[] Dendrochronology Program Library Run 155 Program COF 11:18 Tue 19 Apr 2011 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 27869

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

File of DATED series: 155\_EQU

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 1879 to 2010 132 years

Continuous time span is 1879 to 2010 132 years

Portion with two or more series is 1880 to 2010 131 years

>> 283B 1977 absent in 1 of 22 series, but is not usually narrow: master index is .054

>> 286B 2008 absent in 8 of 22 series, but is not usually narrow: master index is -.267

>> 288A 2007 absent in 3 of 22 series, but is not usually narrow: master index is .139

>> 288A 2008 absent in 8 of 22 series, but is not usually narrow: master index is -.267

>> 288A 2009 absent in 6 of 22 series, but is not usually narrow: master index is .418

>> 288A 2010 absent in 7 of 22 series, but is not usually narrow: master index is .049

>> 288B 1976 absent in 1 of 22 series, but is not usually narrow: master index is .796

>> 288B 1987 absent in 1 of 22 series, but is not usually narrow: master index is .509

>> 288B 1988 absent in 1 of 22 series, but is not usually narrow: master index is .438

>> 288B 2005 absent in 1 of 22 series, but is not usually narrow: master index is .526

>> 288B 2007 absent in 3 of 22 series, but is not usually narrow: master index is .139

>> 288B 2008 absent in 8 of 22 series, but is not usually narrow: master index is -.267

>> 288B 2009 absent in 6 of 22 series, but is not usually narrow: master index is .418

>> 288B 2010 absent in 7 of 22 series, but is not usually narrow: master index is .049

>> 289A 1982 absent in 2 of 22 series, but is not usually narrow: master index is .229

>> 289A 1983 absent in 2 of 22 series, but is not usually narrow: master index is .489

>> 289A 2008 absent in 8 of 22 series, but is not usually narrow: master index is -.267

>> 289B 1982 absent in 2 of 22 series, but is not usually narrow: master index is .229

>> 289B 1983 absent in 2 of 22 series, but is not usually narrow: master index is .489

>> 289B 1984 absent in 1 of 22 series, but is not usually narrow: master index is .289

>> 289B 2008 absent in 8 of 22 series, but is not usually narrow: master index is -.267

>> 290A 1936 absent in 1 of 17 series, but is not usually narrow: master index is -.081

>> 290A 2009 absent in 6 of 22 series, but is not usually narrow: master index is .418

>> 290A 2010 absent in 7 of 22 series, but is not usually narrow: master index is .049

>> 290B 2010 absent in 7 of 22 series, but is not usually narrow: master index is .049

>> 291A 1969 absent in 1 of 22 series, but is not usually narrow: master index is .945

>> 291A 1970 absent in 1 of 22 series, but is not usually narrow: master index is .841

>> 291A 2007 absent in 3 of 22 series, but is not usually narrow: master index is .139

>> 291A 2008 absent in 8 of 22 series, but is not usually narrow: master index is -.267

>> 291A 2009 absent in 6 of 22 series, but is not usually narrow: master index is .418

>> 291A 2010 absent in 7 of 22 series, but is not usually narrow: master index is .049

>> 291B 2008 absent in 8 of 22 series, but is not usually narrow: master index is -.267

>> 291B 2009 absent in 6 of 22 series, but is not usually narrow: master index is .418

>> 291B 2010 absent in 7 of 22 series, but is not usually narrow: master index is .049

>> 421B 2008 absent in 8 of 22 series, but is not usually narrow: master index is -.267

>> 421B 2009 absent in 6 of 22 series, but is not usually narrow: master index is .418

>> 421B 2010 absent in 7 of 22 series, but is not usually narrow: master index is .049

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

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

\*O\* Master series 1879 2010 132 yrs \*O\*

\*F\* Total rings in all series 1973 \*F\*

\*E\* Total dated rings checked 1972 \*E\*

\*C\* Series intercorrelation .453 \*C\*

\*H\* Average mean sensitivity .306 \*H\*

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

\*\*\* Mean length of series 89.7 \*\*\*

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

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

283A 6 absent rings: 1943 1948 1949 1950 1956 1960

283B 3 absent rings: 1948 1977 1978

286B 1 absent rings: 2008

288A 5 absent rings: 2006 2007 2008 2009 2010

288B 12 absent rings: 1975 1976 1978 1987 1988 1989 2005 2006 2007 2008 2009 2010

