[] Dendrochronology Program Library Run STRA2 Program COF 13:25 Tue 14 May 2013 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 28625

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

Title of run: STRA2\_4

File of DATED series: STRA2\_4COMP

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 1906 to 2012 107 years

Continuous time span is 1906 to 2012 107 years

Portion with two or more series is 1913 to 2012 100 years

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

\*C\* Number of dated series 21 \*C\*

\*O\* Master series 1906 2012 107 yrs \*O\*

\*F\* Total rings in all series 1835 \*F\*

\*E\* Total dated rings checked 1828 \*E\*

\*C\* Series intercorrelation .577 \*C\*

\*H\* Average mean sensitivity .186 \*H\*

\*A\* Segments, possible problems 22 \*A\*

\*\*\* Mean length of series 87.4 \*\*\*

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

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: STRA2\_4 13:25 Tue 14 May 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

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

. . . . . . . . . . . . . . . . . . .<====> . 153A 1 1969 2012 44

. . . . . . . . . . . . . . . . . . .<====> . 153C 2 1966 2012 47

. . . . . . . . . . . . . . . . . .<=========> . 155A 3 1917 2012 96

. . . . . . . . . . . . . . . . . .<=========> . 155B 4 1914 2012 99

. . . . . . . . . . . . . . . . . .<=========> . 156A 5 1917 2012 96

. . . . . . . . . . . . . . . . . . <========> . 156B 6 1923 2012 90

. . . . . . . . . . . . . . . . . .<=========> . 157A 7 1916 2012 97

. . . . . . . . . . . . . . . . . .<=========> . 157B 8 1914 2012 99

. . . . . . . . . . . . . . . . . . <=======> . 158A 9 1937 2012 76

. . . . . . . . . . . . . . . . . . <=======> . 158B 10 1932 2012 81

. . . . . . . . . . . . . . . . . .<=========> . 159A 11 1919 2012 94

. . . . . . . . . . . . . . . . . . <========> . 159B 12 1920 2012 93

. . . . . . . . . . . . . . . . . . <========> . 160A 13 1922 2012 91

. . . . . . . . . . . . . . . . . . <========> . 160B 14 1924 2012 89

. . . . . . . . . . . . . . . . . . <=======> . 161A 15 1932 2012 81

. . . . . . . . . . . . . . . . . . <=======> . 161B 16 1937 2012 76

. . . . . . . . . . . . . . . . . <==========> . 162A 17 1906 2012 107

. . . . . . . . . . . . . . . . . .<=========> . 162B 18 1918 2012 95

. . . . . . . . . . . . . . . . . .<=========> . 163A 19 1914 2012 99

. . . . . . . . . . . . . . . . . .<=========> . 163B 20 1913 2012 100

. . . . . . . . . . . . . . . . . . <========> . 164A 21 1928 2012 85

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

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: STRA2\_4 13:25 Tue 14 May 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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1950 -1.380 19 2000 -2.288 21

