[] Dendrochronology Program Library Run FINAL Program COF 11:00 Wed 03 Jul 2013 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 28675

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

Title of run: Final

File of DATED series: SNCMid\_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 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 1772 to 2012 241 years

Continuous time span is 1772 to 2012 241 years

Portion with two or more series is 1807 to 2012 206 years

>> 540A 1827 absent in 1 of 4 series, but is not usually narrow: master index is 1.237

>> 544A 1978 absent in 1 of 24 series, but is not usually narrow: master index is .611

>> 544A 1982 absent in 1 of 24 series, but is not usually narrow: master index is .810

>> 545A 1969 absent in 1 of 24 series, but is not usually narrow: master index is -.079

>> 545A 1970 absent in 1 of 24 series, but is not usually narrow: master index is .755

>> 545A 1971 absent in 1 of 24 series, but is not usually narrow: master index is .820

>> 545A 1972 absent in 1 of 24 series, but is not usually narrow: master index is .233

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

\*C\* Number of dated series 24 \*C\*

\*O\* Master series 1772 2012 241 yrs \*O\*

\*F\* Total rings in all series 3585 \*F\*

\*E\* Total dated rings checked 3550 \*E\*

\*C\* Series intercorrelation .613 \*C\*

\*H\* Average mean sensitivity .260 \*H\*

\*A\* Segments, possible problems 34 \*A\*

\*\*\* Mean length of series 149.4 \*\*\*

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

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

540A 1 absent rings: 1827

544A 3 absent rings: 1977 1978 1982

544B 9 absent rings: 1837 1838 1843 1852 1853 1854 1967 1968 1977

545A 10 absent rings: 1887 1964 1965 1966 1967 1968 1969 1970 1971 1972

545B 5 absent rings: 1887 1964 1965 1966 1967

568B 3 absent rings: 1882 1883 1884

572B 2 absent rings: 1882 1883

33 absent rings .921%

PART 2: TIME PLOT OF TREE-RING SERIES: Final 11:00 Wed 03 Jul 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

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

. . . . . . . . . . . . . . . <====================> . 540A 1 1807 2012 206

. . . . . . . . . . . . . . . . <==================> . 540B 2 1826 2012 187

. . . . . . . . . . . . . . . . . <============> . 542A 3 1880 2012 133

. . . . . . . . . . . . . . . . <================> . 542B 4 1846 2012 167

. . . . . . . . . . . . . . . . . <=============> . 544A 5 1877 2012 136

. . . . . . . . . . . . . . . <=======================> . 544B 6 1772 2012 241

. . . . . . . . . . . . . . . . <===============> . 545A 7 1853 2012 160

. . . . . . . . . . . . . . . . <===============> . 545B 8 1850 2012 163

. . . . . . . . . . . . . . . . . <=============> . 546A 9 1871 2012 142

. . . . . . . . . . . . . . . . . <=============> . 546B 10 1870 2012 143

. . . . . . . . . . . . . . . . . . <========> . 548A 11 1927 2012 86

. . . . . . . . . . . . . . . . . <==========> . 548B 12 1908 2012 105

. . . . . . . . . . . . . . . . <===============> . 562A 13 1859 2012 154

. . . . . . . . . . . . . . . . . <==========> . 562B 14 1900 2012 113

. . . . . . . . . . . . . . . . .<==============> . 566A 15 1863 2012 150

. . . . . . . . . . . . . . . . <================> . 566B 16 1847 2012 166

. . . . . . . . . . . . . . . . .<==============> . 567A 17 1860 2012 153

. . . . . . . . . . . . . . . . <================> . 567B 18 1847 2012 166

. . . . . . . . . . . . . . . . <==================> . 568B 19 1822 2012 191

. . . . . . . . . . . . . . . . . .<=========> . 568C 20 1917 2012 96

. . . . . . . . . . . . . . . . . .<=========> . 569A 21 1911 2012 102

. . . . . . . . . . . . . . . . . .<=========> . 569B 22 1916 2012 97

. . . . . . . . . . . . . . . . <===============> . 572A 23 1855 2012 158

. . . . . . . . . . . . . . . . <================> . 572B 24 1843 2012 170

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

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 11:00 Wed 03 Jul 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 -1.490 1 1850 -.216 9 1900 1.227 19 1950 -.103 24 2000 -1.168 24

