[] Dendrochronology Program Library Run GWA Program COF 15:27 Mon 03 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 30136

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

File of DATED series: gwa.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 1760 to 2016 257 years

Continuous time span is 1760 to 2016 257 years

Portion with two or more series is 1763 to 2016 254 years

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

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

\*O\* Master series 1760 2016 257 yrs \*O\*

\*F\* Total rings in all series 3818 \*F\*

\*E\* Total dated rings checked 3815 \*E\*

\*C\* Series intercorrelation .626 \*C\*

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

\*A\* Segments, possible problems 3 \*A\*

\*\*\* Mean length of series 190.9 \*\*\*

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

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: 15:27 Mon 03 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

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

. . . . . . . . . . . . . . . <====================> . GWA01A 1 1804 2015 212

. . . . . . . . . . . . . . . . <================> . GWA01B 2 1840 2016 177

. . . . . . . . . . . . . . . . .<==============> . GWA02A 3 1869 2015 147

. . . . . . . . . . . . . . . . .<==============> . GWA02B 4 1868 2016 149

. . . . . . . . . . . . . . . .<===================> . GWA3A 5 1817 2015 199

. . . . . . . . . . . . . . . . .<==============> . GWA03B 6 1863 2016 154

. . . . . . . . . . . . . . . <====================> . GWA04A 7 1806 2016 211

. . . . . . . . . . . . . . . . <=================> . GWA04B 8 1830 2016 187

. . . . . . . . . . . . . . . .<===================> . GWA5A 9 1815 2015 201

. . . . . . . . . . . . . . . . <================> . GWA05B 10 1840 2016 177

. . . . . . . . . . . . . . . . <===============> . GWA06A 11 1853 2016 164

. . . . . . . . . . . . . . . . <===============> . GWA06B 12 1856 2016 161

. . . . . . . . . . . . . . . <====================> . GWA07A 13 1805 2015 211

. . . . . . . . . . . . . . . <====================> . GWA07B 14 1805 2015 211

. . . . . . . . . . . . . . . . . <=============> . GWA08A 15 1872 2016 145

. . . . . . . . . . . . . . . . <================> . GWA08B 16 1845 2016 172

. . . . . . . . . . . . . . .<========================> . GWA09A 17 1760 2015 256

. . . . . . . . . . . . . . .<========================> . GWA09B 18 1763 2015 253

. . . . . . . . . . . . . . . . <==================> . GWA10A 19 1822 2016 195

. . . . . . . . . . . . . . . <======================> . GWA10B 20 1780 2015 236

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

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: 15:27 Mon 03 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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1800 -.655 3 1850 .176 14 1900 1.052 20 1950 1.087 20 2000 2.220 20

1801 .244 3 1851 1.164 14 1901 -.581 20 1951 .755 20 2001 1.159 20

1802 -.905 3 1852 -2.472 14 1902 1.322 20 1952 -1.385 20 2002 -1.304 20

1803 -.537 3 1853 -.611 15 1903 1.670 20 1953 -1.172 20 2003 -.890 20

1804 .660 4 1854 .123 15 1904 -.155 20 1954 -.990 20 2004 1.325 20

1805 .161 6 1855 .207 15 1905 .383 20 1955 -1.356 20 2005 -.908 20

1806 .779 7 1856 -.699 16 1906 -.454 20 1956 -1.158 20 2006 -.556 20

1807 .806 7 1857 .624 16 1907 .508 20 1957 .709 20 2007 -1.020 20

1808 .998 7 1858 -.002 16 1908 .687 20 1958 1.356 20 2008 1.223 20

1809 -.322 7 1859 -.473 16 1909 .648 20 1959 .346 20 2009 -.103 20

1760 1.685 1 1810 -.040 7 1860 .495 16 1910 -.867 20 1960 .569 20 2010 .524 20

1761 -.690 1 1811 -.821 7 1861 -1.011 16 1911 -.622 20 1961 .691 20 2011 .551 20

1762 1.001 1 1812 -1.997 7 1862 .973 16 1912 .625 20 1962 .799 20 2012 -1.184 20

1763 -.039 2 1813 -1.203 7 1863 .921 17 1913 -.907 20 1963 .152 20 2013 .016 20

1764 -.287 2 1814 1.219 7 1864 -.789 17 1914 -1.016 20 1964 -.501 20 2014 -.030 20