1951 -.057 19 2001 .528 21

1952 -.282 19 2002 .300 21

1953 .046 19 2003 -1.214 21

1954 .746 19 2004 -.559 21

1955 1.594 19 2005 .370 21

1906 -.348 1 1956 -1.523 19 2006 -.579 21

1907 -1.401 1 1957 .162 19 2007 .892 21

1908 2.491 1 1958 .942 19 2008 -.425 21

1909 .350 1 1959 -.631 19 2009 -.670 21

1910 1.287 1 1960 -.007 19 2010 1.843 21

1911 -2.162 1 1961 .131 19 2011 -.438 21

1912 -2.955 1 1962 -.416 19 2012 1.904 21

1913 -.803 2 1963 .249 19

1914 .999 5 1964 -.692 19

1915 -.787 5 1965 .190 19

1916 1.046 6 1966 .219 20

1917 .544 8 1967 .068 20

1918 .114 9 1968 -.140 20

1919 -.763 10 1969 .276 21

1920 -1.855 11 1970 .196 21

1921 -.923 11 1971 1.008 21

1922 .992 12 1972 .327 21

1923 .410 13 1973 .847 21

1924 1.545 14 1974 -.106 21

1925 1.841 14 1975 1.275 21

1926 1.293 14 1976 -.780 21

1927 -.173 14 1977 -.078 21

1928 -.703 15 1978 -.463 21

1929 -.925 15 1979 .152 21

1930 -.684 15 1980 .202 21

1931 -.283 15 1981 -.296 21

1932 .621 17 1982 .925 21

1933 .266 17 1983 .665 21

1934 -.123 17 1984 -.788 21

1935 -.074 17 1985 -.940 21

1936 -.058 17 1986 -.211 21

1937 1.117 19 1987 .500 21

1938 1.352 19 1988 -.228 21

1939 .711 19 1989 -.466 21

1940 .662 19 1990 .360 21

1941 1.891 19 1991 1.146 21

1942 -.876 19 1992 1.495 21

1943 -1.716 19 1993 1.248 21

1944 -.920 19 1994 -1.273 21

1945 -.425 19 1995 .545 21

1946 -.561 19 1996 -1.751 21

1947 .169 19 1997 -.086 21

1948 -2.540 19 1998 -.549 21

1949 -.214 19 1999 .530 21

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PART 4: Master Bar Plot: STRA2\_4 13:25 Tue 14 May 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

1950f 2000i

1951-----@ 2001-------B

1952----a 2002------A

1953-----@ 2003-e

1954--------C 2004--b

1955----------F 2005-------A

1906---a 1956f 2006--b

1907f 1957------A 2007--------D

1908----------J 1958---------D 2008---b

1909-------A 1959--c 2009--c

1910---------E 1960-----@ 2010----------G

1911i 1961------A 2011---b

1912l 1962---b 2012----------H

1913-c 1963------A

1914---------D 1964--c

1915--c 1965------A

1916---------D 1966------A

1917-------B 1967-----@

1918------@ 1968----a

1919--c 1969------A

1920g 1970------A

1921-d 1971---------D

1922---------D 1972-------A

1923-------B 1973--------C

1924----------F 1974----@

1925----------G 1975---------E

1926---------E 1976--c

1927----a 1977-----@

1928--c 1978---b

1929-d 1979------A

1930--c 1980------A

1931----a 1981----a

1932--------B 1982--------D

1933------A 1983--------C

1934----@ 1984--c

1935-----@ 1985-d

1936-----@ 1986----a

1937---------D 1987-------B

1938---------E 1988----a

1939--------C 1989---b

1940--------C 1990-------A

1941----------H 1991---------E

1942-d 1992----------F

1943g 1993---------E

1944-d 1994-e

1945---b 1995-------B

1946--b 1996g

1947------A 1997-----@

1948j 1998---b

1949----a 1999-------B

PART 5: CORRELATION OF SERIES BY SEGMENTS: STRA2\_4 13:25 Tue 14 May 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 1905 1920 1935 1950 1965 1980 1995

1934 1949 1964 1979 1994 2009 2024

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

1 153A 1969 2012 .42A .57 .61

2 153C 1966 2012 .36A .58 .61

3 155A 1917 2012 .58 .72 .70 .25A .19B .37B .50

4 155B 1914 2012 .45B .53 .61 .26A .59 .60 .63

5 156A 1917 2012 .43 .60 .78 .59 .72 .86 .82

6 156B 1923 2012 .38A .76 .58 .31B .57 .63

7 157A 1916 2012 .71 .79 .73 .73 .70 .58 .65

8 157B 1914 2012 .61 .68 .64 .66B .57 .70 .78

9 158A 1937 2012 .80 .59 .20B .55 .59

10 158B 1932 2012 .50 .49 .26B .18B .61 .64

11 159A 1919 2012 .71 .73 .71 .48 .47 .75 .79

12 159B 1920 2012 .80 .74 .57 .65 .61 .64

13 160A 1922 2012 .56 .56 .37B .57 .80 .84

14 160B 1924 2012 .64 .68 .52 .36A .52 .59

15 161A 1932 2012 .59 .60 .55 .37A .61 .70

16 161B 1937 2012 .67 .69 .56 .47 .50

17 162A 1906 2012 .39A .52 .57 .57 .51 .47 .57

18 162B 1918 2012 .45 .62 .60 .51 .27A .56 .62

19 163A 1914 2012 .50 .55 .61 .37A .43 .57 .62

20 163B 1913 2012 .49 .53 .35B .20B .57 .63 .65

21 164A 1928 2012 .44 .55 .39A .55 .81 .78

Av segment correlation .53 .60 .64 .48 .46 .61 .66

PART 6: POTENTIAL PROBLEMS: STRA2\_4 13:25 Tue 14 May 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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153A 1969 to 2012 44 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