289A 4 absent rings: 1982 1983 2006 2008

289B 5 absent rings: 1982 1983 1984 2006 2008

290A 4 absent rings: 1935 1936 2009 2010

290B 4 absent rings: 1989 1996 1998 2010

291A 7 absent rings: 1969 1970 2006 2007 2008 2009 2010

291B 3 absent rings: 2008 2009 2010

421B 6 absent rings: 1996 1998 1999 2008 2009 2010

60 absent rings 3.041%

PART 2: TIME PLOT OF TREE-RING SERIES: 11:18 Tue 19 Apr 2011 Page 2

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1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000 2050 Ident Seq Time-span Yrs

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

. . . . . . . . . . . . . . . . . <===========> . 282A 1 1895 2010 116

. . . . . . . . . . . . . . . . . <==========> . 282B 2 1900 2010 111

. . . . . . . . . . . . . . . . . <==========> . 283A 3 1903 2010 108

. . . . . . . . . . . . . . . . . <==========> . 283B 4 1900 2010 111

. . . . . . . . . . . . . . . . . . <========> . 284A 5 1927 2010 84

. . . . . . . . . . . . . . . . . . <========> . 284B 6 1925 2010 86

. . . . . . . . . . . . . . . . . . <========> . 285A 7 1925 2010 86

. . . . . . . . . . . . . . . . . . <=======> . 285B 8 1937 2010 74

. . . . . . . . . . . . . . . . . . <=======> . 286A 9 1939 2010 72

. . . . . . . . . . . . . . . . . . <=======> . 286B 10 1937 2010 74

. . . . . . . . . . . . . . . . . . <========> . 287A 11 1929 2010 82

. . . . . . . . . . . . . . . . . . <=======> . 287B 12 1933 2010 78

. . . . . . . . . . . . . . . . . . <=======> . 288A 13 1933 2010 78

. . . . . . . . . . . . . . . . . . <======> . 288B 14 1942 2010 69

. . . . . . . . . . . . . . . . . . <=======> . 289A 15 1932 2010 79

. . . . . . . . . . . . . . . . . . <=======> . 289B 16 1936 2010 75

. . . . . . . . . . . . . . . . . <============> . 290A 17 1880 2010 131

. . . . . . . . . . . . . . . . . <=============> . 290B 18 1879 2010 132

. . . . . . . . . . . . . . . . . . <========> . 291A 19 1922 2010 89

. . . . . . . . . . . . . . . . . .<=========> . 291B 20 1918 2010 93

. . . . . . . . . . . . . . . . . . <======> . 421A 21 1941 2010 70

. . . . . . . . . . . . . . . . . . <=======> . 421B 22 1936 2010 75

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

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: 11:18 Tue 19 Apr 2011 Page 3

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Year Value No Ab Year Value No Ab Year Value No Ab Year Value No Ab Year Value No Ab Year Value No Ab

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1900 -.756 5 1950 -1.203 22 1 2000 .377 22

