[] Dendrochronology Program Library Run LWT Program COF 15:20 Thu 21 Apr 2016 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 29698

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

File of DATED series: LWT3.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 1770 to 2015 246 years

Continuous time span is 1770 to 2015 246 years

Portion with two or more series is 1800 to 2015 216 years

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

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

\*O\* Master series 1770 2015 246 yrs \*O\*

\*F\* Total rings in all series 2970 \*F\*

\*E\* Total dated rings checked 2940 \*E\*

\*C\* Series intercorrelation .607 \*C\*

\*H\* Average mean sensitivity .382 \*H\*

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

\*\*\* Mean length of series 123.8 \*\*\*

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

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: 15:20 Thu 21 Apr 2016 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

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

. . . . . . . . . . . . . . . . . .<=========> . LWT01A 1 1919 2015 97

. . . . . . . . . . . . . . . . . .<=========> . LWT01B 2 1917 2015 99

. . . . . . . . . . . . . . . . . <============> . LWT02A 3 1883 2015 133

. . . . . . . . . . . . . . . . . <============> . LWT02B 4 1881 2015 135

. . . . . . . . . . . . . . . . . .<=========> . LWT03A 5 1918 2015 98

. . . . . . . . . . . . . . . . .<==============> . LWT03B 6 1862 2015 154

. . . . . . . . . . . . . . . . . . <=======> . LWT04A 7 1936 2015 80

. . . . . . . . . . . . . . . . . . <======> . LWT04B 8 1947 2015 69

. . . . . . . . . . . . . . . . . <===========> . LWT05A 9 1899 2015 117

. . . . . . . . . . . . . . . . . <==========> . LWT05B 10 1900 2015 116

. . . . . . . . . . . . . . . . . . <========> . LWT06A 11 1926 2015 90

. . . . . . . . . . . . . . . . . . <========> . LWT06B 12 1921 2015 95

. . . . . . . . . . . . . . . . . . <=======> . LWT07A 13 1932 2015 84

. . . . . . . . . . . . . . . . . . <========> . LWT07B 14 1922 2015 94

. . . . . . . . . . . . . . . . . . <========> . LWT08A 15 1927 2015 89

. . . . . . . . . . . . . . . . . .<=========> . LWT8B 16 1917 2015 99

. . . . . . . . . . . . . . . . . . <=======> . LWT09A 17 1935 2015 81

. . . . . . . . . . . . . . . . . <==========> . LWT09B 18 1909 2015 107

. . . . . . . . . . . . . . . .<===================> . LWT10A 19 1814 2015 202

. . . . . . . . . . . . . . . . <==================> . LWT10B 20 1821 2015 195

. . . . . . . . . . . . . . . . . . <========> . LWT11A 21 1925 2015 91

. . . . . . . . . . . . . . . <=======================> . LWT11B 22 1770 2015 246

. . . . . . . . . . . . . . . . <=================> . LWT12A 23 1833 2015 183

. . . . . . . . . . . . . . . <====================> . LWT12B 24 1800 2015 216

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

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: 15:20 Thu 21 Apr 2016 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 .700 2 1850 -.612 5 1900 -.103 10 1950 .484 24 2000 -1.322 24