1765 -.197 2 1815 1.326 8 1865 -.921 17 1915 1.964 20 1965 -.134 20 2015 1.099 20

1766 -1.430 2 1816 .453 8 1866 -.730 17 1916 1.266 20 1966 -.654 20 2016 -.916 11

1767 -2.785 2 1817 .329 9 1867 -2.044 17 1917 .673 20 1967 -1.002 20

1768 -1.543 2 1818 -.455 9 1868 -.838 18 1918 -1.802 20 1968 .626 20

1769 .039 2 1819 .034 9 1869 .750 19 1919 -2.139 20 1969 2.105 20

1770 2.047 2 1820 -.837 9 1870 -.637 19 1920 -.525 20 1970 -.037 20

1771 1.670 2 1821 -1.098 9 1871 -1.240 19 1921 .111 20 1971 -.798 20

1772 .190 2 1822 .167 10 1872 -.653 20 1922 -.100 20 1972 -.792 20

1773 1.415 2 1823 -.162 10 1873 .171 20 1923 -.365 20 1973 1.018 20

1774 1.161 2 1824 -.223 10 1874 -.158 20 1924 1.087 20 1974 -.701 20

1775 .935 2 1825 .165 10 1875 .560 20 1925 -.079 20 1975 1.544 20

1776 1.159 2 1826 -.341 10 1876 1.222 20 1926 .132 20 1976 -.017 20

1777 .757 2 1827 .475 10 1877 .202 20 1927 1.897 20 1977 -2.094 20

1778 -1.651 2 1828 .020 10 1878 .915 20 1928 -.085 20 1978 -.423 20

1779 -.113 2 1829 .593 10 1879 .926 20 1929 .324 20 1979 -.074 20

1780 -.615 3 1830 -.345 11 1880 1.523 20 1930 -.757 20 1980 1.949 20

1781 -2.455 3 1831 .141 11 1881 .691 20 1931 -.031 20 1981 .428 20

1782 -.439 3 1832 .551 11 1882 .668 20 1932 .431 20 1982 -.140 20

1783 -.430 3 1833 .759 11 1883 .768 20 1933 -.303 20 1983 .177 20

1784 .627 3 1834 .907 11 1884 .389 20 1934 -1.740 20 1984 -.847 20

1785 -.456 3 1835 .544 11 1885 .580 20 1935 .715 20 1985 -1.110 20

1786 .342 3 1836 .461 11 1886 -1.172 20 1936 -2.111 20 1986 .620 20

1787 .749 3 1837 -.091 11 1887 -.746 20 1937 2.080 20 1987 -.342 20

1788 1.015 3 1838 -1.028 11 1888 -1.334 20 1938 .821 20 1988 -1.809 20

1789 1.747 3 1839 -2.905 11 1889 .763 20 1939 -.510 20 1989 .873 20

1790 1.376 3 1840 1.132 13 1890 -1.335 20 1940 -.585 20 1990 .862 20

1791 -1.574 3 1841 -.167 13 1891 -1.100 20 1941 -.154 20 1991 .344 20

1792 -.109 3 1842 -.065 13 1892 .248 20 1942 .930 20 1992 1.575 20

1793 -1.947 3 1843 -.363 13 1893 .180 20 1943 1.319 20 1993 .030 20

1794 -.740 3 1844 1.034 13 1894 -1.276 20 1944 -1.098 20 1994 -1.200 20

1795 .747 3 1845 -.241 14 1895 -3.342 20 1945 -.131 20 1995 -.613 20

1796 .512 3 1846 .026 14 1896 1.545 20 1946 -.016 20 1996 -.680 20

1797 .272 3 1847 1.077 14 1897 .603 20 1947 1.275 20 1997 .385 20

1798 -.343 3 1848 1.506 14 1898 -.485 20 1948 -.046 20 1998 .177 20

1799 -.527 3 1849 -.223 14 1899 -.723 20 1949 -.160 20 1999 -.151 20

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PART 4: Master Bar Plot: 15:27 Mon 03 Jul 2017 Page 4

