[] Dendrochronology Program Library Run GWO Program COF 18:15 Mon 10 Jul 2017 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 30143

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

File of DATED series: gwo.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 1739 to 2015 277 years

Continuous time span is 1739 to 2015 277 years

Portion with two or more series is 1743 to 2015 273 years

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

\*C\* Number of dated series 17 \*C\*

\*O\* Master series 1739 2015 277 yrs \*O\*

\*F\* Total rings in all series 2960 \*F\*

\*E\* Total dated rings checked 2956 \*E\*

\*C\* Series intercorrelation .525 \*C\*

\*H\* Average mean sensitivity .237 \*H\*

\*A\* Segments, possible problems 4 \*A\*

\*\*\* Mean length of series 174.1 \*\*\*

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

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

GWO05A 2 absent rings: 1920 1921

GWO08A 1 absent rings: 1923

GWO08B 2 absent rings: 1922 1923

5 absent rings .169%

PART 2: TIME PLOT OF TREE-RING SERIES: 18:15 Mon 10 Jul 2017 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

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

. . . . . . . . . . . . . . <==========================> . GWO01A 1 1743 2015 273

. . . . . . . . . . . . . . <===========================> . GWO01B 2 1739 2015 277

. . . . . . . . . . . . . . . . <=================> . GWO03A 3 1838 2015 178

. . . . . . . . . . . . . . . . . <=============> . GWO03B 4 1874 2015 142

. . . . . . . . . . . . . . . . . <============> . GWO04A 5 1882 2015 134

. . . . . . . . . . . . . . . . .<==============> . GWO04B 6 1865 2015 151

. . . . . . . . . . . . . . . . . <=============> . GWO05A 7 1877 2015 139

. . . . . . . . . . . . . . . . . <=============> . GWO05B 8 1878 2015 138

. . . . . . . . . . . . . . . <====================> . GWO06A 9 1800 2015 216

. . . . . . . . . . . . . . . <=======================> . GWO06B 10 1770 2015 246

. . . . . . . . . . . . . . . . . <============> . GWO07A 11 1885 2015 131

. . . . . . . . . . . . . . . . . <============> . GWO07B 12 1881 2015 135

. . . . . . . . . . . . . . . . <=================> . GWO08A 13 1832 2015 184

. . . . . . . . . . . . . . . . <==================> . GWO08B 14 1824 2015 192

. . . . . . . . . . . . . . . . <=============> . . GWO09a 15 1834 1975 142

. . . . . . . . . . . . . . . . . <=============> . GWO10A 16 1878 2015 138

. . . . . . . . . . . . . . . . . <=============> . GWO10B 17 1872 2015 144

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

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: 18:15 Mon 10 Jul 2017 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 -.354 2 1800 1.482 4 1850 1.017 8 1900 1.106 17 1950 .631 17