1801 -.459 2 1851 -.630 5 1901 -1.811 10 1951 .952 24 2001 .904 24

1802 .269 2 1852 .295 5 1902 -.698 10 1952 .348 24 2002 .563 24

1803 -.154 2 1853 .849 5 1903 -.162 10 1953 -1.408 24 2003 -.390 24

1804 .220 2 1854 -.079 5 1904 .312 10 1954 -1.564 24 2004 .822 24

1805 .501 2 1855 -1.326 5 1905 .664 10 1955 -.675 24 2005 .678 24

1806 .835 2 1856 -.725 5 1906 .659 10 1956 -.314 24 2006 .573 24

1807 -.803 2 1857 -1.042 5 1907 .881 10 1957 1.192 24 2007 -1.159 24

1808 -.280 2 1858 .181 5 1908 .886 10 1958 1.384 24 2008 -.252 24

1809 1.654 2 1859 .796 5 1909 .957 11 1959 .633 24 2009 .328 24

1810 .789 2 1860 .780 5 1910 .958 11 1960 .583 24 2010 1.236 24

1811 .526 2 1861 -.291 5 1911 .376 11 1961 -.581 24 2011 .139 24

1812 .862 2 1862 .406 6 1912 1.576 11 1962 -.452 24 2012 -2.192 24

1813 .380 2 1863 1.275 6 1913 -.173 11 1963 .174 24 2013 -.551 24

1814 -.037 3 1864 -1.834 6 1914 -1.903 11 1964 -1.633 24 2014 -.567 24

1815 -2.249 3 1865 -2.068 6 1915 .043 11 1965 -.755 24 2015 1.393 24

1816 .442 3 1866 .256 6 1916 1.061 11 1966 -.450 24

1817 .174 3 1867 -.493 6 1917 -1.681 13 1967 -1.008 24

1818 -.109 3 1868 -.766 6 1918 -1.610 14 1968 1.093 24

1819 -1.153 3 1869 .683 6 1919 -.260 15 1969 1.016 24

1770 -.039 1 1820 -1.278 3 1870 .549 6 1920 .118 15 1970 -.029 24

1771 .098 1 1821 -.619 4 1871 -1.108 6 1921 .063 16 1971 1.083 24

1772 .367 1 1822 -.590 4 1872 -.061 6 1922 -.905 17 1972 -.070 24

1773 1.550 1 1823 .911 4 1873 .699 6 1923 .129 17 1973 .968 24

1774 .350 1 1824 .141 4 1874 -.733 6 1924 .813 17 1974 -.188 24

1775 -3.595 1 1825 -.056 4 1875 -.085 6 1925 -.221 18 1975 .616 24

1776 -.640 1 1826 .978 4 1876 .081 6 1926 -.179 19 1976 -1.294 24

1777 -.516 1 1827 1.559 4 1877 -.608 6 1927 .951 20 1977 -.633 24

1778 -1.536 1 1828 1.281 4 1878 1.623 6 1928 1.349 20 1978 .243 24

1779 .163 1 1829 .001 4 1879 .869 6 1929 1.021 20 1979 -.301 24

1780 2.742 1 1830 .674 4 1880 .892 6 1930 -.996 20 1980 1.058 24

1781 2.480 1 1831 -1.153 4 1881 -.560 7 1931 -.092 20 1981 .530 24

1782 -.112 1 1832 -1.187 4 1882 .545 7 1932 .459 21 1982 1.257 24

1783 .288 1 1833 .555 5 1883 1.584 8 1933 -.779 21 1983 -1.161 24

1784 .027 1 1834 -1.073 5 1884 1.056 8 1934 -.891 21 1984 -2.077 24

1785 -1.015 1 1835 .980 5 1885 .633 8 1935 .422 22 1985 -.208 24

1786 -1.895 1 1836 -1.083 5 1886 .108 8 1936 -1.470 23 1986 .690 24

1787 -1.831 1 1837 1.147 5 1887 -1.358 8 1937 -.860 23 1987 .693 24

1788 .247 1 1838 -.094 5 1888 -1.714 8 1938 .998 23 1988 -2.638 24

1789 -1.336 1 1839 -2.057 5 1889 .335 8 1939 1.536 23 1989 -.055 24

1790 .279 1 1840 -.137 5 1890 .889 8 1940 -.685 23 1990 .353 24

1791 1.094 1 1841 -1.078 5 1891 -.391 8 1941 -1.260 23 1991 -.047 24

1792 2.323 1 1842 -1.181 5 1892 .488 8 1942 .865 23 1992 .796 24

1793 .440 1 1843 .575 5 1893 -1.100 8 1943 .362 23 1993 1.013 24

1794 .589 1 1844 .490 5 1894 -1.038 8 1944 -1.534 23 1994 -1.309 24

1795 -.146 1 1845 .999 5 1895 -1.637 8 1945 -.348 23 1995 .138 24

1796 -1.194 1 1846 1.755 5 1896 .052 8 1946 .642 23 1996 -.487 24

1797 -.458 1 1847 1.041 5 1897 1.193 8 1947 .545 24 1997 -.530 24

1798 2.550 1 1848 .601 5 1898 -1.019 8 1948 .446 24 1998 1.399 24

1799 -.322 1 1849 -.439 5 1899 -.804 9 1949 .696 24 1999 .042 24

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PART 4: Master Bar Plot: 15:20 Thu 21 Apr 2016 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--b 1900----@ 1950-------B 2000-e

