[] Dendrochronology Program Library Run 165\_H Program COF 10:24 Fri 18 Mar 2011 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 27837

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

File of DATED series: 165\_HUB

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 30 years lagged successively by 15 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 .4226

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 1911 to 2010 100 years

Continuous time span is 1911 to 2010 100 years

Portion with two or more series is 1914 to 2010 97 years

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

\*C\* Number of dated series 10 \*C\*

\*O\* Master series 1911 2010 100 yrs \*O\*

\*F\* Total rings in all series 808 \*F\*

\*E\* Total dated rings checked 805 \*E\*

\*C\* Series intercorrelation .698 \*C\*

\*H\* Average mean sensitivity .289 \*H\*

\*A\* Segments, possible problems 1 \*A\*

\*\*\* Mean length of series 80.8 \*\*\*

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

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

603A 1 absent rings: 1982

603B 1 absent rings: 1982

2 absent rings .248%

PART 2: TIME PLOT OF TREE-RING SERIES: 10:24 Fri 18 Mar 2011 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

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

. . . . . . . . . . . . . . . . . . <=======> . 601A 1 1933 2010 78

. . . . . . . . . . . . . . . . . . <=======> . 601B 2 1938 2010 73

. . . . . . . . . . . . . . . . . . <=======> . 602A 3 1930 2010 81

. . . . . . . . . . . . . . . . . . <=======> . 602B 4 1933 2010 78

. . . . . . . . . . . . . . . . . . <=======> . 603A 5 1938 2010 73

. . . . . . . . . . . . . . . . . . <=======> . 603B 6 1938 2010 73

. . . . . . . . . . . . . . . . . . <=======> . 604A 7 1934 2010 77

. . . . . . . . . . . . . . . . . . <=======> . 604B 8 1933 2010 78

. . . . . . . . . . . . . . . . . .<=========> . 605A 9 1914 2010 97

. . . . . . . . . . . . . . . . . .<=========> . 605B 10 1911 2010 100

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

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: 10:24 Fri 18 Mar 2011 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 -.693 10 2000 -.993 10

1951 .336 10 2001 -.715 10

1952 -.408 10 2002 .142 10

1953 -3.585 10 2003 -2.555 10

1954 .599 10 2004 -.030 10

1955 -.156 10 2005 -.967 10

1956 .296 10 2006 .013 10

1957 1.700 10 2007 .478 10

1958 .899 10 2008 .592 10

1959 1.204 10 2009 .787 10

1960 .116 10 2010 .724 10

1911 -.944 1 1961 .659 10

1912 .351 1 1962 -1.384 10

1913 1.604 1 1963 -.281 10

1914 1.236 2 1964 -.895 10

1915 1.235 2 1965 -.004 10

1916 1.090 2 1966 -.879 10

1917 -.659 2 1967 -.782 10

1918 .305 2 1968 -1.513 10

1919 -.910 2 1969 -.341 10

1920 -.674 2 1970 1.081 10

1921 -1.007 2 1971 .979 10

1922 -1.821 2 1972 .426 10

1923 -1.974 2 1973 -.295 10

1924 .584 2 1974 .080 10

1925 1.494 2 1975 .929 10

1926 .892 2 1976 1.675 10

1927 1.361 2 1977 1.034 10

1928 -.098 2 1978 -.369 10

1929 -.986 2 1979 .665 10

1930 .674 3 1980 .636 10

1931 -.183 3 1981 -1.382 10

1932 1.095 3 1982 -1.773 10 2

1933 -.978 6 1983 -1.175 10

1934 -1.411 7 1984 -.787 10

1935 .469 7 1985 -.998 10

1936 -1.323 7 1986 -.512 10

1937 -.302 7 1987 .157 10

1938 -.061 10 1988 .125 10

1939 -.308 10 1989 .009 10

1940 .128 10 1990 .636 10

1941 .280 10 1991 .653 10

1942 .343 10 1992 1.669 10

1943 .986 10 1993 1.102 10

1944 .439 10 1994 .769 10

1945 1.986 10 1995 .693 10

1946 -.336 10 1996 -.306 10

1947 1.385 10 1997 -.607 10

1948 -1.301 10 1998 .223 10

1949 .108 10 1999 -.475 10

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PART 4: Master Bar Plot: 10:24 Fri 18 Mar 2011 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--c 2000-d