1801 -2.588 1 1851 .680 9 1901 -.277 19 1951 .283 24 2001 .004 24

1802 .954 1 1852 -.691 9 1 1902 -.167 19 1952 1.292 24 2002 .714 24

1803 -1.231 1 1853 -1.221 10 1 1903 .933 19 1953 .520 24 2003 -.735 24

1804 .205 1 1854 -1.292 10 1 1904 1.693 19 1954 .592 24 2004 -2.113 24

1805 .769 1 1855 .488 11 1905 .980 19 1955 1.045 24 2005 -1.335 24

1806 -.262 1 1856 .384 11 1906 .680 19 1956 -1.049 24 2006 -1.591 24

1807 .208 2 1857 .915 11 1907 1.103 19 1957 .757 24 2007 .086 24

1808 .930 2 1858 1.298 11 1908 .286 20 1958 1.677 24 2008 .355 24

1809 1.479 2 1859 -.627 12 1909 -.272 20 1959 .485 24 2009 .972 24

1810 -.181 2 1860 .260 13 1910 .550 20 1960 -.187 24 2010 1.039 24

1811 -3.390 2 1861 -.355 13 1911 -2.004 21 1961 .773 24 2011 .283 24

1812 -.482 2 1862 -.095 13 1912 -.072 21 1962 .356 24 2012 1.409 24

1813 -.201 2 1863 -.243 14 1913 -.253 21 1963 -.956 24

1814 1.272 2 1864 -.411 14 1914 -.947 21 1964 -2.031 24 2

1815 .262 2 1865 -.199 14 1915 -.197 21 1965 -1.808 24 2

1816 .621 2 1866 -.047 14 1916 .050 22 1966 -1.072 24 2

1817 .565 2 1867 1.021 14 1917 -1.031 23 1967 -1.326 24 3

1818 -1.289 2 1868 .909 14 1918 -1.365 23 1968 -1.147 24 2

1819 -1.327 2 1869 .058 14 1919 -1.477 23 1969 -.079 24 1<<

1820 -.278 2 1870 1.097 15 1920 -.545 23 1970 .755 24 1<<

1821 -.061 2 1871 1.856 16 1921 .155 23 1971 .820 24 1<<

1772 -3.431 1 1822 .697 3 1872 .774 16 1922 .267 23 1972 .233 24 1<<

1773 -.601 1 1823 .303 3 1873 .292 16 1923 -.310 23 1973 .708 24

1774 -.446 1 1824 .663 3 1874 .724 16 1924 1.242 23 1974 -.319 24

1775 1.580 1 1825 .507 3 1875 .616 16 1925 .001 23 1975 -.183 24

1776 .424 1 1826 .464 4 1876 -.180 16 1926 .304 23 1976 -.693 24

1777 -.802 1 1827 1.237 4 1<< 1877 .023 17 1927 .496 24 1977 -.683 24 2

1778 -.214 1 1828 -1.171 4 1878 .295 17 1928 -.101 24 1978 .611 24 1<<

1779 .536 1 1829 .485 4 1879 -.286 17 1929 -.911 24 1979 .686 24

1780 -.028 1 1830 2.592 4 1880 .721 18 1930 -.540 24 1980 .893 24

1781 2.121 1 1831 .517 4 1881 -.396 18 1931 -.066 24 1981 .085 24

1782 2.109 1 1832 .152 4 1882 -.935 18 2 1932 .836 24 1982 .810 24 1<<

1783 1.033 1 1833 -.337 4 1883 -1.838 18 2 1933 .510 24 1983 1.193 24

1784 -.867 1 1834 -.024 4 1884 -.583 18 1 1934 1.691 24 1984 -.352 24

1785 -1.546 1 1835 -.448 4 1885 -1.222 18 1935 -1.744 24 1985 .642 24

1786 -1.473 1 1836 -.473 4 1886 -.119 18 1936 -.883 24 1986 -.177 24

1787 .003 1 1837 -1.150 4 1 1887 -2.012 18 2 1937 -.648 24 1987 1.092 24

1788 .527 1 1838 -2.073 4 1 1888 -1.428 18 1938 .868 24 1988 .527 24

1789 -.449 1 1839 -1.333 4 1889 -.980 18 1939 .403 24 1989 -.765 24

1790 1.502 1 1840 .072 4 1890 -.332 18 1940 -1.267 24 1990 -.402 24

1791 1.404 1 1841 -.498 4 1891 -.029 18 1941 .941 24 1991 .192 24

1792 .535 1 1842 .419 4 1892 .201 18 1942 -.227 24 1992 .767 24

1793 -.834 1 1843 -.701 5 1 1893 -.994 18 1943 -.477 24 1993 1.948 24

1794 2.308 1 1844 -1.022 5 1894 -.084 18 1944 -.175 24 1994 -.069 24

1795 1.458 1 1845 .971 5 1895 -.119 18 1945 .775 24 1995 .024 24

1796 -.257 1 1846 1.535 6 1896 1.163 18 1946 .149 24 1996 -1.664 24

1797 -.826 1 1847 -.366 8 1897 -.113 18 1947 .318 24 1997 -.784 24

1798 -.628 1 1848 1.869 8 1898 .631 18 1948 -2.241 24 1998 -.090 24

1799 -1.811 1 1849 .836 8 1899 .949 18 1949 .735 24 1999 1.412 24

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PART 4: Master Bar Plot: Final 11:00 Wed 03 Jul 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

