[] Dendrochronology Program Library Run PMW Program COF 12:33 Tue 30 Dec 2014 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 29220

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

File of DATED series: IN\_Pioneers\_Qual.txt

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 1817 to 2011 195 years

Continuous time span is 1817 to 2011 195 years

Portion with two or more series is 1826 to 2011 186 years

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

\*C\* Number of dated series 30 \*C\*

\*O\* Master series 1817 2011 195 yrs \*O\*

\*F\* Total rings in all series 3647 \*F\*

\*E\* Total dated rings checked 3638 \*E\*

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

\*H\* Average mean sensitivity .238 \*H\*

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

\*\*\* Mean length of series 121.6 \*\*\*

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

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

PMW023A 1 absent rings: 1925

PMW32A 1 absent rings: 1913

2 absent rings .055%

PART 2: TIME PLOT OF TREE-RING SERIES: 12:33 Tue 30 Dec 2014 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

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

. . . . . . . . . . . . . . . . . <===========> . PMW01B 1 1898 2011 114

. . . . . . . . . . . . . . . . . <==========> . PMW02B 2 1901 2011 111

. . . . . . . . . . . . . . . . . <==========> . PMW03A 3 1902 2011 110

. . . . . . . . . . . . . . . . . <==========> . PMW03B 4 1900 2011 112

. . . . . . . . . . . . . . . . . <=============> . PMW05A 5 1875 2011 137

. . . . . . . . . . . . . . . . . <============> . PMW05B 6 1882 2011 130

. . . . . . . . . . . . . . . . . <============> . PMW06A 7 1884 2011 128

. . . . . . . . . . . . . . . . . <============> . PMW06B 8 1882 2011 130

. . . . . . . . . . . . . . . . . <==========> . PMW08A 9 1903 2011 109

. . . . . . . . . . . . . . . . . . <========> . PMW09A 10 1922 2011 90

. . . . . . . . . . . . . . . . . <===========> . PMW10A 11 1897 2011 115

. . . . . . . . . . . . . . . . . <===========> . PMW20A 12 1890 2011 122

. . . . . . . . . . . . . . . . . <==========> . PMW20B 13 1900 2011 112

. . . . . . . . . . . . . . . . . <==========> . PMW21A 14 1904 2011 108

. . . . . . . . . . . . . . . . . <==========> . PMW21C 15 1908 2011 104

. . . . . . . . . . . . . . . . .<==============> . PMW023A 16 1861 2011 151

. . . . . . . . . . . . . . . . . .<=========> . PMW023B 17 1911 2011 101

. . . . . . . . . . . . . . . . .<==============> . PMW24A 18 1861 2011 151

. . . . . . . . . . . . . . . . . . <======> . PMW025A 19 1944 2011 68

. . . . . . . . . . . . . . . . . <============> . PMW025B 20 1881 2011 131

. . . . . . . . . . . . . . . . . . <======> . PMW026B 21 1941 2011 71

. . . . . . . . . . . . . . . . . <===========> . PMW27A 22 1893 2011 119

. . . . . . . . . . . . . . . . . <============> . PMW31A 23 1886 2011 126

. . . . . . . . . . . . . . . . . . <======> . PMW31B 24 1943 2011 69

. . . . . . . . . . . . . . . . . <=============> . PMW32A 25 1875 2011 137

. . . . . . . . . . . . . . . .<===================> . PMW34A 26 1817 2011 195

. . . . . . . . . . . . . . . . <==================> . PMW35A 27 1826 2011 186

. . . . . . . . . . . . . . . . . <===========> . PMW36A 28 1890 2011 122

. . . . . . . . . . . . . . . . .<==============> . PMW37A 29 1866 2011 146

. . . . . . . . . . . . . . . . . <=============> . PMW38A 30 1870 2011 142

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

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: 12:33 Tue 30 Dec 2014 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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1850 -1.005 2 1900 .885 20 1950 1.254 30 2000 .177 30

