 to 1948 segment:

Lower 1914> -.054 1924< -.046 1910> -.040 1939> -.039 1947> -.023 1927< -.020 Higher 1912 .223 1911 .034

1900 to 1949 segment:

Lower 1914> -.054 1924< -.047 1910> -.039 1939> -.038 1947> -.023 1927< -.021 Higher 1912 .223 1911 .034

1925 to 1974 segment:

Lower 1939> -.048 1969< -.038 1957< -.029 1947> -.028 1927< -.025 1960< -.024 Higher 1958 .060 1964 .046

1960 to 2009 segment:

Lower 1994< -.077 1969< -.036 2004> -.024 1960< -.023 2001< -.019 1987> -.016 Higher 1966 .049 1964 .046

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

80503 1900 to 2008 109 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

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

1950 1999 0 -.20 -.13 -.13 .09 -.06 -.06 -.17 .15 -.14 .14 .31\*-.03 .09 -.01 .04 .06 -.02 .10 -.19 -.12 .00

1959 2008 0 -.19 -.11 -.10 .13 -.02 .01 -.21 .11 -.19 .12 .26\*-.07 .02 -.12 .04 .12 .11 .12 - - -

[B] Entire series, effect on correlation ( .373) is:

Lower 1998< -.070 1941< -.033 1907< -.015 1987> -.011 1984> -.011 1970< -.010 Higher 1977 .032 1958 .017

1950 to 1999 segment:

Lower 1998< -.119 1987> -.019 1984> -.019 1970< -.015 1980> -.015 1966> -.015 Higher 1977 .065 1958 .036

1959 to 2008 segment:

Lower 1998< -.095 1987> -.019 1984> -.019 1970< -.016 1980> -.016 1966> -.015 Higher 1977 .072 1993 .032

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

1997 1998 -4.7 SD

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

1998 -4.7 SD

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50442 1907 to 2008 102 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

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

1907 1956 -1 -.19 -.17 -.11 -.01 .23 .18 .03 .02 .18 .28\* .20| .11 -.09 -.12 -.05 -.24 -.14 .07 -.03 .09 -.11

1925 1974 -2 .05 -.06 -.13 -.13 -.08 -.09 -.10 -.10 .28\* .08 .21| .12 -.09 .13 -.13 -.20 -.24 -.09 .08 .00 .04

[B] Entire series, effect on correlation ( .344) is:

Lower 1995> -.027 1947> -.026 2000< -.019 1926< -.017 1950> -.015 1933> -.015 Higher 1977 .123 1958 .021

1907 to 1956 segment:

Lower 1947> -.054 1926< -.043 1936< -.036 1950> -.033 1933> -.032 1955< -.029 Higher 1922 .042 1912 .034

1925 to 1974 segment:

Lower 1947> -.062 1950> -.039 1933> -.038 1926< -.037 1939> -.034 1936< -.026 Higher 1958 .068 1960 .043

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

1977 -4.6 SD

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80640A 1915 to 2006 92 years Series 11

[B] Entire series, effect on correlation ( .527) is:

Lower 2001< -.031 1994< -.029 1970< -.015 1923> -.012 1944> -.012 1917< -.012 Higher 1977 .037 1991 .026

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111190 1917 to 2009 93 years Series 12

[B] Entire series, effect on correlation ( .424) is:

Lower 1977> -.048 2007< -.022 1935> -.015 1986< -.011 1934> -.010 1931< -.009 Higher 1958 .024 1964 .022

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

1947 -6.9 SD

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

130788 1917 to 2006 90 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

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

1957 2006 8 .03 -.06 -.27 -.05 .08 -.09 .02 -.06 .26 .00 .28| .09 .17 -.10 -.02 -.07 -.18 -.22 .30\*-.15 -

[B] Entire series, effect on correlation ( .249) is:

Lower 1918> -.033 1980> -.032 1975< -.022 1922< -.020 1991> -.019 2003> -.019 Higher 1990 .028 1939 .023

1957 to 2006 segment:

Lower 1980> -.054 1975< -.039 1991> -.032 2003> -.032 1979< -.030 1983< -.021 Higher 1990 .044 1958 .033

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

1979 1980 5.0 SD

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

1918 +3.0 SD; 1979 -5.2 SD

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131091 1918 to 2009 92 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

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

1960 2009 0 -.07 .12 .08 .17 -.12 -.08 -.15 -.01 -.15 .08 .24\* .05 -.14 .05 .17 .02 -.02 - - - -

[B] Entire series, effect on correlation ( .335) is:

Lower 2004< -.057 2006< -.021 2005> -.014 1977> -.012 1929< -.012 2000< -.011 Higher 1993 .016 1922 .015

1960 to 2009 segment:

Lower 2004< -.049 2006< -.029 2000< -.015 1977> -.015 2005> -.014 1978< -.013 Higher 1993 .030 1968 .025

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

2003 2004 -4.7 SD 2004 2005 5.3 SD

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

2004 -5.6 SD

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90552 1920 to 2009 90 years Series 15

