[] Dendrochronology Program Library Run FINAL Program COF 14:31 Tue 25 Jun 2013 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 28667

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

Title of run: Final

File of DATED series: USPLow\_PCRU\_Final

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 1788 to 2012 225 years

Continuous time span is 1788 to 2012 225 years

Portion with two or more series is 1801 to 2012 212 years

>> 615B 1886 absent in 1 of 10 series, but is not usually narrow: master index is 1.508

>> 615B 1887 absent in 1 of 10 series, but is not usually narrow: master index is .808

>> 615B 1978 absent in 2 of 20 series, but is not usually narrow: master index is -.136

>> 626B 1994 absent in 1 of 20 series, but is not usually narrow: master index is .445

>> 626B 1995 absent in 1 of 20 series, but is not usually narrow: master index is -.048

>> 633B 1978 absent in 2 of 20 series, but is not usually narrow: master index is -.136

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

\*C\* Number of dated series 20 \*C\*

\*O\* Master series 1788 2012 225 yrs \*O\*

\*F\* Total rings in all series 2643 \*F\*

\*E\* Total dated rings checked 2630 \*E\*

\*C\* Series intercorrelation .505 \*C\*

\*H\* Average mean sensitivity .271 \*H\*

\*A\* Segments, possible problems 11 \*A\*

\*\*\* Mean length of series 132.1 \*\*\*

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

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

615A 2 absent rings: 1974 2004

615B 8 absent rings: 1886 1887 1974 1977 1978 1982 1983 1985

623A 4 absent rings: 1996 1997 2004 2006

626B 4 absent rings: 1994 1995 1996 1997

633A 1 absent rings: 1878

633B 3 absent rings: 1974 1977 1978

22 absent rings .832%

PART 2: TIME PLOT OF TREE-RING SERIES: Final 14:31 Tue 25 Jun 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

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

. . . . . . . . . . . . . . . . . <===========> . 606A 1 1892 2012 121

. . . . . . . . . . . . . . . . . <===========> . 606B 2 1894 2012 119

. . . . . . . . . . . . . . . . . .<=========> . 610A 3 1916 2012 97

. . . . . . . . . . . . . . . . . <===========> . 610B 4 1892 2012 121

. . . . . . . . . . . . . . . . . . <======> . 612B 5 1943 2012 70

. . . . . . . . . . . . . . . . .<==============> . 615A 6 1868 2012 145

. . . . . . . . . . . . . . . . <================> . 615B 7 1841 2012 172

. . . . . . . . . . . . . . . . <===============> . 617A 8 1856 2012 157

. . . . . . . . . . . . . . . . <===============> . 617B 9 1852 2012 161

. . . . . . . . . . . . . . . . . <===========> . 619A 10 1892 2012 121

. . . . . . . . . . . . . . . . <===============> . 619B 11 1853 2012 160

. . . . . . . . . . . . . . . . . <=============> . 623A 12 1875 2012 138

. . . . . . . . . . . . . . . . . <=============> . 623B 13 1875 2012 138

. . . . . . . . . . . . . . . . . . <========> . 626B 14 1920 2012 93

. . . . . . . . . . . . . . . . . . <========> . 630A 15 1920 2012 93

. . . . . . . . . . . . . . . . . . <======> . 630B 16 1940 2012 73

. . . . . . . . . . . . . . . <====================> . 633A 17 1801 2012 212

. . . . . . . . . . . . . . . <=====================> . 633B 18 1788 2006 219

. . . . . . . . . . . . . . . . . <==========> . 674A 19 1909 2012 104

. . . . . . . . . . . . . . . . . <============> . 674B 20 1884 2012 129

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

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: Final 14:31 Tue 25 Jun 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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1800 2.192 1 1850 .967 3 1900 -.564 14 1950 -.484 20 2000 .000 20