1901 -1.138 5 1951 .225 22 2001 1.385 22

1902 -1.302 5 1952 .193 22 2002 1.379 22

1903 .338 6 1953 -.138 22 2003 .327 22

1904 .128 6 1954 .072 22 2004 .151 22

1905 .266 6 1955 .303 22 2005 .526 22 1<<

1906 -1.181 6 1956 -.724 22 1 2006 -.966 22 5

1907 -.481 6 1957 1.208 22 2007 .139 22 3<<

1908 -.289 6 1958 1.124 22 2008 -.267 22 8<<

1909 -.143 6 1959 .237 22 2009 .418 22 6<<

1910 1.026 6 1960 -.646 22 1 2010 .049 22 7<<

1911 -3.578 6 1961 .982 22

1912 -.002 6 1962 -.545 22

1913 .794 6 1963 -.223 22

1914 .569 6 1964 -.387 22

1915 1.692 6 1965 .280 22

1916 .692 6 1966 -.504 22

1917 .060 6 1967 -.500 22

1918 .302 7 1968 .156 22

1919 -.786 7 1969 .945 22 1<<

1920 -.234 7 1970 .841 22 1<<

1921 -.258 7 1971 .767 22

1922 .221 8 1972 .380 22

1923 -1.165 8 1973 -.633 22

1924 .974 8 1974 -1.194 22

1925 .364 10 1975 -.680 22 1

1926 .489 10 1976 .796 22 1<<

1927 1.188 11 1977 .054 22 1<<

1928 -.274 11 1978 -2.377 22 2

1879 -4.779 1 1929 -.793 12 1979 -1.565 22

1880 -1.505 2 1930 -1.231 12 1980 -.803 22

1881 .409 2 1931 -.223 12 1981 -.995 22

1882 -1.019 2 1932 -.661 13 1982 .229 22 2<<

1883 .357 2 1933 -.422 15 1983 .489 22 2<<

1884 .673 2 1934 -.709 15 1984 .289 22 1<<

1885 .484 2 1935 -.866 15 1 1985 .683 22

1886 1.471 2 1936 -.081 17 1<< 1986 .910 22

1887 -.404 2 1937 -.838 19 1987 .509 22 1<<

1888 -.611 2 1938 .693 19 1988 .438 22 1<<

1889 2.299 2 1939 .171 20 1989 -.467 22 2

1890 1.373 2 1940 .973 20 1990 .465 22

1891 1.857 2 1941 1.187 21 1991 1.338 22

1892 .327 2 1942 .592 22 1992 1.450 22

1893 .787 2 1943 -.774 22 1 1993 .788 22

1894 1.748 2 1944 -.359 22 1994 -.293 22

1895 -2.146 3 1945 .630 22 1995 -.196 22

1896 .008 3 1946 -.146 22 1996 -1.708 22 2

1897 1.498 3 1947 1.100 22 1997 -.915 22

1898 .587 3 1948 -.808 22 2 1998 -.467 22 2

1899 .622 3 1949 -1.083 22 1 1999 -.404 22 1

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PART 4: Master Bar Plot: 11:18 Tue 19 Apr 2011 Page 4

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Year Rel value Year Rel value Year Rel value Year Rel value Year Rel value Year Rel value Year Rel value Year Rel value

1900--c 1950-e 2000------B

1901-e 1951-----A 2001----------F

1902e 1952-----A 2002----------F

1903------A 1953----a 2003------A

1904-----A 1954-----@ 2004-----A

1905------A 1955------A 2005-------B

1906-e 1956--c 2006-d

1907---b 1957---------E 2007-----A

1908---a 1958---------D 2008----a

1909----a 1959------A 2009-------B

1910---------D 1960--c 2010-----@

1911n 1961---------D

1912----@ 1962--b

1913--------C 1963----a

1914-------B 1964---b

1915----------G 1965------A

1916--------C 1966---b

1917-----@ 1967---b

1918------A 1968-----A

1919--c 1969---------D

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

1921----a 1971--------C

1922-----A 1972------B

1923-e 1973--c

1924---------D 1974-e

1925------A 1975--c

1926-------B 1976--------C

1927---------E 1977-----@

1928----a 1978j

1879s 1929-c 1979f

1880f 1930e 1980-c

1881-------B 1931----a 1981-d

1882-d 1932--c 1982------A

1883------A 1933---b 1983-------B

1884--------C 1934--c 1984------A

1885-------B 1935-c 1985--------C

1886----------F 1936----@ 1986---------D

1887---b 1937-c 1987-------B

1888--b 1938--------C 1988-------B

1889----------I 1939-----A 1989---b

1890----------E 1940---------D 1990-------B

1891----------G 1941---------E 1991----------E

1892------A 1942--------B 1992----------F

1893--------C 1943--c 1993--------C

1894----------G 1944---a 1994---a

1895i 1945--------C 1995----a

1896-----@ 1946----a 1996g

1897----------F 1947---------D 1997-d

1898-------B 1948-c 1998---b

1899--------B 1949-d 1999---b

PART 5: CORRELATION OF SERIES BY SEGMENTS: 11:18 Tue 19 Apr 2011 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 282A 1895 2010 .52 .54 .60 .55 .61

