[] Dendrochronology Program Library Run GWM Program COF 17:27 Fri 07 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 30140

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

File of DATED series: gwm.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 1692 to 2016 325 years

Continuous time span is 1692 to 2016 325 years

Portion with two or more series is 1728 to 2015 288 years

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

\*C\* Number of dated series 16 \*C\*

\*O\* Master series 1692 2016 325 yrs \*O\*

\*F\* Total rings in all series 3471 \*F\*

\*E\* Total dated rings checked 3434 \*E\*

\*C\* Series intercorrelation .521 \*C\*

\*H\* Average mean sensitivity .201 \*H\*

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

\*\*\* Mean length of series 216.9 \*\*\*

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

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: 17:27 Fri 07 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

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. . . . . . . . . . . . . . . . <================> . GWM01A 1 1843 2015 173

. . . . . . . . . . . . . . . . <==================> . GWM01B 2 1823 2015 193

. . . . . . . . . . . . . . <===========================> . GWM04A 3 1732 2015 284

. . . . . . . . . . . . . <===============================> . GWM04B 4 1692 2015 324

. . . . . . . . . . . . . . . . <================> . GWM05A 5 1849 2015 167

. . . . . . . . . . . . . . . . <==================> . GWM05B 6 1820 2015 196

. . . . . . . . . . . . . . . <====================> . GWM06A 7 1802 2015 214

. . . . . . . . . . . . . . . <=====================> . GWM06B 8 1795 2015 221

. . . . . . . . . . . . . . <============================> . GWM07a 9 1728 2015 288

. . . . . . . . . . . . . . . <=======================> . GWM07B 10 1772 2015 244

. . . . . . . . . . . . . . . . <================> . GWM08A 11 1849 2015 167

. . . . . . . . . . . . . . . <=====================> . GWM08B 12 1795 2016 222

. . . . . . . . . . . . . . . . <==================> . GWM09A 13 1826 2015 190

. . . . . . . . . . . . . . <===========================> . GWM09B 14 1737 2015 279

. . . . . . . . . . . . . . . . <=================> . GWM10A 15 1832 2015 184

. . . . . . . . . . . . . . . . . <===========> . GWM10B 16 1891 2015 125

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

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: 17:27 Fri 07 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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1700 .961 1 1750 .766 4 1800 -.879 7 1850 .311 15 1900 .569 16

