[] Dendrochronology Program Library Run SWP Program COF 15:06 Mon 05 Jun 2017 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 30108

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 QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

 File of DATED series: swpfinal.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 1909 to 2016 108 years

 Continuous time span is 1909 to 2016 108 years

 Portion with two or more series is 1913 to 2016 104 years

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

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

 \*O\* Master series 1909 2016 108 yrs \*O\*

 \*F\* Total rings in all series 1859 \*F\*

 \*E\* Total dated rings checked 1855 \*E\*

 \*C\* Series intercorrelation .710 \*C\*

 \*H\* Average mean sensitivity .196 \*H\*

 \*A\* Segments, possible problems 0 \*A\*

 \*\*\* Mean length of series 92.9 \*\*\*

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

 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: 15:06 Mon 05 Jun 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

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

 . . . . . . . . . . . . . . . . . .<=========> . SWP01A 1 1919 2016 98

 . . . . . . . . . . . . . . . . . . <========> . SWP01B 2 1924 2016 93

 . . . . . . . . . . . . . . . . . .<=========> . SWP02A 3 1915 2016 102

 . . . . . . . . . . . . . . . . . . <========> . SWP02B 4 1923 2016 94

 . . . . . . . . . . . . . . . . . .<=========> . SWP03A 5 1915 2016 102

 . . . . . . . . . . . . . . . . . .<=========> . SWP03B 6 1913 2016 104

 . . . . . . . . . . . . . . . . . .<=========> . SWP04A 7 1913 2016 104

 . . . . . . . . . . . . . . . . . . <========> . SWP04B 8 1928 2016 89

 . . . . . . . . . . . . . . . . . . <========> . SWP05A 9 1924 2016 93

 . . . . . . . . . . . . . . . . . . <========> . SWP05B 10 1928 2016 89

 . . . . . . . . . . . . . . . . . <==========> . SWP06A 11 1909 2016 108

 . . . . . . . . . . . . . . . . . . <=======> . SWP06B 12 1935 2016 82

 . . . . . . . . . . . . . . . . . . <======> . SWP07A 13 1941 2016 76

 . . . . . . . . . . . . . . . . . .<=========> . SWP07B 14 1918 2016 99

 . . . . . . . . . . . . . . . . . . <=======> . SWP08A 15 1933 2016 84

 . . . . . . . . . . . . . . . . . . <=======> . SWP08B 16 1933 2016 84

 . . . . . . . . . . . . . . . . . .<=========> . SWP09A 17 1916 2016 101

 . . . . . . . . . . . . . . . . . . <========> . SWP09B 18 1922 2016 95

 . . . . . . . . . . . . . . . . . . <=======> . SWP10A 19 1930 2016 87

 . . . . . . . . . . . . . . . . . . <======> . SWP10B 20 1942 2016 75

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

 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: 15:06 Mon 05 Jun 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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 1950 -.283 20 2000 .243 20