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

1969 1998 0 .06 -.12 .16 -.20 -.12 -.20 .12 .04 .19 -.04 .42\*-.19 -.03 -.42 .12 -.13 .12 -.04 .25 -.07 -.08

[B] Entire series, effect on correlation ( .518) is:

Lower 1970< -.106 1994> -.054 1995< -.021 2011> -.017 1987< -.015 1974> -.013 Higher 1976 .028 2012 .028

1969 to 1998 segment:

Lower 1970< -.125 1994> -.106 1995< -.031 1987< -.022 1974> -.020 1978> -.007 Higher 1976 .059 1975 .042

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

153C 1966 to 2012 47 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

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

1966 1995 0 .24 -.24 .08 -.03 -.19 -.23 .29 .14 .22 -.06 .36\*-.02 -.06 -.53 -.11 -.21 .17 -.09 .17 -.06 .04

[B] Entire series, effect on correlation ( .585) is:

Lower 1994> -.072 1988< -.037 1966< -.020 2011> -.018 1968> -.014 1987< -.013 Higher 2000 .044 2003 .026

1966 to 1995 segment:

Lower 1994> -.159 1966< -.032 1987< -.025 1968> -.024 1988< -.019 1974> -.017 Higher 1975 .042 1976 .040

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

155A 1917 to 2012 96 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

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

1950 1979 0 -.21 -.05 -.09 -.10 -.12 -.24 .08 .00 .18 -.05 .25\*-.02 -.20 .04 -.07 -.04 .10 .09 .00 -.15 .04

1965 1994 -9 .03 .24\*-.03 -.31 -.02 -.13 .03 -.38 .05 -.05 .19| .22 .14 .15 -.17 -.07 .20 .08 -.11 -.10 .02

1980 2009 -9 -.18 .53\* .18 -.08 -.03 .02 -.12 .09 -.10 -.27 .37| .14 -.12 .21 - - - - - - -

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

Lower 1978< -.026 2000> -.023 1956> -.021 1993< -.015 2006> -.015 1975< -.011 Higher 1948 .068 1994 .018

1950 to 1979 segment:

Lower 1956> -.077 1978< -.043 1975< -.033 1963< -.028 1967> -.017 1970> -.015 Higher 1959 .038 1958 .037

1965 to 1994 segment:

Lower 1993< -.054 1975< -.040 1988> -.020 1981> -.018 1984> -.017 1967> -.016 Higher 1994 .192 1991 .036

1980 to 2009 segment:

Lower 1993< -.060 2006> -.041 2000> -.041 1997< -.031 2005< -.027 1982< -.017 Higher 1994 .094 2003 .066

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155B 1914 to 2012 99 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

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

1914 1943 -8 - - .62\*-.03 .12 -.36 .13 -.28 -.04 .11 .45| .32 -.01 -.18 -.17 -.04 -.05 -.18 .22 -.09 -.10

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

1950 1979 0 -.25 -.17 .13 -.09 -.05 -.21 .10 .00 .04 -.28 .26\*-.25 -.07 -.25 .06 .03 -.09 -.30 .20 -.03 -.13

[B] Entire series, effect on correlation ( .509) is:

Lower 1920> -.037 1956> -.028 1919< -.019 2000> -.011 1996> -.009 1963< -.009 Higher 1948 .030 1994 .020

1914 to 1943 segment:

Lower 1920> -.130 1927> -.025 1923> -.024 1935< -.015 1930> -.014 1922< -.013 Higher 1941 .045 1942 .040

1950 to 1979 segment:

Lower 1956> -.108 1963< -.043 1974> -.035 1972< -.034 1971< -.030 1959> -.028 Higher 1976 .129 1955 .052

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

1919 1920 4.1 SD

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

156A 1917 to 2012 96 years Series 5

[B] Entire series, effect on correlation ( .651) is:

Lower 1920> -.029 1918< -.023 1974< -.020 1950> -.017 2011> -.012 1928> -.008 Higher 2000 .030 1956 .018

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156B 1923 to 2012 90 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