1701 .777 1 1751 1.669 4 1801 .715 7 1851 1.012 15 1901 .120 16

1702 1.422 1 1752 -.072 4 1802 .435 8 1852 -.345 15 1902 1.209 16

1703 -.500 1 1753 -.344 4 1803 .132 8 1853 .785 15 1903 1.768 16

1704 2.576 1 1754 1.922 4 1804 .849 8 1854 .790 15 1904 -.616 16

1705 1.588 1 1755 .910 4 1805 .545 8 1855 1.691 15 1905 .800 16

1706 .615 1 1756 .964 4 1806 .038 8 1856 .047 15 1906 .133 16

1707 2.196 1 1757 -1.712 4 1807 .610 8 1857 -.317 15 1907 -.632 16

1708 .586 1 1758 .393 4 1808 -.189 8 1858 -2.063 15 1908 .189 16

1709 -.877 1 1759 -1.746 4 1809 -.102 8 1859 -1.756 15 1909 .023 16

1710 -1.834 1 1760 -.659 4 1810 -.196 8 1860 -.338 15 1910 -.592 16

1711 .172 1 1761 .262 4 1811 -.457 8 1861 -.460 15 1911 -.901 16

1712 -2.654 1 1762 -.214 4 1812 -.599 8 1862 .734 15 1912 .740 16

1713 .435 1 1763 -.025 4 1813 -.688 8 1863 .955 15 1913 -.931 16

1714 .083 1 1764 -2.267 4 1814 .544 8 1864 -.194 15 1914 -.460 16

1715 -2.690 1 1765 -1.626 4 1815 .596 8 1865 -.030 15 1915 1.908 16

1716 -3.149 1 1766 .858 4 1816 -.672 8 1866 .992 15 1916 1.079 16

1717 -2.526 1 1767 -.818 4 1817 1.053 8 1867 -1.260 15 1917 .665 16

1718 -1.322 1 1768 .911 4 1818 -.837 8 1868 .064 15 1918 -1.316 16

1719 1.208 1 1769 .761 4 1819 .356 8 1869 .891 15 1919 -1.809 16

1720 .542 1 1770 -.305 4 1820 -.769 9 1870 -.465 15 1920 -1.563 16

1721 -.744 1 1771 -.033 4 1821 -1.145 9 1871 .062 15 1921 -.579 16

1722 .912 1 1772 .279 5 1822 -.195 9 1872 .102 15 1922 -.419 16

1723 .650 1 1773 .882 5 1823 .878 10 1873 .156 15 1923 -.143 16

1724 -2.686 1 1774 .327 5 1824 -.437 10 1874 -1.256 15 1924 .188 16

1725 1.166 1 1775 1.323 5 1825 -.748 10 1875 -1.215 15 1925 -.096 16

1726 .431 1 1776 -1.380 5 1826 .400 11 1876 .384 15 1926 -.440 16

1727 .097 1 1777 .759 5 1827 -.033 11 1877 -1.278 15 1927 .135 16

1728 1.217 2 1778 -.190 5 1828 .408 11 1878 .552 15 1928 -.173 16

1729 .979 2 1779 -.772 5 1829 -.685 11 1879 1.306 15 1929 .740 16

1730 1.077 2 1780 -.164 5 1830 .192 11 1880 .733 15 1930 .294 16

1731 -1.023 2 1781 -.163 5 1831 .992 11 1881 .474 15 1931 1.414 16

1732 -.242 3 1782 -.404 5 1832 1.795 12 1882 1.563 15 1932 -.172 16

1733 -.451 3 1783 .034 5 1833 1.661 12 1883 .645 15 1933 -.399 16

1734 -.964 3 1784 1.060 5 1834 .933 12 1884 .295 15 1934 .095 16

1735 -.048 3 1785 .897 5 1835 -.205 12 1885 .948 15 1935 .765 16

1736 1.283 3 1786 1.113 5 1836 .446 12 1886 .017 15 1936 -1.223 16

1737 2.147 4 1787 .492 5 1837 -1.100 12 1887 -.030 15 1937 2.304 16

1738 -.268 4 1788 -.180 5 1838 -2.192 12 1888 -1.309 15 1938 1.306 16

1739 -.426 4 1789 -1.175 5 1839 -2.659 12 1889 -.205 15 1939 -.356 16

1740 -1.243 4 1790 -.837 5 1840 1.213 12 1890 -1.433 15 1940 -.458 16

1741 .845 4 1791 -.084 5 1841 .473 12 1891 -1.136 16 1941 -.010 16

1692 .715 1 1742 -1.574 4 1792 -1.970 5 1842 .095 12 1892 .391 16 1942 1.084 16

1693 2.265 1 1743 -2.037 4 1793 .825 5 1843 -.138 13 1893 .704 16 1943 .747 16

1694 -3.105 1 1744 .134 4 1794 1.064 5 1844 .423 13 1894 -1.120 16 1944 -1.640 16

1695 -.961 1 1745 .946 4 1795 .767 7 1845 -1.734 13 1895 -1.683 16 1945 -.436 16

1696 -.407 1 1746 -.278 4 1796 -.283 7 1846 -.172 13 1896 1.003 16 1946 .531 16

1697 -.507 1 1747 1.064 4 1797 -.562 7 1847 .924 13 1897 .264 16 1947 .430 16

1698 .418 1 1748 -1.433 4 1798 -.401 7 1848 .752 13 1898 .221 16 1948 -.903 16

1699 .470 1 1749 1.159 4 1799 -.322 7 1849 -.844 15 1899 -.135 16 1949 .118 16

PART 3: Master Dating Series: 17:27 Fri 07 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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1950 .552 16 2000 .586 16