1800f 1850----a 1900---------E 1950----@ 2000-e

1801j 1851--------C 1901---a 1951------A 2001-----@

1802---------D 1852--c 1902----a 1952---------E 2002--------C

1803-e 1853-e 1903---------D 1953-------B 2003--c

1804------A 1854-e 1904----------G 1954-------B 2004h

1805--------C 1855-------B 1905---------D 1955---------D 2005-e

1806---a 1856------B 1906--------C 1956-d 2006f

1807------A 1857---------D 1907---------D 1957--------C 2007-----@

1808---------D 1858---------E 1908------A 1958----------G 2008------A

1809----------F 1859--c 1909---a 1959-------B 2009---------D

1810----a 1860------A 1910-------B 1960----a 2010---------D

1811n 1861---a 1911h 1961--------C 2011------A

1812---b 1862----@ 1912-----@ 1962------A 2012----------F

1813----a 1863----a 1913----a 1963-d

1814---------E 1864---b 1914-d 1964h

1815------A 1865----a 1915----a 1965g

1816-------B 1866-----@ 1916-----@ 1966-d

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

1818-e 1868---------D 1918-e 1968-e

1819-e 1869-----@ 1919-f 1969-----@

1820---a 1870---------D 1920--b 1970--------C

1821-----@ 1871----------G 1921------A 1971--------C

1772n 1822--------C 1872--------C 1922------A 1972------A

1773--b 1823------A 1873------A 1923---a 1973--------C

1774---b 1824--------C 1874--------C 1924---------E 1974---a

1775----------F 1825-------B 1875-------B 1925-----@ 1975----a

1776-------B 1826-------B 1876----a 1926------A 1976--c

1777--c 1827---------E 1877-----@ 1927-------B 1977--c

1778----a 1828-e 1878------A 1928----@ 1978-------B

1779-------B 1829-------B 1879---a 1929--d 1979--------C

1780-----@ 1830----------J 1880--------C 1930--b 1980---------D

1781----------H 1831-------B 1881---b 1931-----@ 1981-----@

1782----------H 1832------A 1882-d 1932--------C 1982--------C

1783---------D 1833---a 1883g 1933-------B 1983---------E

1784--c 1834-----@ 1884--b 1934----------G 1984---a

1785f 1835---b 1885-e 1935g 1985-------C

1786-f 1836---b 1886----@ 1936--d 1986----a

1787-----@ 1837-e 1887h 1937--c 1987---------D

1788-------B 1838h 1888-f 1938--------C 1988-------B

1789---b 1839-e 1889-d 1939------B 1989--c

1790----------F 1840-----@ 1890---a 1940-e 1990---b

1791----------F 1841---b 1891-----@ 1941---------D 1991------A

1792-------B 1842-------B 1892------A 1942----a 1992--------C

1793--c 1843--c 1893-d 1943---b 1993----------H

1794----------I 1844-d 1894-----@ 1944----a 1994-----@

1795----------F 1845---------D 1895----@ 1945--------C 1995-----@

1796----a 1846----------F 1896---------E 1946------A 1996g

1797--c 1847---a 1897----@ 1947------A 1997--c

1798--c 1848----------G 1898-------C 1948i 1998----@

1799g 1849--------C 1899---------D 1949--------C 1999----------F

PART 5: CORRELATION OF SERIES BY SEGMENTS: Final 11:00 Wed 03 Jul 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 1800 1815 1830 1845 1860 1875 1890 1905 1920 1935 1950 1965 1980 1995

1829 1844 1859 1874 1889 1904 1919 1934 1949 1964 1979 1994 2009 2024

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

1 540A 1807 2012 .25B .21B .72 .38A .42A .47B .33A .54 .72 .77 .80 .70 .87 .87

2 540B 1826 2012 .46 .59 .62 .72 .73 .64 .66 .76 .79 .77 .71 .83 .80

3 542A 1880 2012 .69 .64 .65 .77 .72 .54 .75 .82 .81

4 542B 1846 2012 .56 .71 .37B .43 .75 .75 .76 .71 .72 .76 .77

5 544A 1877 2012 .62 .69 .59 .63 .64 .55 .57 .58 .61

6 544B 1772 2012 .28B .21B .51 .45 .62 .70 .71 .57 .64 .64 .36A .24B .57 .62

7 545A 1853 2012 .49 .33A .34B .66 .71 .74 .73 .56 .66 .71 .69

8 545B 1850 2012 .43 .16B .32B .72 .70 .72 .69 .37A .64 .63 .65

9 546A 1871 2012 .31B .47 .67 .68 .54 .52 .65 .55 .67 .66

10 546B 1870 2012 .40B .43 .38A .40A .53 .43 .30B .40A .55 .61

11 548A 1927 2012 .65 .70 .80 .66 .60 .57

12 548B 1908 2012 .45B .50 .80 .84 .67 .68 .66

13 562A 1859 2012 .42B .53B .80 .71 .76 .81 .77 .27A .36A .70 .70

14 562B 1900 2012 .57 .61 .70 .77 .75 .38A .46 .47

15 566A 1863 2012 .55 .54 .53 .48 .68 .79 .71 .59 .77 .80

16 566B 1847 2012 .42B .35A .59 .59 .51 .72 .80 .57 .50 .79 .80

17 567A 1860 2012 .57 .62 .72 .67 .64 .69 .77 .44 .55 .56

18 567B 1847 2012 .69 .59 .62 .70 .68 .71 .77 .80 .70 .73 .73

19 568B 1822 2012 .37B .61 .64 .49 .64 .78 .60 .78 .83 .63 .80 .89 .89

20 568C 1917 2012 .44 .66 .76 .66 .66 .60 .63

21 569A 1911 2012 .64 .71 .81 .67 .68 .72 .73

22 569B 1916 2012 .84 .87 .87 .58 .50B .70 .71

23 572A 1855 2012 .49 .29B .43 .59 .71 .78 .78 .60 .62 .70 .72

24 572B 1843 2012 .57 .61 .39B .50 .56 .54 .65 .72 .66 .61 .80 .80

Av segment correlation .26 .31 .60 .52 .46 .55 .61 .62 .69 .73 .62 .59 .69 .70

PART 6: POTENTIAL PROBLEMS: Final 11:00 Wed 03 Jul 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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540A 1807 to 2012 206 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

