[] Dendrochronology Program Library Run OHJ Program COF 10:27 Tue 11 Jun 2019 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 30844

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

File of DATED series: OH\_JohnsonWoods\_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 1708 to 2012 305 years

Continuous time span is 1708 to 2012 305 years

Portion with two or more series is 1715 to 2012 298 years

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

\*C\* Number of dated series 36 \*C\*

\*O\* Master series 1708 2012 305 yrs \*O\*

\*F\* Total rings in all series 5880 \*F\*

\*E\* Total dated rings checked 5873 \*E\*

\*C\* Series intercorrelation .612 \*C\*

\*H\* Average mean sensitivity .256 \*H\*

\*A\* Segments, possible problems 8 \*A\*

\*\*\* Mean length of series 163.3 \*\*\*

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

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

No ring measurements of zero value

PART 2: TIME PLOT OF TREE-RING SERIES: 10:27 Tue 11 Jun 2019 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

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

. . . . . . . . . . . . . . <===========================> . AJW01A 1 1736 2012 277

. . . . . . . . . . . . . .<=============================> . AJW01B 2 1715 2012 298

. . . . . . . . . . . . . . . . . <==========> . AJW02A 3 1904 2012 109

. . . . . . . . . . . . . . . . . <=============> . AJW02B 4 1876 2012 137

. . . . . . . . . . . . . . <============================> . AJW03A 5 1723 2012 290

. . . . . . . . . . . . . .<=============================> . AJW03B 6 1718 2012 295

. . . . . . . . . . . . . <==============================> . AJW05A 7 1708 2012 305

. . . . . . . . . . . . . . . . <===============> . AJW05B 8 1852 2012 161

. . . . . . . . . . . . . . . . .<==============> . AJW06A 9 1867 2012 146

. . . . . . . . . . . . . . . . .<==============> . AJW06B 10 1865 2012 148

. . . . . . . . . . . . . . . . .<==============> . AJW07A 11 1861 2012 152

. . . . . . . . . . . . . . . <====================> . AJW07B 12 1806 2012 207

. . . . . . . . . . . . . . . . <==================> . AJW08A 13 1829 2012 184

. . . . . . . . . . . . . . . . <==================> . AJW08B 14 1821 2012 192

. . . . . . . . . . . . . . . . . .<=========> . AJW09A 15 1912 2012 101

. . . . . . . . . . . . . . <============================> . AJW09B 16 1725 2012 288

. . . . . . . . . . . . . . . . . <===========> . AJW10A 17 1897 2012 116

. . . . . . . . . . . . . . . . <================> . AJW10B 18 1847 2012 166

. . . . . . . . . . . . . . . . . <=============> . AJW11A 19 1872 2012 141

. . . . . . . . . . . . . . . . . <==========> . AJW11B 20 1900 2012 113

. . . . . . . . . . . . . . . . . . <======> . AJW12A 21 1941 2012 72

. . . . . . . . . . . . . . . . . <==========> . AJW12B 22 1902 2012 111

. . . . . . . . . . . . . . . . . <=============> . AJW14A 23 1876 2012 137

. . . . . . . . . . . . . . . . <===============> . AJW14B 24 1852 2012 161

. . . . . . . . . . . . . . . . . <=============> . AJW15A 25 1870 2012 143

. . . . . . . . . . . . . . . . . <=============> . AJW15B 26 1870 2012 143

. . . . . . . . . . . . . . . . . <==========> . AJW16A 27 1905 2012 108

. . . . . . . . . . . . . . . . .<==============> . AJW16B 28 1865 2012 148

. . . . . . . . . . . . . . . . <===============> . AJW17A 29 1852 2012 161

. . . . . . . . . . . . . . . . . <=============> . AJW17B 30 1875 2012 138

. . . . . . . . . . . . . . . . . <============> . AJW18A 31 1889 2012 124

. . . . . . . . . . . . . . . . . . <=======> . AJW18B 32 1930 2012 83

. . . . . . . . . . . . . . . . . <===========> . AJW19A 33 1891 2012 122

. . . . . . . . . . . . . . . . . <============> . AJW19B 34 1880 2012 133

. . . . . . . . . . . . . . . . . <=============> . AJW20A 35 1875 2012 138

. . . . . . . . . . . . . . . . . <============> . AJW20B 36 1881 2012 132

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

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: 10:27 Tue 11 Jun 2019 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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1750 .437 6 1800 -.276 6 1850 1.116 10 1900 -.439 30 1950 1.813 36