1751 .895 2 1801 .115 4 1851 1.087 8 1901 .166 17 1951 -.745 17

1752 .776 2 1802 .672 4 1852 -2.534 8 1902 .727 17 1952 -1.737 17

1753 -.140 2 1803 -1.072 4 1853 -.754 8 1903 1.725 17 1953 -.932 17

1754 .874 2 1804 -.015 4 1854 .140 8 1904 -.099 17 1954 -.030 17

1755 -2.255 2 1805 .252 4 1855 .186 8 1905 -.038 17 1955 -.084 17

1756 -1.487 2 1806 .277 4 1856 -.571 8 1906 .246 17 1956 -.864 17

1757 1.264 2 1807 -.475 4 1857 .135 8 1907 -.372 17 1957 .227 17

1758 .955 2 1808 -2.013 4 1858 -.418 8 1908 -.351 17 1958 1.787 17

1759 2.570 2 1809 .137 4 1859 -.668 8 1909 -.443 17 1959 -.302 17

1760 .465 2 1810 .991 4 1860 1.616 8 1910 -.669 17 1960 1.167 17

1761 1.419 2 1811 -1.547 4 1861 .019 8 1911 .409 17 1961 .105 17

1762 -1.025 2 1812 -.409 4 1862 1.363 8 1912 1.317 17 1962 .304 17

1763 .436 2 1813 1.183 4 1863 1.701 8 1913 .048 17 1963 .807 17

1764 -2.135 2 1814 1.118 4 1864 .307 8 1914 -.075 17 1964 .901 17

1765 -2.228 2 1815 1.697 4 1865 .298 9 1915 1.898 17 1965 .589 17

1766 .313 2 1816 -.758 4 1866 .160 9 1916 1.415 17 1966 -.550 17

1767 -1.188 2 1817 .026 4 1867 -1.104 9 1917 .638 17 1967 -.450 17

1768 1.718 2 1818 -1.139 4 1868 -.795 9 1918 -.608 17 1968 -.454 17

1769 .320 2 1819 -.794 4 1869 -.693 9 1919 -1.797 17 1969 1.035 17

1770 -.711 3 1820 -1.883 4 1870 -1.608 9 1920 -2.242 17 1 1970 -.374 17

1771 .591 3 1821 -1.285 4 1871 -1.470 9 1921 -1.529 17 1 1971 -.966 17

1772 .485 3 1822 .000 4 1872 -1.398 10 1922 -.686 17 1 1972 -.126 17

1773 .592 3 1823 .824 4 1873 -.950 10 1923 -1.046 17 2 1973 .163 17

1774 .933 3 1824 .229 5 1874 -.531 11 1924 -.060 17 1974 -.072 17

1775 1.028 3 1825 -.741 5 1875 .290 11 1925 -.855 17 1975 .120 17

1776 -1.271 3 1826 1.309 5 1876 .907 11 1926 .478 17 1976 -1.632 16

1777 -2.276 3 1827 1.670 5 1877 .368 12 1927 -.084 17 1977 -1.697 16

1778 -1.538 3 1828 1.773 5 1878 -.207 14 1928 .372 17 1978 -.204 16

1779 -.225 3 1829 -1.092 5 1879 .330 14 1929 .395 17 1979 .637 16

1780 .447 3 1830 -.703 5 1880 2.142 14 1930 .082 17 1980 1.897 16

1781 1.532 3 1831 .490 5 1881 1.088 15 1931 .470 17 1981 1.700 16

1782 -1.814 3 1832 .029 6 1882 -.035 16 1932 .938 17 1982 .565 16

1783 -.638 3 1833 1.554 6 1883 .515 16 1933 -.389 17 1983 -.806 16

1784 -.024 3 1834 .268 7 1884 .866 16 1934 -.242 17 1984 -.461 16

1785 .370 3 1835 -1.013 7 1885 .314 17 1935 .375 17 1985 .127 16

1786 1.619 3 1836 -.084 7 1886 -.533 17 1936 -.232 17 1986 .276 16

1787 1.058 3 1837 .494 7 1887 -.319 17 1937 -.999 17 1987 -.001 16

1788 .953 3 1838 -.847 8 1888 -.348 17 1938 1.199 17 1988 -1.301 16

1739 2.113 1 1789 1.618 3 1839 -.663 8 1889 -.045 17 1939 .836 17 1989 -.743 16

1740 1.253 1 1790 .663 3 1840 1.100 8 1890 -.793 17 1940 1.137 17 1990 -.017 16

1741 -.338 1 1791 .448 3 1841 .960 8 1891 -.216 17 1941 .504 17 1991 -.351 16

1742 .361 1 1792 -2.557 3 1842 .699 8 1892 .457 17 1942 1.749 17 1992 1.145 16

1743 .032 2 1793 -2.461 3 1843 -.584 8 1893 .281 17 1943 .332 17 1993 .522 16

1744 -1.097 2 1794 1.139 3 1844 -1.630 8 1894 -.736 17 1944 -.816 17 1994 -.857 16

1745 -.345 2 1795 -1.280 3 1845 -2.123 8 1895 -1.728 17 1945 .621 17 1995 -.090 16