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

1923 1952 0 .19 -.23 .24 -.26 -.11 -.28 -.04 .15 .11 -.29 .38\*-.06 -.12 -.13 .20 .13 .29 -.14 .14 -.10 -.23

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

1965 1994 6 .31 -.05 .00 .04 -.10 .00 -.06 -.40 -.18 -.46 .31|-.18 .27 .01 .07 .02 .38\* .02 .08 .21 .07

[B] Entire series, effect on correlation ( .488) is:

Lower 1923< -.132 1984> -.018 1991< -.013 1928> -.010 1985> -.009 1975< -.008 Higher 1956 .042 1942 .031

1923 to 1952 segment:

Lower 1923< -.288 1928> -.024 1925< -.011 1927> -.009 1950> -.008 1931< -.003 Higher 1942 .103 1924 .041

1965 to 1994 segment:

Lower 1984> -.100 1991< -.060 1985> -.049 1975< -.034 1973< -.031 1993< -.027 Higher 1994 .294 1982 .037

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

1923 1924 4.2 SD

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

1923 -5.5 SD

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157A 1916 to 2012 97 years Series 7

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

Lower 2000> -.017 1919> -.016 2006> -.013 1953< -.010 1999< -.009 1968> -.008 Higher 1942 .016 1994 .012

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157B 1914 to 2012 99 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

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

1950 1979 -8 -.03 -.33 .67\* .02 .01 -.09 .11 -.05 .41 -.22 .66|-.22 -.04 .09 -.11 -.29 .50 -.25 -.06 .21 -.02

[B] Entire series, effect on correlation ( .648) is:

Lower 1950< -.030 1915> -.020 1939< -.018 1982< -.011 1987< -.010 1928> -.008 Higher 2000 .033 1956 .026

1950 to 1979 segment:

Lower 1950< -.067 1976> -.031 1958< -.028 1960< -.021 1970> -.008 1974> -.007 Higher 1956 .117 1954 .009

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158A 1937 to 2012 76 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

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

1965 1994 -7 .07 -.11 .17 .31\*-.12 .21 -.14 .02 -.01 -.15 .20| .02 -.14 -.07 -.18 -.05 -.07 .00 -.10 -.06 .29

[B] Entire series, effect on correlation ( .617) is:

Lower 1994> -.037 1983< -.014 1949< -.013 2003> -.013 1976> -.012 1969< -.012 Higher 1956 .031 2000 .029

1965 to 1994 segment:

Lower 1994> -.123 1983< -.046 1969< -.036 1976> -.027 1989> -.018 1978> -.018 Higher 1984 .095 1975 .070

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158B 1932 to 2012 81 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

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

1950 1979 6 -.17 -.11 .36 .02 .22 -.02 .08 .05 .26 -.32 .26|-.23 -.07 -.16 .16 -.17 .39\*-.08 .18 .15 -.09

1965 1994 -8 .02 -.13 .33\* .04 .11 -.16 -.08 -.15 -.11 -.24 .18|-.07 .07 -.24 .25 -.29 .22 -.31 .13 -.15 .12

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

Lower 1970< -.039 2003> -.032 1942> -.025 1994> -.025 1951< -.011 1978> -.009 Higher 2000 .072 1948 .043

1950 to 1979 segment:

Lower 1970< -.073 1978> -.028 1951< -.026 1975< -.017 1960> -.016 1964> -.015 Higher 1950 .096 1958 .033

1965 to 1994 segment:

Lower 1970< -.092 1994> -.065 1978> -.034 1989> -.029 1975< -.025 1983< -.020 Higher 1984 .082 1976 .047

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159A 1919 to 2012 94 years Series 11

[B] Entire series, effect on correlation ( .693) is:

Lower 2004> -.015 1965< -.012 1927> -.012 1966< -.011 1959> -.009 1942> -.008 Higher 2000 .033 1948 .032

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

2004 +3.4 SD

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159B 1920 to 2012 93 years Series 12

[B] Entire series, effect on correlation ( .678) is:

Lower 2002< -.029 1959> -.014 2011> -.012 1996> -.010 1931> -.009 1988< -.009 Higher 1948 .038 2000 .034

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160A 1922 to 2012 91 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

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

1950 1979 -2 -.11 -.38 .49 -.28 -.28 .30 .01 -.17 .50\*-.27 .37|-.24 -.18 .04 -.08 -.18 .33 -.01 -.19 .23 .01

