[] Dendrochronology Program Library Run 6 Program COF 15:18 Tue 20 Mar 2012 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 28205

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

Title of run: 6

File of DATED series: MIC001\_ACSA

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 1898 to 2011 114 years

Continuous time span is 1898 to 2011 114 years

Portion with two or more series is 1908 to 2011 104 years

>> 9a 1978 absent in 1 of 10 series, but is not usually narrow: master index is -.242

>> 10a 2007 absent in 1 of 10 series, but is not usually narrow: master index is -.066

>> 10a 2008 absent in 1 of 10 series, but is not usually narrow: master index is 1.028

>> 10a 2009 absent in 1 of 10 series, but is not usually narrow: master index is .732

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

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

\*O\* Master series 1898 2011 114 yrs \*O\*

\*F\* Total rings in all series 695 \*F\*

\*E\* Total dated rings checked 685 \*E\*

\*C\* Series intercorrelation .319 \*C\*

\*H\* Average mean sensitivity .317 \*H\*

\*A\* Segments, possible problems 10 \*A\*

\*\*\* Mean length of series 69.5 \*\*\*

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

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

8b 1 absent rings: 1988

9a 1 absent rings: 1978

10a 7 absent rings: 1973 1987 2007 2008 2009 2010 2011

10b 1 absent rings: 2011

10 absent rings 1.439%

PART 2: TIME PLOT OF TREE-RING SERIES: 6 15:18 Tue 20 Mar 2012 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

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

. . . . . . . . . . . . . . . . . . <=====> . 7a 1 1958 2011 54

. . . . . . . . . . . . . . . . . . <=======> . 7b 2 1937 2011 75

. . . . . . . . . . . . . . . . . . .<====> . 8a 3 1962 2011 50

. . . . . . . . . . . . . . . . . . <=======> . 8b 4 1938 2011 74

. . . . . . . . . . . . . . . . . . <=====> . 9a 5 1958 2011 54

. . . . . . . . . . . . . . . . . . <======> . 9b 6 1947 2011 65

. . . . . . . . . . . . . . . . . <===========> . 10a 7 1898 2011 114

. . . . . . . . . . . . . . . . . <==========> . 10b 8 1908 2011 104

. . . . . . . . . . . . . . . . . . <=====> . 11a 9 1955 2011 57

. . . . . . . . . . . . . . . . . . .<====> . 11b 10 1964 2011 48

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

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: 6 15:18 Tue 20 Mar 2012 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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1900 .594 1 1950 .329 5 2000 .670 10

1901 .121 1 1951 .475 5 2001 .862 10

1902 .288 1 1952 .162 5 2002 1.146 10

1903 -1.496 1 1953 -.433 5 2003 .766 10

1904 -2.266 1 1954 -1.060 5 2004 .994 10

1905 -2.571 1 1955 .250 6 2005 .553 10

1906 -2.771 1 1956 -1.020 6 2006 -.548 10

1907 1.204 1 1957 .515 6 2007 -.066 10 1<<

1908 .660 2 1958 -.033 8 2008 1.028 10 1<<

1909 1.117 2 1959 .069 8 2009 .732 10 1<<

1910 1.972 2 1960 -.595 8 2010 -1.771 10 1

1911 2.084 2 1961 .159 8 2011 -1.555 10 2

1912 -.272 2 1962 -1.821 9

1913 -.388 2 1963 .631 9

1914 -.320 2 1964 1.534 10

1915 -1.178 2 1965 1.778 10

1916 -.437 2 1966 .369 10

1917 -.861 2 1967 .543 10

1918 -.241 2 1968 .364 10

1919 -.479 2 1969 .571 10

1920 -.554 2 1970 .651 10

1921 -.226 2 1971 1.070 10

1922 -.231 2 1972 .048 10

1923 1.471 2 1973 -.968 10 1

1924 2.277 2 1974 -.172 10

1925 .725 2 1975 .202 10

1926 1.046 2 1976 .124 10

1927 .917 2 1977 -.239 10

1928 -.293 2 1978 -.242 10 1<<

1929 -1.534 2 1979 -.973 10

1930 -.849 2 1980 -.220 10

1931 .621 2 1981 -1.501 10

1932 -.515 2 1982 .280 10

1933 -1.695 2 1983 -.322 10

1934 -.297 2 1984 .004 10

1935 1.496 2 1985 -1.068 10

1936 .621 2 1986 -2.753 10

1937 -.029 3 1987 -1.294 10 1

1938 .139 4 1988 -1.128 10 1

1939 -.009 4 1989 -.816 10

1940 .002 4 1990 .291 10

1941 .145 4 1991 .513 10

1942 .052 4 1992 .180 10

1943 -.183 4 1993 .779 10

1944 -1.575 4 1994 .890 10

1945 -1.510 4 1995 .433 10

1946 .179 4 1996 -.587 10

1947 .999 5 1997 .194 10

1898 1.169 1 1948 .805 5 1998 .469 10

1899 1.690 1 1949 .898 5 1999 .046 10

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PART 4: Master Bar Plot: 6 15:18 Tue 20 Mar 2012 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