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1807 1836 7 .12 -.10 .07 .02 .06 -.03 .02 -.01 -.20 .13 .25| .18 -.02 -.28 -.08 -.18 .06 .31\*-.22 .09 -.10

1815 1844 -7 .00 .04 -.02 .26\* .15 -.18 .11 .12 -.15 .02 .21| .22 -.19 -.10 .03 -.24 .22 -.15 -.29 -.01 .02

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

1845 1874 0 -.07 .04 -.14 -.13 .16 -.01 -.15 .11 .16 -.23 .38\*-.06 -.30 .03 -.08 -.42 -.41 .19 -.08 -.12 .25

1860 1889 0 -.15 -.02 -.23 -.04 .29 .04 .21 .24 .06 .01 .42\*-.03 -.15 .17 .04 -.05 -.17 .10 -.08 -.17 .02

1875 1904 5 -.20 -.01 -.12 -.10 .02 -.04 .22 .01 -.08 .19 .47| .33 .18 .19 .08 .48\* .25 .00 -.16 .03 .06

1890 1919 0 -.29 -.17 .15 .02 -.05 .03 .07 -.13 .05 .01 .33\* .20 .25 .00 .10 .23 .06 -.14 -.17 .08 .21

[B] Entire series, effect on correlation ( .528) is:

Lower 1865< -.030 1818> -.029 1810> -.018 1809< -.016 1817< -.014 1896< -.011 Higher 1948 .021 1811 .019

1807 to 1836 segment:

Lower 1817< -.064 1809< -.057 1818> -.046 1827< -.043 1810> -.040 1807> -.033 Higher 1811 .196 1830 .115

1815 to 1844 segment:

Lower 1818> -.097 1817< -.086 1827< -.058 1828> -.032 1815> -.030 1825< -.029 Higher 1830 .242 1831 .041

1845 to 1874 segment:

Lower 1865< -.191 1850> -.038 1847> -.026 1854> -.022 1866< -.021 1846< -.018 Higher 1848 .062 1852 .033

1860 to 1889 segment:

Lower 1865< -.233 1866< -.027 1889> -.018 1881> -.012 1863> -.010 1872< -.005 Higher 1871 .062 1870 .037

1875 to 1904 segment:

Lower 1896< -.132 1893> -.044 1897> -.024 1899< -.015 1889> -.013 1890> -.011 Higher 1887 .092 1903 .046

1890 to 1919 segment:

Lower 1896< -.113 1893> -.041 1897> -.024 1916< -.021 1911> -.014 1890> -.011 Higher 1903 .055 1904 .046

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

1864 1865 -4.2 SD

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

1827 1.237 4 1 >> WARNING: Ring is not usually narrow

Present in series 2 540B time span 1826 to 2012

Present in series 6 544B time span 1772 to 2012

Present in series 19 568B time span 1822 to 2012

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

1807 +3.2 SD; 1865 -5.9 SD; 1866 -6.9 SD

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540B 1826 to 2012 187 years Series 2

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

Lower 1828> -.016 1849< -.015 1942< -.006 1853> -.006 1826> -.006 1830< -.006 Higher 1935 .013 1887 .010

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

1828 +3.1 SD; 1883 -4.6 SD

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542A 1880 to 2012 133 years Series 3

[B] Entire series, effect on correlation ( .713) is:

Lower 1963> -.012 1964> -.011 1977< -.006 1960< -.006 1925> -.005 1937< -.005 Higher 1948 .014 1887 .013

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

1948 -5.2 SD; 1964 +3.1 SD

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542B 1846 to 2012 167 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

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1875 1904 -10 .48\* .02 .04 -.04 -.02 -.08 .43 -.13 .08 -.18 .37|-.22 .06 -.11 .43 -.06 -.05 -.30 .04 -.09 -.13

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

Lower 1897< -.087 1857< -.012 1852> -.011 1901> -.011 1891< -.006 1945< -.005 Higher 1935 .022 1956 .009

1875 to 1904 segment:

Lower 1897< -.208 1901> -.048 1887> -.030 1891< -.019 1893> -.006 1882> -.006 Higher 1896 .047 1883 .038

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

1896 1897 -4.1 SD

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

1897 -5.9 SD

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544A 1877 to 2012 136 years Series 5

[B] Entire series, effect on correlation ( .528) is:

Lower 1982< -.069 1948> -.019 2000> -.017 1942> -.010 1978< -.010 1974> -.009 Higher 1935 .046 1940 .011

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

1977 -.683 24 2

1978 .611 24 1 >> WARNING: Ring is not usually narrow

1982 .810 24 1 >> WARNING: Ring is not usually narrow

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

1940 -5.0 SD; 1982 -5.0 SD

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544B 1772 to 2012 241 years Series 6