1801 -.240 2 1851 1.760 3 1901 -1.069 14 1951 .315 20 2001 -.296 20

1802 .073 2 1852 -.462 4 1902 -.708 14 1952 .169 20 2002 .289 20

1803 -.923 2 1853 .006 5 1903 .631 14 1953 -.286 20 2003 .165 20

1804 -1.351 2 1854 -.929 5 1904 1.226 14 1954 -.569 20 2004 -2.261 20 2

1805 2.832 2 1855 .174 5 1905 .482 14 1955 .535 20 2005 -1.161 20

1806 -2.661 2 1856 .879 6 1906 -.013 14 1956 -1.542 20 2006 -.843 20 1

1807 1.288 2 1857 1.395 6 1907 -.170 14 1957 .935 20 2007 -.396 19

1808 .670 2 1858 1.868 6 1908 -.739 14 1958 1.048 20 2008 -1.361 19

1809 -.440 2 1859 .007 6 1909 -.543 15 1959 .065 20 2009 .125 19

1810 .985 2 1860 1.148 6 1910 .505 15 1960 -.736 20 2010 .936 19

1811 1.481 2 1861 .311 6 1911 -1.709 15 1961 .714 20 2011 .745 19

1812 .216 2 1862 1.188 6 1912 -.252 15 1962 -.997 20 2012 1.324 19

1813 .157 2 1863 .175 6 1913 -.165 15 1963 -1.795 20

1814 -2.586 2 1864 -.018 6 1914 .469 15 1964 -.090 20

1815 -.416 2 1865 .239 6 1915 1.350 15 1965 -.215 20

1816 1.380 2 1866 .193 6 1916 1.593 16 1966 -.384 20

1817 .901 2 1867 .249 6 1917 .522 16 1967 -.936 20

1818 -1.193 2 1868 .729 7 1918 -.061 16 1968 -.839 20

1819 .393 2 1869 -1.803 7 1919 .082 16 1969 .831 20

1820 -.108 2 1870 .209 7 1920 -.531 18 1970 .607 20

1821 .420 2 1871 -.038 7 1921 .264 18 1971 1.222 20

1822 .039 2 1872 .250 7 1922 -.151 18 1972 -.041 20

1823 -.502 2 1873 -1.054 7 1923 -1.242 18 1973 .283 20

1824 .639 2 1874 -.427 7 1924 .368 18 1974 -1.354 20 3

1825 2.699 2 1875 -1.113 9 1925 -.533 18 1975 .231 20

1826 1.320 2 1876 -.130 9 1926 .576 18 1976 .603 20

1827 1.989 2 1877 -.598 9 1927 .988 18 1977 -.470 20 2

1828 .262 2 1878 -1.153 9 1 1928 .772 18 1978 -.136 20 2<<

1829 -2.256 2 1879 -2.045 9 1929 -.846 18 1979 -.039 20

1830 .074 2 1880 -1.230 9 1930 -.379 18 1980 .934 20

1831 -1.973 2 1881 -.900 9 1931 -.265 18 1981 .232 20

1832 -1.931 2 1882 -.966 9 1932 -.038 18 1982 -.865 20 1

1833 -2.796 2 1883 -.920 9 1933 -.967 18 1983 -.940 20 1

1834 -.495 2 1884 -1.101 10 1934 -.933 18 1984 -.899 20

1835 -1.427 2 1885 -.056 10 1935 -1.641 18 1985 -1.406 20 1

1836 -.588 2 1886 1.508 10 1<< 1936 -1.245 18 1986 -.651 20

1837 .733 2 1887 .808 10 1<< 1937 -1.033 18 1987 .242 20

1788 -1.076 1 1838 -1.096 2 1888 1.397 10 1938 .690 18 1988 .937 20

1789 -1.689 1 1839 -.467 2 1889 1.437 10 1939 .873 18 1989 1.317 20

1790 2.155 1 1840 .885 2 1890 .925 10 1940 .131 19 1990 1.364 20

1791 1.753 1 1841 .119 3 1891 1.043 10 1941 .713 19 1991 1.056 20

1792 -.228 1 1842 .892 3 1892 .679 13 1942 .798 19 1992 1.367 20

1793 .594 1 1843 .177 3 1893 -.137 13 1943 -.096 20 1993 1.561 20

1794 .041 1 1844 -1.955 3 1894 -.241 14 1944 .353 20 1994 .445 20 1<<

1795 .886 1 1845 .557 3 1895 .260 14 1945 1.244 20 1995 -.048 20 1<<

1796 .273 1 1846 .136 3 1896 -.110 14 1946 -.249 20 1996 -.768 20 2

1797 .851 1 1847 -.690 3 1897 .047 14 1947 .570 20 1997 -.975 20 2

1798 -1.680 1 1848 1.226 3 1898 .497 14 1948 -.725 20 1998 .276 20