[B] Entire series, effect on correlation ( .610) is:

Lower 1922< -.039 1956> -.023 1959> -.016 1932< -.012 1961< -.010 1978< -.009 Higher 1996 .024 2000 .019

1950 to 1979 segment:

Lower 1956> -.064 1959> -.051 1961< -.030 1979< -.028 1962> -.024 1967< -.022 Higher 1950 .057 1955 .042

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

160B 1924 to 2012 89 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

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

1965 1994 0 .16 -.17 .11 -.28 -.02 .14 .23 .24 .10 .06 .36\*-.29 -.19 -.56 -.05 .10 .04 .00 .10 .11 .07

[B] Entire series, effect on correlation ( .587) is:

Lower 1994> -.024 2002< -.011 1929> -.010 1979< -.010 1965< -.009 1989< -.009 Higher 1948 .014 2010 .013

1965 to 1994 segment:

Lower 1994> -.122 1979< -.030 1965< -.029 1985> -.022 1969< -.015 1990< -.013 Higher 1975 .038 1971 .038

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161A 1932 to 2012 81 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

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

1965 1994 0 .20 -.09 .17 -.17 -.24 -.03 .10 -.30 -.14 .29 .37\*-.07 -.04 -.14 .05 .07 -.28 -.11 .07 .08 -.04

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

Lower 1941< -.020 1997< -.019 1977< -.018 1958< -.014 1996> -.013 1932< -.012 Higher 2000 .056 1956 .041

1965 to 1994 segment:

Lower 1977< -.059 1973< -.045 1980< -.032 1986< -.031 1970> -.024 1981> -.024 Higher 1994 .029 1992 .027

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161B 1937 to 2012 76 years Series 16

[B] Entire series, effect on correlation ( .567) is:

Lower 1959< -.032 2000> -.023 1948> -.020 2009< -.016 2011> -.011 1977< -.010 Higher 1956 .046 1994 .033

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162A 1906 to 2012 107 years Series 17

[\*] Early part of series cannot be checked from 1906 to 1912 -- 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

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

1913 1942 0 - - - -.27 -.04 -.04 -.10 -.25 .10 .34 .39\*-.06 -.22 -.15 -.21 -.45 -.08 .17 .11 -.22 .04

[B] Entire series, effect on correlation ( .488) is:

Lower 1915> -.023 1927> -.016 1935< -.011 1918> -.011 2009> -.010 1924< -.009 Higher 1920 .021 2000 .020

1913 to 1942 segment:

Lower 1915> -.078 1927> -.053 1918> -.036 1935< -.035 1924< -.034 1913> -.021 Higher 1920 .107 1922 .034

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

162B 1918 to 2012 95 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 0 -.17 .05 .00 -.29 .05 -.09 .19 -.30 .17 -.18 .27\*-.37 -.03 -.10 .12 .23 .08 .15 .19 -.01 -.12

[B] Entire series, effect on correlation ( .586) is:

Lower 1956> -.027 1940< -.021 1994> -.016 1930< -.015 1984> -.014 1939< -.011 Higher 1948 .037 2000 .023

1965 to 1994 segment:

Lower 1984> -.063 1992< -.044 1994> -.033 1969< -.031 1988> -.029 1985> -.022 Higher 1976 .173 1975 .048

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

163A 1914 to 2012 99 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

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

1950 1979 0 -.15 .06 -.07 -.11 .12 -.25 .04 .25 -.01 -.01 .37\*-.28 .14 -.09 -.18 .11 -.03 -.18 .04 -.27 .11

[B] Entire series, effect on correlation ( .551) is:

Lower 1927< -.031 1991< -.029 1956> -.023 2000> -.013 1990< -.012 1925< -.009 Higher 1948 .040 1994 .026

1950 to 1979 segment:

Lower 1956> -.105 1970> -.024 1957< -.024 1962< -.023 1960< -.021 1976> -.014 Higher 1959 .064 1975 .052

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163B 1913 to 2012 100 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

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

1935 1964 -6 .12 .24 -.03 .10 .46\*-.07 .17 .13 -.27 -.07 .35|-.33 -.06 -.15 .06 -.09 -.21 -.12 .31 -.29 .17