1801---b 1851--c 1901g 1951---------D 2001---------D

1802------A 1852------A 1902--c 1952------A 2002-------B

1803----a 1853--------C 1903----a 1953-f 2003---b

1804-----A 1854----@ 1904------A 1954f 2004--------C

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

1806--------C 1856--c 1906-------C 1956---a 2006-------B

1807--c 1857-d 1907--------D 1957---------E 2007-e

1808----a 1858-----A 1908--------D 1958----------F 2008----a

1809----------G 1859--------C 1909---------D 1959-------C 2009------A

1810--------C 1860--------C 1910---------D 1960-------B 2010---------E

1811-------B 1861---a 1911------B 1961---b 2011-----A

1812--------C 1862------B 1912----------F 1962---b 2012i

1813------B 1863----------E 1913----a 1963-----A 2013---b

1814----@ 1864g 1914h 1964g 2014---b

1815i 1865h 1915-----@ 1965--c 2015----------F

1816------B 1866------A 1916---------D 1966---b

1817-----A 1867---b 1917g 1967-d

1818----@ 1868--c 1918f 1968---------D

1819-e 1869-------C 1919----a 1969---------D

1770----@ 1820-e 1870-------B 1920-----@ 1970----@

1771-----@ 1821--b 1871-d 1921-----@ 1971---------D

1772------A 1822---b 1872----@ 1922--d 1972----@

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

1774------A 1824-----A 1874--c 1924--------C 1974----a

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

1776--c 1826---------D 1876-----@ 1926----a 1976-e

1777---b 1827----------F 1877--b 1927---------D 1977--c

1778f 1828----------E 1878----------F 1928----------E 1978------A

1779-----A 1829-----@ 1879--------C 1929---------D 1979---a

1780----------K 1830-------C 1880--------D 1930-d 1980---------D

1781----------J 1831-e 1881---b 1931----@ 1981-------B

1782----@ 1832-e 1882-------B 1932------B 1982---------E

1783------A 1833-------B 1883----------F 1933--c 1983-e

1784-----@ 1834-d 1884---------D 1934--d 1984h

1785-d 1835---------D 1885-------C 1935------B 1985----a

1786h 1836-d 1886-----@ 1936-f 1986--------C

1787g 1837---------E 1887-e 1937--c 1987--------C

1788------A 1838----@ 1888g 1938---------D 1988k

1789-e 1839h 1889------A 1939----------F 1989----@

1790------A 1840----a 1890--------D 1940--c 1990------A

1791---------D 1841-d 1891---b 1941-e 1991----@

1792----------I 1842-e 1892-------B 1942--------C 1992--------C

1793------B 1843-------B 1893-d 1943------A 1993---------D

1794-------B 1844-------B 1894-d 1944f 1994-e

1795----a 1845---------D 1895g 1945---a 1995-----A

1796-e 1846----------G 1896-----@ 1946-------C 1996---b

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

1798----------J 1848-------B 1898-d 1948------B 1998----------F

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

PART 5: CORRELATION OF SERIES BY SEGMENTS: 15:20 Thu 21 Apr 2016 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 1800 1825 1850 1875 1900 1925 1950 1975