1799 -.962 1 1849 -.659 3 1899 -.260 14 1949 1.049 20 1999 -.037 20

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PART 4: Master Bar Plot: Final 14:31 Tue 25 Jun 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

1800----------I 1850---------D 1900---b 1950---b 2000-----@

1801----a 1851----------G 1901-d 1951------A 2001---a

1802-----@ 1852---b 1902--c 1952------A 2002------A

1803-d 1853-----@ 1903-------C 1953----a 2003------A

1804-e 1854-d 1904---------E 1954---b 2004i

1805----------K 1855------A 1905-------B 1955-------B 2005-e

1806k 1856--------D 1906-----@ 1956f 2006--c

1807---------E 1857----------F 1907----a 1957---------D 2007---b

1808--------C 1858----------G 1908--c 1958---------D 2008-e

1809---b 1859-----@ 1909---b 1959-----@ 2009-----A

1810---------D 1860---------E 1910-------B 1960--c 2010---------D

1811----------F 1861------A 1911g 1961--------C 2011--------C

1812------A 1862---------E 1912----a 1962-d 2012----------E

1813------A 1863------A 1913----a 1963g

1814j 1864-----@ 1914-------B 1964----@

1815---b 1865------A 1915----------E 1965----a

1816----------F 1866------A 1916----------F 1966---b

1817--------D 1867------A 1917-------B 1967-d

1818-e 1868--------C 1918----@ 1968--c

1819-------B 1869g 1919-----@ 1969--------C

1820----@ 1870------A 1920---b 1970-------B

1821-------B 1871-----@ 1921------A 1971---------E

1822-----@ 1872------A 1922----a 1972-----@

1823---b 1873-d 1923-e 1973------A

1824-------C 1874---b 1924------A 1974-e

1825----------K 1875-d 1925---b 1975------A

1826----------E 1876----a 1926-------B 1976-------B

1827----------H 1877---b 1927---------D 1977---b

1828------A 1878-e 1928--------C 1978----a

1829i 1879h 1929--c 1979-----@

1830-----@ 1880-e 1930---b 1980---------D

1831h 1881--d 1931----a 1981------A

1832h 1882-d 1932-----@ 1982--c

1833k 1883-d 1933-d 1983-d

1834---b 1884-d 1934-d 1984--d

1835-f 1885----@ 1935g 1985-f

1836---b 1886----------F 1936-e 1986--c

1837--------C 1887--------C 1937-d 1987------A

1788-d 1838-d 1888----------F 1938--------C 1988---------D

1789g 1839---b 1889----------F 1939--------C 1989----------E

1790----------I 1840--------D 1890---------D 1940-----A 1990----------E

1791----------G 1841-----@ 1891---------D 1941--------C 1991---------D

1792----a 1842--------D 1892--------C 1942--------C 1992----------E

1793-------B 1843------A 1893----a 1943----@ 1993----------F

1794-----@ 1844h 1894----a 1944------A 1994-------B

1795--------D 1845-------B 1895------A 1945---------E 1995----@

1796------A 1846-----A 1896----@ 1946----a 1996--c

1797--------C 1847--c 1897-----@ 1947-------B 1997-d

1798g 1848---------E 1898-------B 1948--c 1998------A

1799-d 1849--c 1899----a 1949---------D 1999-----@

PART 5: CORRELATION OF SERIES BY SEGMENTS: Final 14:31 Tue 25 Jun 2013 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 1800 1825 1850 1875 1900 1925 1950 1975

