[] Dendrochronology Program Library Run ASCU4 Program COF 12:41 Mon 11 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 28561

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

Title of run: ASCU\_4

File of DATED series: ASCU\_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 1862 to 2012 151 years

Continuous time span is 1862 to 2012 151 years

Portion with two or more series is 1863 to 2012 150 years

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

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

\*O\* Master series 1862 2012 151 yrs \*O\*

\*F\* Total rings in all series 1525 \*F\*

\*E\* Total dated rings checked 1524 \*E\*

\*C\* Series intercorrelation .606 \*C\*

\*H\* Average mean sensitivity .222 \*H\*

\*A\* Segments, possible problems 21 \*A\*

\*\*\* Mean length of series 69.3 \*\*\*

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

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

61A 1 absent rings: 1981

1 absent rings .066%

PART 2: TIME PLOT OF TREE-RING SERIES: ASCU\_4 12:41 Mon 11 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

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

. . . . . . . . . . . . . . . . . . <=====> . 53A 1 1952 2012 61

. . . . . . . . . . . . . . . . . . <======> . 53B 2 1944 2012 69

. . . . . . . . . . . . . . . . . . .<====> . 54A 3 1969 2012 44

. . . . . . . . . . . . . . . . . . . <===> . 54B 4 1971 2012 42

. . . . . . . . . . . . . . . . . . <======> . 55B 5 1946 2012 67

. . . . . . . . . . . . . . . . . . <======> . 56A 6 1945 2012 68

. . . . . . . . . . . . . . . . . . <======> . 56B 7 1948 2012 65

. . . . . . . . . . . . . . . . . . .<====> . 57B 8 1960 2012 53

. . . . . . . . . . . . . . . . . . <========> . 58A 9 1920 2012 93

. . . . . . . . . . . . . . . . . . <========> . 58B 10 1920 2012 93

. . . . . . . . . . . . . . . . . . <=====> . 59A 11 1956 2012 57

. . . . . . . . . . . . . . . . . . .<====> . 59B 12 1965 2012 48

. . . . . . . . . . . . . . . . . . .<====> . 60A 13 1963 2012 50

. . . . . . . . . . . . . . . . . . .<====> . 60B 14 1962 2012 51

. . . . . . . . . . . . . . . . . . <======> . 61A 15 1946 2012 67

. . . . . . . . . . . . . . . . . . <======> . 61B 16 1944 2012 69

. . . . . . . . . . . . . . . . .<==============> . 62A 17 1863 2012 150

. . . . . . . . . . . . . . . . .<==============> . 62B 18 1862 2012 151

. . . . . . . . . . . . . . . . . . <=====> . 63A 19 1958 2012 55

. . . . . . . . . . . . . . . . . . <=====> . 63B 20 1955 2012 58

. . . . . . . . . . . . . . . . . . <=====> . 64A 21 1957 2012 56

. . . . . . . . . . . . . . . . . . <=====> . 64B 22 1955 2012 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: ASCU\_4 12:41 Mon 11 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