1849 1874 1899 1924 1949 1974 1999 2024

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

1 LWT01A 1919 2015 .81 .83 .83 .84

2 LWT01B 1917 2015 .74 .76 .77 .79

3 LWT02A 1883 2015 .52 .69 .62 .54 .63

4 LWT02B 1881 2015 .64 .82 .70 .63 .62

5 LWT03A 1918 2015 .76 .83 .49 .41

6 LWT03B 1862 2015 .64 .75 .75 .74 .74 .77

7 LWT04A 1936 2015 .61 .68 .64

8 LWT04B 1947 2015 .72 .73 .73

9 LWT05A 1899 2015 .62 .63 .82 .83 .74

10 LWT05B 1900 2015 .68 .79 .82 .70

11 LWT06A 1926 2015 .50 .73 .78

12 LWT06B 1921 2015 .63 .65 .74 .72

13 LWT07A 1932 2015 .34 .60 .68

14 LWT07B 1922 2015 .61 .72 .79 .82

15 LWT08A 1927 2015 .66 .70 .77

16 LWT8B 1917 2015 .40 .55 .65 .59

17 LWT09A 1935 2015 .60 .37 .41

18 LWT09B 1909 2015 .43 .53 .41 .45

19 LWT10A 1814 2015 .31B .35 .43 .67 .78 .73 .70 .67

20 LWT10B 1821 2015 .51 .55 .57 .78 .69 .50 .60 .69

21 LWT11A 1925 2015 .66 .62 .55

22 LWT11B 1770 2015 .17A .37 .45 .57 .57 .59 .48 .47

23 LWT12A 1833 2015 .50 .52 .68 .52 .51 .79 .79

24 LWT12B 1800 2015 .33A .62 .62 .58 .58 .54 .63 .60

Av segment correlation .33 .48 .54 .65 .65 .64 .66 .66

PART 6: POTENTIAL PROBLEMS: 15:20 Thu 21 Apr 2016 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

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

LWT01A 1919 to 2015 97 years Series 1

[B] Entire series, effect on correlation ( .827) is:

Lower 1977< -.012 2006< -.012 1962< -.006 2005< -.005 1957< -.004 2000> -.004 Higher 1988 .025 2012 .008

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

LWT01B 1917 to 2015 99 years Series 2

[B] Entire series, effect on correlation ( .768) is:

Lower 2006< -.018 1951< -.012 2005< -.010 1918> -.010 1957< -.009 1996> -.009 Higher 1988 .027 1917 .016

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

LWT02A 1883 to 2015 133 years Series 3

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

Lower 1898> -.021 1891> -.011 1979< -.009 1961< -.008 1958< -.008 1980< -.008 Higher 2012 .017 1936 .012

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

LWT02B 1881 to 2015 135 years Series 4

[B] Entire series, effect on correlation ( .652) is:

Lower 1898> -.022 2002< -.021 1991< -.019 1891> -.013 1967> -.006 1985> -.006 Higher 1988 .018 1917 .017

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

LWT03A 1918 to 2015 98 years Series 5

[B] Entire series, effect on correlation ( .568) is:

Lower 2001< -.041 1985< -.036 1984> -.019 1976> -.018 1994> -.018 1989< -.017 Higher 2012 .017 1964 .012

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

1984 1985 -4.1 SD

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

1984 +3.2 SD

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LWT03B 1862 to 2015 154 years Series 6

[B] Entire series, effect on correlation ( .730) is:

Lower 1864> -.015 1967< -.011 1879< -.009 1901> -.008 1862< -.007 1991> -.005 Higher 1988 .020 1936 .006

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

LWT04A 1936 to 2015 80 years Series 7

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

Lower 2009< -.082 1958< -.020 1965> -.019 1968< -.019 1998< -.012 1980< -.010 Higher 1988 .061 2012 .020

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

1965 +3.3 SD

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

LWT04B 1947 to 2015 69 years Series 8

[B] Entire series, effect on correlation ( .710) is:

Lower 1966< -.021 1996< -.017 2000> -.012 1947< -.010 1962> -.010 1950< -.008 Higher 1984 .013 1994 .012

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LWT05A 1899 to 2015 117 years Series 9

[B] Entire series, effect on correlation ( .684) is:

Lower 1901< -.068 2000> -.012 2005< -.007 2004< -.006 1902> -.006 1915< -.005 Higher 1988 .020 1912 .008

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

1901 1902 4.1 SD

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

1901 -7.1 SD

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LWT05B 1900 to 2015 116 years Series 10

[B] Entire series, effect on correlation ( .714) is:

Lower 1906< -.017 1917> -.010 1900> -.008 2003> -.007 1909< -.006 1926< -.006 Higher 1988 .020 1901 .010

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LWT06A 1926 to 2015 90 years Series 11

[B] Entire series, effect on correlation ( .653) is:

Lower 1936> -.048 1965< -.016 1964> -.013 1976> -.011 1961> -.010 1930> -.009 Higher 1988 .056 1994 .012

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

1936 +3.9 SD

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

LWT06B 1921 to 2015 95 years Series 12

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

Lower 1967> -.022 1938< -.020 1976< -.019 1929< -.010 1925> -.009 1977> -.007 Higher 1988 .019 1983 .010

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

1976 -4.8 SD

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

LWT07A 1932 to 2015 84 years Series 13

[B] Entire series, effect on correlation ( .548) is:

Lower 1940> -.024 1953> -.023 1958< -.018 1979> -.016 1945< -.015 1968< -.014 Higher 1988 .057 1998 .014

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

1994 -5.6 SD

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

LWT07B 1922 to 2015 94 years Series 14

[B] Entire series, effect on correlation ( .730) is:

Lower 1922> -.043 1937> -.010 1956> -.009 1953> -.009 1923< -.008 1967> -.007 Higher 1988 .019 2012 .015

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

1922 +3.9 SD

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LWT08A 1927 to 2015 89 years Series 15

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

Lower 1954< -.022 2000> -.019 1960< -.011 2003< -.008 1961> -.008 1937> -.008 Higher 1988 .030 2012 .018

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LWT8B 1917 to 2015 99 years Series 16

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

Lower 1917> -.059 1926< -.042 2000> -.020 1918> -.013 1934> -.012 1967> -.012 Higher 2012 .020 1964 .019

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

1917 +4.0 SD; 1918 +3.1 SD; 1926 -5.1 SD

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LWT09A 1935 to 2015 81 years Series 17

[B] Entire series, effect on correlation ( .462) is:

Lower 1988> -.091 1949< -.047 1987< -.040 1993< -.039 1995< -.011 1937> -.011 Higher 1936 .029 2012 .019

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

1987 1988 5.1 SD

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

1988 +4.7 SD

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LWT09B 1909 to 2015 107 years Series 18

[B] Entire series, effect on correlation ( .439) is:

Lower 1998< -.077 1909< -.039 1949< -.019 1913> -.014 1997> -.012 1937> -.011 Higher 1936 .018 1944 .013

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

1997 1998 -4.4 SD

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

1997 +3.1 SD; 1998 -4.6 SD

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LWT10A 1814 to 2015 202 years Series 19

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

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

1814 1863 10 -.13 -.19 -.06 .03 -.08 .24 -.19 .05 -.14 -.08 .31|-.04 .18 .18 -.01 .00 -.24 -.11 -.30 -.27 .31\*

[B] Entire series, effect on correlation ( .554) is:

Lower 1839< -.027 1854< -.020 1818> -.013 1847< -.008 1878< -.007 1856> -.007 Higher 1988 .028 1836 .010

1814 to 1863 segment:

Lower 1854< -.041 1818> -.037 1839< -.031 1856> -.021 1842> -.019 1847< -.019 Higher 1836 .062 1815 .031

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

1839 1840 4.2 SD

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

1818 +3.7 SD; 1839 -7.6 SD; 1856 +3.2 SD

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LWT10B 1821 to 2015 195 years Series 20

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

Lower 1821> -.017 1959< -.010 1856> -.009 1958< -.008 1993< -.008 1869< -.008 Higher 1988 .019 1917 .014

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

1821 +3.5 SD; 1873 +3.6 SD

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

LWT11A 1925 to 2015 91 years Series 21

[B] Entire series, effect on correlation ( .594) is:

Lower 2012> -.022 1925> -.019 1987< -.017 1942< -.014 1988> -.011 2001< -.010 Higher 1976 .015 1964 .012

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LWT11B 1770 to 2015 246 years Series 22

[\*] Early part of series cannot be checked from 1770 to 1799 -- 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

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

1800 1849 0 .02 .08 -.13 -.01 -.08 -.07 .10 .07 .14 -.15 .17\* .08 -.02 -.03 -.23 .01 -.17 .09 .15 -.01 -.29

[B] Entire series, effect on correlation ( .401) is:

Lower 1809> -.017 2012> -.014 1992< -.013 1807> -.012 1839> -.012 1823< -.011 Higher 1917 .013 1864 .009

1800 to 1849 segment:

Lower 1809> -.058 1823< -.040 1839> -.032 1800< -.024 1848< -.023 1807> -.020 Higher 1837 .040 1836 .028

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

1809 +5.1 SD; 1839 +4.1 SD; 1955 +3.1 SD; 2012 +3.5 SD

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

LWT12A 1833 to 2015 183 years Series 23

[B] Entire series, effect on correlation ( .610) is:

Lower 1839> -.020 1872< -.019 1934< -.015 1933> -.009 1863< -.009 1912< -.007 Higher 1988 .017 1917 .013