2 282B 1900 2010 .53 .38 .53 .48

3 283A 1903 2010 .44 .36B .47 .44

4 283B 1900 2010 .44 .28B .35 .38

5 284A 1927 2010 .52 .61 .60

6 284B 1925 2010 .51 .66 .52

7 285A 1925 2010 .22B .28A .39

8 285B 1937 2010 .26A .25B .35

9 286A 1939 2010 .48 .50 .53

10 286B 1937 2010 .63 .73 .61

11 287A 1929 2010 .48 .46 .41

12 287B 1933 2010 .48 .34 .35

13 288A 1933 2010 .48 .41 .38

14 288B 1942 2010 .36 .37 .33

15 289A 1932 2010 .52 .60 .56

16 289B 1936 2010 .30A .27A .23A

17 290A 1880 2010 .54 .42 .40 .63 .59

18 290B 1879 2010 .62 .58 .42 .58 .66

19 291A 1922 2010 .29B .19B .18B .31A

20 291B 1918 2010 .29A .29A .47 .48

21 421A 1941 2010 .46 .46 .49

22 421B 1936 2010 .51 .54 .52

Av segment correlation .56 .44 .42 .46 .46

PART 6: POTENTIAL PROBLEMS: 11:18 Tue 19 Apr 2011 Page 5

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For each series with potential problems the following diagnostics may appear:

[A] Correlations with master dating series of flagged 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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282A 1895 to 2010 116 years Series 1

[B] Entire series, effect on correlation ( .538) is:

Lower 1911> -.017 1960< -.015 1901> -.010 1895> -.009 1964> -.007 1908> -.006 Higher 1948 .016 1978 .011

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

282B 1900 to 2010 111 years Series 2

[B] Entire series, effect on correlation ( .514) is:

Lower 1999< -.022 1920< -.021 1932> -.021 2010> -.017 1904> -.011 1989> -.010 Higher 1911 .125 1978 .015

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

1911 -4.8 SD; 1932 +3.1 SD

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283A 1903 to 2010 108 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

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1925 1974 4 .23 -.17 .00 -.01 .00 -.09 -.14 .14 .19 .04 .36|-.01 .11 .03 .43\*-.11 .12 -.32 -.10 .00 -.10

[B] Entire series, effect on correlation ( .467) is:

Lower 1923> -.034 1921< -.031 1940< -.015 1908> -.013 1903< -.012 1989< -.010 Higher 1911 .110 1978 .020

1925 to 1974 segment:

Lower 1940< -.050 1931< -.026 1959> -.021 1926< -.019 1946> -.017 1966> -.015 Higher 1948 .038 1957 .025

[D] 6 Absent rings: Year Master N series Absent

1943 -.774 22 1

1948 -.808 22 2

1949 -1.083 22 1

1950 -1.203 22 1

1956 -.724 22 1

1960 -.646 22 1

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

283B 1900 to 2010 111 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

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

1925 1974 -10 .34\*-.15 .12 -.19 .13 -.15 -.19 .13 -.02 .07 .28| .10 .05 -.06 .21 -.18 .14 -.26 -.01 -.23 -.16

[B] Entire series, effect on correlation ( .447) is:

Lower 1906> -.025 1974> -.016 1912< -.015 1950> -.014 1900> -.012 2010< -.011 Higher 1911 .047 1948 .039

1925 to 1974 segment:

Lower 1974> -.038 1950> -.033 1947< -.029 1958< -.028 1960> -.025 1945< -.021 Higher 1948 .156 1957 .041

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

1911 1912 -4.4 SD

[D] 3 Absent rings: Year Master N series Absent

1948 -.808 22 2

1977 .054 22 1 >> WARNING: Ring is not usually narrow

1978 -2.377 22 2

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

1948 -5.5 SD

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284A 1927 to 2010 84 years Series 5

[B] Entire series, effect on correlation ( .545) is:

Lower 2010< -.021 1987< -.016 1947< -.014 1956> -.013 1933> -.011 2003< -.010 Higher 1978 .021 2006 .013