1751 .873 6 1801 .495 6 1851 1.927 10 1901 .324 30 1951 .572 36

1752 .413 6 1802 1.107 6 1852 .244 13 1902 2.060 31 1952 -.907 36

1753 -.787 6 1803 -1.174 6 1853 1.503 13 1903 1.359 31 1953 .887 36

1754 .396 6 1804 .447 6 1854 -.409 13 1904 .951 32 1954 -2.086 36

1755 -.335 6 1805 1.743 6 1855 -.986 13 1905 .935 33 1955 .403 36

1756 2.196 6 1806 .106 7 1856 -1.366 13 1906 -1.288 33 1956 1.268 36

1757 -.788 6 1807 .958 7 1857 -1.600 13 1907 .527 33 1957 .282 36

1708 1.431 1 1758 .778 6 1808 -.163 7 1858 -.728 13 1908 -1.109 33 1958 .951 36

1709 -.893 1 1759 -.326 6 1809 1.491 7 1859 .746 13 1909 -.316 33 1959 -.350 36

1710 1.484 1 1760 1.565 6 1810 -2.436 7 1860 .819 13 1910 -1.350 33 1960 -.087 36

1711 .763 1 1761 -.679 6 1811 -2.046 7 1861 -.105 14 1911 -1.823 33 1961 .809 36

1712 -.762 1 1762 -.875 6 1812 -.218 7 1862 1.450 14 1912 1.105 34 1962 -.603 36

1713 -3.179 1 1763 .092 6 1813 -.594 7 1863 -1.030 14 1913 .225 34 1963 .944 36

1714 -1.119 1 1764 -.296 6 1814 .449 7 1864 -.353 14 1914 -1.875 34 1964 .755 36

1715 1.472 2 1765 -2.583 6 1815 .897 7 1865 .651 16 1915 1.538 34 1965 -.064 36

1716 .123 2 1766 1.850 6 1816 -.062 7 1866 .674 16 1916 1.184 34 1966 -1.381 36

1717 -.234 2 1767 -.023 6 1817 -1.591 7 1867 -.477 17 1917 .640 34 1967 -.766 36

1718 -.789 3 1768 1.490 6 1818 .702 7 1868 -.279 17 1918 -.766 34 1968 .442 36

1719 .376 3 1769 -.103 6 1819 -1.878 7 1869 1.370 17 1919 -1.344 34 1969 .991 36

1720 -.209 3 1770 -.150 6 1820 -.111 7 1870 -1.986 19 1920 .514 34 1970 -.271 36

1721 -.351 3 1771 -1.957 6 1821 -.777 8 1871 -.972 19 1921 .286 34 1971 .360 36

1722 .759 3 1772 -.287 6 1822 .261 8 1872 -1.035 20 1922 .735 34 1972 -1.287 36

1723 -.754 4 1773 .124 6 1823 1.148 8 1873 .007 20 1923 -1.556 34 1973 .918 36

1724 -.911 4 1774 .395 6 1824 1.470 8 1874 -1.845 20 1924 1.307 34 1974 -.652 36

1725 1.404 5 1775 .720 6 1825 1.106 8 1875 .469 22 1925 -.445 34 1975 .276 36

1726 .763 5 1776 .687 6 1826 .021 8 1876 .474 24 1926 -.042 34 1976 -1.041 36

1727 .461 5 1777 -.009 6 1827 .655 8 1877 .292 24 1927 1.337 34 1977 -1.514 36

1728 .515 5 1778 -1.676 6 1828 .375 8 1878 1.191 24 1928 .620 34 1978 .900 36

1729 1.811 5 1779 1.115 6 1829 -1.068 9 1879 .762 24 1929 .112 34 1979 -.474 36

1730 .282 5 1780 -2.258 6 1830 .038 9 1880 -.173 25 1930 -1.747 35 1980 .780 36

1731 -.821 5 1781 1.838 6 1831 1.042 9 1881 .882 26 1931 -.683 35 1981 -.025 36

1732 -.766 5 1782 .476 6 1832 -1.145 9 1882 1.080 26 1932 .441 35 1982 .642 36

1733 -1.074 5 1783 .469 6 1833 -.405 9 1883 .683 26 1933 -1.070 35 1983 1.196 36

1734 -.753 5 1784 .219 6 1834 .925 9 1884 -.871 26 1934 .444 35 1984 -1.113 36

1735 .668 5 1785 -.814 6 1835 .939 9 1885 .897 26 1935 1.749 35 1985 .321 36

1736 -.943 6 1786 -.605 6 1836 .587 9 1886 -.778 26 1936 -.114 35 1986 -.109 36

1737 -.764 6 1787 .907 6 1837 -.338 9 1887 -.480 26 1937 1.336 35 1987 .384 36

1738 .587 6 1788 -.491 6 1838 -.860 9 1888 -.817 26 1938 .048 35 1988 -1.890 36

1739 .851 6 1789 .551 6 1839 -2.859 9 1889 1.541 27 1939 .641 35 1989 .901 36

1740 .578 6 1790 -.561 6 1840 .093 9 1890 .608 27 1940 .894 35 1990 .390 36

1741 -.482 6 1791 -.587 6 1841 .261 9 1891 -.065 28 1941 -.329 36 1991 -.767 36

1742 -.294 6 1792 -.531 6 1842 .053 9 1892 .616 28 1942 -.593 36 1992 .201 36

1743 -.703 6 1793 .215 6 1843 .054 9 1893 -.807 28 1943 -.403 36 1993 1.019 36

1744 -.012 6 1794 .947 6 1844 .537 9 1894 -2.418 28 1944 -1.245 36 1994 .209 36

1745 2.194 6 1795 .184 6 1845 -.728 9 1895 -2.613 28 1945 -.051 36 1995 .878 36

1746 -.122 6 1796 1.290 6 1846 -1.120 9 1896 .690 28 1946 -.491 36 1996 -.307 36

1747 .369 6 1797 .360 6 1847 .692 10 1897 .936 29 1947 -.799 36 1997 -1.457 36

1748 -2.258 6 1798 -.959 6 1848 .874 10 1898 .363 29 1948 -1.599 36 1998 -.775 36

1749 -1.077 6 1799 -1.308 6 1849 -.674 10 1899 -.703 29 1949 -.042 36 1999 -.221 36

PART 3: Master Dating Series: 10:27 Tue 11 Jun 2019 Page 4

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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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2000 1.435 36

2001 -.177 36

2002 -.146 36

2003 -.466 36

2004 1.170 36

2005 .032 36

2006 -.036 36

2007 -.334 36

2008 .073 36

2009 .565 36

2010 .143 36

2011 .371 36

2012 -1.087 36

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PART 4: Master Bar Plot: 10:27 Tue 11 Jun 2019 Page 5

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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