1849 1874 1899 1924 1949 1974 1999 2024

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

1 606A 1892 2012 .44 .51 .55 .42 .39

2 606B 1894 2012 .39 .38 .50 .48 .51

3 610A 1916 2012 .53 .56 .49 .62

4 610B 1892 2012 .46 .50 .65 .57 .61

5 612B 1943 2012 .38 .40 .44

6 615A 1868 2012 .28B .24B .39 .44 .36 .42

7 615B 1841 2012 .26B .34B .39 .52 .50 .47 .67

8 617A 1856 2012 .51 .65 .56 .56 .47 .38

9 617B 1852 2012 .51 .59 .51 .46 .52 .53

10 619A 1892 2012 .42 .67 .67 .59 .59

11 619B 1853 2012 .30A .50 .44 .44 .45 .57

12 623A 1875 2012 .58 .61 .58 .53 .46

13 623B 1875 2012 .43 .38 .41 .41 .57

14 626B 1920 2012 .30A .33A .56 .50

15 630A 1920 2012 .59 .61 .59 .60

16 630B 1940 2012 .64 .63 .53

17 633A 1801 2012 .77 .75 .65 .54 .36 .24A .37 .32B

18 633B 1788 2006 .76 .68 .54 .32B .28B .45 .48 .44

19 674A 1909 2012 .63 .63 .57 .51

20 674B 1884 2012 .42 .59 .73 .71 .68

Av segment correlation .76 .56 .45 .45 .49 .52 .51 .52

PART 6: POTENTIAL PROBLEMS: Final 14:31 Tue 25 Jun 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 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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606A 1892 to 2012 121 years Series 1

[B] Entire series, effect on correlation ( .446) is:

Lower 1981< -.032 1982> -.017 1948> -.015 1994> -.014 1955< -.011 1910< -.010 Higher 1956 .025 1974 .014

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606B 1894 to 2012 119 years Series 2

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

Lower 1954< -.024 1996> -.023 1948> -.015 1994> -.014 1902< -.011 1919< -.010 Higher 2004 .013 1915 .012

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610A 1916 to 2012 97 years Series 3

[B] Entire series, effect on correlation ( .569) is:

Lower 1952< -.038 1970< -.016 1977> -.016 1993< -.015 1923> -.012 1996< -.011 Higher 2004 .071 1956 .026

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

1970 -4.8 SD

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610B 1892 to 2012 121 years Series 4

[B] Entire series, effect on correlation ( .524) is:

Lower 1902> -.033 1903< -.019 1950> -.014 1985> -.013 1919> -.012 1904< -.012 Higher 1911 .046 2004 .024

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

1901 1902 4.1 SD

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

1902 +4.5 SD; 1919 +3.5 SD; 1986 +3.2 SD

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612B 1943 to 2012 70 years Series 5

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

Lower 1974> -.042 1979< -.037 1945< -.024 1968> -.017 1946> -.016 1950> -.013 Higher 2004 .028 1956 .023

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

1968 +3.0 SD; 1974 +3.5 SD

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615A 1868 to 2012 145 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

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1868 1917 2 .13 -.05 .00 -.27 .01 -.30 .06 -.06 .01 -.05 .28| .01 .41\* .31 .04 -.10 .22 -.30 .13 .10 -.19

1875 1924 3 -.12 .04 -.10 -.37 .00 -.33 -.10 .06 -.02 .00 .24| .15 .27 .40\*-.14 -.11 .23 -.27 .08 .16 -.11

[B] Entire series, effect on correlation ( .456) is:

Lower 1911> -.023 1869> -.015 1956> -.014 1884> -.012 1901> -.011 1918> -.009 Higher 2004 .054 1974 .021

1868 to 1917 segment:

Lower 1911> -.048 1884> -.035 1901> -.031 1898< -.028 1892< -.021 1909< -.016 Higher 1888 .038 1916 .027

1875 to 1924 segment:

Lower 1911> -.059 1884> -.041 1901> -.037 1918> -.030 1898< -.028 1924< -.023 Higher 1888 .045 1923 .035

[D] 2 Absent rings: Year Master N series Absent

1974 -1.354 20 3

2004 -2.261 20 2

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

1956 +3.5 SD; 1974 -5.8 SD

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615B 1841 to 2012 172 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

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

1841 1890 10 .04 -.18 -.08 -.01 -.06 .09 .00 -.13 .25 -.09 .26| .06 .01 .14 .22 .16 -.01 -.08 .00 .25 .42\*

1850 1899 -2 .00 -.18 -.09 -.01 -.03 .05 -.01 -.08 .36\*-.05 .34| .10 -.04 .08 .19 .15 .18 .04 .04 .19 .25

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

Lower 1886< -.064 1961< -.016 1847> -.014 1889< -.010 1878> -.009 1859> -.009 Higher 2004 .053 1911 .014

1841 to 1890 segment:

Lower 1886< -.155 1847> -.028 1889< -.023 1878> -.020 1841> -.019 1843< -.018 Higher 1869 .049 1888 .046

1850 to 1899 segment:

Lower 1886< -.192 1889< -.028 1878> -.025 1859> -.022 1868< -.016 1884> -.013 Higher 1869 .055 1888 .048

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

1885 1886 -5.5 SD 1887 1888 5.0 SD

[D] 8 Absent rings: Year Master N series Absent

1886 1.508 10 1 >> WARNING: Ring is not usually narrow

1887 .808 10 1 >> WARNING: Ring is not usually narrow

1974 -1.354 20 3

1977 -.470 20 2

1978 -.136 20 2 >> WARNING: Ring is not usually narrow

1982 -.865 20 1

1983 -.940 20 1

1985 -1.406 20 1

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

1847 +3.3 SD; 1886 -7.2 SD; 1887 -6.4 SD

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617A 1856 to 2012 157 years Series 8

[B] Entire series, effect on correlation ( .501) is:

Lower 1862< -.019 1859< -.013 1997> -.013 1864> -.008 1935> -.008 1904< -.008 Higher 1869 .026 1974 .013

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

1869 -5.0 SD

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617B 1852 to 2012 161 years Series 9

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

Lower 1996> -.016 1873> -.013 1925> -.013 1862< -.013 1875> -.010 1959> -.009 Higher 1911 .030 1869 .028

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619A 1892 to 2012 121 years Series 10

[B] Entire series, effect on correlation ( .544) is:

Lower 1894< -.062 1994< -.029 1899> -.012 1991< -.007 1967> -.006 1924< -.006 Higher 2004 .021 1911 .012

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619B 1853 to 2012 160 years Series 11

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

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

1853 1902 0 .04 .14 .06 .05 .18 -.03 .01 .10 -.02 .19 .30\* .18 .21 -.04 .02 -.15 .21 -.15 .12 -.25 -.05

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

Lower 1853< -.032 1854> -.017 1991< -.012 1955< -.009 1982< -.009 1974> -.008 Higher 2004 .043 1963 .009

1853 to 1902 segment:

Lower 1853< -.126 1854> -.053 1863> -.019 1890< -.016 1859> -.015 1862< -.010 Higher 1858 .029 1879 .025

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

1853 1854 4.4 SD

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623A 1875 to 2012 138 years Series 12

[B] Entire series, effect on correlation ( .596) is:

Lower 2006< -.014 1955< -.014 1982> -.013 1879> -.012 1904< -.012 1923> -.007 Higher 2004 .058 1911 .034

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

1996 -.768 20 2

1997 -.975 20 2

2004 -2.261 20 2

2006 -.843 20 1

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

1956 -6.3 SD

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623B 1875 to 2012 138 years Series 13