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284B 1925 to 2010 86 years Series 6

[B] Entire series, effect on correlation ( .498) is:

Lower 2000< -.038 1937> -.021 1942< -.019 2008> -.012 1980> -.011 1988< -.009 Higher 1978 .057 1996 .018

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285A 1925 to 2010 86 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

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

1925 1974 -3 .00 -.12 -.23 .07 .00 .21 -.02 .23\*-.03 -.18 .22| .00 -.06 -.11 -.08 -.34 .01 .20 -.13 -.06 -.13

1950 1999 0 .18 -.29 -.14 -.08 -.01 .18 -.03 .13 -.26 -.22 .28\* .24 -.12 .17 -.10 -.36 -.04 .07 -.23 -.04 -.01

[B] Entire series, effect on correlation ( .303) is:

Lower 1948> -.040 1953< -.019 2010< -.018 1929> -.017 1992< -.014 1979> -.014 Higher 1978 .028 1947 .021

1925 to 1974 segment:

Lower 1948> -.068 1953< -.033 1929> -.029 1942< -.024 1961< -.023 1950> -.022 Higher 1947 .045 1940 .037

1950 to 1999 segment:

Lower 1953< -.038 1979> -.029 1950> -.027 1981> -.027 1992< -.024 1960> -.024 Higher 1978 .061 1991 .039

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285B 1937 to 2010 74 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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1937 1986 0 .21 -.18 -.11 .01 .19 -.09 .08 -.04 -.16 -.27 .26\* .10 -.14 -.04 .10 -.08 .08 .25 .04 -.08 -.08

1950 1999 1 .20 -.35 -.11 -.09 .17 -.10 .08 -.08 -.19 -.19 .25| .26\*-.15 .12 .11 -.09 -.03 .19 .04 -.07 -.10

[B] Entire series, effect on correlation ( .351) is:

Lower 1950> -.033 1961< -.029 1966< -.017 1970< -.017 1981> -.016 1955< -.015 Higher 1978 .019 1947 .019

1937 to 1986 segment:

Lower 1950> -.039 1961< -.036 1970< -.021 1981> -.019 1955< -.019 1973> -.017 Higher 1978 .032 1947 .030

1950 to 1999 segment:

Lower 1950> -.045 1961< -.036 1981> -.023 1970< -.021 1973> -.020 1955< -.018 Higher 1978 .033 1957 .022

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

1950 +3.2 SD

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286A 1939 to 2010 72 years Series 9

[B] Entire series, effect on correlation ( .493) is:

Lower 1948> -.046 1956> -.028 2010> -.017 1984> -.014 2008< -.013 1975< -.011 Higher 1996 .028 2001 .018

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

1984 +3.2 SD

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286B 1937 to 2010 74 years Series 10

[B] Entire series, effect on correlation ( .603) is:

Lower 2010> -.054 1937< -.034 1978> -.020 1941< -.014 1975< -.011 2000< -.010 Higher 1948 .017 1991 .015

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

2008 -.267 22 8 >> WARNING: Ring is not usually narrow

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

1937 -4.8 SD

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287A 1929 to 2010 82 years Series 11

[B] Entire series, effect on correlation ( .448) is:

Lower 1930> -.046 2010> -.029 1984< -.025 2002< -.023 1943> -.017 1974> -.014 Higher 1948 .038 1978 .036

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287B 1933 to 2010 78 years Series 12

[B] Entire series, effect on correlation ( .439) is:

Lower 1978> -.063 1989> -.016 1943> -.016 1993< -.013 1939> -.012 2010> -.010 Higher 1948 .061 1961 .018

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288A 1933 to 2010 78 years Series 13

[B] Entire series, effect on correlation ( .443) is:

Lower 1962< -.037 2001< -.023 1989> -.019 1982< -.009 1933> -.009 2007< -.009 Higher 2006 .018 1961 .016

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

2006 -.966 22 5

2007 .139 22 3 >> WARNING: Ring is not usually narrow

2008 -.267 22 8 >> WARNING: Ring is not usually narrow

2009 .418 22 6 >> WARNING: Ring is not usually narrow

2010 .049 22 7 >> WARNING: Ring is not usually narrow

>> WARNING: Last ring in series is ABSENT

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

1962 -5.8 SD

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288B 1942 to 2010 69 years Series 14