1750------B 1800----a 1850---------D 1900---b 1950----------G 2000----------F

1751--------C 1801-------B 1851----------H 1901------A 1951-------B 2001----a

1752------B 1802---------D 1852------A 1902----------H 1952--d 2002----a

1753--c 1803-e 1853----------F 1903----------E 1953--------D 2003---b

1754------B 1804------B 1854---b 1904---------D 1954h 2004---------E

1755---a 1805----------G 1855-d 1905---------D 1955------B 2005-----@

1756----------I 1806-----@ 1856-e 1906-e 1956---------E 2006-----@

1757--c 1807---------D 1857f 1907-------B 1957------A 2007---a

1708----------F 1758--------C 1808----a 1858--c 1908-d 1958---------D 2008-----@

1709--d 1759---a 1809----------F 1859--------C 1909---a 1959---a 2009-------B

1710----------F 1760----------F 1810j 1860--------C 1910-e 1960----@ 2010-----A

1711--------C 1761--c 1811h 1861----@ 1911g 1961--------C 2011------A

1712--c 1762--c 1812----a 1862----------F 1912---------D 1962---b 2012-d

1713m 1763-----@ 1813---b 1863-d 1913------A 1963---------D

1714-d 1764----a 1814------B 1864---a 1914h 1964--------C

1715----------F 1765j 1815--------D 1865-------C 1915----------F 1965----@

1716-----@ 1766----------G 1816----@ 1866-------C 1916---------E 1966-f

1717----a 1767-----@ 1817f 1867---b 1917-------C 1967--c

1718--c 1768----------F 1818--------C 1868----a 1918--c 1968------B

1719------B 1769----@ 1819h 1869----------E 1919-e 1969---------D

1720----a 1770----a 1820----@ 1870h 1920-------B 1970----a

1721---a 1771h 1821--c 1871-d 1921------A 1971------A

1722--------C 1772----a 1822------A 1872-d 1922--------C 1972-e

1723--c 1773-----@ 1823---------E 1873-----@ 1923f 1973---------D

1724--d 1774------B 1824----------F 1874g 1924----------E 1974--c

1725----------F 1775--------C 1825---------D 1875------B 1925---b 1975------A

1726--------C 1776--------C 1826-----@ 1876-------B 1926-----@ 1976-d

1727------B 1777-----@ 1827-------C 1877------A 1927----------E 1977f

1728-------B 1778g 1828------A 1878---------E 1928-------B 1978--------D

1729----------G 1779---------D 1829-d 1879--------C 1929-----@ 1979---b

1730------A 1780i 1830-----@ 1880----a 1930g 1980--------C

1731--c 1781----------G 1831---------D 1881--------D 1931--c 1981-----@

1732--c 1782-------B 1832-e 1882---------D 1932------B 1982-------C

1733-d 1783------B 1833---b 1883--------C 1933-d 1983---------E

1734--c 1784------A 1834---------D 1884--c 1934------B 1984-d

1735-------C 1785--c 1835---------D 1885--------D 1935----------G 1985------A

1736-d 1786---b 1836-------B 1886--c 1936----@ 1986----@

1737--c 1787--------D 1837---a 1887---b 1937----------E 1987------B

1738-------B 1788---b 1838--c 1888--c 1938-----@ 1988h

1739--------C 1789-------B 1839k 1889----------F 1939-------C 1989--------D

1740-------B 1790---b 1840-----@ 1890-------B 1940--------D 1990------B