 1951 .166 20 2001 .474 20

 1952 -.167 20 2002 1.504 20

 1953 -1.131 20 2003 .604 20

 1954 -1.817 20 2004 .335 20

 1955 -.171 20 2005 .657 20

 1956 -.474 20 2006 1.560 20

 1957 1.702 20 2007 -1.327 20

 1958 1.458 20 2008 .145 20

 1909 .438 1 1959 -.419 20 2009 .801 20

 1910 1.186 1 1960 -.094 20 2010 .686 20

 1911 1.869 1 1961 .274 20 2011 1.179 20

 1912 .212 1 1962 -1.545 20 2012 -2.748 20

 1913 .327 3 1963 -1.157 20 2013 -.547 20

 1914 .709 3 1964 -1.648 20 2014 -.957 20

 1915 1.595 5 1965 -1.730 20 2015 -.213 20

 1916 .952 6 1966 -1.878 20 2016 .802 20

 1917 -.300 6 1967 .106 20

 1918 .746 7 1968 1.177 20

 1919 -1.788 8 1969 .770 20

 1920 -.426 8 1970 1.571 20

 1921 .021 8 1971 .161 20

 1922 -.269 9 1972 .019 20

 1923 -.654 10 1973 1.203 20

 1924 -.689 12 1974 .900 20

 1925 -1.052 12 1975 .068 20

 1926 -1.177 12 1976 .031 20

 1927 -.140 12 1977 .632 20

 1928 .402 14 1978 .493 20

 1929 .540 14 1979 .714 20

 1930 -1.404 15 1980 .449 20

 1931 -.505 15 1981 1.179 20

 1932 -.456 15 1982 .011 20

 1933 .816 17 1983 -.542 20

 1934 .229 17 1984 -1.345 20

 1935 1.308 18 1985 .165 20

 1936 -.853 18 1986 .054 20

 1937 .514 18 1987 -.334 20

 1938 2.051 18 1988 -2.355 20

 1939 .745 18 1989 .480 20

 1940 -.479 18 1990 -1.465 20

 1941 -.849 19 1991 -.899 20

 1942 .776 20 1992 .734 20

 1943 .718 20 1993 1.254 20

 1944 -1.387 20 1994 .140 20

 1945 1.304 20 1995 .376 20

 1946 .560 20 1996 -1.810 20

 1947 .290 20 1997 -1.898 20

 1948 -.109 20 1998 -.970 20

 1949 -.765 20 1999 -.360 20

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PART 4: Master Bar Plot: 15:06 Mon 05 Jun 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

 1950---a 2000------A

 1951-----A 2001-------B

 1952----a 2002----------F

 1953-e 2003-------B

 1954g 2004------A

 1955----a 2005--------C

 1956---b 2006----------F

 1957----------G 2007-e

 1958----------F 2008-----A

 1909------B 1959---b 2009--------C

 1910---------E 1960----@ 2010--------C

 1911----------G 1961------A 2011---------E

 1912-----A 1962f 2012k

 1913------A 1963-e 2013---b

 1914--------C 1964g 2014-d

 1915----------F 1965g 2015----a

 1916--------D 1966h 2016--------C

 1917---a 1967-----@

 1918--------C 1968---------E

 1919g 1969--------C

 1920---b 1970----------F

 1921-----@ 1971-----A

 1922---a 1972-----@

 1923--c 1973---------E

 1924--c 1974--------D

 1925-d 1975-----@

 1926-e 1976-----@

 1927----a 1977-------C

 1928------B 1978-------B

 1929-------B 1979--------C

 1930-f 1980-------B

 1931---b 1981---------E

 1932---b 1982----@

 1933--------C 1983---b

 1934-----A 1984-e

 1935---------E 1985-----A

 1936--c 1986-----@

 1937-------B 1987---a

 1938----------H 1988i

 1939--------C 1989-------B

 1940---b 1990-f

 1941--c 1991--d

 1942--------C 1992--------C

 1943--------C 1993---------E

 1944-f 1994-----A

 1945---------E 1995------B

 1946-------B 1996g

 1947------A 1997h

 1948----@ 1998-d

 1949--c 1999---a

PART 5: CORRELATION OF SERIES BY SEGMENTS: 15:06 Mon 05 Jun 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 1900 1925 1950 1975

 1949 1974 1999 2024

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

 1 SWP01A 1919 2016 .44 .56 .36 .45

 2 SWP01B 1924 2016 .52 .52 .43 .54

 3 SWP02A 1915 2016 .83 .82 .82 .90

 4 SWP02B 1923 2016 .63 .63 .81 .86

 5 SWP03A 1915 2016 .72 .71 .75 .85

 6 SWP03B 1913 2016 .67 .68 .69 .70

 7 SWP04A 1913 2016 .51 .70 .71 .78

 8 SWP04B 1928 2016 .62 .55 .72

 9 SWP05A 1924 2016 .79 .81 .83 .81

 10 SWP05B 1928 2016 .82 .64 .58

 11 SWP06A 1909 2016 .40 .52 .78 .77

 12 SWP06B 1935 2016 .78 .81 .88

 13 SWP07A 1941 2016 .73 .76 .85

 14 SWP07B 1918 2016 .76 .77 .65 .65

 15 SWP08A 1933 2016 .71 .65 .76

 16 SWP08B 1933 2016 .68 .67 .78

 17 SWP09A 1916 2016 .75 .77 .69 .50

 18 SWP09B 1922 2016 .73 .79 .71 .79

 19 SWP10A 1930 2016 .66 .69 .82

 20 SWP10B 1942 2016 .67 .74 .78

 Av segment correlation .64 .70 .69 .74

PART 6: POTENTIAL PROBLEMS: 15:06 Mon 05 Jun 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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 SWP01A 1919 to 2016 98 years Series 1