[\*] Early part of series cannot be checked from 1772 to 1806 -- 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

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

1807 1836 10 .04 .01 -.01 .30 -.12 -.03 -.08 -.13 -.19 .11 .28| .20 -.15 -.10 -.04 -.01 .10 .06 .00 -.21 .35\*

1815 1844 10 -.07 .06 .03 .18 -.08 -.05 -.16 .22 -.30 .03 .21| .07 -.04 .10 .04 -.02 .07 -.04 -.01 -.30 .40\*

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

1950 1979 0 -.32 -.22 .08 -.11 .02 .05 .00 .35 -.07 .07 .36\*-.04 .10 .19 .10 .04 -.15 -.38 -.10 .20 -.22

1965 1994 -1 -.08 -.04 -.25 -.24 .18 .11 -.09 -.24 .05 .42\* .24|-.34 -.03 -.20 .16 -.03 .08 -.05 .09 .07 .10

[B] Entire series, effect on correlation ( .516) is:

Lower 1818< -.017 1817> -.014 1809> -.013 1810< -.013 1807< -.011 1849> -.009 Higher 1811 .019 1830 .014

1807 to 1836 segment:

Lower 1817> -.065 1809> -.057 1818< -.044 1810< -.039 1807< -.035 1835> -.018 Higher 1811 .167 1830 .105

1815 to 1844 segment:

Lower 1817> -.089 1818< -.076 1844> -.027 1815< -.025 1835> -.023 1828> -.021 Higher 1830 .168 1843 .037

1950 to 1979 segment:

Lower 1974> -.087 1951< -.062 1976> -.045 1959> -.024 1977< -.017 1956> -.013 Higher 1957 .047 1958 .041

1965 to 1994 segment:

Lower 1974> -.080 1994> -.069 1982< -.046 1976> -.040 1984> -.028 1985< -.026 Higher 1993 .094 1967 .037

[D] 9 Absent rings: Year Master N series Absent

1837 -1.150 4 1

Present in series 1 540A time span 1807 to 2012

Present in series 2 540B time span 1826 to 2012

Present in series 19 568B time span 1822 to 2012

1838 -2.073 4 1

Present in series 1 540A time span 1807 to 2012

Present in series 2 540B time span 1826 to 2012

Present in series 19 568B time span 1822 to 2012

1843 -.701 5 1

Present in series 1 540A time span 1807 to 2012

Present in series 2 540B time span 1826 to 2012

Present in series 19 568B time span 1822 to 2012

Present in series 24 572B time span 1843 to 2012

1852 -.691 9 1

1853 -1.221 10 1

1854 -1.292 10 1

1967 -1.326 24 3

1968 -1.147 24 2

1977 -.683 24 2

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

2004 -4.8 SD

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545A 1853 to 2012 160 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

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

1860 1889 0 -.06 -.08 -.04 .10 -.06 .22 .17 .14 -.04 .04 .33\*-.22 -.32 -.24 .32 .21 .03 -.09 .09 .01 .30

1875 1904 -4 .02 -.09 .25 .11 .02 .12 .38\*-.04 .15 .19 .34|-.25 .04 -.15 .30 .13 .02 -.12 -.08 -.08 .27

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

Lower 2000> -.013 1881> -.011 1918> -.008 1877< -.007 1942< -.007 1863> -.006 Higher 1935 .046 1911 .018

1860 to 1889 segment:

Lower 1881> -.064 1877< -.050 1868< -.043 1863> -.030 1885> -.019 1861> -.016 Higher 1887 .250 1871 .040

1875 to 1904 segment:

Lower 1881> -.067 1877< -.047 1885> -.020 1890< -.017 1897> -.016 1891< -.015 Higher 1887 .221 1896 .031

[D] 10 Absent rings: Year Master N series Absent

1887 -2.012 18 2

1964 -2.031 24 2

1965 -1.808 24 2

1966 -1.072 24 2

1967 -1.326 24 3

1968 -1.147 24 2

1969 -.079 24 1 >> WARNING: Ring is not usually narrow

1970 .755 24 1 >> WARNING: Ring is not usually narrow

1971 .820 24 1 >> WARNING: Ring is not usually narrow

1972 .233 24 1 >> WARNING: Ring is not usually narrow

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

1942 -4.6 SD

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545B 1850 to 2012 163 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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1860 1889 4 -.01 .26 .05 -.06 .00 .00 -.02 .17 -.17 -.07 .16|-.15 -.03 -.20 .37\*-.02 .09 -.06 .16 .08 .30

1875 1904 -4 .12 .20 .33 .01 .15 .22 .35\*-.06 .27 .16 .32|-.35 .06 -.23 .27 -.14 .14 -.24 .07 -.10 .12

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1950 1979 0 .25 -.06 .09 .13 -.28 -.35 .02 -.09 .31 -.08 .37\*-.03 -.54 -.34 -.18 -.23 -.09 .07 .16 .26 .25

[B] Entire series, effect on correlation ( .627) is:

Lower 1955< -.011 1872< -.010 1940> -.008 1883> -.007 1921< -.007 1863> -.007 Higher 1935 .050 1911 .018

1860 to 1889 segment:

Lower 1872< -.058 1883> -.035 1868< -.033 1877< -.030 1882> -.029 1863> -.029 Higher 1887 .237 1871 .076

1875 to 1904 segment:

Lower 1883> -.045 1876> -.040 1882> -.039 1877< -.036 1881> -.026 1891< -.021 Higher 1887 .195 1900 .029

1950 to 1979 segment:

Lower 1955< -.071 1959> -.032 1963> -.028 1968> -.021 1972> -.020 1978< -.016 Higher 1964 .081 1956 .030

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

1887 -2.012 18 2

1964 -2.031 24 2

1965 -1.808 24 2

1966 -1.072 24 2

1967 -1.326 24 3

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

1883 +3.1 SD

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546A 1871 to 2012 142 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

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1871 1900 6 -.16 -.02 .14 -.29 .27 .34 .09 -.08 .24 .09 .31| .09 .06 -.07 .09 .11 .45\*-.19 -.05 -.08 -.09

[B] Entire series, effect on correlation ( .562) is:

Lower 1956> -.017 1948> -.017 1883> -.016 1885> -.011 1940> -.010 1984> -.008 Higher 2000 .023 1996 .014

1871 to 1900 segment:

Lower 1883> -.096 1885> -.066 1872> -.041 1884< -.018 1879> -.012 1891< -.011 Higher 1887 .125 1881 .032

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546B 1870 to 2012 143 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

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1870 1899 6 -.17 -.03 -.13 -.19 .17 .12 -.02 .00 .21 -.07 .40| .21 -.07 -.07 .21 -.13 .45\*-.09 .11 -.22 .28

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1890 1919 0 -.28 -.07 .10 .22 -.01 .22 .24 .23 -.21 .28 .38\* .24 .21 .17 -.11 .12 -.31 -.17 -.10 -.13 .14

1905 1934 0 -.20 -.10 -.13 .15 .06 -.16 .15 .13 .05 .38 .40\* .01 .16 -.04 -.30 .09 .24 -.18 -.10 -.21 .19

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1950 1979 2 -.26 .13 -.02 -.12 .05 -.22 -.12 -.02 -.37 .05 .30| .20 .39\* .30 .12 .17 -.04 -.19 -.10 .14 .00

1965 1994 0 .01 .16 .25 -.13 -.29 .01 -.23 -.04 .11 -.04 .40\*-.15 .09 .14 .16 .09 -.18 -.42 .17 .19 .19

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

Lower 1875< -.038 1956> -.026 1885> -.008 1911> -.008 1992< -.007 1898< -.007 Higher 1887 .028 1935 .027

1870 to 1899 segment:

Lower 1875< -.114 1885> -.043 1897> -.034 1893> -.033 1898< -.022 1878< -.014 Higher 1887 .221 1880 .031

1890 to 1919 segment:

Lower 1898< -.055 1897> -.048 1900< -.035 1911> -.032 1915< -.027 1893> -.023 Higher 1904 .067 1903 .056

1905 to 1934 segment:

Lower 1934< -.060 1928> -.038 1911> -.035 1915< -.033 1923> -.027 1916< -.022 Higher 1924 .055 1929 .048

1950 to 1979 segment:

Lower 1956> -.186 1954< -.043 1961< -.035 1950> -.025 1971< -.024 1968> -.012 Higher 1970 .041 1952 .040

1965 to 1994 segment:

Lower 1992< -.058 1980< -.035 1981> -.032 1971< -.025 1994> -.023 1991< -.019 Higher 1987 .038 1983 .035

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

1956 +3.3 SD

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548A 1927 to 2012 86 years Series 11

[B] Entire series, effect on correlation ( .631) is:

Lower 2004> -.019 1940> -.016 2005< -.014 1942> -.014 2010< -.008 1938< -.008 Higher 1948 .025 2000 .024

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548B 1908 to 2012 105 years Series 12

[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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1908 1937 7 .36 .28 .09 -.11 .18 .15 -.21 .09 .02 -.15 .45|-.03 -.15 -.29 -.09 .02 -.39 .46\* .08 -.04 -.16

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

Lower 1928< -.057 1995< -.024 1929> -.012 2012< -.010 1908> -.008 2004> -.008 Higher 1948 .024 2000 .024

1908 to 1937 segment:

Lower 1928< -.184 1929> -.028 1921< -.014 1908> -.013 1914> -.010 1909> -.008 Higher 1935 .073 1911 .050

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

1928 -5.3 SD

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562A 1859 to 2012 154 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

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1859 1888 -4 .17 -.12 .06 -.10 .09 .14 .57\*-.07 -.03 .19 .42| .05 -.01 -.07 -.09 -.04 .35 -.35 -.14 -.15 .26

1860 1889 -4 .17 -.09 .03 -.06 .11 .18 .53\*-.08 -.08 .15 .53| .03 .02 -.07 -.10 -.03 .36 -.34 -.20 -.17 .28

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1950 1979 0 -.08 -.01 .08 -.06 .08 -.03 -.18 .19 -.12 .12 .27\* .06 .03 -.14 -.02 -.38 -.39 .06 -.41 .17 -.10