[B] Entire series, effect on correlation ( .417) is:

Lower 1976< -.030 1979> -.028 1977> -.025 2005< -.025 1966> -.023 1975< -.022 Higher 1978 .138 1996 .021

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

1976 1977 4.3 SD

[D] 12 Absent rings: Year Master N series Absent

1975 -.680 22 1

1976 .796 22 1 >> WARNING: Ring is not usually narrow

1978 -2.377 22 2

1987 .509 22 1 >> WARNING: Ring is not usually narrow

1988 .438 22 1 >> WARNING: Ring is not usually narrow

1989 -.467 22 2

2005 .526 22 1 >> WARNING: Ring is not usually narrow

2006 -.966 22 5

2007 .139 22 3 >> WARNING: Ring is not usually narrow

2008 -.267 22 8 >> WARNING: Ring is not usually narrow

2009 .418 22 6 >> WARNING: Ring is not usually narrow

2010 .049 22 7 >> WARNING: Ring is not usually narrow

>> WARNING: Last ring in series is ABSENT

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

1979 +3.1 SD

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289A 1932 to 2010 79 years Series 15

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

Lower 1982< -.150 1976< -.023 1943> -.020 1937> -.016 1981> -.014 1983< -.009 Higher 1978 .063 2001 .021

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

1981 1982 -4.9 SD

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

1982 .229 22 2 >> WARNING: Ring is not usually narrow

1983 .489 22 2 >> WARNING: Ring is not usually narrow

2006 -.966 22 5

2008 -.267 22 8 >> WARNING: Ring is not usually narrow

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289B 1936 to 2010 75 years Series 16

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

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1936 1985 0 -.02 -.07 -.08 .07 .09 .05 .04 -.16 .13 -.09 .30\*-.03 -.10 -.32 .03 -.08 .19 .10 .05 -.28 -.09

1950 1999 0 .07 -.29 -.13 .17 .11 .04 .13 -.06 .06 -.03 .27\* .08 -.03 -.14 .14 -.20 .09 .21 .02 -.25 .06

1961 2010 0 -.09 -.30 -.15 .05 .00 .19 .15 .05 .09 .15 .23\* - - - - - - - - - -

[B] Entire series, effect on correlation ( .336) is:

Lower 1962> -.039 1978> -.026 2010> -.024 1955< -.024 1938< -.018 1946> -.018 Higher 1948 .053 2006 .041

1936 to 1985 segment:

Lower 1962> -.061 1978> -.040 1955< -.034 1946> -.028 1981> -.023 1938< -.023 Higher 1948 .085 1957 .038

1950 to 1999 segment:

Lower 1962> -.059 1955< -.041 1982< -.028 1978> -.024 1981> -.020 1989> -.015 Higher 1957 .038 1996 .035

1961 to 2010 segment:

Lower 1962> -.057 2010> -.035 1982< -.030 1978> -.023 1981> -.019 2002< -.016 Higher 2006 .081 1996 .035

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

1982 .229 22 2 >> WARNING: Ring is not usually narrow

1983 .489 22 2 >> WARNING: Ring is not usually narrow

1984 .289 22 1 >> WARNING: Ring is not usually narrow

2006 -.966 22 5

2008 -.267 22 8 >> WARNING: Ring is not usually narrow

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290A 1880 to 2010 131 years Series 17

[B] Entire series, effect on correlation ( .470) is:

Lower 2009< -.023 1937> -.015 1935< -.013 1977> -.012 1928> -.012 1969< -.010 Higher 1978 .039 1895 .034

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

1936 1937 5.4 SD

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

1935 -.866 15 1

1936 -.081 17 1 >> WARNING: Ring is not usually narrow

2009 .418 22 6 >> WARNING: Ring is not usually narrow

2010 .049 22 7 >> WARNING: Ring is not usually narrow

>> WARNING: Last ring in series is ABSENT

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

1911 +3.0 SD; 1935 -5.4 SD; 1936 -6.0 SD

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290B 1879 to 2010 132 years Series 18