 [B] Entire series, effect on correlation ( .431) is:

 Lower 1990> -.047 1977< -.036 1919> -.026 1964< -.010 1993< -.010 1998> -.007 Higher 2012 .032 1938 .016

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

 1990 +4.3 SD

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

 SWP01B 1924 to 2016 93 years Series 2

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

 Lower 2005< -.028 1990> -.026 1962> -.020 1996> -.018 1979< -.011 1963> -.009 Higher 2012 .031 1988 .024

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

 1963 +3.1 SD; 1988 -5.3 SD; 1996 +3.0 SD

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

 SWP02A 1915 to 2016 102 years Series 3

 [B] Entire series, effect on correlation ( .870) is:

 Lower 1981< -.012 1936> -.011 1931> -.005 1946< -.005 1987> -.004 1997> -.004 Higher 2012 .034 1919 .009

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

 SWP02B 1923 to 2016 94 years Series 4

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

 Lower 1925< -.019 1948< -.016 1941> -.015 1939< -.012 1931> -.008 1997> -.006 Higher 2012 .073 2007 .012

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

 SWP03A 1915 to 2016 102 years Series 5

 [B] Entire series, effect on correlation ( .794) is:

 Lower 1958< -.014 1949> -.012 1926> -.008 1930< -.008 1925> -.007 1934> -.006 Higher 2012 .022 1919 .013

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

 SWP03B 1913 to 2016 104 years Series 6

 [B] Entire series, effect on correlation ( .687) is:

 Lower 1925> -.014 1952> -.013 1929< -.011 1983> -.010 1914< -.009 2016< -.008 Higher 1988 .015 1996 .014

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

 1952 +3.4 SD

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

 SWP04A 1913 to 2016 104 years Series 7

 [B] Entire series, effect on correlation ( .677) is:

 Lower 1919> -.042 1941< -.012 1984> -.009 1949> -.007 1930> -.007 1921< -.007 Higher 2012 .039 2007 .012

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

 SWP04B 1928 to 2016 89 years Series 8

 [B] Entire series, effect on correlation ( .703) is:

 Lower 1990> -.051 1949< -.017 1959> -.013 1944> -.013 1974< -.010 1967< -.008 Higher 2012 .096 1957 .008

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

 1990 +3.1 SD

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 SWP05A 1924 to 2016 93 years Series 9

 [B] Entire series, effect on correlation ( .807) is:

 Lower 1990< -.019 1926> -.009 2006< -.008 1934< -.007 1924< -.006 1947< -.006 Higher 2012 .017 1988 .012

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

 SWP05B 1928 to 2016 89 years Series 10

 [B] Entire series, effect on correlation ( .655) is:

 Lower 2012> -.041 1990< -.038 1988> -.028 1978< -.018 1993< -.010 1942< -.006 Higher 1930 .011 1962 .010

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 SWP06A 1909 to 2016 108 years Series 11

 [\*] Early part of series cannot be checked from 1909 to 1912 -- not matched by another series

 [B] Entire series, effect on correlation ( .592) is:

 Lower 1935< -.039 1930> -.021 1925> -.019 1926> -.009 2014> -.008 1936< -.007 Higher 1990 .019 2007 .018

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

 1926 +3.1 SD

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 SWP06B 1935 to 2016 82 years Series 12

 [B] Entire series, effect on correlation ( .857) is:

 Lower 1984> -.006 1946< -.006 1998< -.005 1990> -.005 1939> -.004 1956> -.004 Higher 2012 .043 1996 .007

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

 SWP07A 1941 to 2016 76 years Series 13

 [B] Entire series, effect on correlation ( .791) is:

 Lower 1953< -.017 2001< -.012 1944> -.012 2007> -.011 1950> -.009 1989< -.008 Higher 2012 .072 1990 .010

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

 SWP07B 1918 to 2016 99 years Series 14

 [B] Entire series, effect on correlation ( .691) is:

 Lower 2012> -.022 1983> -.014 1981< -.014 1955< -.008 1942< -.007 1998> -.007 Higher 1990 .014 2007 .013

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

 SWP08A 1933 to 2016 84 years Series 15

 [B] Entire series, effect on correlation ( .755) is:

 Lower 2009< -.015 1957< -.013 2001< -.009 1987> -.009 1950> -.008 2016< -.008 Higher 2012 .085 1990 .012