1951 .727 16 2001 -.069 16

1952 -.969 16 2002 -1.490 16

1953 -1.096 16 2003 -.622 16

1954 -.884 16 2004 .905 16

1955 -1.542 16 2005 -.214 16

1956 -1.110 16 2006 -.519 16

1957 .492 16 2007 -1.662 16

1958 .326 16 2008 .780 16

1959 .078 16 2009 -.614 16

1960 .187 16 2010 .866 16

1961 .646 16 2011 1.275 16

1962 -.011 16 2012 -.677 16

1963 1.463 16 2013 .037 16

1964 -.531 16 2014 -.393 16

1965 -.179 16 2015 .527 16

1966 -.415 16 2016 -.788 1

1967 -.689 16

1968 .998 16

1969 1.622 16

1970 .440 16

1971 -.200 16

1972 -.157 16

1973 1.127 16

1974 .125 16

1975 1.339 16

1976 .068 16

1977 -1.566 16

1978 -.389 16

1979 -.297 16

1980 1.211 16

1981 -1.190 16

1982 -.661 16

1983 -.094 16

1984 -1.557 16

1985 -.321 16

1986 .747 16

1987 .332 16

1988 -1.049 16

1989 1.176 16

1990 .311 16

1991 -.460 16

1992 .509 16

1993 -.551 16

1994 -.783 16

1995 .137 16

1996 .342 16

1997 .727 16

1998 1.918 16

1999 .530 16

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PART 4: Master Bar Plot: 17:27 Fri 07 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

1700---------D 1750--------C 1800--d 1850------A 1900-------B 1950-------B 2000-------B

1701--------C 1751----------G 1801--------C 1851---------D 1901-----@ 1951--------C 2001----@

1702----------F 1752----@ 1802-------B 1852---a 1902---------E 1952-d 2002f

1703---b 1753---a 1803-----A 1853--------C 1903----------G 1953-d 2003--b

1704----------J 1754----------H 1804--------C 1854--------C 1904--b 1954--d 2004---------D

1705----------F 1755---------D 1805-------B 1855----------G 1905--------C 1955f 2005----a