1851 -.739 2 1901 -1.524 21 1951 1.303 30 2001 1.145 30

1852 -.829 2 1902 .603 22 1952 -.259 30 2002 .630 30

1853 -1.892 2 1903 1.007 23 1953 -.908 30 2003 -1.330 30

1854 -1.582 2 1904 -.200 24 1954 -2.880 30 2004 -.845 30

1855 .307 2 1905 .373 24 1955 1.036 30 2005 -1.132 30

1856 -4.140 2 1906 -.325 24 1956 -.238 30 2006 -.111 30

1857 -.622 2 1907 1.275 24 1957 .574 30 2007 -1.419 30

1858 -.643 2 1908 -1.177 25 1958 1.085 30 2008 .042 30

1859 .878 2 1909 .192 25 1959 .115 30 2009 1.021 30

1860 -.347 2 1910 1.376 25 1960 -.316 30 2010 .555 30

1861 .804 4 1911 -1.027 26 1961 .730 30 2011 .188 30

1862 1.312 4 1912 .597 26 1962 -.041 30

1863 1.935 4 1913 -.637 26 1 1963 .298 30

1864 .159 4 1914 -1.275 26 1964 .055 30

1865 .401 4 1915 1.178 26 1965 .400 30

1866 -.279 5 1916 1.290 26 1966 -.920 30

1817 1.170 1 1867 -.596 5 1917 .825 26 1967 -1.130 30

1818 .131 1 1868 -.466 5 1918 -.733 26 1968 .059 30

1819 -.684 1 1869 .528 5 1919 .062 26 1969 -.330 30

1820 -.962 1 1870 .340 6 1920 -.192 26 1970 -.107 30

1821 -1.262 1 1871 -.840 6 1921 -1.134 26 1971 -.532 30

1822 -2.502 1 1872 -.086 6 1922 .580 27 1972 -1.350 30

1823 -1.135 1 1873 -.692 6 1923 -.041 27 1973 1.363 30

1824 1.352 1 1874 -1.514 6 1924 .378 27 1974 1.333 30

1825 1.006 1 1875 .241 8 1925 -2.357 27 1 1975 .249 30

1826 1.283 2 1876 .977 8 1926 .316 27 1976 .888 30

1827 .595 2 1877 .149 8 1927 .584 27 1977 -.285 30

1828 1.714 2 1878 .718 8 1928 1.171 27 1978 .408 30

1829 .608 2 1879 -.565 8 1929 -.282 27 1979 -.232 30

1830 1.609 2 1880 -.314 8 1930 -.768 27 1980 .006 30

1831 -1.463 2 1881 .311 9 1931 -.030 27 1981 -.421 30

1832 -1.060 2 1882 .566 11 1932 1.132 27 1982 1.449 30

1833 -1.873 2 1883 .728 11 1933 -.088 27 1983 -.530 30

1834 -1.479 2 1884 .402 12 1934 -1.480 27 1984 -1.537 30

1835 -.552 2 1885 -.195 12 1935 .658 27 1985 .312 30

1836 .258 2 1886 -.250 13 1936 -1.796 27 1986 -.153 30

1837 .194 2 1887 -1.247 13 1937 -.111 27 1987 -.539 30

1838 .707 2 1888 -.146 13 1938 1.580 27 1988 -2.587 30

1839 -1.604 2 1889 1.396 13 1939 1.356 27 1989 1.042 30

1840 .037 2 1890 .115 15 1940 .034 27 1990 .542 30

1841 -.516 2 1891 .422 15 1941 -.205 28 1991 -.359 30

1842 2.297 2 1892 -.195 15 1942 .083 28 1992 .691 30

1843 1.399 2 1893 -1.240 16 1943 -.235 29 1993 .955 30

1844 .463 2 1894 -.836 16 1944 -1.945 30 1994 .027 30

1845 -.430 2 1895 -1.152 16 1945 .488 30 1995 1.421 30

1846 1.161 2 1896 1.442 16 1946 -.044 30 1996 -.084 30

1847 .564 2 1897 .415 17 1947 .301 30 1997 -.278 30

1848 1.422 2 1898 -.104 18 1948 .332 30 1998 .701 30

1849 .981 2 1899 .488 18 1949 .984 30 1999 .815 30

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PART 4: Master Bar Plot: 12:33 Tue 30 Dec 2014 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