1965 1994 0 .29 .00 .05 -.02 -.01 .18 -.28 .19 -.03 .12 .36\*-.20 .05 -.37 -.20 -.01 .02 -.01 -.40 .07 -.08

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

Lower 1859> -.019 1977< -.012 1861> -.011 1873< -.009 1979< -.009 1863< -.009 Higher 1948 .026 1911 .019

1859 to 1888 segment:

Lower 1859> -.114 1861> -.054 1873< -.038 1863< -.035 1879> -.032 1860< -.018 Higher 1887 .154 1870 .039

1860 to 1889 segment:

Lower 1861> -.070 1879> -.042 1873< -.040 1863< -.037 1867< -.021 1860< -.019 Higher 1887 .142 1870 .034

1950 to 1979 segment:

Lower 1976> -.050 1960> -.039 1979< -.039 1968> -.035 1950> -.032 1978< -.030 Higher 1958 .086 1956 .054

1965 to 1994 segment:

Lower 1976> -.055 1979< -.042 1968> -.038 1978< -.035 1970< -.033 1977< -.031 Higher 1993 .108 1987 .036

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562B 1900 to 2012 113 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

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1965 1994 0 .24 .25 .38 -.20 .09 .16 -.21 .07 -.06 .11 .38\*-.07 .31 -.03 -.07 -.10 -.08 -.10 -.01 -.03 -.12

[B] Entire series, effect on correlation ( .619) is:

Lower 1999< -.013 2004> -.009 1987< -.009 2010< -.009 1901> -.009 1907< -.009 Higher 1948 .033 1956 .015

1965 to 1994 segment:

Lower 1987< -.048 1985< -.040 1973< -.034 1981> -.034 1971< -.032 1990> -.026 Higher 1993 .093 1994 .052

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

1948 -4.6 SD

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566A 1863 to 2012 150 years Series 15

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

Lower 1893< -.017 1919> -.012 1932< -.009 1933< -.008 1917> -.008 1901< -.008 Higher 1948 .027 1911 .016

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

1919 +3.8 SD

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566B 1847 to 2012 166 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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1847 1876 9 -.08 .20 -.29 .18 .04 .02 -.20 -.11 -.14 -.10 .42| .09 .09 .21 .05 -.06 -.16 -.01 .02 .43\* .02

1860 1889 0 .04 .12 -.16 .23 .13 .18 .12 -.36 .08 -.02 .35\* .04 .12 -.05 .22 .07 .05 -.24 .17 .09 -.19

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

Lower 1874< -.017 1969< -.014 1923< -.011 1847> -.010 1862> -.009 1917> -.009 Higher 1948 .024 1911 .016

1847 to 1876 segment:

Lower 1874< -.097 1847> -.059 1862> -.055 1860< -.020 1876> -.020 1869> -.019 Higher 1859 .101 1848 .072

1860 to 1889 segment:

Lower 1874< -.156 1862> -.040 1860< -.039 1868< -.030 1876> -.014 1869> -.013 Higher 1871 .061 1867 .054

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

1862 +3.5 SD; 1919 +3.5 SD; 1977 +3.5 SD

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567A 1860 to 2012 153 years Series 17

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

Lower 1948> -.019 1946< -.016 1994> -.016 1992< -.015 1942> -.011 1862< -.010 Higher 1935 .045 1911 .016

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567B 1847 to 2012 166 years Series 18

[B] Entire series, effect on correlation ( .692) is:

Lower 1918< -.013 1988< -.011 1913> -.008 1942> -.007 1853> -.007 1929> -.007 Higher 1911 .014 2000 .011

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

1913 +3.1 SD

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568B 1822 to 2012 191 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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1822 1851 3 .33 -.03 -.03 -.10 .11 -.06 -.08 .22 -.25 -.04 .37|-.26 -.31 .47\*-.23 .28 .03 -.17 -.08 .04 .13

[B] Entire series, effect on correlation ( .625) is:

Lower 1828< -.048 1826< -.019 1931< -.012 1825> -.009 1859> -.006 1881> -.005 Higher 1935 .024 1948 .007

1822 to 1851 segment:

Lower 1828< -.097 1826< -.059 1825> -.039 1843> -.029 1831> -.019 1836> -.016 Higher 1830 .057 1847 .040

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

1882 -.935 18 2

1883 -1.838 18 2

1884 -.583 18 1

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

1828 -5.2 SD

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568C 1917 to 2012 96 years Series 20

[B] Entire series, effect on correlation ( .591) is:

Lower 1917> -.029 2000> -.018 1924< -.014 1927< -.011 1931< -.011 1959> -.009 Higher 1935 .022 1948 .021

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

1917 +3.7 SD; 1918 +3.4 SD

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569A 1911 to 2012 102 years Series 21

[B] Entire series, effect on correlation ( .662) is:

Lower 1998< -.017 1968< -.016 1918> -.014 1917> -.014 1949< -.012 2006< -.007 Higher 1935 .036 2000 .012

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

1918 +3.7 SD; 1966 +3.1 SD

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569B 1916 to 2012 97 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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1965 1994 -5 -.11 -.04 .28 .15 .12 .53\* .14 .05 -.03 -.24 .50|-.09 -.01 -.17 -.20 .29 .39 .08 -.14 -.08 -.09