1706-------B 1756---------D 1806-----@ 1856-----@ 1906-----A 1956-d 2006---b

1707----------I 1757g 1807-------B 1857---a 1907--c 1957-------B 2007g

1708-------B 1758------B 1808----a 1858h 1908------A 1958------A 2008--------C

1709--d 1759g 1809----@ 1859g 1909-----@ 1959-----@ 2009--b

1710g 1760--c 1810----a 1860---a 1910--b 1960------A 2010--------C

1711-----A 1761------A 1811---b 1861---b 1911-d 1961-------C 2011---------E

1712k 1762----a 1812--b 1862--------C 1912--------C 1962-----@ 2012--c

1713-------B 1763-----@ 1813--c 1863---------D 1913-d 1963----------F 2013-----@

1714-----@ 1764i 1814-------B 1864----a 1914---b 1964---b 2014---b

1715k 1765g 1815-------B 1865-----@ 1915----------H 1965----a 2015-------B

1716m 1766--------C 1816--c 1866---------D 1916---------D 1966---b 2016--c

1717j 1767--c 1817---------D 1867-e 1917--------C 1967--c

1718-e 1768---------D 1818--c 1868-----@ 1918-e 1968---------D

1719---------E 1769--------C 1819------A 1869---------D 1919g 1969----------F

1720-------B 1770---a 1820--c 1870---b 1920f 1970-------B

1721--c 1771-----@ 1821-e 1871-----@ 1921--b 1971----a

1722---------D 1772------A 1822----a 1872-----@ 1922---b 1972----a

1723-------C 1773--------D 1823--------D 1873-----A 1923----a 1973---------E

1724k 1774------A 1824---b 1874-e 1924------A 1974-----A

1725---------E 1775----------E 1825--c 1875-e 1925----@ 1975----------E

1726-------B 1776-f 1826------B 1876------B 1926---b 1976-----@

1727-----@ 1777--------C 1827-----@ 1877-e 1927-----A 1977f

1728---------E 1778----a 1828------B 1878-------B 1928----a 1978---b

1729---------D 1779--c 1829--c 1879----------E 1929--------C 1979---a

1730---------D 1780----a 1830------A 1880--------C 1930------A 1980---------E

1731-d 1781----a 1831---------D 1881-------B 1931----------F 1981-e

1732----a 1782---b 1832----------G 1882----------F 1932----a 1982--c

1733---b 1783-----@ 1833----------G 1883-------C 1933---b 1983----@

1734-d 1784---------D 1834---------D 1884------A 1934-----@ 1984f

1735-----@ 1785---------D 1835----a 1885---------D 1935--------C 1985---a

1736---------E 1786---------D 1836-------B 1886-----@ 1936-e 1986--------C

1737----------I 1787-------B 1837-d 1887-----@ 1937----------I 1987------A

1738----a 1788----a 1838i 1888-e 1938----------E 1988-d

1739---b 1789-e 1839k 1889----a 1939---a 1989---------E

1740-e 1790--c 1840---------E 1890-f 1940---b 1990------A

1741--------C 1791----@ 1841-------B 1891-e 1941-----@ 1991---b

1692--------C 1742f 1792h 1842-----@ 1892------B 1942---------D 1992-------B

1693----------I 1743h 1793--------C 1843----a 1893--------C 1943--------C 1993--b

1694l 1744-----A 1794---------D 1844------B 1894-d 1944g 1994--c

1695-d 1745---------D 1795--------C 1845g 1895g 1945---b 1995-----A

1696---b 1746----a 1796----a 1846----a 1896---------D 1946-------B 1996------A

1697---b 1747---------D 1797--b 1847---------D 1897------A 1947-------B 1997--------C

1698------B 1748-f 1798---b 1848--------C 1898------A 1948-d 1998----------H

1699-------B 1749---------E 1799---a 1849--c 1899----a 1949-----@ 1999-------B

PART 5: CORRELATION OF SERIES BY SEGMENTS: 17:27 Fri 07 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 GWM01A 1843 2015 .69 .60 .56 .49 .46 .57 .51

2 GWM01B 1823 2015 .72 .72 .60 .62 .60 .51 .46 .32A

3 GWM04A 1732 2015 .60 .52 .39 .51 .56 .46 .56 .53 .40 .32A .41

4 GWM04B 1692 2015 .62 .42 .18B .52 .59 .47 .53 .70 .55 .28A .46

5 GWM05A 1849 2015 .72 .71 .58 .53 .52 .52 .55

6 GWM05B 1820 2015 .62 .62 .47 .43 .52 .48 .43 .50

7 GWM06A 1802 2015 .47 .73 .62 .57 .50 .49 .58 .63

8 GWM06B 1795 2015 .49 .50 .73 .66 .61 .64 .65 .56 .64

9 GWM07a 1728 2015 .52 .53 .40 .54 .50 .35B .47 .48 .35 .38 .35

10 GWM07B 1772 2015 .32A .32A .54 .62 .21B .26B .54 .48 .39 .39

11 GWM08A 1849 2015 .69 .68 .67 .59 .61 .65 .58

12 GWM08B 1795 2016 .40 .54 .65 .55 .47 .59 .59 .56 .60

13 GWM09A 1826 2015 .62 .59 .55 .52 .49 .68 .79

14 GWM09B 1737 2015 .53 .30A .24B .39 .56 .60 .55 .54 .43 .46 .62

15 GWM10A 1832 2015 .60 .60 .59 .56 .50 .57 .58

16 GWM10B 1891 2015 .57 .57 .43 .41 .44

Av segment correlation .57 .42 .35 .53 .64 .55 .54 .56 .49 .49 .52

PART 6: POTENTIAL PROBLEMS: 17:27 Fri 07 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