1746 -.145 2 1796 -.223 3 1846 -.477 8 1896 .612 17 1946 -.052 17 1996 -.712 16

1747 -.978 2 1797 -1.016 3 1847 1.194 8 1897 .073 17 1947 -1.187 17 1997 .124 16

1748 -.061 2 1798 .631 3 1848 1.064 8 1898 -.767 17 1948 -1.198 17 1998 -.102 16

1749 -1.245 2 1799 .414 3 1849 .768 8 1899 -.802 17 1949 .315 17 1999 .247 16

PART 3: Master Dating Series: 18:15 Mon 10 Jul 2017 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 1.272 16

2001 .854 16

2002 -.860 16

2003 .516 16

2004 1.931 16

2005 .386 16

2006 -.781 16

2007 -1.047 16

2008 -.366 16

2009 -.817 16

2010 -.691 16

2011 .621 16

2012 -1.002 16

2013 -.073 16

2014 -.019 16

2015 1.723 16

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PART 4: Master Bar Plot: 18:15 Mon 10 Jul 2017 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---a 1800----------F 1850---------D 1900---------D 1950--------C 2000---------E

1751--------D 1801-----@ 1851---------D 1901------A 1951--c 2001--------C

1752--------C 1802--------C 1852j 1902--------C 1952g 2002--c

1753----a 1803-d 1853--c 1903----------G 1953-d 2003-------B

1754--------C 1804-----@ 1854-----A 1904----@ 1954-----@ 2004----------H

1755i 1805------A 1855------A 1905-----@ 1955----@ 2005-------B

1756f 1806------A 1856---b 1906------A 1956--c 2006--c

1757---------E 1807---b 1857-----A 1907---a 1957------A 2007-d

1758---------D 1808h 1858---b 1908---a 1958----------G 2008---a

1759----------J 1809-----A 1859--c 1909---b 1959---a 2009--c

1760-------B 1810---------D 1860----------F 1910--c 1960---------E 2010--c

1761----------F 1811f 1861-----@ 1911-------B 1961-----@ 2011-------B

1762-d 1812---b 1862---------E 1912---------E 1962------A 2012-d

1763-------B 1813---------E 1863----------G 1913-----@ 1963--------C 2013----@

1764i 1814---------D 1864------A 1914----@ 1964--------D 2014-----@

1765i 1815----------G 1865------A 1915----------H 1965-------B 2015----------G

1766------A 1816--c 1866------A 1916----------F 1966---b

1767-e 1817-----@ 1867-d 1917--------C 1967---b

1768----------G 1818-e 1868--c 1918--b 1968---b

1769------A 1819--c 1869--c 1919g 1969---------D

1770--c 1820h 1870f 1920i 1970---a

1771-------B 1821-e 1871f 1921f 1971-d

1772-------B 1822-----@ 1872f 1922--c 1972----a

1773-------B 1823--------C 1873-d 1923-d 1973------A

1774--------D 1824------A 1874---b 1924----@ 1974----@

1775---------D 1825--c 1875------A 1925--c 1975-----@

1776-e 1826---------E 1876--------D 1926-------B 1976g

1777i 1827----------G 1877------A 1927----@ 1977g

1778f 1828----------G 1878----a 1928------A 1978----a

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

1780-------B 1830--c 1880----------I 1930-----@ 1980----------H

1781----------F 1831-------B 1881---------D 1931-------B 1981----------G

1782g 1832-----@ 1882-----@ 1932--------D 1982-------B

1783--c 1833----------F 1883-------B 1933---b 1983--c

1784-----@ 1834------A 1884--------C 1934----a 1984---b

1785------A 1835-d 1885------A 1935------A 1985-----A

1786----------F 1836----@ 1886---b 1936----a 1986------A

1787---------D 1837-------B 1887---a 1937-d 1987-----@

1788---------D 1838--c 1888---a 1938---------E 1988-e

1739----------H 1789----------F 1839--c 1889-----@ 1939--------C 1989--c

1740---------E 1790--------C 1840---------D 1890--c 1940---------E 1990-----@