1950 1979 8 .17 .23 .04 .07 .27 -.19 .20 -.19 -.22 -.21 .20|-.10 .13 .02 .34 .00 -.14 .11 .38\*-.13 -.17

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

Lower 1955< -.021 1964> -.013 1942> -.011 1929> -.010 1991< -.010 1944> -.010 Higher 1948 .022 1994 .022

1935 to 1964 segment:

Lower 1955< -.073 1964> -.047 1944> -.034 1950> -.027 1949< -.025 1954< -.025 Higher 1948 .149 1956 .096

1950 to 1979 segment:

Lower 1955< -.090 1964> -.069 1950> -.040 1978> -.040 1954< -.028 1967> -.026 Higher 1956 .209 1976 .103

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164A 1928 to 2012 85 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

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

1950 1979 0 .14 .24 .38 -.09 .08 .03 .15 .10 -.03 -.05 .39\*-.25 -.07 .18 .21 -.03 .00 -.07 -.02 -.08 -.06

[B] Entire series, effect on correlation ( .583) is:

Lower 1942> -.026 1928> -.024 1976> -.019 2011< -.018 1943> -.014 1957< -.010 Higher 1948 .057 2000 .038

1950 to 1979 segment:

Lower 1976> -.082 1957< -.059 1970> -.034 1974> -.024 1950> -.022 1953< -.018 Higher 1956 .301 1959 .033

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PART 7: DESCRIPTIVE STATISTICS: STRA2\_4 13:25 Tue 14 May 2013 Page 6

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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 153A 1969 2012 44 3 1 .518 1.63 3.45 .739 .857 .177 2.77 .547 -.052 1

2 153C 1966 2012 47 3 1 .585 1.73 3.37 .790 .883 .186 2.79 .661 .098 1

3 155A 1917 2012 96 7 3 .506 1.13 3.38 .632 .900 .230 2.71 .420 .038 1

4 155B 1914 2012 99 7 2 .509 1.35 3.58 .818 .947 .191 2.63 .461 -.018 1

5 156A 1917 2012 96 7 0 .651 1.90 4.32 .796 .866 .189 2.54 .461 -.019 1

6 156B 1923 2012 90 6 2 .488 2.08 5.05 1.114 .926 .184 2.58 .375 -.069 1

7 157A 1916 2012 97 7 0 .645 2.20 4.01 .599 .795 .134 2.37 .329 -.095 1

8 157B 1914 2012 99 7 1 .648 2.10 4.12 .913 .888 .174 2.48 .436 -.043 1

9 158A 1937 2012 76 5 1 .617 2.29 4.37 .839 .901 .131 2.40 .332 -.011 1

10 158B 1932 2012 81 6 2 .505 2.43 4.44 .823 .850 .147 2.61 .494 -.096 1

11 159A 1919 2012 94 7 0 .693 1.77 4.59 .724 .797 .185 2.78 .535 -.005 1

12 159B 1920 2012 93 6 0 .678 1.27 2.84 .606 .911 .151 2.72 .555 -.053 1

13 160A 1922 2012 91 6 1 .610 1.46 4.16 .982 .940 .225 2.66 .557 -.076 1

14 160B 1924 2012 89 6 1 .587 1.24 4.13 1.005 .940 .256 2.70 .431 -.024 1

15 161A 1932 2012 81 6 1 .572 2.17 4.07 .834 .867 .165 2.51 .406 -.048 1

16 161B 1937 2012 76 5 0 .567 2.02 4.68 .780 .767 .168 2.52 .464 -.088 1

17 162A 1906 2012 107 7 1 .488 1.54 3.20 .748 .864 .194 2.59 .402 -.024 1

18 162B 1918 2012 95 7 1 .586 1.52 4.31 .797 .869 .223 2.76 .493 -.044 1

19 163A 1914 2012 99 7 1 .551 1.40 3.22 .794 .902 .180 2.76 .450 -.019 2

20 163B 1913 2012 100 7 2 .512 1.58 3.68 .897 .889 .187 2.68 .373 -.028 2

21 164A 1928 2012 85 6 1 .583 1.55 5.02 1.120 .947 .204 2.55 .444 -.127 2

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Total or mean: 1835 128 22 .577 1.72 5.05 .826 .882 .186 2.79 .451 -.040

- = [ COFECHA STRA2COF ] = -