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

1900 1.379 2 1950 -.588 10 2000 -1.414 22

1901 -.917 2 1951 1.130 10 2001 .072 22

1902 -1.848 2 1952 .302 11 2002 -.231 22

1903 -.299 2 1953 -.454 11 2003 -1.790 22

1904 1.781 2 1954 1.075 11 2004 -1.256 22

1905 -.043 2 1955 1.010 13 2005 -.708 22

1906 -1.472 2 1956 -.813 14 2006 .397 22

1907 .156 2 1957 1.152 15 2007 .794 22

1908 -.456 2 1958 .438 16 2008 .912 22

1909 .001 2 1959 .103 16 2009 .837 22

1910 .922 2 1960 .195 17 2010 1.616 22

1911 -3.627 2 1961 1.079 17 2011 -1.000 22

1862 -1.183 1 1912 .573 2 1962 .411 18 2012 -.039 22

1863 .025 2 1913 .846 2 1963 .545 19

1864 -.822 2 1914 .981 2 1964 -.366 19

1865 -.960 2 1915 1.527 2 1965 .011 20

1866 1.075 2 1916 1.249 2 1966 -.529 20

1867 .403 2 1917 -.549 2 1967 .280 20

1868 -.136 2 1918 -.916 2 1968 -.549 20

1869 .391 2 1919 -1.772 2 1969 -1.332 21

1870 2.666 2 1920 -.496 4 1970 -1.077 21

1871 1.351 2 1921 1.391 4 1971 -.271 22

1872 .753 2 1922 .747 4 1972 -.463 22

1873 -3.807 2 1923 .610 4 1973 -.293 22

1874 .763 2 1924 .292 4 1974 -.266 22

1875 .377 2 1925 .156 4 1975 .373 22

1876 -1.291 2 1926 .041 4 1976 .473 22

1877 -.968 2 1927 .230 4 1977 1.231 22

1878 1.068 2 1928 -.274 4 1978 -.131 22

1879 -.626 2 1929 -1.462 4 1979 .281 22

1880 .686 2 1930 .024 4 1980 .573 22

1881 .852 2 1931 1.506 4 1981 -1.264 22 1

1882 -1.047 2 1932 1.309 4 1982 -.068 22

1883 -.903 2 1933 .964 4 1983 -.588 22

1884 .512 2 1934 -.605 4 1984 -.438 22

1885 -1.627 2 1935 .033 4 1985 .520 22

1886 .384 2 1936 .245 4 1986 .709 22

1887 -.782 2 1937 -.555 4 1987 1.330 22

1888 1.300 2 1938 -1.815 4 1988 .129 22

1889 1.069 2 1939 -.012 4 1989 -.176 22

1890 1.370 2 1940 -.510 4 1990 .242 22

1891 -1.664 2 1941 -.465 4 1991 .306 22

1892 -.284 2 1942 -1.001 4 1992 .917 22

1893 .159 2 1943 -.223 4 1993 .786 22

1894 1.319 2 1944 -.945 6 1994 -.084 22

1895 -1.868 2 1945 .018 7 1995 1.036 22

1896 1.427 2 1946 -.689 9 1996 -.744 22

1897 .271 2 1947 .568 9 1997 -.356 22

1898 .526 2 1948 -1.190 10 1998 -.584 22

1899 1.806 2 1949 -1.049 10 1999 -.331 22

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PART 4: Master Bar Plot: ASCU\_4 12:41 Mon 11 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