1741---a 1791-------B 1841---------D 1891----a 1941-------B 1991---a

1742------A 1792j 1842--------C 1892-------B 1942----------G 1992---------E

1743-----@ 1793j 1843---b 1893------A 1943------A 1993-------B

1744-d 1794---------E 1844g 1894--c 1944--c 1994--c

1745---a 1795-e 1845h 1895g 1945-------B 1995----@

1746----a 1796----a 1846---b 1896-------B 1946-----@ 1996--c

1747-d 1797-d 1847---------E 1897-----@ 1947-e 1997-----@

1748----@ 1798--------C 1848---------D 1898--c 1948-e 1998----@

1749-e 1799-------B 1849--------C 1899--c 1949------A 1999------A

PART 5: CORRELATION OF SERIES BY SEGMENTS: 18:15 Mon 10 Jul 2017 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 1725 1750 1775 1800 1825 1850 1875 1900 1925 1950 1975

1774 1799 1824 1849 1874 1899 1924 1949 1974 1999 2024

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

1 GWO01A 1743 2015 .52 .83 .61 .50 .66 .66 .54 .54 .44 .50 .63

2 GWO01B 1739 2015 .49 .76 .65 .70 .70 .53 .39 .43 .42 .42 .56

3 GWO03A 1838 2015 .58 .58 .75 .76 .58 .53 .53

4 GWO03B 1874 2015 .48 .50 .55 .45 .57 .54

5 GWO04A 1882 2015 .43 .46 .48 .58 .62

6 GWO04B 1865 2015 .30A .43 .59 .49 .45 .43

7 GWO05A 1877 2015 .43 .43 .42 .50 .56

8 GWO05B 1878 2015 .41 .40B .37 .47 .55

9 GWO06A 1800 2015 .50 .53 .62 .65 .66 .50 .43 .42

10 GWO06B 1770 2015 .39 .42 .51 .58 .54 .57 .60 .35 .41 .36

11 GWO07A 1885 2015 .64 .76 .62 .46 .45

12 GWO07B 1881 2015 .62 .70 .58 .47 .41

13 GWO08A 1832 2015 .68 .73 .66 .55 .54 .59 .53

14 GWO08B 1824 2015 .72 .74 .77 .61 .60 .64 .67 .65

15 GWO09a 1834 1975 .60 .54 .62 .68 .38 .38

16 GWO10A 1878 2015 .52 .53 .47 .49 .53

17 GWO10B 1872 2015 .45 .44 .32A .31A .42 .48

Av segment correlation .51 .66 .56 .59 .63 .56 .54 .56 .47 .49 .52

PART 6: POTENTIAL PROBLEMS: 18:15 Mon 10 Jul 2017 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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GWO01A 1743 to 2015 273 years Series 1

[B] Entire series, effect on correlation ( .533) is:

Lower 1749> -.051 1743> -.021 1803> -.009 1816> -.007 1842< -.007 1839> -.006 Higher 1852 .022 1755 .009

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

1748 1749 4.8 SD

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

1743 +4.6 SD; 1749 +4.7 SD

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

GWO01B 1739 to 2015 277 years Series 2

[\*] Early part of series cannot be checked from 1739 to 1742 -- not matched by another series

[B] Entire series, effect on correlation ( .531) is:

Lower 1749< -.039 1743< -.022 1797> -.009 1977> -.008 1900< -.008 1896< -.007 Higher 1852 .012 1755 .010

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

1743 -4.6 SD; 1749 -4.7 SD; 1977 +3.2 SD

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

GWO03A 1838 to 2015 178 years Series 3

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

Lower 1979< -.016 2006< -.015 1957< -.012 1951> -.011 1844> -.009 1863< -.009 Higher 2004 .010 1952 .009

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

1875 +3.8 SD

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GWO03B 1874 to 2015 142 years Series 4

[B] Entire series, effect on correlation ( .512) is:

Lower 1881< -.025 1966> -.024 1907< -.017 1938< -.013 1937> -.012 1876< -.009 Higher 1920 .016 1976 .014