1850-d 1900--------D 1950---------E 2000-----A

1851--c 1901f 1951----------E 2001---------E

1852--c 1902-------B 1952---a 2002-------C

1853h 1903---------D 1953--d 2003-e

1854f 1904----a 1954l 2004--c

1855------A 1905------A 1955---------D 2005-e

1856q 1906---a 1956---a 2006----@

1857--b 1907---------E 1957-------B 2007f

1858--c 1908-e 1958---------D 2008-----@

1859--------D 1909------A 1959-----@ 2009---------D

1860---a 1910----------F 1960---a 2010-------B

1861--------C 1911-d 1961--------C 2011------A

1862----------E 1912-------B 1962----@

1863----------H 1913--c 1963------A

1864-----A 1914-e 1964-----@

1865------B 1915---------E 1965------B

1866---a 1916----------E 1966-d

1817---------E 1867--b 1917--------C 1967-e

1818-----A 1868---b 1918--c 1968-----@

1819--c 1869-------B 1919-----@ 1969---a

1820-d 1870------A 1920----a 1970----@

1821-e 1871--c 1921-e 1971--b

1822j 1872----@ 1922-------B 1972-e

1823-e 1873--c 1923----@ 1973----------E

1824----------E 1874f 1924------B 1974----------E

1825---------D 1875------A 1925i 1975------A

1826---------E 1876---------D 1926------A 1976--------D

1827-------B 1877-----A 1927-------B 1977---a

1828----------G 1878--------C 1928---------E 1978------B

1829-------B 1879--b 1929---a 1979---a

1830----------F 1880---a 1930--c 1980-----@

1831f 1881------A 1931----@ 1981---b

1832-d 1882-------B 1932---------E 1982----------F

1833g 1883--------C 1933----@ 1983--b

1834f 1884------B 1934f 1984f

1835--b 1885----a 1935-------C 1985------A

1836------A 1886---a 1936g 1986----a

1837------A 1887-e 1937----@ 1987--b

1838--------C 1888----a 1938----------F 1988j

1839f 1889----------F 1939----------E 1989---------D

1840-----@ 1890-----@ 1940-----@ 1990-------B

1841--b 1891------B 1941----a 1991---a

1842----------I 1892----a 1942-----@ 1992--------C

1843----------F 1893-e 1943---a 1993--------D

1844-------B 1894--c 1944h 1994-----@

1845---b 1895-e 1945-------B 1995----------F

1846---------E 1896----------F 1946----@ 1996----@

1847-------B 1897------B 1947------A 1997---a

1848----------F 1898----@ 1948------A 1998--------C

1849---------D 1899-------B 1949---------D 1999--------C

PART 5: CORRELATION OF SERIES BY SEGMENTS: 12:33 Tue 30 Dec 2014 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 1825 1850 1875 1900 1925 1950 1975

1874 1899 1924 1949 1974 1999 2024

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

1 PMW01B 1898 2011 .59 .62 .46 .31A .36

2 PMW02B 1901 2011 .79 .74 .62 .49

3 PMW03A 1902 2011 .72 .62 .63 .61

4 PMW03B 1900 2011 .80 .79 .77 .80

5 PMW05A 1875 2011 .59 .74 .67 .70 .61

6 PMW05B 1882 2011 .64 .78 .76 .76 .77

7 PMW06A 1884 2011 .52 .59 .61 .55 .49

8 PMW06B 1882 2011 .53 .74 .73 .71 .62

9 PMW08A 1903 2011 .66 .72 .57 .52

10 PMW09A 1922 2011 .60 .60 .50 .56

11 PMW10A 1897 2011 .71 .71 .66 .55 .63

12 PMW20A 1890 2011 .58 .67 .71 .53 .42

13 PMW20B 1900 2011 .74 .64 .53 .50

14 PMW21A 1904 2011 .57 .60 .54 .50

15 PMW21C 1908 2011 .75 .68 .68 .58

16 PMW023A 1861 2011 .42 .11B .32A .46 .34 .45

17 PMW023B 1911 2011 .55 .64 .62 .57

18 PMW24A 1861 2011 .35 .43 .18B .09B .37 .50

19 PMW025A 1944 2011 .64 .61 .57

20 PMW025B 1881 2011 .41B .45 .59 .63 .59

21 PMW026B 1941 2011 .40 .52 .39

22 PMW27A 1893 2011 .53 .56 .55 .33A .22A

23 PMW31A 1886 2011 .80 .83 .83 .76 .56

24 PMW31B 1943 2011 .73 .72 .49

25 PMW32A 1875 2011 .52 .72 .75 .76 .59

26 PMW34A 1817 2011 .32A .37 .57 .68 .54 .51 .40

27 PMW35A 1826 2011 .28A .22A .50 .64 .59 .61 .54

28 PMW36A 1890 2011 .76 .75 .77 .73 .58

29 PMW37A 1866 2011 .62 .65 .80 .72 .56 .45

30 PMW38A 1870 2011 .73 .73 .84 .84 .79 .62

Av segment correlation .30 .45 .56 .66 .64 .59 .53

PART 6: POTENTIAL PROBLEMS: 12:33 Tue 30 Dec 2014 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