1900----------F 1950--b 2000f

1901-d 1951---------E 2001-----@

1902g 1952------A 2002----a

1903----a 1953---b 2003g

1904----------G 1954---------D 2004-e

1905-----@ 1955---------D 2005--c

1906f 1956--c 2006------B

1907-----A 1957---------E 2007--------C

1908---b 1958-------B 2008--------D

1909-----@ 1959-----@ 2009--------C

1910--------D 1960------A 2010----------F

1911o 1961---------D 2011-d

1862-e 1912-------B 1962-------B 2012-----@

1863-----@ 1913--------C 1963-------B

1864--c 1914---------D 1964---a

1865-d 1915----------F 1965-----@

1866---------D 1916---------E 1966---b

1867-------B 1917---b 1967------A

1868----a 1918-d 1968---b

1869------B 1919g 1969-e

1870----------K 1920---b 1970-d

1871----------E 1921----------F 1971----a

1872--------C 1922--------C 1972---b

1873o 1923-------B 1973----a

1874--------C 1924------A 1974----a

1875------B 1925-----A 1975------A

1876-e 1926-----@ 1976-------B

1877-d 1927------A 1977---------E

1878---------D 1928----a 1978----a

1879--c 1929f 1979------A

1880--------C 1930-----@ 1980-------B

1881--------C 1931----------F 1981-e

1882-d 1932----------E 1982-----@

1883-d 1933---------D 1983--b

1884-------B 1934--b 1984---b

1885g 1935-----@ 1985-------B

1886------B 1936------A 1986--------C

1887--c 1937---b 1987----------E

1888----------E 1938g 1988-----A

1889---------D 1939-----@ 1989----a

1890----------E 1940---b 1990------A

1891g 1941---b 1991------A

1892----a 1942-d 1992--------D

1893------A 1943----a 1993--------C

1894----------E 1944-d 1994----@

1895g 1945-----@ 1995---------D

1896----------F 1946--c 1996--c

1897------A 1947-------B 1997---a

1898-------B 1948-e 1998--b

1899----------G 1949-d 1999---a

PART 5: CORRELATION OF SERIES BY SEGMENTS: ASCU\_4 12:41 Mon 11 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 1860 1875 1890 1905 1920 1935 1950 1965 1980 1995

1889 1904 1919 1934 1949 1964 1979 1994 2009 2024

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

1 53A 1952 2012 .53 .39A .60 .64

2 53B 1944 2012 .65 .51 .34A .42A .61

3 54A 1969 2012 .46 .59 .73

4 54B 1971 2012 .37A .59 .65

5 55B 1946 2012 .59 .58 .65 .80 .70

6 56A 1945 2012 .50 .52 .51 .74 .71

7 56B 1948 2012 .59 .59 .45 .54 .42A

8 57B 1960 2012 .55 .39A .36A .43

9 58A 1920 2012 .41A .36B .56 .74 .52 .37B

10 58B 1920 2012 .32B .50 .70 .55 .56 .56

11 59A 1956 2012 .50 .44 .77 .76

12 59B 1965 2012 .59 .64 .69

13 60A 1963 2012 .40A .42A .52 .61

14 60B 1962 2012 .71 .72 .51 .60

15 61A 1946 2012 .55 .58 .62 .58 .71

16 61B 1944 2012 .46 .61 .62 .68 .68

17 62A 1863 2012 .86 .85 .93 .85 .46 .39B .47 .47 .56 .69

18 62B 1862 2012 .86 .85 .93 .78 .35A .32B .27B .42A .58 .65

19 63A 1958 2012 .33B .37A .81 .87

20 63B 1955 2012 .48 .43 .65 .64

21 64A 1957 2012 .69 .77 .71 .71

22 64B 1955 2012 .35A .44 .68 .73

Av segment correlation .86 .85 .93 .81 .39 .49 .52 .51 .61 .64

PART 6: POTENTIAL PROBLEMS: ASCU\_4 12:41 Mon 11 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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53A 1952 to 2012 61 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

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

1965 1994 0 .29 -.11 -.04 -.18 -.07 -.13 .02 -.02 .10 -.14 .39\* .25 .12 .06 .05 .17 .02 -.18 -.01 -.02 .06

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

Lower 1968< -.075 1991< -.020 1966> -.013 2007< -.012 1978> -.011 1983> -.009 Higher 1956 .025 1969 .025

1965 to 1994 segment:

Lower 1968< -.046 1991< -.033 1966> -.028 1978> -.027 1983> -.021 1977< -.017 Higher 1969 .084 1987 .045

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

53B 1944 to 2012 69 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

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

1965 1994 0 -.11 -.21 .14 -.11 -.05 .10 .03 .04 -.03 .10 .34\* .06 -.02 -.31 .02 .16 -.13 .11 .32 .04 .09

1980 2009 0 -.05 -.14 .05 -.08 -.02 -.17 -.07 .05 .05 -.08 .42\*-.07 -.02 .09 - - - - - - -

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

Lower 1992< -.037 1978> -.028 1989< -.022 1981> -.019 1944> -.017 1952> -.013 Higher 2011 .054 1948 .022

1965 to 1994 segment:

Lower 1992< -.107 1978> -.086 1981> -.045 1989< -.037 1966> -.032 1983> -.015 Higher 1969 .124 1987 .069

1980 to 2009 segment:

Lower 1992< -.087 1989< -.041 1981> -.036 2004> -.022 1997> -.019 2006< -.011 Higher 2000 .088 1987 .045

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54A 1969 to 2012 44 years Series 3

[B] Entire series, effect on correlation ( .660) is:

Lower 1988< -.024 1996> -.023 1981> -.021 1979< -.021 1994> -.020 1991< -.020 Higher 2011 .075 2003 .027

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

1973 +3.1 SD

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54B 1971 to 2012 42 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

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

1971 2000 0 .18 -.12 .00 .09 -.21 .15 -.25 .04 .16 .05 .37\*-.13 .03 .08 -.32 .05 -.21 .14 -.14 -.17 .22

[B] Entire series, effect on correlation ( .511) is:

Lower 1971< -.105 1996> -.031 1989< -.027 1979< -.019 2004> -.018 1981> -.013 Higher 2003 .052 2011 .045

1971 to 2000 segment:

Lower 1971< -.113 1996> -.051 1979< -.023 1981> -.021 1989< -.019 1972> -.015 Higher 1995 .047 1977 .042

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55B 1946 to 2012 67 years Series 5

[B] Entire series, effect on correlation ( .653) is:

Lower 2011> -.057 1968> -.027 1964< -.021 1982< -.019 1946< -.014 1958> -.007 Higher 1948 .023 1981 .022

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

1968 +3.1 SD

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56A 1945 to 2012 68 years Series 6

[B] Entire series, effect on correlation ( .589) is:

Lower 1968> -.027 1946> -.020 1952< -.019 1969> -.017 2011> -.014 1982< -.011 Higher 1981 .035 2003 .020

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

1968 +3.3 SD; 1969 +3.0 SD

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56B 1948 to 2012 65 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

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

1983 2012 0 -.12 -.19 .06 .14 -.16 .08 -.21 -.21 .09 -.07 .42\* - - - - - - - - - -

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

Lower 2003> -.032 1977< -.030 1986< -.025 1972< -.023 2011> -.020 2004> -.013 Higher 1969 .025 1996 .024

1983 to 2012 segment:

Lower 1986< -.072 2003> -.049 1983> -.026 2004> -.026 2010< -.026 2012< -.024 Higher 1996 .083 2000 .063

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

1984 +3.4 SD

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57B 1960 to 2012 53 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

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

1965 1994 0 .22 .18 -.29 .00 -.12 -.10 -.10 -.01 .02 .09 .39\*-.06 -.18 .22 -.09 .14 .24 -.22 -.03 .17 .00

1980 2009 0 -.05 .16 -.18 .15 -.19 -.09 .01 -.05 .30 -.16 .36\* .01 -.14 .00 - - - - - - -

[B] Entire series, effect on correlation ( .453) is:

Lower 1981> -.058 2011> -.038 1990< -.026 1968> -.025 1991< -.021 1992< -.018 Higher 1969 .038 2003 .032

1965 to 1994 segment:

Lower 1981> -.147 1968> -.054 1990< -.040 1991< -.032 1992< -.032 1989> -.022 Higher 1969 .143 1978 .062

1980 to 2009 segment:

Lower 1981> -.104 1990< -.052 1991< -.043 1992< -.034 2004> -.029 2007< -.023 Higher 2003 .095 1996 .047

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

1981 +3.2 SD

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58A 1920 to 2012 93 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

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

1920 1949 0 -.17 -.03 .11 -.18 .26 .25 .01 -.33 -.36 -.09 .41\* .06 .09 .08 .17 .07 .25 -.09 -.08 .00 .39

1935 1964 6 .18 -.41 .00 -.38 .12 -.33 .12 -.25 .04 -.25 .36|-.10 .01 .18 .33 -.06 .49\* .20 .08 .08 .37

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

1983 2012 -1 -.08 -.15 .18 .00 .09 .23 -.09 .11 .00 .39\* .37| - - - - - - - - - -

[B] Entire series, effect on correlation ( .450) is:

Lower 2011> -.045 1923< -.017 1939< -.015 1998> -.015 1953> -.014 2000> -.013 Higher 1931 .019 2003 .018

1920 to 1949 segment:

Lower 1923< -.078 1939< -.065 1943< -.037 1929> -.032 1948> -.029 1920> -.029 Higher 1931 .088 1921 .070

1935 to 1964 segment:

Lower 1939< -.061 1953> -.059 1963< -.054 1943< -.035 1948> -.029 1956> -.022 Higher 1951 .094 1957 .084

1983 to 2012 segment:

Lower 2011> -.136 1998> -.043 2000> -.036 2009< -.026 1996> -.021 1997< -.015 Higher 2003 .070 1987 .040

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

2004 -5.9 SD

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58B 1920 to 2012 93 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

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

1920 1949 10 .00 .01 .30 -.06 .16 -.07 .00 -.27 -.14 -.34 .32| .01 .08 -.09 .09 .01 -.02 -.04 .10 .08 .52\*

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

Lower 1932< -.023 1944> -.018 1942> -.017 1983> -.012 1939< -.011 1935< -.010 Higher 2011 .019 1957 .015

1920 to 1949 segment:

Lower 1932< -.067 1944> -.052 1942> -.050 1939< -.030 1935< -.029 1920> -.027 Higher 1948 .079 1931 .063

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

1983 +3.0 SD

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59A 1956 to 2012 57 years Series 11

[B] Entire series, effect on correlation ( .644) is:

Lower 1976< -.038 1978> -.025 1970> -.023 1968> -.022 1965< -.020 1969> -.017 Higher 1981 .034 2011 .029

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

1970 +3.3 SD

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59B 1965 to 2012 48 years Series 12

[B] Entire series, effect on correlation ( .679) is:

Lower 1992< -.029 2000> -.025 1976< -.018 2004> -.014 1973> -.011 1980< -.010 Higher 2011 .027 1969 .021

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60A 1963 to 2012 50 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

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

1963 1992 0 .29 .06 -.16 .00 -.13 -.27 -.38 -.10 .25 -.16 .40\*-.02 .01 .24 -.14 -.07 -.01 -.01 .07 -.09 .11

1965 1994 0 .31 -.02 -.17 .02 -.18 -.27 -.40 -.14 .20 -.18 .42\*-.01 .03 .23 -.14 -.01 .09 .00 .08 -.05 .10

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

Lower 1996> -.071 1969> -.058 1998> -.024 2000> -.018 1965< -.016 2005< -.014 Higher 2011 .090 2003 .077

1963 to 1992 segment:

Lower 1969> -.137 1970> -.032 1964> -.032 1965< -.031 1990< -.024 1979< -.016 Higher 1981 .117 1977 .044

1965 to 1994 segment:

Lower 1969> -.152 1970> -.037 1965< -.030 1990< -.022 1974> -.016 1978> -.015 Higher 1981 .112 1977 .046

[E] Outliers 3 3.0 SD above or -4.5 SD below mean for year

1969 +3.5 SD; 1996 +3.4 SD; 1998 +4.0 SD

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60B 1962 to 2012 51 years Series 14

[B] Entire series, effect on correlation ( .628) is:

Lower 2009< -.046 1997< -.032 2004> -.027 2007< -.021 2000> -.018 1996> -.011 Higher 2011 .073 1981 .036

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61A 1946 to 2012 67 years Series 15

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

Lower 1960< -.045 2003> -.024 1949> -.013 1953< -.012 1962< -.009 1958> -.009 Higher 2011 .032 1951 .015

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

1981 -1.264 22 1

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61B 1944 to 2012 69 years Series 16

[B] Entire series, effect on correlation ( .581) is:

Lower 1944< -.059 1946> -.022 1964> -.011 1984< -.009 1985< -.009 2003> -.009 Higher 1981 .020 2011 .019