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

 SWP08B 1933 to 2016 84 years Series 16

 [B] Entire series, effect on correlation ( .782) is:

 Lower 1980< -.022 1999< -.021 1979< -.013 2001< -.009 1972> -.009 1937< -.007 Higher 2012 .065 1990 .011

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

 SWP09A 1916 to 2016 101 years Series 17

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

 Lower 2012> -.054 1999< -.020 2011< -.020 1925> -.013 1990> -.010 1923> -.008 Higher 1919 .023 1930 .011

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 SWP09B 1922 to 2016 95 years Series 18

 [B] Entire series, effect on correlation ( .763) is:

 Lower 1990> -.042 1926> -.009 1923> -.009 1931< -.009 1980> -.008 1922> -.007 Higher 2012 .056 1988 .015

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

 SWP10A 1930 to 2016 87 years Series 19

 [B] Entire series, effect on correlation ( .770) is:

 Lower 1990> -.027 1964> -.012 1985< -.012 1946< -.011 1945< -.011 1972< -.010 Higher 2012 .074 2007 .012

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

 SWP10B 1942 to 2016 75 years Series 20

 [B] Entire series, effect on correlation ( .740) is:

 Lower 1944> -.023 2000< -.014 1976< -.009 1969< -.008 1990> -.008 2003< -.008 Higher 2012 .075 1988 .018

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 [\*] All segments correlate highest as dated with correlation with master series over .3281

PART 7: DESCRIPTIVE STATISTICS: 15:06 Mon 05 Jun 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 SWP01A 1919 2016 98 4 0 .431 3.95 10.34 1.457 .687 .211 2.65 .419 .032 1

 2 SWP01B 1924 2016 93 4 0 .533 3.89 8.60 1.248 .620 .225 2.44 .363 .004 1

 3 SWP02A 1915 2016 102 4 0 .870 3.65 6.74 1.258 .764 .186 2.43 .372 -.089 1

 4 SWP02B 1923 2016 94 4 0 .768 3.48 5.86 1.175 .753 .197 2.43 .350 .004 1

 5 SWP03A 1915 2016 102 4 0 .794 2.50 5.89 1.154 .812 .215 2.62 .487 -.030 1

 6 SWP03B 1913 2016 104 4 0 .687 3.37 7.43 1.513 .799 .228 2.51 .384 -.062 2

 7 SWP04A 1913 2016 104 4 0 .677 3.27 7.58 1.545 .868 .193 2.74 .488 -.004 1

 8 SWP04B 1928 2016 89 3 0 .703 3.58 7.21 1.198 .790 .168 2.45 .374 -.074 1

 9 SWP05A 1924 2016 93 4 0 .807 4.52 9.64 2.046 .852 .195 2.61 .425 -.033 1

 10 SWP05B 1928 2016 89 3 0 .655 4.39 8.65 1.602 .773 .189 2.36 .340 -.036 1

 11 SWP06A 1909 2016 108 4 0 .592 3.63 9.66 1.665 .736 .220 2.64 .485 .012 1

 12 SWP06B 1935 2016 82 3 0 .857 3.71 8.28 1.312 .798 .170 2.49 .436 -.061 1

 13 SWP07A 1941 2016 76 3 0 .791 4.56 6.69 1.118 .570 .191 2.46 .421 -.007 1

 14 SWP07B 1918 2016 99 4 0 .691 3.18 7.50 1.344 .793 .222 2.53 .419 -.014 1

 15 SWP08A 1933 2016 84 3 0 .755 3.64 7.06 1.186 .817 .156 2.48 .356 -.028 2

 16 SWP08B 1933 2016 84 3 0 .782 3.53 6.87 1.086 .779 .154 2.66 .431 -.040 1

 17 SWP09A 1916 2016 101 4 0 .610 3.79 6.85 1.119 .543 .196 2.66 .451 -.053 1

 18 SWP09B 1922 2016 95 4 0 .763 3.77 8.15 1.340 .769 .182 2.71 .459 -.016 1

 19 SWP10A 1930 2016 87 3 0 .770 2.74 6.80 1.015 .735 .195 2.63 .369 -.097 1

 20 SWP10B 1942 2016 75 3 0 .740 2.92 9.51 1.815 .910 .211 2.61 .476 .072 1

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 Total or mean: 1859 72 0 .710 3.59 10.34 1.363 .758 .196 2.74 .416 -.026

 - = [ COFECHA SWP COF ] = -