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

PMW01B 1898 to 2011 114 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

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

1950 1999 0 .05 -.23 -.25 -.30 .10 .10 .19 -.07 .00 -.11 .31\*-.10 .18 -.16 .07 .16 .00 .19 .09 -.13 -.22

[B] Entire series, effect on correlation ( .472) is:

Lower 1954> -.018 1982< -.017 1899< -.016 1988> -.010 1958< -.010 1967> -.009 Higher 1925 .031 1936 .026

1950 to 1999 segment:

Lower 1982< -.045 1958< -.028 1967> -.018 1962> -.017 1976< -.016 1987> -.016 Higher 1995 .038 1974 .025

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

PMW02B 1901 to 2011 111 years Series 2

[B] Entire series, effect on correlation ( .665) is:

Lower 2003> -.023 1994< -.020 1932< -.014 1989< -.010 2004> -.010 1992< -.010 Higher 1954 .025 1925 .018

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

PMW03A 1902 to 2011 110 years Series 3

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

Lower 1972< -.027 1979> -.010 1997> -.010 1987> -.009 1947< -.008 1952> -.006 Higher 1988 .025 1944 .013

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

PMW03B 1900 to 2011 112 years Series 4

[B] Entire series, effect on correlation ( .784) is:

Lower 1982< -.014 1960> -.008 1906< -.007 1956> -.007 1980< -.007 1952< -.004 Higher 1988 .022 1936 .011

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

PMW05A 1875 to 2011 137 years Series 5

[B] Entire series, effect on correlation ( .632) is:

Lower 1876< -.017 1972< -.014 2003> -.014 1879< -.010 1927< -.009 1888> -.007 Higher 1988 .033 1944 .012

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

PMW05B 1882 to 2011 130 years Series 6

[B] Entire series, effect on correlation ( .731) is:

Lower 1883< -.017 2002< -.011 1895> -.008 1903< -.008 1919< -.007 1923> -.006 Higher 1988 .026 1936 .011

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

PMW06A 1884 to 2011 128 years Series 7

[B] Entire series, effect on correlation ( .536) is:

Lower 1902< -.059 1884< -.016 1996< -.015 1895> -.010 1964< -.010 1888> -.008 Higher 1925 .029 1936 .023

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

1888 +3.0 SD; 1902 -4.7 SD

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PMW06B 1882 to 2011 130 years Series 8

[B] Entire series, effect on correlation ( .636) is:

Lower 1882< -.031 2004< -.019 1975< -.017 1925> -.014 1902< -.010 1906> -.008 Higher 1988 .035 1936 .014

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

PMW08A 1903 to 2011 109 years Series 9

[B] Entire series, effect on correlation ( .600) is:

Lower 1908> -.044 1998< -.024 2007> -.017 1988> -.016 1934> -.012 1948< -.009 Higher 1925 .035 1944 .018

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

1908 +3.5 SD

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

PMW09A 1922 to 2011 90 years Series 10

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

Lower 1960< -.082 1999< -.020 1929> -.011 1942< -.009 1985< -.008 1966> -.008 Higher 1925 .038 1944 .015

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

1960 -5.4 SD

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

PMW10A 1897 to 2011 115 years Series 11

[B] Entire series, effect on correlation ( .632) is:

Lower 1954> -.022 1997< -.014 1921< -.012 1908> -.012 2004> -.009 1961< -.006 Higher 1944 .016 1901 .012

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PMW20A 1890 to 2011 122 years Series 12

[B] Entire series, effect on correlation ( .566) is:

Lower 1988> -.027 1980< -.023 1915< -.018 1927< -.012 1950< -.012 1965< -.011 Higher 1954 .058 1936 .014

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

PMW20B 1900 to 2011 112 years Series 13

[B] Entire series, effect on correlation ( .620) is:

Lower 1988> -.033 1967< -.018 2007> -.016 1904> -.009 1992< -.008 1964> -.008 Higher 1925 .019 1954 .015

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

PMW21A 1904 to 2011 108 years Series 14

[B] Entire series, effect on correlation ( .515) is:

Lower 1914> -.028 2003> -.020 1972> -.013 1958< -.013 1908> -.008 1936> -.008 Higher 1925 .017 1938 .011

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

1914 +3.5 SD

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PMW21C 1908 to 2011 104 years Series 15

[B] Entire series, effect on correlation ( .682) is:

Lower 1967> -.018 1962< -.018 1914> -.011 1975> -.011 1936> -.011 1956> -.010 Higher 1954 .044 1988 .013

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

1954 -4.7 SD

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PMW023A 1861 to 2011 151 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

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

1875 1924 3 -.23 -.09 .07 .13 -.03 .05 .10 -.10 .02 -.23 .11| .04 -.15 .26\*-.11 -.04 -.05 .04 .05 -.10 .07

1900 1949 0 .02 .00 -.11 -.10 -.10 -.13 .25 -.15 .32 -.23 .32\* .07 -.22 -.04 -.32 -.12 .03 .09 .30 .03 .07

[B] Entire series, effect on correlation ( .430) is:

Lower 1911> -.023 1916< -.017 1879> -.016 1921> -.015 1910< -.013 1972> -.010 Higher 1925 .067 1936 .024

1875 to 1924 segment:

Lower 1911> -.073 1916< -.061 1879> -.052 1921> -.047 1910< -.046 1882< -.024 Higher 1908 .077 1896 .069

1900 to 1949 segment:

Lower 1911> -.060 1916< -.040 1921> -.037 1910< -.031 1914> -.016 1946< -.012 Higher 1925 .169 1936 .049

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

1925 -2.357 27 1

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

1879 +3.1 SD; 1925 -6.3 SD

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PMW023B 1911 to 2011 101 years Series 17

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

Lower 2001< -.062 1911> -.034 1976< -.012 1950< -.012 1923< -.011 1975< -.009 Higher 1988 .061 1936 .020

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PMW24A 1861 to 2011 151 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

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

1900 1949 7 .12 .02 -.24 -.18 .11 .00 .04 .27 .03 -.08 .18|-.08 -.15 -.07 -.24 .15 -.01 .34\*-.09 -.01 -.01

1925 1974 7 .10 .14 -.08 -.05 -.01 -.02 .12 .14 .00 .05 .09|-.06 -.19 -.04 -.16 .03 .00 .27\* .13 .13 -.21

[B] Entire series, effect on correlation ( .295) is:

Lower 1939< -.032 1975< -.026 1944> -.016 1867> -.016 1921> -.015 1869< -.013 Higher 1988 .025 1908 .018

1900 to 1949 segment:

Lower 1939< -.086 1944> -.041 1921> -.039 1911> -.030 1937< -.025 1945< -.018 Higher 1908 .060 1914 .037

1925 to 1974 segment:

Lower 1939< -.089 1944> -.037 1937< -.024 1961< -.019 1945< -.019 1963< -.015 Higher 1932 .037 1955 .037

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

1867 +3.0 SD; 1921 +3.1 SD; 1939 -4.6 SD

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

PMW025A 1944 to 2011 68 years Series 19

[B] Entire series, effect on correlation ( .633) is:

Lower 1976< -.026 2003> -.023 1960< -.022 1972> -.021 1961< -.019 1967> -.019 Higher 1954 .084 2007 .016

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PMW025B 1881 to 2011 131 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

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

1881 1930 3 -.17 -.17 -.07 .15 -.07 -.07 .20 -.05 -.12 -.05 .41|-.07 -.24 .43\*-.20 -.08 .08 -.04 .02 -.08 -.04

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

Lower 1922< -.061 1928< -.018 1936> -.013 1967> -.011 1921> -.008 1977< -.008 Higher 1925 .043 1954 .022

1881 to 1930 segment:

Lower 1922< -.130 1928< -.038 1921> -.021 1901> -.017 1904> -.014 1906> -.012 Higher 1925 .139 1908 .064

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

1921 1922 -4.1 SD

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PMW026B 1941 to 2011 71 years Series 21

[B] Entire series, effect on correlation ( .442) is:

Lower 1973< -.049 1976< -.038 1967> -.035 1944> -.022 1943> -.022 1966> -.021 Higher 1954 .120 1988 .080

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

1943 +3.4 SD; 1967 +3.8 SD

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

PMW27A 1893 to 2011 119 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

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

1950 1999 0 -.04 .15 .19 -.20 .00 .19 -.01 -.13 -.05 -.08 .33\*-.20 .03 -.32 .07 -.07 -.08 .16 .12 -.06 -.03