[B] Entire series, effect on correlation ( .480) is:

Lower 1955< -.050 1914< -.023 1973< -.014 1963> -.013 1992< -.011 1915< -.010 Higher 2004 .041 1956 .023

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

1956 -7.7 SD

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626B 1920 to 2012 93 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

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

1920 1969 0 -.08 .05 .19 .00 .09 .03 -.14 -.13 -.12 -.26 .30\*-.35 -.09 .03 .05 -.15 .21 -.09 .03 -.12 .26

1925 1974 0 -.03 .03 .09 .07 .10 -.02 -.13 -.20 -.04 -.22 .33\*-.38 -.03 -.05 .04 -.02 .12 -.09 .03 -.05 .26

[B] Entire series, effect on correlation ( .398) is:

Lower 2011< -.036 1935> -.030 1956> -.025 1942< -.018 1990< -.013 1933> -.011 Higher 2004 .030 1962 .016

1920 to 1969 segment:

Lower 1935> -.051 1956> -.042 1942< -.032 1944< -.019 1933> -.019 1941< -.014 Higher 1962 .035 1969 .022

1925 to 1974 segment:

Lower 1935> -.048 1956> -.039 1942< -.032 1944< -.019 1933> -.018 1941< -.015 Higher 1962 .032 1971 .028

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

1994 .445 20 1 >> WARNING: Ring is not usually narrow

1995 -.048 20 1 >> WARNING: Ring is not usually narrow

1996 -.768 20 2

1997 -.975 20 2

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

1935 +3.5 SD; 1943 -6.1 SD; 1956 +3.2 SD

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630A 1920 to 2012 93 years Series 15

[B] Entire series, effect on correlation ( .571) is:

Lower 1996< -.017 1920> -.017 2008> -.014 1994< -.014 1923> -.013 1945< -.012 Higher 2004 .060 1957 .012

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630B 1940 to 2012 73 years Series 16

[B] Entire series, effect on correlation ( .539) is:

Lower 1996> -.037 1946< -.023 1948> -.021 2004> -.016 2008> -.011 1958< -.011 Higher 1962 .024 1949 .012

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

1996 +3.8 SD

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633A 1801 to 2012 212 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

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

1925 1974 0 .00 -.01 -.07 -.05 .15 -.25 .16 -.32 -.01 -.17 .24\*-.28 .22 -.14 .17 -.18 .14 .09 .15 -.23 .15

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

1963 2012 -4 -.12 -.01 -.08 .00 -.10 -.06 .34\* .05 .13 .00 .32| - - - - - - - - - -

[B] Entire series, effect on correlation ( .487) is:

Lower 2004> -.022 1944< -.017 1952< -.017 2008< -.012 1956> -.009 2012< -.007 Higher 1806 .036 1911 .015

1925 to 1974 segment:

Lower 1944< -.064 1952< -.053 1956> -.035 1934> -.017 1963> -.013 1933> -.010 Higher 1948 .036 1969 .034

1963 to 2012 segment:

Lower 2004> -.131 2012< -.036 1963> -.019 1987< -.018 1980< -.016 1994> -.012 Higher 1969 .031 2008 .022

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

1878 -1.153 9 1

[E] Outliers 6 3.0 SD above or -4.5 SD below mean for year

1932 +3.3 SD; 1934 +3.7 SD; 1944 -5.4 SD; 1952 -4.6 SD; 2004 +3.8 SD; 2008 -4.5 SD

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633B 1788 to 2006 219 years Series 18

[\*] Early part of series cannot be checked from 1788 to 1800 -- 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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1875 1924 2 .12 .14 .11 .03 .10 .03 .03 .06 .18 .14 .32| .08 .33\* .11 .12 .16 -.07 -.28 -.20 -.33 -.12

1900 1949 2 .02 .15 .00 -.12 -.04 .03 .00 -.13 .05 .06 .28|-.18 .28\*-.15 .00 -.09 .10 -.30 -.10 -.19 .08