[\*] Early part of series cannot be checked from 1879 to 1879 -- not matched by another series

[B] Entire series, effect on correlation ( .556) is:

Lower 1908< -.013 1887> -.011 1880> -.011 1998< -.010 1885> -.009 1906> -.009 Higher 1911 .037 1895 .021

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

1977 1978 -4.1 SD 1978 1979 4.0 SD

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

1989 -.467 22 2

1996 -1.708 22 2

1998 -.467 22 2

2010 .049 22 7 >> WARNING: Ring is not usually narrow

>> WARNING: Last ring in series is ABSENT

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

291A 1922 to 2010 89 years Series 19

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

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1922 1971 5 -.08 .16 -.16 -.09 .02 -.33 -.05 -.13 .30 -.13 .29|-.13 .05 .11 .04 .31\*-.19 -.13 .04 -.15 -.15

1925 1974 -2 -.03 .15 -.07 -.16 .02 -.30 -.15 -.11 .29\*-.11 .19| .02 .03 .12 .10 .23 -.11 -.22 .13 -.20 -.17

1950 1999 1 -.04 -.14 -.07 -.11 -.12 -.18 .02 .11 .20 .12 .18| .35\* .27 -.02 .02 -.12 -.17 -.36 -.01 -.09 -.21

1961 2010 0 .21 -.08 -.11 -.01 -.13 -.12 .04 .03 -.01 .09 .31\* - - - - - - - - - -

[B] Entire series, effect on correlation ( .178) is:

Lower 1969< -.133 1951< -.016 1966> -.016 1934> -.013 1970< -.012 1996> -.011 Higher 1948 .047 1923 .030

1922 to 1971 segment:

Lower 1969< -.185 1951< -.024 1966> -.023 1934> -.018 1970< -.017 1945< -.015 Higher 1948 .086 1923 .053

1925 to 1974 segment:

Lower 1969< -.175 1951< -.025 1966> -.022 1970< -.018 1934> -.017 1945< -.015 Higher 1948 .102 1971 .026

1950 to 1999 segment:

Lower 1969< -.168 1966> -.025 1951< -.023 1970< -.015 1989> -.013 1962> -.011 Higher 1978 .055 1961 .024

1961 to 2010 segment:

Lower 1969< -.203 1966> -.027 1996> -.017 1970< -.016 1989> -.015 1962> -.014 Higher 2001 .047 2006 .037

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

1968 1969 -5.5 SD 1970 1971 4.7 SD

[D] 7 Absent rings: Year Master N series Absent

1969 .945 22 1 >> WARNING: Ring is not usually narrow

1970 .841 22 1 >> WARNING: Ring is not usually narrow

2006 -.966 22 5

2007 .139 22 3 >> WARNING: Ring is not usually narrow

2008 -.267 22 8 >> WARNING: Ring is not usually narrow

2009 .418 22 6 >> WARNING: Ring is not usually narrow

2010 .049 22 7 >> WARNING: Ring is not usually narrow

>> WARNING: Last ring in series is ABSENT

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

1969 -6.3 SD; 1970 -6.0 SD

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291B 1918 to 2010 93 years Series 20

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

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1918 1967 0 -.16 -.01 .26 -.11 -.03 -.10 -.11 .07 -.01 .10 .29\*-.19 .05 .07 .06 -.02 .08 -.10 -.31 -.13 .14

1925 1974 0 -.01 -.08 -.01 .04 -.04 -.08 -.11 .02 -.07 .18 .29\*-.04 .06 -.07 .04 .27 .14 -.06 -.19 -.30 .01

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

Lower 1962> -.030 1966> -.025 2006> -.025 1937> -.020 1948> -.018 1921> -.017 Higher 1996 .039 1924 .016

1918 to 1967 segment:

Lower 1962> -.051 1966> -.042 1937> -.033 1938< -.028 1951< -.027 1921> -.027 Higher 1924 .042 1940 .028

1925 to 1974 segment:

Lower 1962> -.056 1966> -.047 1937> -.037 1938< -.029 1951< -.028 1958< -.027 Higher 1940 .030 1927 .029