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

GWM01A 1843 to 2015 173 years Series 1

[B] Entire series, effect on correlation ( .551) is:

Lower 1944> -.022 1991< -.017 1919> -.015 1899> -.009 2015< -.009 1961< -.008 Higher 1858 .019 1845 .015

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

GWM01B 1823 to 2015 193 years Series 2

[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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1966 2015 0 .12 -.27 -.04 .28 .15 -.12 -.12 .10 -.29 .12 .32\*-.01 - - - - - - - - -

[B] Entire series, effect on correlation ( .539) is:

Lower 2000< -.018 2015< -.017 2012> -.014 1891> -.010 1926< -.008 1993> -.008 Higher 1839 .017 1845 .014

1966 to 2015 segment:

Lower 2000< -.058 2015< -.054 2012> -.046 1993> -.025 1967> -.022 1981> -.020 Higher 1977 .078 1984 .053

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

1891 +3.1 SD

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GWM04A 1732 to 2015 284 years Series 3

[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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1950 1999 0 -.23 .09 .14 .10 .11 -.06 -.01 .02 .01 -.05 .32\*-.07 -.24 .14 -.01 -.06 .02 -.04 -.54 -.03 .21

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

Lower 1990< -.024 1895> -.022 1977> -.009 1838> -.007 1766< -.007 1779> -.007 Higher 1792 .009 1858 .009

1950 to 1999 segment:

Lower 1990< -.099 1977> -.047 1964> -.031 1987< -.017 1960< -.016 1992< -.016 Higher 1952 .036 1998 .030

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

1814 +3.3 SD; 1895 +5.0 SD

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GWM04B 1692 to 2015 324 years Series 4

[\*] Early part of series cannot be checked from 1692 to 1727 -- 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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1775 1824 9 -.01 .16 .05 .12 .11 -.20 .09 -.12 -.14 -.20 .18|-.25 .07 .11 -.01 .11 -.05 .01 -.04 .30\*-.03

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

1950 1999 0 -.01 -.02 .04 .21 .10 -.06 -.11 -.04 -.25 .10 .28\*-.23 .09 -.03 .03 .18 .07 -.19 -.38 .01 -.07

[B] Entire series, effect on correlation ( .494) is:

Lower 1855< -.013 1981> -.012 1730> -.011 1803< -.011 1779> -.011 1783< -.008 Higher 1845 .010 1944 .008

1775 to 1824 segment:

Lower 1779> -.057 1803< -.044 1783< -.039 1797> -.037 1787< -.031 1775< -.025 Higher 1776 .076 1818 .027

1950 to 1999 segment:

Lower 1981> -.075 1997< -.045 1965< -.031 1974> -.023 1964> -.018 1960< -.015 Higher 1988 .041 1952 .040

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

1730 +3.8 SD; 1779 +3.3 SD; 1797 +3.0 SD; 1981 +3.3 SD

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GWM05A 1849 to 2015 167 years Series 5

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

Lower 1963< -.022 1912< -.015 1919> -.012 1948> -.012 1988> -.009 1991> -.008 Higher 1944 .011 1867 .011

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

1909 +3.1 SD

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GWM05B 1820 to 2015 196 years Series 6

[B] Entire series, effect on correlation ( .491) is:

Lower 1899< -.020 1952> -.018 1877> -.012 1825> -.008 1945< -.008 1963< -.007 Higher 1895 .011 1839 .008

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

1877 +3.0 SD; 1917 +3.3 SD; 1952 +3.7 SD

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GWM06A 1802 to 2015 214 years Series 7

[B] Entire series, effect on correlation ( .547) is:

Lower 1877> -.018 1808> -.012 1929< -.011 1820> -.011 1821> -.011 1927< -.010 Higher 1944 .013 1838 .012

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

1808 +3.1 SD; 1821 +3.4 SD; 1877 +3.4 SD

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GWM06B 1795 to 2015 221 years Series 8