[B] Entire series, effect on correlation ( .559) is:

Lower 1944< -.018 1906< -.009 1988< -.009 1899> -.008 1834> -.007 2006> -.007 Higher 1806 .049 1805 .013

1875 to 1924 segment:

Lower 1899> -.047 1906< -.045 1921< -.033 1893> -.027 1918> -.023 1900> -.022 Higher 1915 .038 1879 .026

1900 to 1949 segment:

Lower 1944< -.074 1906< -.027 1921< -.025 1943> -.021 1938< -.019 1918> -.017 Higher 1915 .031 1935 .024

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

1974 -1.354 20 3

1977 -.470 20 2

1978 -.136 20 2 >> WARNING: Ring is not usually narrow

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

2006 +3.3 SD

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674A 1909 to 2012 104 years Series 19

[B] Entire series, effect on correlation ( .575) is:

Lower 2011< -.023 1956> -.021 1968> -.012 1911> -.011 1996> -.011 1951< -.010 Higher 1935 .009 1950 .008

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674B 1884 to 2012 129 years Series 20

[B] Entire series, effect on correlation ( .599) is:

Lower 2011< -.017 1911> -.016 1900> -.015 1891< -.014 1884< -.012 1901> -.012 Higher 2004 .032 1956 .018

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

1901 +3.1 SD; 1945 +3.1 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 606A 1892 2012 121 5 0 .446 .82 3.90 .771 .917 .199 2.77 .455 -.068 2

2 606B 1894 2012 119 5 0 .450 1.67 4.17 .989 .864 .245 2.74 .464 .040 1

3 610A 1916 2012 97 4 0 .569 1.55 4.85 1.250 .928 .229 2.67 .452 -.044 1

4 610B 1892 2012 121 5 0 .524 1.04 3.46 .823 .901 .273 2.84 .348 -.054 1

5 612B 1943 2012 70 3 0 .453 2.30 4.32 .767 .602 .222 2.57 .491 -.128 1

6 615A 1868 2012 145 6 2 .456 .98 2.86 .628 .849 .307 2.75 .409 -.028 1

7 615B 1841 2012 172 7 2 .417 .80 4.07 .683 .795 .354 2.92 .360 -.031 2

8 617A 1856 2012 157 6 0 .501 .60 2.21 .376 .811 .266 2.77 .391 -.044 1

9 617B 1852 2012 161 6 0 .518 .80 2.57 .502 .805 .296 2.77 .521 -.024 2

10 619A 1892 2012 121 5 0 .544 1.25 3.21 .660 .849 .229 2.73 .435 -.008 1

11 619B 1853 2012 160 6 1 .443 .74 2.55 .545 .896 .233 2.67 .384 -.005 1

12 623A 1875 2012 138 5 0 .596 .77 5.08 .994 .962 .323 2.44 .367 -.042 1

13 623B 1875 2012 138 5 0 .480 1.07 5.72 1.139 .949 .290 2.62 .457 .046 1

14 626B 1920 2012 93 4 2 .398 .53 1.79 .507 .943 .328 2.91 .538 -.049 1

15 630A 1920 2012 93 4 0 .571 1.14 2.48 .583 .830 .237 2.68 .542 .038 1

16 630B 1940 2012 73 3 0 .539 1.81 3.48 .639 .802 .165 2.51 .419 .000 1

17 633A 1801 2012 212 8 2 .487 .76 2.77 .642 .937 .267 2.77 .383 -.060 1

18 633B 1788 2006 219 8 2 .559 .98 4.12 1.009 .944 .323 2.78 .409 -.029 2

19 674A 1909 2012 104 4 0 .575 1.30 3.16 .725 .787 .255 2.67 .470 -.031 1

20 674B 1884 2012 129 5 0 .599 .89 2.71 .619 .853 .224 3.09 .560 -.066 1

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Total or mean: 2643 104 11 .505 1.01 5.72 .740 .871 .271 3.09 .434 -.029

- = [ COFECHA FINALCOF ] = -