1741---b 1791---b 1841------A 1891----@ 1941---a 1991--c

1742----a 1792---b 1842-----@ 1892-------B 1942---b 1992-----A

1743--c 1793------A 1843-----@ 1893--c 1943---b 1993---------D

1744-----@ 1794---------D 1844-------B 1894j 1944-e 1994-----A

1745----------I 1795-----A 1845--c 1895j 1945-----@ 1995--------D

1746----@ 1796----------E 1846-d 1896--------C 1946---b 1996----a

1747------A 1797------A 1847--------C 1897---------D 1947--c 1997-f

1748i 1798-d 1848--------C 1898------A 1948f 1998--c

1749-d 1799-e 1849--c 1899--c 1949-----@ 1999----a

PART 5: CORRELATION OF SERIES BY SEGMENTS: 10:27 Tue 11 Jun 2019 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 1700 1725 1750 1775 1800 1825 1850 1875 1900 1925 1950 1975

1749 1774 1799 1824 1849 1874 1899 1924 1949 1974 1999 2024

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

1 AJW01A 1736 2012 .70 .60 .71 .75 .72 .71 .69 .73 .65 .62 .54

2 AJW01B 1715 2012 .72 .76 .62 .64 .73 .79 .82 .75 .62 .44 .48 .43

3 AJW02A 1904 2012 .69 .57 .61 .63

4 AJW02B 1876 2012 .72 .81 .74 .54 .54

5 AJW03A 1723 2012 .17B .15B .61 .66 .53 .44 .49 .59 .58 .47 .39 .31B

6 AJW03B 1718 2012 .44 .58 .59 .46 .46 .58 .63 .68 .70 .60 .59 .42

7 AJW05A 1708 2012 .65 .76 .73 .69 .69 .69 .73 .77 .48 .40 .67 .51

8 AJW05B 1852 2012 .72 .69 .58 .52 .58 .65

9 AJW06A 1867 2012 .82 .83 .59 .48 .56 .45

10 AJW06B 1865 2012 .83 .86 .67 .67 .77 .70

11 AJW07A 1861 2012 .65 .71 .79 .58 .51 .34

12 AJW07B 1806 2012 .77 .78 .73 .80 .75 .62 .58 .59

13 AJW08A 1829 2012 .74 .70 .63 .71 .63 .53 .52

14 AJW08B 1821 2012 .49 .54 .68 .73 .66 .68 .65 .50

15 AJW09A 1912 2012 .71 .79 .81 .77

16 AJW09B 1725 2012 .40B .48 .58 .61 .51 .61 .65 .61 .62 .61 .51

17 AJW10A 1897 2012 .51 .59 .64 .83 .59

18 AJW10B 1847 2012 .67 .66 .74 .77 .66 .69 .68

19 AJW11A 1872 2012 .70 .73 .72 .53 .41 .41

20 AJW11B 1900 2012 .66 .46 .41 .37

21 AJW12A 1941 2012 .46 .59 .53

22 AJW12B 1902 2012 .69 .59 .46 .45

23 AJW14A 1876 2012 .79 .72 .53 .30B .20B

24 AJW14B 1852 2012 .75 .81 .70 .65 .67 .62

25 AJW15A 1870 2012 .63 .77 .79 .54 .51 .54

26 AJW15B 1870 2012 .74 .83 .81 .53 .54 .49

27 AJW16A 1905 2012 .75 .75 .57 .48

28 AJW16B 1865 2012 .68 .71 .77 .68 .43 .40

29 AJW17A 1852 2012 .75 .75 .61 .35 .39 .25A

30 AJW17B 1875 2012 .76 .78 .58 .39 .35

31 AJW18A 1889 2012 .86 .85 .64 .46 .48

32 AJW18B 1930 2012 .63 .69 .61

33 AJW19A 1891 2012 .85 .78 .77 .75 .65

34 AJW19B 1880 2012 .79 .70 .68 .66 .59

35 AJW20A 1875 2012 .81 .77 .67 .37 .15B

36 AJW20B 1881 2012 .72 .56 .53 .67 .59

Av segment correlation .49 .56 .61 .62 .63 .65 .70 .74 .70 .59 .56 .50

PART 6: POTENTIAL PROBLEMS: 10:27 Tue 11 Jun 2019 Page 6

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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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AJW01A 1736 to 2012 277 years Series 1