1962 2011 0 -.12 .20 .10 -.22 -.02 .10 .08 -.08 -.06 -.11 .22\* - - - - - - - - - -

[B] Entire series, effect on correlation ( .466) is:

Lower 1988> -.054 1928< -.030 1911> -.024 1966> -.016 1987> -.015 1929< -.014 Higher 1925 .055 1954 .044

1950 to 1999 segment:

Lower 1988> -.129 1966> -.039 1987> -.036 1992< -.026 1961< -.014 1967> -.013 Higher 1954 .172 1972 .028

1962 to 2011 segment:

Lower 1988> -.133 1966> -.040 1987> -.035 1992< -.033 2002< -.023 1993< -.013 Higher 2007 .056 1972 .041

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

1966 +3.1 SD; 1987 +3.4 SD; 1988 +4.9 SD

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

PMW31A 1886 to 2011 126 years Series 23

[B] Entire series, effect on correlation ( .735) is:

Lower 2006< -.016 2003> -.016 1911< -.013 1949< -.007 2000> -.007 2004> -.007 Higher 1954 .017 1925 .010

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PMW31B 1943 to 2011 69 years Series 24

[B] Entire series, effect on correlation ( .630) is:

Lower 2006< -.070 1992< -.030 1974< -.013 2007> -.011 1946> -.009 1959< -.008 Higher 1954 .080 1944 .018

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PMW32A 1875 to 2011 137 years Series 25

[B] Entire series, effect on correlation ( .623) is:

Lower 1913< -.022 1927< -.013 2003> -.013 2009< -.012 1888< -.012 1885> -.008 Higher 1954 .031 1944 .013

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

1913 -.637 26 1

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

PMW34A 1817 to 2011 195 years Series 26

[\*] Early part of series cannot be checked from 1817 to 1825 -- 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

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

1826 1875 0 - -.17 -.10 -.28 .03 -.12 -.01 .00 .22 .05 .32\* .04 .08 -.20 .06 -.16 .00 -.12 -.15 -.34 -.12

[B] Entire series, effect on correlation ( .444) is:

Lower 1831> -.039 2007> -.019 1853< -.016 1856< -.011 1995< -.011 1958< -.008 Higher 1988 .035 1954 .014

1826 to 1875 segment:

Lower 1831> -.077 1853< -.040 1856< -.023 1872> -.011 1835> -.011 1841< -.011 Higher 1842 .025 1863 .021

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

1856 -5.4 SD; 2007 +3.7 SD

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

PMW35A 1826 to 2011 186 years Series 27

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

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

1826 1875 0 - -.02 .03 -.21 -.07 -.15 .08 -.21 .11 .08 .28\* .03 .18 -.04 -.04 -.09 .12 -.24 -.06 -.15 -.04

1850 1899 0 -.12 -.05 .15 -.13 -.05 -.16 .03 -.05 .00 .12 .22\*-.04 .06 .00 -.03 .05 .22 .09 .11 -.20 .05

[B] Entire series, effect on correlation ( .418) is:

Lower 1856> -.047 1853> -.019 1831< -.015 1877< -.012 1865< -.009 2011< -.007 Higher 1988 .021 1925 .012

1826 to 1875 segment:

Lower 1831< -.058 1853> -.032 1865< -.025 1856> -.013 1835< -.013 1871> -.011 Higher 1842 .029 1863 .020

1850 to 1899 segment:

Lower 1877< -.043 1853> -.035 1865< -.028 1896< -.015 1885< -.013 1851< -.013 Higher 1863 .029 1889 .017

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

1855 1856 4.4 SD 1856 1857 -4.6 SD

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

1853 +3.6 SD; 1856 +5.4 SD

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PMW36A 1890 to 2011 122 years Series 28

[B] Entire series, effect on correlation ( .712) is:

Lower 1942< -.016 1984> -.013 1995< -.011 2003> -.010 1965< -.007 1937< -.006 Higher 1954 .032 1925 .017

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PMW37A 1866 to 2011 146 years Series 29

[B] Entire series, effect on correlation ( .608) is:

Lower 1978< -.022 2001< -.019 1998< -.016 1972> -.009 1979> -.007 1888< -.007 Higher 1988 .033 1954 .030

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

1961 +3.5 SD

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PMW38A 1870 to 2011 142 years Series 30