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

1966 +3.7 SD

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

GWO04A 1882 to 2015 134 years Series 5

[B] Entire series, effect on correlation ( .527) is:

Lower 1937< -.036 1990< -.018 1947> -.013 1882> -.011 1989> -.009 1886> -.008 Higher 1976 .021 2004 .015

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

1937 -5.5 SD

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

GWO04B 1865 to 2015 151 years Series 6

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

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

1865 1914 0 -.24 -.19 -.18 -.12 -.03 .06 .11 .27 .15 .12 .30\* .13 -.10 .12 .01 -.14 -.16 -.24 -.24 -.02 -.05

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

Lower 1966< -.013 1947> -.012 1867> -.012 1968> -.010 1878> -.010 2005< -.009 Higher 1976 .029 2004 .018

1865 to 1914 segment:

Lower 1867> -.036 1906< -.033 1878> -.032 1897> -.027 1875< -.024 1886> -.022 Higher 1903 .038 1880 .037

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GWO05A 1877 to 2015 139 years Series 7

[B] Entire series, effect on correlation ( .520) is:

Lower 1962< -.022 1944> -.016 2008< -.012 1900< -.011 1959> -.009 1926< -.009 Higher 1920 .021 1976 .017

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

1920 -2.242 17 1

1921 -1.529 17 1

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

GWO05B 1878 to 2015 138 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

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

1900 1949 -4 .00 -.13 -.01 .07 -.04 -.08 .45\* .08 -.01 .08 .40|-.10 -.17 .08 -.22 -.21 -.09 -.04 -.24 -.05 -.06

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

Lower 1941< -.021 1944> -.016 1897> -.013 1890> -.012 1950< -.011 1988> -.011 Higher 1952 .020 1880 .017

1900 to 1949 segment:

Lower 1941< -.081 1944> -.055 1933> -.027 1919> -.026 1913> -.015 1926< -.015 Higher 1915 .057 1942 .036

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

1897 +3.1 SD; 1957 +3.0 SD

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

GWO06A 1800 to 2015 216 years Series 9

[B] Entire series, effect on correlation ( .546) is:

Lower 1839< -.036 1983> -.019 1844> -.008 1997< -.006 2011< -.006 1878< -.005 Higher 1976 .011 1958 .007

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

1839 -5.4 SD; 1983 +4.2 SD

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GWO06B 1770 to 2015 246 years Series 10

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

Lower 1793> -.016 1797< -.013 1959> -.012 2001< -.011 1845> -.008 1774< -.008 Higher 1792 .012 1976 .007

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

1792 1793 4.1 SD

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

1793 +3.4 SD; 1947 -4.7 SD

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GWO07A 1885 to 2015 131 years Series 11

[B] Entire series, effect on correlation ( .572) is:

Lower 1995< -.020 2002> -.018 1889< -.016 1976> -.016 1898> -.013 1982< -.011 Higher 1920 .013 1919 .013

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GWO07B 1881 to 2015 135 years Series 12

[B] Entire series, effect on correlation ( .543) is:

Lower 1976> -.022 2006> -.015 2008> -.013 1970> -.011 1965< -.008 1955< -.007 Higher 1919 .015 1895 .014

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

2008 +3.8 SD

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GWO08A 1832 to 2015 184 years Series 13

[B] Entire series, effect on correlation ( .588) is:

Lower 1998> -.017 1937> -.012 1832< -.012 2006> -.011 1839> -.010 1944< -.008 Higher 1852 .033 1845 .009

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

1923 -1.046 17 2

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

1998 +4.6 SD

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

GWO08B 1824 to 2015 192 years Series 14

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

Lower 1922< -.032 2006> -.016 1919> -.010 1825> -.009 1948> -.009 1824< -.009 Higher 1852 .034 1958 .007

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

1921 1922 -4.3 SD

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

1922 -.686 17 1

1923 -1.046 17 2

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

GWO09a 1834 to 1975 142 years Series 15

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

Lower 1962< -.056 1952> -.027 1850< -.024 1844> -.017 1891< -.012 1970> -.012 Higher 1852 .025 1845 .014