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Year Rel value Year Rel value Year Rel value Year Rel value Year Rel value Year Rel value Year Rel value Year Rel value

1800--c 1850------A 1900---------D 1950---------D 2000----------I

1801------A 1851---------E 1901---b 1951--------C 2001---------E

1802-d 1852j 1902---------E 1952-f 2002-e

1803---b 1853--b 1903----------G 1953-e 2003-d

1804-------C 1854-----@ 1904----a 1954-d 2004---------E

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

1806--------C 1856--c 1906---b 1956-e 2006---b

1807--------C 1857-------B 1907-------B 1957--------C 2007-d

1808---------D 1858-----@ 1908--------C 1958----------E 2008---------E

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

1760----------G 1810-----@ 1860-------B 1910--c 1960-------B 2010-------B

1761--c 1811--c 1861-d 1911--b 1961--------C 2011-------B

1762---------D 1812h 1862---------D 1912-------B 1962--------C 2012-e

1763-----@ 1813-e 1863--------D 1913-d 1963------A 2013-----@

1764----a 1814---------E 1864--c 1914-d 1964---b 2014-----@

1765----a 1815---------E 1865-d 1915----------H 1965----a 2015---------D

1766f 1816-------B 1866--c 1916---------E 1966--c 2016-d

1767k 1817------A 1867h 1917--------C 1967-d

1768f 1818---b 1868--c 1918g 1968-------C

1769-----@ 1819-----@ 1869--------C 1919i 1969----------H

1770----------H 1820--c 1870--c 1920---b 1970-----@

1771----------G 1821-d 1871-e 1921-----@ 1971--c

1772------A 1822------A 1872--c 1922----@ 1972--c

1773----------F 1823----a 1873------A 1923---a 1973---------D

1774---------E 1824----a 1874----a 1924---------D 1974--c

1775---------D 1825------A 1875-------B 1925----@ 1975----------F

1776---------E 1826---a 1876---------E 1926------A 1976-----@

1777--------C 1827-------B 1877------A 1927----------H 1977h

1778g 1828-----@ 1878--------D 1928----@ 1978---b

1779----@ 1829-------B 1879---------D 1929------A 1979-----@

1780--b 1830---a 1880----------F 1930--c 1980----------H

1781j 1831------A 1881--------C 1931-----@ 1981-------B

1782---b 1832-------B 1882--------C 1932-------B 1982----a

1783---b 1833--------C 1883--------C 1933----a 1983------A

1784-------C 1834--------D 1884------B 1934g 1984--c

1785---b 1835-------B 1885-------B 1935--------C 1985-d

1786------A 1836-------B 1886-e 1936h 1986-------B

1787--------C 1837----@ 1887--c 1937----------H 1987---a

1788---------D 1838-d 1888-e 1938--------C 1988g

1789----------G 1839l 1889--------C 1939---b 1989--------C

1790----------F 1840---------E 1890-e 1940---b 1990--------C

1791f 1841----a 1891-d 1941----a 1991------A

1792----@ 1842-----@ 1892------A 1942---------D 1992----------F

1793h 1843---a 1893------A 1943---------E 1993-----@

1794--c 1844---------D 1894-e 1944-d 1994-e

1795--------C 1845----a 1895m 1945----a 1995--b

1796-------B 1846-----@ 1896----------F 1946-----@ 1996--c

1797------A 1847---------D 1897-------B 1947---------E 1997------B

1798---a 1848----------F 1898---b 1948-----@ 1998------A

1799---b 1849----a 1899--c 1949----a 1999----a

PART 5: CORRELATION OF SERIES BY SEGMENTS: 15:27 Mon 03 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 1750 1775 1800 1825 1850 1875 1900 1925 1950 1975