[B] Entire series, effect on correlation ( .734) is:

Lower 2005> -.017 1969< -.013 1986> -.013 1963> -.011 1983< -.010 1970< -.010 Higher 1935 .046 1948 .020

1965 to 1994 segment:

Lower 1986> -.065 1977> -.048 1969< -.043 1983< -.036 1970< -.036 1976> -.024 Higher 1994 .061 1993 .056

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

1920 +3.1 SD; 2005 +4.0 SD

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572A 1855 to 2012 158 years Series 23

[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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1860 1889 3 -.03 .06 -.06 .09 -.07 -.07 .13 .09 -.13 .25 .29| .05 .36 .56\* .13 .06 .27 .26 -.01 .09 -.09

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

Lower 1984< -.022 1948> -.015 1893> -.011 1974> -.008 1864> -.008 1950> -.007 Higher 1935 .043 1911 .012

1860 to 1889 segment:

Lower 1864> -.057 1870< -.051 1860< -.045 1889> -.038 1886< -.023 1880< -.021 Higher 1871 .152 1887 .065

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

1977 +3.1 SD

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572B 1843 to 2012 170 years Series 24

[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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1860 1889 2 -.17 .03 -.05 -.26 -.23 -.01 .10 .10 .30 -.14 .39| .28 .42\* .10 .27 .13 .38 .00 .29 .00 -.01

[B] Entire series, effect on correlation ( .641) is:

Lower 1859> -.012 1939< -.011 1976> -.010 1948> -.010 1914> -.010 1893> -.010 Higher 1935 .042 1911 .017

1860 to 1889 segment:

Lower 1886< -.032 1875< -.028 1877< -.022 1867< -.019 1865> -.017 1888> -.016 Higher 1871 .083 1883 .028

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

1882 -.935 18 2

1883 -1.838 18 2

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

1911 -5.9 SD; 1976 +3.2 SD; 1977 +3.0 SD

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PART 7: DESCRIPTIVE STATISTICS: Final 11:00 Wed 03 Jul 2013 Page 6

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

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

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

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1 540A 1807 2012 206 14 6 .528 .76 1.92 .406 .797 .281 2.75 .397 -.037 2

2 540B 1826 2012 187 13 0 .678 .84 2.78 .457 .869 .222 2.89 .528 -.078 1

3 542A 1880 2012 133 9 0 .713 1.18 5.41 .768 .882 .229 2.53 .369 -.053 1

4 542B 1846 2012 167 11 1 .596 1.28 3.98 .783 .797 .270 2.46 .285 -.086 1

5 544A 1877 2012 136 9 0 .528 .88 3.00 .719 .899 .344 2.69 .451 .019 1

6 544B 1772 2012 241 14 4 .516 .60 2.66 .626 .930 .388 3.14 .461 .022 1

7 545A 1853 2012 160 11 2 .658 1.06 2.92 .655 .886 .255 2.50 .340 -.043 2

8 545B 1850 2012 163 11 3 .627 1.11 3.56 .757 .899 .254 2.58 .340 -.065 1

9 546A 1871 2012 142 10 1 .562 1.70 4.32 1.236 .929 .218 2.58 .383 -.019 1

10 546B 1870 2012 143 10 5 .447 1.55 4.70 1.201 .928 .237 2.64 .393 -.056 2

11 548A 1927 2012 86 6 0 .631 2.48 4.93 .919 .674 .233 2.54 .424 -.074 2

12 548B 1908 2012 105 7 1 .628 1.46 6.40 .928 .819 .237 2.62 .455 -.053 1

13 562A 1859 2012 154 11 4 .583 1.04 3.81 .761 .884 .296 2.90 .518 -.043 1

14 562B 1900 2012 113 8 1 .619 1.49 3.23 .694 .770 .256 2.70 .370 -.038 2

15 566A 1863 2012 150 10 0 .636 1.24 3.18 .613 .835 .207 2.65 .385 -.061 1

16 566B 1847 2012 166 11 2 .636 1.06 2.61 .567 .859 .210 2.67 .407 -.021 2

17 567A 1860 2012 153 10 0 .632 1.55 3.85 .744 .875 .187 2.81 .451 .015 1

18 567B 1847 2012 166 11 0 .692 1.30 3.15 .612 .872 .194 2.68 .419 -.010 1

19 568B 1822 2012 191 13 1 .625 .99 3.58 .771 .898 .276 2.55 .357 -.067 1

20 568C 1917 2012 96 7 0 .591 2.02 5.73 1.367 .901 .244 2.59 .392 -.028 1

21 569A 1911 2012 102 7 0 .662 2.12 5.38 .960 .690 .306 2.68 .626 -.052 1

22 569B 1916 2012 97 7 1 .734 1.48 3.63 .687 .579 .336 2.82 .491 -.069 1

23 572A 1855 2012 158 11 1 .644 1.20 3.97 .864 .903 .219 2.67 .397 -.029 2

24 572B 1843 2012 170 12 1 .641 1.08 2.92 .720 .902 .277 2.57 .400 -.054 1

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Total or mean: 3585 243 34 .613 1.23 6.40 .754 .857 .260 3.14 .415 -.039

- = [ COFECHA FINALCOF ] = -