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

Lower 1881< -.012 1981< -.007 1973< -.006 1798< -.006 1839> -.005 1896< -.005 Higher 1748 .006 1810 .006

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AJW01B 1715 to 2012 298 years Series 2

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

Lower 1944> -.011 1794< -.008 1974> -.008 1933> -.006 1988> -.006 1774< -.005 Higher 1895 .009 1839 .009

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

1944 +3.5 SD

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AJW02A 1904 to 2012 109 years Series 3

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

Lower 1984> -.015 1991> -.014 1954> -.013 1978< -.012 1960< -.012 1926< -.012 Higher 1988 .021 1930 .012

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AJW02B 1876 to 2012 137 years Series 4

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

Lower 1999< -.055 1958< -.014 2008< -.010 1923> -.008 1977> -.007 1980< -.007 Higher 1988 .020 1911 .010

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AJW03A 1723 to 2012 290 years Series 5

[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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1723 1772 -1 .11 .03 -.03 -.13 -.06 .01 .03 -.16 .07 .19\* .17|-.08 -.11 -.15 .02 -.13 -.02 .17 .14 -.05 .16

1725 1774 7 .09 -.03 .06 -.13 -.04 .00 .03 -.23 .09 .19 .15|-.02 -.08 -.14 -.01 -.04 -.09 .20\* .11 -.06 .14

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

1963 2012 -4 .18 .03 -.04 -.10 .01 -.16 .38\*-.16 .00 -.19 .31| - - - - - - - - - -

[B] Entire series, effect on correlation ( .427) is:

Lower 1748> -.020 1923> -.014 1725< -.009 1745< -.009 1852> -.008 1731> -.008 Higher 1988 .013 1895 .009

1723 to 1772 segment:

Lower 1748> -.086 1725< -.043 1731> -.037 1747< -.036 1745< -.033 1746> -.031 Higher 1765 .056 1756 .043

1725 to 1774 segment:

Lower 1748> -.081 1725< -.043 1731> -.035 1747< -.035 1745< -.034 1746> -.031 Higher 1765 .060 1756 .041

1963 to 2012 segment:

Lower 1997> -.049 1984> -.029 2008< -.021 2003> -.020 1980< -.020 1998> -.014 Higher 1988 .109 1976 .034

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

1745 1746 4.0 SD 1747 1748 4.5 SD

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

1746 +3.2 SD; 1748 +4.2 SD; 1794 +3.1 SD; 1852 +4.4 SD; 1923 +4.1 SD; 1976 -6.0 SD

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

AJW03B 1718 to 2012 295 years Series 6

[B] Entire series, effect on correlation ( .530) is:

Lower 1730< -.014 1894> -.014 1718> -.010 2004< -.009 1784> -.009 1821> -.008 Higher 1895 .013 1870 .012

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

1718 +3.2 SD; 1784 +4.0 SD; 1821 +3.2 SD; 1822 +3.7 SD; 1853 +3.0 SD; 1894 +3.4 SD

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AJW05A 1708 to 2012 305 years Series 7

[\*] Early part of series cannot be checked from 1708 to 1714 -- not matched by another series

[B] Entire series, effect on correlation ( .645) is:

Lower 1937< -.027 1933> -.006 1803< -.005 1788< -.005 1790> -.005 1719> -.005 Higher 1839 .010 1894 .008

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

1937 -5.2 SD

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AJW05B 1852 to 2012 161 years Series 8

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

Lower 1876< -.014 1979< -.010 1943< -.010 1923> -.008 1988> -.007 1954> -.006 Higher 1895 .019 1894 .017

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AJW06A 1867 to 2012 146 years Series 9

[B] Entire series, effect on correlation ( .611) is:

Lower 2005< -.027 1975< -.011 1971< -.010 1934< -.009 1968< -.008 1972> -.008 Higher 1895 .021 1870 .015

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AJW06B 1865 to 2012 148 years Series 10

[B] Entire series, effect on correlation ( .720) is:

Lower 2009< -.015 1939< -.011 1944> -.008 1870> -.008 1912< -.006 1960> -.005 Higher 1894 .014 1954 .010

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AJW07A 1861 to 2012 152 years Series 11

[B] Entire series, effect on correlation ( .590) is:

Lower 1970< -.062 2000< -.027 1988> -.013 1861> -.009 1911> -.009 1976> -.006 Higher 1914 .012 1930 .010

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

1861 +3.1 SD; 1970 -5.3 SD

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AJW07B 1806 to 2012 207 years Series 12

[B] Entire series, effect on correlation ( .697) is:

Lower 1954> -.010 1977> -.009 1969< -.009 1970< -.008 1986< -.008 1880< -.007 Higher 1839 .014 1870 .010

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AJW08A 1829 to 2012 184 years Series 13

[B] Entire series, effect on correlation ( .613) is:

Lower 1895> -.016 1976> -.012 1914> -.012 1985< -.011 1890< -.011 1912< -.007 Higher 1954 .012 1988 .011

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AJW08B 1821 to 2012 192 years Series 14

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

Lower 1870> -.014 1992< -.013 2011< -.009 1827< -.008 1998< -.008 1882< -.007 Higher 1954 .015 1874 .010

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AJW09A 1912 to 2012 101 years Series 15

[B] Entire series, effect on correlation ( .736) is:

Lower 1919> -.022 1927< -.010 1987< -.007 1929< -.007 1959> -.007 1950< -.006 Higher 1954 .018 1948 .010

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AJW09B 1725 to 2012 288 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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1725 1774 -10 .42\* .13 -.01 -.09 -.05 -.05 .23 -.16 -.18 -.37 .40| .05 .37 -.13 -.09 -.15 .12 .13 .07 -.01 -.14

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

Lower 1748> -.012 1853< -.009 1872> -.008 1749> -.007 1798> -.007 1990< -.006 Higher 1870 .011 1954 .011

1725 to 1774 segment:

Lower 1748> -.059 1749> -.041 1746< -.022 1737> -.020 1728< -.020 1731< -.016 Higher 1745 .044 1771 .043

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

1782 +3.2 SD

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

AJW10A 1897 to 2012 116 years Series 17

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

Lower 2010< -.058 1928< -.031 1897< -.022 1906> -.016 1933> -.008 1939< -.006 Higher 1954 .027 1988 .017

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AJW10B 1847 to 2012 166 years Series 18

[B] Entire series, effect on correlation ( .675) is:

Lower 2008< -.013 1956< -.011 1853< -.011 1894> -.009 1863> -.009 1997> -.009 Higher 1988 .012 1895 .010

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AJW11A 1872 to 2012 141 years Series 19

[B] Entire series, effect on correlation ( .552) is:

Lower 1959< -.056 1977> -.022 1978< -.018 1997> -.014 1967> -.011 1948> -.010 Higher 1988 .022 1895 .017

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

1876 +3.3 SD; 1959 -5.2 SD; 1977 +3.3 SD

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AJW11B 1900 to 2012 113 years Series 20

[B] Entire series, effect on correlation ( .525) is:

Lower 2006< -.027 1984> -.018 1980< -.017 1956< -.015 1935< -.014 1923> -.011 Higher 1911 .025 1948 .017

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

1939 +3.3 SD

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AJW12A 1941 to 2012 72 years Series 21

[B] Entire series, effect on correlation ( .425) is:

Lower 1945< -.083 2006< -.031 1997> -.023 1942> -.015 1957< -.012 1967> -.010 Higher 1988 .046 1977 .040

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AJW12B 1902 to 2012 111 years Series 22

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

Lower 1997> -.018 1942< -.016 1937< -.013 2012< -.013 1976> -.011 1958< -.011 Higher 1911 .011 1972 .011

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AJW14A 1876 to 2012 137 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

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

1950 1999 7 .01 -.13 -.09 -.11 -.02 .14 -.08 .06 .14 -.34 .30|-.12 .17 -.30 -.02 -.05 -.03 .32\* .16 .01 -.04

1963 2012 -2 -.05 -.14 -.15 -.01 -.02 .13 -.04 -.08 .32\*-.39 .20| - - - - - - - - - -

[B] Entire series, effect on correlation ( .521) is:

Lower 1990< -.080 1976> -.018 1997> -.012 1968< -.011 1964< -.010 1882< -.009 Higher 1894 .034 1895 .014

1950 to 1999 segment:

Lower 1990< -.161 1976> -.041 1997> -.026 1964< -.022 1968< -.022 1993< -.017 Higher 1956 .028 1984 .024

1963 to 2012 segment:

Lower 1990< -.146 1976> -.043 1997> -.027 1964< -.024 1968< -.023 1993< -.018 Higher 2000 .040 1984 .031

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

1936 +3.1 SD; 1976 +3.1 SD; 1990 -5.8 SD

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AJW14B 1852 to 2012 161 years Series 24

[B] Entire series, effect on correlation ( .706) is:

Lower 1946< -.019 1996< -.014 1958< -.009 1998> -.006 1874> -.006 1932< -.006 Higher 1894 .013 1954 .009

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AJW15A 1870 to 2012 143 years Series 25

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

Lower 1969< -.029 1870> -.020 1961< -.013 1872> -.011 1871< -.011 1878< -.009 Higher 1894 .012 1930 .010

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AJW15B 1870 to 2012 143 years Series 26

[B] Entire series, effect on correlation ( .635) is:

Lower 1954> -.026 2006< -.021 1872> -.014 1964< -.013 1974> -.012 1870> -.010 Higher 1895 .027 1911 .012

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AJW16A 1905 to 2012 108 years Series 27

[B] Entire series, effect on correlation ( .609) is:

Lower 2011< -.031 1972> -.017 1982< -.012 1975< -.010 1988> -.009 1951< -.009 Higher 1954 .031 1948 .013

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AJW16B 1865 to 2012 148 years Series 28

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

Lower 1988> -.019 1974< -.015 1998> -.012 2003> -.007 1933> -.007 1992< -.006 Higher 1954 .013 1894 .012

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AJW17A 1852 to 2012 161 years Series 29

[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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1963 2012 0 .05 -.09 -.01 .24 .00 .04 .03 -.06 -.07 -.01 .25\* - - - - - - - - - -

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

Lower 1973< -.025 1938< -.013 1948> -.013 1966> -.011 1884> -.010 1977> -.009 Higher 1895 .029 1894 .026

1963 to 2012 segment:

Lower 1973< -.092 1966> -.035 1977> -.024 1974> -.020 2007> -.014 1980< -.014 Higher 2000 .034 1972 .031

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AJW17B 1875 to 2012 138 years Series 30

[B] Entire series, effect on correlation ( .573) is:

Lower 1979< -.045 1988> -.027 1966> -.010 1878< -.009 1876< -.008 1980< -.007 Higher 1894 .021 1923 .008

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

1988 +3.0 SD

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AJW18A 1889 to 2012 124 years Series 31

[B] Entire series, effect on correlation ( .689) is:

Lower 1996> -.018 1956< -.013 1989< -.013 1973< -.010 1957< -.010 1991> -.009 Higher 1894 .024 1988 .014

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

1996 +3.9 SD

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AJW18B 1930 to 2012 83 years Series 32

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

Lower 1930> -.051 1992< -.018 2008< -.017 1963< -.012 1945< -.011 1996> -.008 Higher 1954 .027 1988 .017

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

1930 +3.5 SD

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AJW19A 1891 to 2012 122 years Series 33

[B] Entire series, effect on correlation ( .756) is:

Lower 1965< -.013 1945< -.011 1999< -.011 1919> -.010 1992> -.006 1942> -.006 Higher 1954 .014 1988 .011

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AJW19B 1880 to 2012 133 years Series 34

[B] Entire series, effect on correlation ( .698) is:

Lower 1987< -.012 1934< -.011 1918> -.010 1972> -.009 1989< -.007 1919> -.007 Higher 1954 .016 1894 .010

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AJW20A 1875 to 2012 138 years Series 35

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

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

1963 2012 -5 -.18 .07 -.09 -.01 .08 .34\*-.06 -.29 .12 .06 .15| - - - - - - - - - -

[B] Entire series, effect on correlation ( .605) is:

Lower 1988> -.027 1966> -.022 1998> -.015 1978< -.013 1993< -.011 2003< -.009 Higher 1954 .025 1894 .022

1963 to 2012 segment:

Lower 1988> -.058 1966> -.055 1998> -.037 1978< -.036 1993< -.031 1985< -.022 Higher 2012 .030 1969 .028

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

1966 +3.4 SD; 1998 +3.3 SD

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AJW20B 1881 to 2012 132 years Series 36

[B] Entire series, effect on correlation ( .646) is:

Lower 2009< -.016 1933> -.015 1966> -.013 1910> -.010 1923> -.010 1882< -.010 Higher 1894 .027 1895 .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 AJW01A 1736 2012 277 11 0 .678 1.35 2.70 .340 .125 .255 2.81 .470 .027 1