[B] Entire series, effect on correlation ( .742) is:

Lower 2009< -.028 1989< -.010 1996> -.008 1987> -.007 2007> -.007 1879> -.006 Higher 1954 .025 1988 .023

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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 PMW01B 1898 2011 114 5 1 .472 2.89 6.70 1.194 .507 .294 2.61 .413 -.075 6

2 PMW02B 1901 2011 111 4 0 .665 2.63 5.95 1.121 .705 .268 2.75 .575 .006 3

3 PMW03A 1902 2011 110 4 0 .639 1.91 7.22 .844 .658 .251 2.45 .390 -.052 2

4 PMW03B 1900 2011 112 4 0 .784 2.41 4.37 .701 .461 .238 2.57 .488 -.064 1

5 PMW05A 1875 2011 137 5 0 .632 2.62 8.02 1.334 .759 .245 2.57 .405 -.005 1

6 PMW05B 1882 2011 130 5 0 .731 2.70 7.80 1.305 .761 .240 2.69 .451 .050 1

7 PMW06A 1884 2011 128 5 0 .536 2.27 5.08 .993 .821 .195 2.73 .523 .006 1

8 PMW06B 1882 2011 130 5 0 .636 2.28 4.69 .828 .763 .197 2.56 .490 -.003 1

9 PMW08A 1903 2011 109 4 0 .600 2.91 8.49 1.370 .675 .262 2.71 .472 -.042 1

10 PMW09A 1922 2011 90 4 0 .585 4.25 7.89 1.306 .519 .230 2.49 .397 .003 2

11 PMW10A 1897 2011 115 5 0 .632 3.39 6.88 1.063 .514 .257 2.54 .498 -.031 1

12 PMW20A 1890 2011 122 5 0 .566 2.47 6.05 .823 .507 .213 2.73 .378 -.005 1

13 PMW20B 1900 2011 112 4 0 .620 2.67 4.73 .804 .460 .250 2.70 .465 -.013 2

14 PMW21A 1904 2011 108 4 0 .515 2.74 6.84 1.502 .798 .254 2.67 .372 .009 1

15 PMW21C 1908 2011 104 4 0 .682 2.83 8.58 1.261 .645 .271 2.72 .389 -.012 1

16 PMW023A 1861 2011 151 6 2 .430 1.61 3.59 .607 .594 .280 2.51 .318 -.021 1

17 PMW023B 1911 2011 101 4 0 .545 2.21 4.06 .824 .694 .246 2.62 .430 -.008 1

18 PMW24A 1861 2011 151 6 2 .295 1.44 3.44 .732 .844 .230 2.63 .435 -.022 1

19 PMW025A 1944 2011 68 3 0 .633 4.03 9.66 1.553 .606 .234 2.67 .495 .022 1

20 PMW025B 1881 2011 131 5 1 .506 2.00 4.75 1.170 .873 .227 2.60 .484 -.103 1

21 PMW026B 1941 2011 71 3 0 .442 2.92 5.60 .864 .708 .159 2.74 .505 -.032 1

22 PMW27A 1893 2011 119 5 2 .466 2.07 3.95 .632 .756 .173 2.59 .451 .025 1

23 PMW31A 1886 2011 126 5 0 .735 2.59 4.63 .592 .323 .215 2.56 .427 -.026 2

24 PMW31B 1943 2011 69 3 0 .630 2.07 2.93 .393 .353 .166 2.70 .513 .090 1

25 PMW32A 1875 2011 137 5 0 .623 1.97 4.25 .696 .290 .336 2.68 .443 .031 1

26 PMW34A 1817 2011 195 7 1 .444 1.63 4.26 .741 .807 .202 2.76 .319 -.025 1

27 PMW35A 1826 2011 186 7 2 .418 1.70 4.62 .731 .774 .209 2.87 .466 -.045 1

28 PMW36A 1890 2011 122 5 0 .712 2.27 4.67 .826 .446 .267 2.67 .498 .000 1

29 PMW37A 1866 2011 146 6 0 .608 1.86 3.69 .513 .296 .248 2.99 .519 -.030 1

30 PMW38A 1870 2011 142 6 0 .742 2.24 6.90 1.248 .783 .251 2.57 .512 -.035 1

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Total or mean: 3647 143 11 .577 2.36 9.66 .933 .634 .238 2.99 .447 -.016

- = [ COFECHA PMW COF ] = -