[D] 3 Absent rings: Year Master N series Absent

2008 -.267 22 8 >> WARNING: Ring is not usually narrow

2009 .418 22 6 >> WARNING: Ring is not usually narrow

2010 .049 22 7 >> WARNING: Ring is not usually narrow

>> WARNING: Last ring in series is ABSENT

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421A 1941 to 2010 70 years Series 21

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

Lower 1962> -.054 1969< -.023 2010> -.021 1981> -.020 1949> -.016 1956> -.014 Higher 1978 .042 2001 .017

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421B 1936 to 2010 75 years Series 22

[B] Entire series, effect on correlation ( .492) is:

Lower 2010> -.057 1936< -.034 1937> -.030 1962> -.020 2006> -.017 2004< -.017 Higher 1948 .058 1996 .034

[D] 6 Absent rings: Year Master N series Absent

1996 -1.708 22 2

1998 -.467 22 2

1999 -.404 22 1

2008 -.267 22 8 >> WARNING: Ring is not usually narrow

2009 .418 22 6 >> WARNING: Ring is not usually narrow

2010 .049 22 7 >> WARNING: Ring is not usually narrow

>> WARNING: Last ring in series is ABSENT

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

2010 +3.9 SD

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

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

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

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1 282A 1895 2010 116 5 0 .538 1.55 5.69 1.703 .970 .211 2.69 .472 -.060 2

2 282B 1900 2010 111 4 0 .514 1.40 5.09 1.426 .949 .254 2.38 .326 -.056 1

3 283A 1903 2010 108 4 1 .467 1.13 4.51 1.248 .953 .391 2.63 .464 -.038 1

4 283B 1900 2010 111 4 1 .447 1.30 4.80 1.357 .954 .316 2.68 .401 .081 1

5 284A 1927 2010 84 3 0 .545 1.30 4.48 .815 .860 .263 2.80 .559 -.039 1

6 284B 1925 2010 86 3 0 .498 1.15 4.56 .943 .940 .256 2.53 .473 -.037 2

7 285A 1925 2010 86 3 2 .303 2.05 4.79 1.045 .875 .240 2.67 .494 -.051 3

8 285B 1937 2010 74 3 2 .351 1.40 3.54 .827 .898 .219 2.56 .397 -.080 2

9 286A 1939 2010 72 3 0 .493 1.67 4.05 1.127 .903 .228 2.96 .629 -.076 1

10 286B 1937 2010 74 3 0 .603 1.27 3.63 1.019 .927 .330 2.73 .437 .001 2

11 287A 1929 2010 82 3 0 .448 1.55 4.59 .959 .856 .265 2.72 .583 -.078 1

12 287B 1933 2010 78 3 0 .439 1.78 3.57 .804 .704 .284 2.93 .548 -.034 1

13 288A 1933 2010 78 3 0 .443 1.08 3.53 1.047 .939 .300 2.43 .347 .015 1

14 288B 1942 2010 69 3 0 .417 1.13 4.45 1.242 .919 .467 2.57 .468 -.043 1

15 289A 1932 2010 79 3 0 .397 1.03 3.95 1.074 .951 .428 2.53 .381 .016 3

16 289B 1936 2010 75 3 3 .336 1.45 4.65 1.531 .935 .519 2.69 .561 .004 1

17 290A 1880 2010 131 5 0 .470 1.60 5.46 1.483 .925 .288 2.72 .442 -.015 2

18 290B 1879 2010 132 5 0 .556 1.21 5.42 1.349 .963 .336 2.58 .383 -.047 1

19 291A 1922 2010 89 4 4 .178 1.25 4.39 1.142 .905 .312 2.51 .341 .041 1

20 291B 1918 2010 93 4 2 .429 2.00 4.92 1.485 .948 .234 2.69 .582 .067 1

21 421A 1941 2010 70 3 0 .510 1.66 4.75 1.053 .849 .292 2.89 .529 -.005 2

22 421B 1936 2010 75 3 0 .492 1.63 5.56 1.513 .951 .366 3.20 .522 .009 1

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Total or mean: 1973 77 15 .453 1.43 5.69 1.220 .917 .306 3.20 .463 -.019

- = [ COFECHA 155 COF ] = -