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

Lower 1803> -.024 1989< -.009 1899< -.007 1986< -.007 1964> -.006 1845> -.006 Higher 1838 .011 1944 .009

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

1803 +5.2 SD; 1817 +3.2 SD

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

GWM07a 1728 to 2015 288 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

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

1850 1899 -3 -.09 -.19 -.22 .21 -.08 -.11 .34 .35\* .08 .15 .35|-.06 -.15 -.09 -.02 -.18 -.16 -.10 -.44 -.14 .02

[B] Entire series, effect on correlation ( .432) is:

Lower 1730< -.013 1867> -.010 2002> -.009 2012> -.008 1886> -.007 1919> -.007 Higher 1792 .011 1764 .011

1850 to 1899 segment:

Lower 1867> -.068 1886> -.051 1862< -.026 1879< -.023 1863< -.021 1876< -.021 Higher 1877 .062 1855 .028

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

1851 +3.6 SD; 1886 +3.9 SD; 1958 +3.8 SD

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GWM07B 1772 to 2015 244 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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1772 1821 0 -.03 .09 .08 -.18 -.18 .11 -.18 .17 .13 .05 .32\*-.14 .15 -.18 -.10 -.19 -.25 -.02 .15 .01 .29

1775 1824 0 -.08 .13 .16 -.26 -.08 .07 -.17 .21 .09 -.02 .32\*-.10 .10 -.15 -.14 -.14 -.25 -.06 .09 -.01 .30

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

1850 1899 -3 -.22 -.20 -.31 -.07 .07 -.06 .02 .48\* .08 .12 .21|-.09 -.13 -.17 .07 -.13 -.16 -.01 -.10 -.18 .08

1875 1924 -3 .07 -.18 -.29 .04 .17 -.07 -.14 .35\* .06 .10 .26|-.06 -.18 -.08 -.03 -.16 .01 -.02 -.01 -.02 .05

[B] Entire series, effect on correlation ( .408) is:

Lower 1895> -.015 1878< -.014 1867> -.013 1888> -.011 1974< -.009 1776> -.008 Higher 1839 .014 1792 .013

1772 to 1821 segment:

Lower 1776> -.045 1818> -.028 1811< -.027 1799> -.023 1809> -.020 1781< -.017 Higher 1792 .078 1775 .023

1775 to 1824 segment:

Lower 1776> -.046 1818> -.027 1811< -.026 1799> -.022 1809> -.019 1781< -.017 Higher 1792 .073 1775 .023

1850 to 1899 segment:

Lower 1878< -.072 1895> -.061 1867> -.054 1888> -.046 1899> -.027 1863< -.023 Higher 1858 .060 1877 .042

1875 to 1924 segment:

Lower 1895> -.070 1878< -.069 1888> -.053 1899> -.031 1924< -.016 1916< -.015 Higher 1915 .050 1877 .034

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

1867 +3.2 SD; 1888 +3.3 SD; 1895 +3.5 SD; 1929 +3.6 SD

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

GWM08A 1849 to 2015 167 years Series 11

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

Lower 1974< -.015 1867> -.014 1901< -.012 1893< -.009 1926> -.008 2002> -.008 Higher 1937 .010 1919 .009

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

GWM08B 1795 to 2016 222 years Series 12

[\*] Later part of series cannot be checked from 2016 to 2016 -- not matched by another series

[B] Entire series, effect on correlation ( .539) is:

Lower 1918> -.016 1795< -.013 1909< -.010 1867> -.010 2011< -.009 1881< -.009 Higher 1944 .013 1845 .013

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GWM09A 1826 to 2015 190 years Series 13

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

Lower 1958< -.021 1945> -.011 1935< -.011 1906< -.010 1921< -.007 1826< -.007 Higher 1858 .013 2002 .009

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

1945 +4.4 SD

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GWM09B 1737 to 2015 279 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