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62A 1863 to 2012 150 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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1935 1964 -4 .15 .17 .16 .32 .09 -.04 .43\* .28 -.12 -.07 .39|-.02 -.14 -.19 .22 -.21 -.21 -.29 .03 -.44 -.22

[B] Entire series, effect on correlation ( .767) is:

Lower 1927< -.014 1951< -.011 1872< -.008 1991> -.007 1957< -.006 2006< -.005 Higher 1911 .041 1873 .036

1935 to 1964 segment:

Lower 1951< -.081 1957< -.045 1945< -.035 1964> -.024 1946> -.022 1937> -.021 Higher 1948 .054 1961 .053

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

1991 +3.0 SD

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62B 1862 to 2012 151 years Series 18

[\*] Early part of series cannot be checked from 1862 to 1862 -- 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

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

1920 1949 0 .01 .25 -.01 -.14 .04 .16 .09 .11 -.08 .22 .35\*-.20 -.37 -.20 .24 -.17 .03 -.17 .07 -.23 .10

1935 1964 -4 .17 .08 .31 -.04 -.05 .00 .45\* .13 -.14 .19 .32|-.14 .05 -.21 .21 -.38 -.01 -.05 .04 -.44 .15

1950 1979 -4 -.06 -.11 .02 -.09 -.07 -.06 .52\* .17 .10 .13 .27|-.08 .01 -.05 -.10 -.17 -.07 .01 .18 -.12 .09

1965 1994 0 -.26 -.14 -.11 -.12 -.11 .31 .39 .19 .27 .00 .42\* .10 -.20 -.03 -.20 .03 -.07 .14 .09 -.26 .00

[B] Entire series, effect on correlation ( .704) is:

Lower 1920< -.013 1949< -.012 1929< -.008 1957< -.008 1951< -.007 1872> -.006 Higher 1911 .051 1873 .045

1920 to 1949 segment:

Lower 1920< -.054 1941> -.025 1928> -.025 1937> -.017 1922< -.016 1947< -.015 Higher 1948 .077 1938 .041

1935 to 1964 segment:

Lower 1957< -.064 1951< -.058 1949< -.027 1947< -.025 1964> -.021 1941> -.020 Higher 1948 .098 1938 .052

1950 to 1979 segment:

Lower 1957< -.071 1951< -.063 1964> -.035 1973< -.022 1975< -.019 1967< -.016 Higher 1956 .055 1961 .046

1965 to 1994 segment:

Lower 1985< -.042 1973< -.032 1975< -.022 1978> -.020 1967< -.018 1991> -.017 Higher 1987 .037 1968 .035

[E] Outliers 3 3.0 SD above or -4.5 SD below mean for year

1939 +4.0 SD; 1941 +3.2 SD; 1991 +3.0 SD

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63A 1958 to 2012 55 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

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

1958 1987 -10 .50\* .31 .12 -.12 .01 -.20 -.29 -.22 .07 -.33 .33|-.13 .06 -.09 -.06 .14 -.12 -.12 .06 -.37 .07

1965 1994 0 .22 .18 .18 -.04 -.04 -.13 -.19 -.28 -.17 -.19 .37\*-.04 .22 .01 -.02 .15 -.14 -.05 .06 -.37 -.08

[B] Entire series, effect on correlation ( .658) is:

Lower 1969> -.073 1958< -.016 1976< -.015 1972> -.012 1980< -.012 1966> -.009 Higher 2011 .068 2003 .052

1958 to 1987 segment:

Lower 1969> -.163 1976< -.037 1980< -.028 1958< -.027 1972> -.026 1979< -.020 Higher 1981 .176 1978 .060

1965 to 1994 segment:

Lower 1969> -.173 1976< -.047 1980< -.036 1972> -.027 1979< -.026 1966> -.017 Higher 1981 .196 1978 .064

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

1969 +4.1 SD

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63B 1955 to 2012 58 years Series 20

[B] Entire series, effect on correlation ( .576) is:

Lower 1994< -.057 1978> -.032 1959< -.022 1970> -.017 1969> -.014 1967< -.010 Higher 1981 .043 2011 .039

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

1971 +3.0 SD

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64A 1957 to 2012 56 years Series 21

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

Lower 1958< -.042 2000> -.027 2004< -.026 1979< -.013 1988> -.011 1989> -.008 Higher 1981 .035 2011 .025

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64B 1955 to 2012 58 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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1955 1984 0 -.06 -.13 .25 -.13 .10 .12 -.04 .11 .02 .09 .35\*-.20 .12 .08 .03 -.13 -.37 -.24 .05 -.19 -.09

[B] Entire series, effect on correlation ( .523) is:

Lower 1970< -.059 1961< -.030 1977< -.028 1955< -.023 2000> -.012 1968> -.011 Higher 2011 .061 1981 .031

1955 to 1984 segment:

Lower 1961< -.052 1970< -.050 1977< -.049 1955< -.040 1968> -.022 1979< -.016 Higher 1981 .086 1978 .040

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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 53A 1952 2012 61 4 1 .551 2.59 4.66 .787 .664 .191 2.52 .420 .050 1

2 53B 1944 2012 69 5 2 .572 1.80 3.62 .743 .557 .277 2.66 .553 -.019 1

3 54A 1969 2012 44 3 0 .660 1.75 2.55 .456 .486 .219 2.57 .560 -.039 1

4 54B 1971 2012 42 3 1 .511 1.85 3.51 .556 .555 .224 2.69 .581 .016 1

5 55B 1946 2012 67 5 0 .653 1.76 3.97 .649 .784 .191 2.66 .599 -.044 1

6 56A 1945 2012 68 5 0 .589 1.91 4.32 1.121 .857 .227 2.77 .602 -.018 1

7 56B 1948 2012 65 5 1 .509 1.35 3.99 1.125 .917 .211 2.67 .596 -.081 1

8 57B 1960 2012 53 4 2 .453 1.76 3.14 .450 .704 .157 2.64 .509 .003 1

9 58A 1920 2012 93 6 3 .450 1.07 4.30 .799 .774 .292 3.07 .443 -.021 1

10 58B 1920 2012 93 6 1 .519 .96 3.45 .752 .880 .279 2.68 .372 -.037 1

11 59A 1956 2012 57 4 0 .644 2.26 3.92 .614 .607 .186 2.51 .480 -.045 1

12 59B 1965 2012 48 3 0 .679 2.67 3.71 .636 .617 .157 2.42 .404 -.041 1

13 60A 1963 2012 50 4 2 .518 1.89 2.64 .330 .296 .175 2.58 .591 -.069 1

14 60B 1962 2012 51 4 0 .628 1.89 3.12 .461 .475 .181 2.54 .580 -.051 1

15 61A 1946 2012 67 5 0 .639 1.86 6.58 1.419 .838 .318 2.55 .399 -.086 1

16 61B 1944 2012 69 5 0 .581 1.87 3.63 .829 .734 .263 2.55 .477 -.072 1

17 62A 1863 2012 150 10 1 .767 1.51 4.34 .858 .846 .232 2.65 .417 -.078 1

18 62B 1862 2012 151 10 4 .704 1.48 4.03 .748 .813 .229 2.61 .423 -.053 1

19 63A 1958 2012 55 4 2 .658 2.66 4.61 .579 .374 .169 2.57 .537 -.077 1

20 63B 1955 2012 58 4 0 .576 2.46 4.11 .550 .475 .169 2.42 .530 -.089 1

21 64A 1957 2012 56 4 0 .683 1.87 3.26 .500 .693 .177 2.57 .626 .030 1

22 64B 1955 2012 58 4 1 .523 1.82 4.00 .632 .693 .199 2.57 .471 .013 1

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Total or mean: 1525 107 21 .606 1.77 6.58 .742 .703 .222 3.07 .492 -.041

- = [ COFECHA ASCU4COF ] = -