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

1839 +3.6 SD

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

LWT12B 1800 to 2015 216 years Series 24

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

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

1800 1849 0 .02 -.23 .17 .01 -.30 -.03 -.08 -.09 .16 -.03 .33\*-.12 .19 .02 .06 .10 -.19 .12 -.21 .05 .11

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

Lower 1809< -.034 1829< -.012 1867> -.010 1807< -.009 1922> -.008 1800> -.007 Higher 1988 .023 1917 .016

1800 to 1849 segment:

Lower 1809< -.097 1829< -.037 1800> -.027 1807< -.026 1824> -.014 1813> -.014 Higher 1815 .040 1836 .024

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

1800 +4.0 SD; 1809 -5.1 SD; 1867 +3.4 SD

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PART 7: DESCRIPTIVE STATISTICS: 15:20 Thu 21 Apr 2016 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 LWT01A 1919 2015 97 4 0 .827 2.81 5.74 1.209 .548 .377 2.49 .425 .032 1

2 LWT01B 1917 2015 99 4 0 .768 2.90 6.17 1.270 .542 .384 2.71 .574 -.006 1

3 LWT02A 1883 2015 133 5 0 .591 3.15 9.84 2.133 .730 .380 2.87 .537 -.008 1

4 LWT02B 1881 2015 135 5 0 .652 3.03 9.87 1.951 .744 .355 2.61 .432 -.006 2

5 LWT03A 1918 2015 98 4 0 .568 1.76 3.87 .752 .253 .419 2.84 .564 .022 1

6 LWT03B 1862 2015 154 6 0 .730 2.43 8.42 1.147 .392 .400 2.80 .543 -.017 1

7 LWT04A 1936 2015 80 3 0 .631 6.21 14.32 3.053 .562 .396 2.62 .516 .007 2

8 LWT04B 1947 2015 69 3 0 .710 5.96 15.60 3.429 .728 .410 2.71 .639 .030 2

9 LWT05A 1899 2015 117 5 0 .684 3.05 9.04 1.707 .554 .408 2.62 .316 -.037 2

10 LWT05B 1900 2015 116 4 0 .714 2.56 6.88 1.474 .508 .397 3.05 .565 .044 1

11 LWT06A 1926 2015 90 3 0 .653 4.67 10.70 1.910 .489 .363 2.61 .471 -.052 2

12 LWT06B 1921 2015 95 4 0 .699 4.03 7.74 1.687 .396 .387 2.52 .409 -.021 2

13 LWT07A 1932 2015 84 3 0 .548 4.65 12.21 2.767 .698 .438 2.74 .407 -.031 1

14 LWT07B 1922 2015 94 4 0 .730 4.58 12.23 2.474 .643 .383 2.76 .537 .024 1

15 LWT08A 1927 2015 89 3 0 .699 4.11 7.98 1.419 .268 .364 2.60 .468 -.032 2

16 LWT8B 1917 2015 99 4 0 .494 4.09 7.59 1.514 .341 .367 2.53 .528 -.028 2

17 LWT09A 1935 2015 81 3 0 .462 4.40 15.60 2.918 .618 .453 2.70 .621 -.020 1

18 LWT09B 1909 2015 107 4 0 .439 4.42 16.68 3.295 .674 .428 2.86 .587 -.013 1

19 LWT10A 1814 2015 202 8 1 .554 1.52 7.40 1.081 .790 .318 2.69 .396 -.042 4

20 LWT10B 1821 2015 195 8 0 .608 1.50 7.30 1.165 .827 .342 2.79 .412 -.063 2

21 LWT11A 1925 2015 91 3 0 .594 1.66 4.73 .955 .643 .356 2.75 .495 .007 2

22 LWT11B 1770 2015 246 8 1 .401 1.42 5.77 1.139 .677 .439 3.08 .382 -.052 2

23 LWT12A 1833 2015 183 7 0 .610 1.76 4.97 1.060 .667 .348 2.64 .428 -.063 2

24 LWT12B 1800 2015 216 8 1 .525 1.38 4.30 .729 .546 .351 2.91 .474 -.041 2

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Total or mean: 2970 113 3 .607 2.84 16.68 1.589 .598 .382 3.08 .474 -.022

- = [ COFECHA LWT COF ] = -