1799 1824 1849 1874 1899 1924 1949 1974 1999 2024

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

1 GWA01A 1804 2015 .55 .51 .45 .48 .71 .64 .52 .53

2 GWA01B 1840 2016 .56 .55 .48 .70 .66 .66 .70

3 GWA02A 1869 2015 .71 .75 .78 .63 .64 .65

4 GWA02B 1868 2016 .64 .69 .81 .79 .74 .73

5 GWA3A 1817 2015 .28B .37 .72 .69 .66 .74 .68 .59

6 GWA03B 1863 2016 .69 .67 .66 .78 .79 .70

7 GWA04A 1806 2016 .55 .55 .62 .65 .69 .63 .70 .79

8 GWA04B 1830 2016 .70 .80 .87 .73 .69 .79 .79

9 GWA5A 1815 2015 .70 .64 .75 .84 .83 .75 .76 .80

10 GWA05B 1840 2016 .35 .76 .84 .73 .72 .78 .77

11 GWA06A 1853 2016 .69 .79 .81 .80 .75 .69

12 GWA06B 1856 2016 .79 .82 .71 .71 .71 .70

13 GWA07A 1805 2015 .43 .50 .62 .69 .62 .55 .45 .48

14 GWA07B 1805 2015 .47 .47 .62 .72 .74 .64 .42 .50

15 GWA08A 1872 2016 .66 .79 .77 .57 .55 .71

16 GWA08B 1845 2016 .64 .65 .79 .87 .73 .59 .56

17 GWA09A 1760 2015 .54 .39 .26B .47 .60 .73 .66 .57 .48 .48

18 GWA09B 1763 2015 .50 .35B .40 .45 .47 .57 .51 .49 .56 .61

19 GWA10A 1822 2016 .43 .43 .52 .67 .63 .69 .65 .68

20 GWA10B 1780 2015 .42 .49 .34 .51 .75 .71 .68 .61 .73

Av segment correlation .52 .38 .46 .50 .64 .71 .72 .67 .64 .66

PART 6: POTENTIAL PROBLEMS: 15:27 Mon 03 Jul 2017 Page 5

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For each series with potential problems the following diagnostics may appear:

[A] Correlations with master dating series of flagged 50-year segments of series filtered with 32-year spline,

at every point from ten years earlier (-10) to ten years later (+10) than dated

[B] Effect of those data values which most lower or raise correlation with master series

Symbol following year indicates value in series is greater (>) or lesser (<) than master series value

[C] Year-to-year changes very different from the mean change in other series

[D] Absent rings (zero values)

[E] Values which are statistical outliers from mean for the year

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GWA01A 1804 to 2015 212 years Series 1

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

Lower 1886> -.013 1975< -.013 1815< -.012 1880< -.011 1899< -.011 1883< -.009 Higher 1852 .034 1895 .019

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

1886 +3.4 SD

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GWA01B 1840 to 2016 177 years Series 2

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

Lower 1880< -.031 1886> -.013 1965< -.010 1920< -.007 1868> -.007 2002> -.005 Higher 1852 .025 1977 .011

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GWA02A 1869 to 2015 147 years Series 3

[B] Entire series, effect on correlation ( .701) is:

Lower 1970< -.050 1906> -.010 1998< -.009 1968< -.007 1985> -.007 1955> -.005 Higher 1977 .012 1895 .011

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GWA02B 1868 to 2016 149 years Series 4

[B] Entire series, effect on correlation ( .699) is:

Lower 1877< -.078 1978< -.009 2006> -.008 1893< -.006 1988> -.005 1935< -.004 Higher 1895 .028 1937 .008

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

1877 -5.6 SD

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GWA3A 1817 to 2015 199 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

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

1817 1866 7 -.16 -.10 -.15 .20 .17 -.08 .01 -.13 -.02 -.32 .28|-.18 -.10 .02 -.08 -.02 .22 .29\* .00 .21 -.21

[B] Entire series, effect on correlation ( .565) is:

Lower 1832< -.028 1833< -.013 1839> -.013 1865> -.012 1821> -.011 1986< -.010 Higher 1852 .027 1895 .014

1817 to 1866 segment:

Lower 1832< -.085 1833< -.042 1865> -.036 1821> -.036 1839> -.031 1836< -.024 Higher 1852 .204 1840 .030

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

1865 +3.1 SD

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

GWA03B 1863 to 2016 154 years Series 6

[B] Entire series, effect on correlation ( .700) is:

Lower 2016> -.013 2015< -.009 1870> -.008 1914> -.008 1899> -.007 2012> -.006 Higher 1936 .012 1977 .010

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GWA04A 1806 to 2016 211 years Series 7

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

Lower 1825< -.012 1894< -.012 1826> -.010 1830> -.008 1950< -.007 1815< -.007 Higher 1839 .011 1895 .010

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

1894 -4.6 SD

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GWA04B 1830 to 2016 187 years Series 8

[B] Entire series, effect on correlation ( .743) is:

Lower 1839< -.014 1936> -.010 1832< -.008 1865> -.008 1869< -.008 2006< -.006 Higher 1852 .013 1896 .005

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

1839 -6.5 SD

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GWA5A 1815 to 2015 201 years Series 9

[B] Entire series, effect on correlation ( .758) is:

Lower 1865> -.010 1869< -.005 2006> -.005 1829< -.005 1819< -.005 1959< -.004 Higher 1895 .009 1839 .007

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

1895 -5.1 SD

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GWA05B 1840 to 2016 177 years Series 10

[B] Entire series, effect on correlation ( .650) is:

Lower 1840< -.091 1869< -.009 2002> -.008 1930> -.008 1957< -.006 1907< -.006 Higher 1895 .026 2000 .009

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

1840 -6.2 SD

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GWA06A 1853 to 2016 164 years Series 11

[B] Entire series, effect on correlation ( .743) is:

Lower 2012< -.008 1902< -.008 1871> -.008 1861> -.007 1989< -.006 2006> -.006 Higher 1936 .015 1895 .007

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GWA06B 1856 to 2016 161 years Series 12

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

Lower 1927< -.008 2006> -.007 1861> -.006 1944> -.006 1977> -.006 1922> -.006 Higher 1895 .023 1936 .016

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GWA07A 1805 to 2015 211 years Series 13

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

Lower 1980< -.022 1960< -.011 1809> -.009 1830> -.008 1852> -.005 1808< -.004 Higher 1839 .019 1895 .011

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

1857 +3.2 SD

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GWA07B 1805 to 2015 211 years Series 14

[B] Entire series, effect on correlation ( .565) is:

Lower 1980< -.027 1960< -.012 1909< -.005 2004< -.005 1818> -.005 1846< -.005 Higher 1936 .022 2000 .009

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

1857 +3.5 SD; 1980 -4.5 SD

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GWA08A 1872 to 2016 145 years Series 15

[B] Entire series, effect on correlation ( .664) is:

Lower 1872< -.038 1973< -.013 1955< -.009 1961< -.009 1975< -.008 1957< -.005 Higher 1895 .013 1988 .009

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GWA08B 1845 to 2016 172 years Series 16

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

Lower 2014< -.031 1873< -.016 1961< -.010 1874< -.010 1865> -.010 1985> -.009 Higher 1936 .015 1852 .012

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GWA09A 1760 to 2015 256 years Series 17

[\*] Early part of series cannot be checked from 1760 to 1762 -- not matched by another series

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

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1800 1849 -10 .32\*-.07 -.01 -.03 .00 .07 .00 .03 -.13 -.15 .26| .07 .01 .08 .10 -.32 -.32 -.04 .11 .13 .02

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

Lower 1865< -.025 1794> -.014 1849< -.008 1839> -.008 1782> -.008 1820> -.007 Higher 1852 .025 1936 .018

1800 to 1849 segment:

Lower 1820> -.035 1839> -.029 1807< -.022 1817< -.021 1801< -.020 1844< -.020 Higher 1840 .029 1812 .029

[E] Outliers 4 3.0 SD above or -4.5 SD below mean for year

1782 +3.6 SD; 1794 +4.2 SD; 1839 +3.2 SD; 1865 -6.8 SD

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GWA09B 1763 to 2015 253 years Series 18

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

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

1775 1824 -1 .14 -.05 -.20 -.06 .05 -.29 -.10 -.06 .02 .43\* .35|-.11 .18 -.08 -.28 -.03 -.22 -.05 -.08 .01 .04

[B] Entire series, effect on correlation ( .496) is:

Lower 1865< -.024 1793> -.011 1782< -.011 1942< -.009 1844< -.008 1855< -.006 Higher 1852 .013 1977 .011

1775 to 1824 segment:

Lower 1782< -.051 1793> -.042 1820> -.023 1814< -.019 1809> -.016 1817> -.015 Higher 1791 .057 1778 .033

[E] Outliers 4 3.0 SD above or -4.5 SD below mean for year

1817 +3.3 SD; 1865 -5.8 SD; 1921 +3.7 SD; 1922 +3.4 SD

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GWA10A 1822 to 2016 195 years Series 19

[B] Entire series, effect on correlation ( .607) is:

Lower 1852> -.027 1925> -.012 1828< -.010 1850< -.008 2016< -.008 1955> -.008 Higher 1895 .023 1936 .013

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

1852 +3.0 SD; 1925 +3.9 SD

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GWA10B 1780 to 2015 236 years Series 20

[B] Entire series, effect on correlation ( .582) is:

Lower 1852> -.023 1804< -.008 1791> -.008 1951< -.006 1871> -.005 1794< -.005 Higher 1936 .013 2000 .007

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

1852 +3.1 SD

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PART 7: DESCRIPTIVE STATISTICS: 15:27 Mon 03 Jul 2017 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 ()

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

1 GWA01A 1804 2015 212 8 0 .527 1.66 3.67 .516 .655 .210 2.57 .351 -.013 2

2 GWA01B 1840 2016 177 7 0 .632 1.98 3.58 .580 .608 .212 2.48 .335 .015 1

3 GWA02A 1869 2015 147 6 0 .701 1.94 4.95 .864 .786 .242 2.69 .404 -.018 1

4 GWA02B 1868 2016 149 6 0 .699 2.22 5.67 .897 .543 .267 2.63 .384 .023 1

5 GWA3A 1817 2015 199 8 1 .565 1.59 4.52 .831 .849 .223 2.78 .518 -.008 3

6 GWA03B 1863 2016 154 6 0 .700 2.21 5.33 .818 .682 .215 2.96 .518 .017 2

7 GWA04A 1806 2016 211 8 0 .644 1.39 5.83 1.061 .836 .310 2.80 .422 .047 1

8 GWA04B 1830 2016 187 7 0 .743 1.59 5.49 .946 .827 .278 2.57 .317 .029 1

9 GWA5A 1815 2015 201 8 0 .758 1.96 4.66 .881 .722 .259 2.62 .327 .024 1

10 GWA05B 1840 2016 177 7 0 .650 2.27 4.91 .900 .663 .265 2.76 .432 .003 1

11 GWA06A 1853 2016 164 6 0 .743 2.41 4.14 .670 .485 .221 2.70 .499 .036 1

12 GWA06B 1856 2016 161 6 0 .731 2.39 4.48 .645 .421 .227 2.70 .475 -.024 1

13 GWA07A 1805 2015 211 8 0 .528 2.44 6.49 .881 .653 .206 2.70 .367 -.017 2

14 GWA07B 1805 2015 211 8 0 .565 2.51 5.80 .807 .674 .193 2.76 .384 -.016 2

15 GWA08A 1872 2016 145 6 0 .664 2.77 5.02 .867 .662 .196 2.65 .442 .000 1

16 GWA08B 1845 2016 172 7 0 .662 2.33 4.03 .593 .382 .217 2.70 .516 -.042 2

17 GWA09A 1760 2015 256 10 1 .527 1.46 4.64 .546 .557 .253 2.87 .348 .000 1

18 GWA09B 1763 2015 253 10 1 .496 1.27 3.18 .479 .711 .213 2.71 .343 -.003 1

19 GWA10A 1822 2016 195 8 0 .607 2.17 6.83 1.213 .790 .252 2.86 .485 -.001 1

20 GWA10B 1780 2015 236 9 0 .582 1.80 4.93 1.003 .807 .260 2.79 .452 .025 1

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Total or mean: 3818 149 3 .626 1.97 6.83 .794 .672 .237 2.96 .411 .004

- = [ COFECHA GWA COF ] = -