1951------A 2001--c

1952---b 2002-----A

1953n 2003j

1954-------B 2004----@

1955----a 2005-d

1956------A 2006-----@

1957----------G 2007-------B

1958--------D 2008-------B

1959---------E 2009--------C

1960-----@ 2010--------C

1911-d 1961-------C

1912------A 1962f

1913----------F 1963---a

1914---------E 1964-d

1915---------E 1965-----@

1916---------D 1966--d

1917--c 1967--c

1918------A 1968f

1919-d 1969---a

1920--c 1970---------D

1921-d 1971---------D

1922g 1972------B

1923h 1973---a

1924-------B 1974-----@

1925----------F 1975--------D

1926--------D 1976----------G

1927----------E 1977---------D

1928----@ 1978---a

1929-d 1979-------C

1930-------C 1980-------C

1931----a 1981f

1932---------D 1982g

1933-d 1983-e

1934f 1984--c

1935-------B 1985-d

1936e 1986---b

1937---a 1987-----A

1938----@ 1988-----A

1939---a 1989-----@

1940-----A 1990-------C

1941------A 1991-------C

1942------A 1992----------G

1943---------D 1993---------D

1944------B 1994--------C

1945----------H 1995--------C

1946---a 1996---a

1947----------F 1997--b

1948e 1998-----A

1949-----@ 1999---b

PART 5: CORRELATION OF SERIES BY SEGMENTS: 10:24 Fri 18 Mar 2011 Page 5

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Correlations of 30-year dated segments, lagged 15 years

Flags: A = correlation under .4226 but highest as dated; B = correlation higher at other than dated position

Seq Series Time\_span 1905 1920 1935 1950 1965 1980 1995

1934 1949 1964 1979 1994 2009 2024

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

1 601A 1933 2010 .80 .78 .75 .68 .65 .64

2 601B 1938 2010 .78 .77 .72 .75 .75

3 602A 1930 2010 .79 .78 .77 .68 .65 .66

4 602B 1933 2010 .86 .88 .85 .63 .68 .67

5 603A 1938 2010 .76 .74 .62 .57 .58

6 603B 1938 2010 .83 .92 .75 .83 .80

7 604A 1934 2010 .72 .71 .83 .69 .74 .70

8 604B 1933 2010 .62 .66 .68 .61 .62 .62

9 605A 1914 2010 .49 .57 .50 .63 .63 .57 .63

10 605B 1911 2010 .64 .72 .76 .78 .40B .43 .65

Av segment correlation .56 .72 .74 .77 .64 .65 .67

PART 6: POTENTIAL PROBLEMS: 10:24 Fri 18 Mar 2011 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 30-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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601A 1933 to 2010 78 years Series 1

[B] Entire series, effect on correlation ( .734) is:

Lower 1989< -.011 1982< -.010 1960< -.009 1939> -.008 1985> -.008 1996< -.007 Higher 1948 .016 1981 .010

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

1953 +3.3 SD

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601B 1938 to 2010 73 years Series 2

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

Lower 1961< -.023 1996< -.020 1978< -.007 1945< -.006 1952> -.006 1968> -.005 Higher 2003 .025 1953 .024

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602A 1930 to 2010 81 years Series 3

[B] Entire series, effect on correlation ( .723) is:

Lower 1967< -.025 1939> -.016 2002< -.012 1996> -.011 1955< -.009 1956< -.009 Higher 1953 .044 1948 .011

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602B 1933 to 2010 78 years Series 4

[B] Entire series, effect on correlation ( .773) is:

Lower 1972< -.029 1982> -.020 1933> -.009 1954< -.007 1990< -.006 2009< -.006 Higher 1953 .051 1962 .013

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603A 1938 to 2010 73 years Series 5

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

Lower 2009< -.032 1990< -.016 1953> -.011 1938< -.011 1982< -.009 1970< -.009 Higher 2003 .031 1976 .012

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

1982 -1.773 10 2

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

2002 +3.6 SD

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603B 1938 to 2010 73 years Series 6

[B] Entire series, effect on correlation ( .789) is:

Lower 1938< -.013 2010< -.010 1973> -.010 1942< -.009 1982< -.007 1950> -.006 Higher 1953 .030 2003 .025

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

1982 -1.773 10 2

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

2002 +3.0 SD

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

604A 1934 to 2010 77 years Series 7

[B] Entire series, effect on correlation ( .719) is:

Lower 1941< -.025 1948> -.014 1962> -.014 1986< -.012 2010< -.011 1937> -.010 Higher 1953 .067 2003 .031

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

1953 -4.7 SD

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604B 1933 to 2010 78 years Series 8

[B] Entire series, effect on correlation ( .589) is:

Lower 1933> -.029 1948> -.027 1968> -.019 2000> -.016 1951< -.013 1994< -.012 Higher 1953 .069 2003 .046

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

1968 +3.4 SD; 1998 +3.7 SD; 2000 +4.3 SD; 2001 +3.4 SD

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605A 1914 to 2010 97 years Series 9

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

Lower 1939< -.097 1962> -.029 1934> -.010 1980< -.009 1982> -.009 1936> -.008 Higher 1953 .020 1948 .016

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

1962 +3.9 SD

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605B 1911 to 2010 100 years Series 10

[\*] Early part of series cannot be checked from 1911 to 1913 -- 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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1965 1994 1 -.11 -.19 -.36 -.25 -.10 -.21 -.16 .04 .10 -.12 .40| .71\* .27 -.03 .20 .23 -.17 -.22 -.05 -.16 -.24

[B] Entire series, effect on correlation ( .681) is:

Lower 1980< -.048 1940< -.031 1996> -.015 1939> -.013 1982> -.012 1934> -.010 Higher 1953 .022 1948 .016

1965 to 1994 segment:

Lower 1980< -.214 1977< -.036 1982> -.020 1971< -.018 1967> -.018 1965< -.011 Higher 1981 .103 1976 .045

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PART 7: DESCRIPTIVE STATISTICS: 10:24 Fri 18 Mar 2011 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 601A 1933 2010 78 6 0 .734 1.66 3.24 .724 .753 .250 2.58 .541 .011 2

2 601B 1938 2010 73 5 0 .755 1.66 3.78 .837 .840 .251 2.71 .613 -.063 2

3 602A 1930 2010 81 6 0 .723 1.36 3.55 .779 .747 .277 2.63 .538 -.052 1

4 602B 1933 2010 78 6 0 .773 1.37 5.03 1.111 .863 .282 2.50 .405 -.065 1

5 603A 1938 2010 73 5 0 .662 1.34 4.57 1.214 .830 .335 2.61 .418 .029 2

6 603B 1938 2010 73 5 0 .789 1.86 4.76 1.196 .804 .329 2.59 .500 .027 3

7 604A 1934 2010 77 6 0 .719 2.12 5.35 .879 .600 .282 2.69 .374 -.032 2

8 604B 1933 2010 78 6 0 .589 1.83 4.50 .973 .735 .279 2.80 .592 -.049 2

9 605A 1914 2010 97 7 0 .594 1.36 4.19 .839 .775 .302 2.66 .381 -.051 1

10 605B 1911 2010 100 7 1 .681 1.38 4.46 .918 .794 .302 2.79 .512 -.057 1

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Total or mean: 808 59 1 .698 1.58 5.35 .941 .774 .289 2.80 .486 -.032

- = [ COFECHA 165\_HCOF ] = -