2 AJW01B 1715 2012 298 12 0 .665 1.15 3.45 .375 .218 .300 2.67 .379 -.017 1

3 AJW02A 1904 2012 109 4 0 .630 1.90 4.65 .486 .366 .189 2.62 .398 -.003 1

4 AJW02B 1876 2012 137 5 0 .623 1.81 2.96 .416 .402 .195 2.62 .400 -.036 2

5 AJW03A 1723 2012 290 12 3 .427 .98 2.88 .473 .690 .275 2.91 .354 .007 1

6 AJW03B 1718 2012 295 12 0 .530 1.06 2.97 .553 .746 .284 3.03 .447 .007 1

7 AJW05A 1708 2012 305 12 0 .645 1.08 2.35 .364 .382 .291 2.70 .415 .016 1

8 AJW05B 1852 2012 161 6 0 .628 1.01 2.13 .351 .480 .277 3.06 .510 .030 2

9 AJW06A 1867 2012 146 6 0 .611 1.61 2.98 .461 .504 .207 2.70 .566 -.011 1

10 AJW06B 1865 2012 148 6 0 .720 1.69 3.18 .454 .525 .207 2.75 .457 -.009 1

11 AJW07A 1861 2012 152 6 0 .590 1.33 2.80 .356 .311 .224 2.63 .360 -.026 1

12 AJW07B 1806 2012 207 8 0 .697 1.25 2.86 .373 .460 .238 2.69 .473 .016 1

13 AJW08A 1829 2012 184 7 0 .613 1.72 3.07 .602 .658 .262 2.61 .429 -.033 2

14 AJW08B 1821 2012 192 8 0 .596 1.69 3.19 .598 .593 .268 2.75 .478 -.018 2

15 AJW09A 1912 2012 101 4 0 .736 1.30 2.48 .429 .541 .279 2.50 .490 -.029 1

16 AJW09B 1725 2012 288 11 1 .528 .88 2.40 .460 .741 .294 2.88 .529 .010 2

17 AJW10A 1897 2012 116 5 0 .599 1.61 3.06 .420 .357 .236 2.62 .460 .027 1

18 AJW10B 1847 2012 166 7 0 .675 1.46 3.37 .425 .416 .235 2.71 .469 -.020 1

19 AJW11A 1872 2012 141 6 0 .552 1.49 3.26 .381 .398 .223 2.67 .367 .007 1

20 AJW11B 1900 2012 113 4 0 .525 2.11 3.51 .438 .076 .226 2.86 .505 .023 4

21 AJW12A 1941 2012 72 3 0 .425 2.45 3.98 .501 -.023 .220 2.61 .442 .076 1

22 AJW12B 1902 2012 111 4 0 .566 1.63 2.61 .396 .467 .216 2.52 .452 -.056 1

23 AJW14A 1876 2012 137 5 2 .521 1.42 4.72 .495 .513 .227 2.64 .366 .017 1

24 AJW14B 1852 2012 161 6 0 .706 1.36 2.16 .320 .207 .236 2.55 .411 -.003 1

25 AJW15A 1870 2012 143 6 0 .623 1.27 2.96 .505 .603 .268 2.74 .544 .023 1

26 AJW15B 1870 2012 143 6 0 .635 1.30 3.04 .454 .455 .284 2.73 .470 -.009 1

27 AJW16A 1905 2012 108 4 0 .609 1.89 3.96 .683 .597 .270 2.56 .432 .025 1

28 AJW16B 1865 2012 148 6 0 .608 1.54 2.75 .407 .393 .235 2.65 .500 .003 1

29 AJW17A 1852 2012 161 6 1 .591 1.17 2.53 .430 .485 .280 2.68 .422 .073 1

30 AJW17B 1875 2012 138 5 0 .573 1.52 2.93 .475 .387 .257 2.57 .379 .006 2

31 AJW18A 1889 2012 124 5 0 .689 1.68 2.86 .456 .072 .300 2.81 .493 .062 1

32 AJW18B 1930 2012 83 3 0 .603 2.26 3.51 .520 .287 .214 2.55 .462 -.071 1

33 AJW19A 1891 2012 122 5 0 .756 1.61 3.30 .443 .150 .288 2.74 .521 -.050 2

34 AJW19B 1880 2012 133 5 0 .698 1.66 2.89 .414 .191 .247 2.57 .452 .003 2

35 AJW20A 1875 2012 138 5 1 .605 1.60 2.66 .395 .376 .225 2.54 .477 -.021 1

36 AJW20B 1881 2012 132 5 0 .646 1.50 2.81 .440 .391 .248 2.65 .494 .044 1

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Total or mean: 5880 231 8 .612 1.41 4.72 .442 .428 .256 3.06 .449 .003

- = [ COFECHA OHJ COF ] = -