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

1962 -5.0 SD

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

GWO10A 1878 to 2015 138 years Series 16

[B] Entire series, effect on correlation ( .522) is:

Lower 1897< -.021 1902< -.017 1983> -.016 1899> -.012 1910> -.011 2007> -.010 Higher 1920 .015 1988 .014

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GWO10B 1872 to 2015 144 years Series 17

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

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

1900 1949 0 .08 .09 -.14 .11 .18 -.29 .02 .08 -.07 -.06 .32\*-.07 -.03 -.03 -.05 -.02 .08 .00 -.05 -.04 .02

1925 1974 0 .18 .22 -.02 .13 .08 -.06 .13 -.10 .11 -.30 .31\* .09 -.17 -.07 -.05 .09 .07 -.09 -.16 -.22 .06

[B] Entire series, effect on correlation ( .407) is:

Lower 1931< -.043 2004< -.020 1983> -.015 1898> -.012 1952> -.012 1902< -.011 Higher 1976 .037 1915 .013

1900 to 1949 segment:

Lower 1931< -.120 1902< -.029 1912< -.022 1904> -.021 1921> -.015 1914< -.014 Higher 1915 .044 1938 .042

1925 to 1974 segment:

Lower 1931< -.122 1952> -.034 1961< -.015 1932< -.014 1958< -.013 1926< -.010 Higher 1938 .048 1960 .031

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

1931 -4.6 SD

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PART 7: DESCRIPTIVE STATISTICS: 18:15 Mon 10 Jul 2017 Page 7

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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 ()

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

1 GWO01A 1743 2015 273 11 0 .533 .91 2.63 .333 .581 .214 2.86 .360 .017 1

2 GWO01B 1739 2015 277 11 0 .531 .85 3.39 .422 .676 .226 2.86 .442 .014 1

3 GWO03A 1838 2015 178 7 0 .600 .86 3.97 .450 .640 .248 2.84 .434 .027 1

4 GWO03B 1874 2015 142 6 0 .512 .85 3.38 .545 .756 .239 2.72 .542 .046 1

5 GWO04A 1882 2015 134 5 0 .527 1.16 2.50 .428 .661 .224 2.59 .355 -.005 1

6 GWO04B 1865 2015 151 6 1 .456 .96 2.04 .421 .790 .223 2.87 .419 -.031 2

7 GWO05A 1877 2015 139 5 0 .520 .64 2.07 .291 .800 .233 2.88 .586 -.013 1

8 GWO05B 1878 2015 138 5 1 .447 .74 2.67 .333 .689 .222 2.95 .561 .005 1

9 GWO06A 1800 2015 216 8 0 .546 .87 2.08 .355 .678 .239 2.73 .397 .019 1

10 GWO06B 1770 2015 246 10 0 .442 .54 1.65 .273 .801 .224 2.57 .366 -.055 1

11 GWO07A 1885 2015 131 5 0 .572 1.55 3.62 .594 .578 .233 2.81 .560 -.003 1

12 GWO07B 1881 2015 135 5 0 .543 1.51 3.36 .617 .622 .240 2.78 .467 -.001 1

13 GWO08A 1832 2015 184 7 0 .588 1.22 3.07 .596 .672 .296 3.07 .465 .022 1

14 GWO08B 1824 2015 192 8 0 .632 1.09 2.97 .491 .605 .280 2.84 .424 .017 1

15 GWO09a 1834 1975 142 6 0 .510 1.17 2.31 .471 .725 .232 2.72 .430 -.037 1

16 GWO10A 1878 2015 138 5 0 .522 1.74 4.31 .722 .717 .223 2.90 .509 -.028 3

17 GWO10B 1872 2015 144 6 2 .407 1.65 4.24 .701 .719 .242 2.77 .441 .003 1

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Total or mean: 2960 116 4 .525 1.03 4.31 .456 .686 .237 3.07 .446 .001

- = [ COFECHA GWO COF ] = -