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

1750 1799 0 -.03 .09 .06 -.03 -.05 .15 -.03 -.02 -.15 -.30 .30\*-.05 .01 .07 .09 -.08 .00 .11 .06 .10 -.03

1775 1824 -9 .20 .30\* .15 .00 .05 -.10 -.15 -.23 -.04 -.30 .24|-.01 .05 .23 .13 -.10 -.10 .06 .16 .12 -.03

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

Lower 1958< -.025 1765> -.010 1799> -.008 2009> -.007 1792> -.006 1917< -.006 Higher 1858 .012 1918 .008

1750 to 1799 segment:

Lower 1765> -.046 1799> -.041 1788< -.031 1768< -.021 1773< -.019 1791< -.019 Higher 1754 .041 1764 .040

1775 to 1824 segment:

Lower 1799> -.045 1788< -.028 1811> -.026 1792> -.023 1822< -.022 1824> -.022 Higher 1818 .040 1776 .035

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

1765 +3.6 SD; 1766 +3.1 SD; 1799 +3.8 SD; 1958 -4.8 SD

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GWM10A 1832 to 2015 184 years Series 15

[B] Entire series, effect on correlation ( .569) is:

Lower 1847< -.011 1953> -.010 1974> -.010 1943< -.009 1891> -.008 1926> -.008 Higher 1936 .011 1867 .009

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

1912 +3.7 SD; 1934 +3.2 SD; 1974 +3.1 SD

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GWM10B 1891 to 2015 125 years Series 16

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

Lower 1953> -.017 1977> -.013 1964> -.012 1974> -.011 2001< -.011 1904> -.009 Higher 2002 .020 1918 .018

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

1953 +3.0 SD; 2013 +3.7 SD

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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 GWM01A 1843 2015 173 7 0 .551 2.00 3.52 .512 .543 .203 2.66 .491 -.061 1

2 GWM01B 1823 2015 193 8 1 .539 1.85 2.78 .401 .369 .193 2.57 .443 -.030 1

3 GWM04A 1732 2015 284 11 1 .496 1.59 3.56 .620 .774 .214 2.71 .427 .012 1

4 GWM04B 1692 2015 324 11 2 .494 1.48 2.98 .601 .747 .228 2.62 .443 -.011 1

5 GWM05A 1849 2015 167 7 0 .585 2.18 3.97 .575 .634 .174 2.82 .494 .014 1

6 GWM05B 1820 2015 196 8 0 .491 1.91 4.49 .630 .765 .160 2.90 .459 -.061 2

7 GWM06A 1802 2015 214 8 0 .547 1.75 3.88 .742 .872 .180 2.68 .481 -.002 1

8 GWM06B 1795 2015 221 9 0 .599 1.89 4.30 .939 .884 .195 3.00 .403 -.012 1

9 GWM07a 1728 2015 288 11 1 .432 1.23 3.47 .524 .599 .251 3.09 .500 .001 1

10 GWM07B 1772 2015 244 10 4 .408 1.25 2.99 .479 .666 .221 3.01 .521 .029 1

11 GWM08A 1849 2015 167 7 0 .625 2.49 4.38 .669 .648 .165 2.71 .441 .015 1

12 GWM08B 1795 2016 222 9 0 .539 2.15 4.12 .736 .764 .187 2.72 .380 .004 1

13 GWM09A 1826 2015 190 7 0 .600 1.81 4.07 .508 .571 .192 2.76 .424 -.012 2

14 GWM09B 1737 2015 279 11 2 .472 1.35 3.01 .468 .692 .218 2.67 .414 .036 1

15 GWM10A 1832 2015 184 7 0 .569 2.01 4.97 .750 .733 .185 2.97 .416 -.009 1

16 GWM10B 1891 2015 125 5 0 .516 2.80 4.92 .723 .608 .167 2.83 .543 .022 1

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Total or mean: 3471 136 11 .521 1.77 4.97 .611 .689 .201 3.09 .452 -.003

- = [ COFECHA GWM COF ] = -