[B] Entire series, effect on correlation ( .435) is:

Lower 1947> -.047 1986< -.016 1935> -.013 2007< -.012 1922< -.010 2003< -.009 Higher 1990 .021 1964 .019

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91332 1921 to 2009 89 years Series 16

[B] Entire series, effect on correlation ( .476) is:

Lower 1962< -.053 2004> -.021 1927< -.018 1946> -.018 1921< -.016 1976< -.014 Higher 1991 .030 1958 .027

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140810 1923 to 2009 87 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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1960 2009 -7 .06 -.25 -.01 .37\*-.18 .05 -.16 -.02 .17 -.11 .33|-.09 -.07 -.09 -.07 .12 -.11 - - - -

[B] Entire series, effect on correlation ( .391) is:

Lower 1980> -.041 2002< -.019 1925< -.016 1998< -.013 1979< -.013 1997> -.012 Higher 1966 .025 1947 .017

1960 to 2009 segment:

Lower 1980> -.061 2002< -.032 1998< -.021 1979< -.020 1988< -.018 1997> -.017 Higher 1966 .047 1968 .023

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

1980 +3.1 SD

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131061 1925 to 2007 83 years Series 18

[B] Entire series, effect on correlation ( .502) is:

Lower 1944> -.018 1964> -.018 1952< -.017 1980> -.016 1931< -.015 2002> -.014 Higher 1947 .020 1990 .015

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131138 1926 to 2009 84 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

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

1926 1975 3 .03 .03 -.09 -.05 -.28 -.15 -.18 -.18 .02 .20 .33| .24 .03 .38\* .05 .04 .02 -.07 -.34 -.34 -.15

[B] Entire series, effect on correlation ( .485) is:

Lower 1930> -.033 1929< -.031 1939> -.025 1948< -.022 1947> -.017 2000< -.013 Higher 1977 .082 1991 .034

1926 to 1975 segment:

Lower 1930> -.067 1929< -.061 1939> -.048 1948< -.042 1947> -.022 1960< -.020 Higher 1966 .048 1958 .043

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

1929 1930 4.3 SD

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50356 1928 to 2009 82 years Series 20

[B] Entire series, effect on correlation ( .428) is:

Lower 2005< -.045 1947> -.033 1980> -.025 1956< -.021 1950> -.017 2004> -.014 Higher 1977 .122 1966 .045

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190929 1930 to 2015 86 years Series 21

[\*] Later part of series cannot be checked from 2011 to 2015 -- 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

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

1950 1999 0 -.03 .01 .05 -.04 -.05 -.01 .07 .06 .25 .10 .28\*-.18 -.14 -.02 -.20 -.14 .05 -.11 .06 -.10 .07

[B] Entire series, effect on correlation ( .277) is:

Lower 1955< -.044 1991> -.026 1954< -.021 1962> -.019 1990< -.018 1943< -.016 Higher 1977 .097 1966 .025

1950 to 1999 segment:

Lower 1955< -.061 1991> -.041 1962> -.031 1954< -.028 1990< -.022 1983> -.016 Higher 1977 .151 1966 .037

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

121301 1931 to 2009 79 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

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

1931 1980 0 .13 -.21 .00 -.12 -.32 -.06 -.03 -.04 .03 -.03 .29\* .18 .27 .15 -.05 .16 -.05 -.22 -.09 -.37 .13

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

1960 2009 -10 .33\*-.20 -.06 .11 -.03 -.06 -.11 -.12 -.08 -.13 .19| .14 .06 .04 -.07 .05 -.08 - - - -

[B] Entire series, effect on correlation ( .285) is:

Lower 2002< -.060 1980> -.043 2003> -.026 1935> -.025 1976< -.019 1932> -.013 Higher 1947 .035 1958 .023

1931 to 1980 segment:

Lower 1980> -.073 1935> -.040 1976< -.034 1961< -.023 1932> -.022 1937< -.015 Higher 1947 .057 1958 .040

1960 to 2009 segment:

Lower 2002< -.084 1980> -.066 2003> -.039 1976< -.026 1961< -.018 1975< -.011 Higher 1993 .036 1991 .032

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

2002 2003 4.1 SD

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

1980 +3.0 SD

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

50262 1940 to 2010 71 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

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

1940 1989 -10 .26\*-.16 .09 -.05 .10 -.12 -.06 .13 -.05 .05 .22|-.06 .22 -.05 -.11 .11 -.24 -.03 -.13 -.01 -.07

1961 2010 -8 .09 .00 .24\*-.04 -.10 -.01 -.11 -.07 -.18 .00 .22|-.16 .02 .02 -.06 .17 - - - - -

[B] Entire series, effect on correlation ( .244) is:

Lower 1980> -.032 1945< -.026 1946> -.026 1972< -.013 1977> -.012 1974< -.011 Higher 1958 .038 1990 .037

1940 to 1989 segment:

Lower 1980> -.043 1946> -.034 1945< -.033 1972< -.015 1977> -.014 1962> -.014 Higher 1958 .053 1953 .033

1961 to 2010 segment:

Lower 1980> -.049 1972< -.023 1974< -.021 1962> -.015 2006< -.015 2007< -.014 Higher 1990 .065 1966 .032

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

2005 +3.2 SD

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80554 1943 to 2008 66 years Series 24

[B] Entire series, effect on correlation ( .649) is:

Lower 2004> -.031 1943> -.017 1991> -.013 1985< -.013 1946> -.012 1992> -.011 Higher 1977 .037 1956 .011

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100963 1951 to 2008 58 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

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

1951 2000 0 .13 -.22 .12 -.11 -.08 .16 -.01 .14 .00 .13 .21\*-.12 -.14 -.10 .07 -.07 .03 -.01 .11 .04 .11

1959 2008 -5 .06 -.25 .02 -.13 -.07 .24\* .09 .05 -.06 .08 .20| .03 .00 -.17 .02 -.01 .08 .16 - - -

[B] Entire series, effect on correlation ( .146) is:

Lower 2008< -.055 1966> -.045 1964> -.039 1958< -.018 1995> -.016 1991> -.016 Higher 1977 .099 1960 .031

1951 to 2000 segment:

Lower 1966> -.059 1964> -.053 1958< -.029 1975< -.024 1995> -.021 1956< -.020 Higher 1977 .133 1960 .036

1959 to 2008 segment:

Lower 2008< -.077 1966> -.054 1964> -.045 1975< -.020 1991> -.020 1995> -.019 Higher 1977 .107 1960 .034

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

1958 1959 4.0 SD

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Corr //-------- Unfiltered --------\\ //---- Filtered -----\\

No. No. No. with Mean Max Std Auto Mean Max Std Auto AR

Seq Series Interval Years Segmt Flags Master msmt msmt dev corr sens value dev corr ()

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

1 91385 1884 2009 126 5 1 .452 1.43 3.07 .514 .689 .211 2.66 .471 .040 1

2 60358r 1890 1995 106 4 2 .316 .85 1.95 .466 .759 .297 2.76 .502 -.140 1

3 70162 1892 2008 117 5 0 .512 1.71 7.06 1.450 .907 .312 2.67 .449 .014 2

4 111081 1892 2009 118 5 0 .429 1.60 4.19 .902 .811 .260 2.86 .397 .032 2

5 50336 1893 2009 117 5 0 .449 1.07 4.28 .732 .844 .254 2.94 .606 .048 2

6 121162 1895 2004 110 5 0 .534 .98 3.43 .678 .857 .244 2.81 .561 -.040 1

7 91302 1896 2009 114 5 1 .319 2.38 5.17 1.144 .857 .204 2.40 .272 -.025 1

8 60124 1899 2009 111 5 4 .259 1.08 3.61 .751 .869 .253 2.58 .390 -.015 2

9 80503 1900 2008 109 4 2 .373 .87 2.53 .573 .907 .213 2.60 .348 -.035 1

10 50442 1907 2008 102 4 2 .344 1.37 3.57 .764 .851 .253 2.49 .337 -.046 1

11 80640A 1915 2006 92 4 0 .527 1.23 2.26 .472 .690 .229 2.51 .453 -.045 1

12 111190 1917 2009 93 4 0 .424 .74 1.62 .367 .874 .206 2.46 .313 -.043 1

13 130788 1917 2006 90 4 1 .249 .71 3.43 .644 .838 .338 2.69 .486 -.060 1

14 131091 1918 2009 92 4 1 .335 1.19 4.24 .955 .905 .241 2.63 .327 -.116 1

15 90552 1920 2009 90 4 0 .435 1.66 3.24 .612 .776 .186 2.67 .508 -.052 1

16 91332 1921 2009 89 4 0 .476 2.38 4.57 .638 .481 .218 2.68 .418 -.057 1

17 140810 1923 2009 87 4 1 .391 1.00 2.82 .542 .743 .292 2.84 .577 -.033 1

18 131061 1925 2007 83 3 0 .502 1.33 2.75 .639 .689 .308 2.85 .456 .047 1

19 131138 1926 2009 84 3 1 .485 1.04 2.08 .512 .735 .269 2.71 .549 -.103 1

20 50356 1928 2009 82 3 0 .428 2.14 3.28 .452 .254 .191 2.53 .427 -.018 1

21 190929 1930 2015 86 3 1 .277 .64 2.04 .407 .803 .276 2.81 .623 -.053 1

22 121301 1931 2009 79 3 2 .285 .84 2.36 .536 .835 .277 2.70 .506 -.124 1

23 50262 1940 2010 71 3 2 .244 .66 1.51 .207 .251 .260 2.78 .476 .017 1

24 80554 1943 2008 66 3 0 .649 2.52 4.91 .925 .569 .254 2.62 .430 -.098 1

25 100963 1951 2008 58 2 2 .146 .89 3.56 .681 .796 .350 2.61 .471 -.095 2

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Total or mean: 2372 98 23 .397 1.30 7.06 .680 .758 .254 2.94 .451 -.036

- = [ COFECHA CAOVLCOF ] = -