1900-------B 1950------A 2000--------C

1901-----@ 1951-------B 2001--------C

1902------A 1952-----A 2002---------E

1903f 1953--b 2003--------C

1904i 1954-d 2004---------D

1905j 1955------A 2005-------B

1906k 1956-d 2006--b

1907---------E 1957-------B 2007----@

1908--------C 1958----@ 2008---------D

1909---------D 1959-----@ 2009--------C

1910----------H 1960--b 2010g

1911----------H 1961-----A 2011f

1912---a 1962g

1913---b 1963-------C

1914---a 1964----------F

1915-e 1965----------G

1916--b 1966------A

1917-c 1967-------B

1918---a 1968------A

1919--b 1969-------B

1920--b 1970--------C

1921---a 1971---------D

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

1923----------F 1973-d

1924----------I 1974---a

1925--------C 1975-----A

1926---------D 1976-----@

1927---------D 1977---a

1928---a 1978---a

1929f 1979-d

1930-c 1980---a

1931-------B 1981f

1932--b 1982------A

1933g 1983---a

1934---a 1984----@

1935----------F 1985-d

1936-------B 1986k

1937----@ 1987-e

1938-----A 1988-e

1939----@ 1989-c

1940----@ 1990------A

1941-----A 1991-------B

1942-----@ 1992-----A

1943---a 1993--------C

1944f 1994---------D

1945f 1995-------B

1946-----A 1996--b

1947---------D 1997-----A

1898---------E 1948--------C 1998-------B

1899----------G 1949---------D 1999-----@

PART 5: CORRELATION OF SERIES BY SEGMENTS: 6 15:18 Tue 20 Mar 2012 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 7a 1958 2011 .36 .43

2 7b 1937 2011 .27A .19B .29B

3 8a 1962 2011 .52

4 8b 1938 2011 .28A .35 .52

5 9a 1958 2011 .48 .62

6 9b 1947 2011 .36B .46 .52

7 10a 1898 2011 .08B .18B .43 .46

8 10b 1908 2011 .05B .03B .38 .59

9 11a 1955 2011 .40 .37

10 11b 1964 2011 -.21B

Av segment correlation .07 .22 .34 .48

PART 6: POTENTIAL PROBLEMS: 6 15:18 Tue 20 Mar 2012 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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7a 1958 to 2011 54 years Series 1

[B] Entire series, effect on correlation ( .419) is:

Lower 1996> -.107 1995< -.028 1985> -.027 1979> -.017 1981> -.016 1988< -.015 Higher 1986 .079 1962 .042

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

1995 1996 4.3 SD

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

7b 1937 to 2011 75 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

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

1937 1986 0 -.15 -.17 -.18 .11 .25 .16 -.08 -.01 .07 -.07 .27\* .07 .05 -.02 -.16 -.17 .03 -.20 -.10 -.20 .24

1950 1999 -6 -.06 .18 -.10 -.01 .33\* .16 -.06 .00 .07 -.12 .19| .16 .04 -.09 -.01 -.06 -.10 -.17 -.08 -.11 .11

1962 2011 -6 .03 .09 -.13 .11 .32\* .13 .00 -.08 -.08 .03 .29| - - - - - - - - - -

[B] Entire series, effect on correlation ( .217) is:

Lower 1937> -.118 1995< -.043 1996> -.036 1987< -.028 1959< -.017 1994< -.014 Higher 2010 .074 1956 .039

1937 to 1986 segment:

Lower 1937> -.209 1959< -.036 1965< -.021 1943< -.017 1961< -.016 1976< -.010 Higher 1986 .059 1956 .059

1950 to 1999 segment:

Lower 1996> -.065 1995< -.064 1987< -.041 1959< -.026 1994< -.021 1991< -.018 Higher 1956 .071 1986 .062

1962 to 2011 segment:

Lower 1995< -.070 1996> -.061 1987< -.045 1994< -.021 1991< -.018 1965< -.017 Higher 2010 .106 1986 .051

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

1995 1996 4.6 SD

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

1937 +3.0 SD; 1995 -4.5 SD

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

8a 1962 to 2011 50 years Series 3

[B] Entire series, effect on correlation ( .522) is:

Lower 1977< -.072 2010> -.019 1981< -.011 1973> -.010 1962> -.009 1978> -.007 Higher 1986 .030 1996 .024

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

8b 1938 to 2011 74 years Series 4

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

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

1938 1987 0 -.13 -.05 -.15 .02 .05 -.03 -.07 -.11 .18 .05 .28\*-.06 -.01 -.21 .09 -.09 -.04 -.09 .24 -.04 .11

[B] Entire series, effect on correlation ( .386) is:

Lower 1956> -.043 1988< -.021 1999< -.021 1946< -.017 2001< -.017 1975< -.015 Higher 2010 .067 1996 .027

1938 to 1987 segment:

Lower 1956> -.062 1975< -.035 1946< -.033 1969< -.033 1971< -.030 1945< -.017 Higher 1986 .068 1964 .045

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

1988 -1.128 10 1

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9a 1958 to 2011 54 years Series 5

[B] Entire series, effect on correlation ( .613) is:

Lower 1996> -.019 1986> -.019 2000< -.018 1980< -.018 1958> -.012 2006> -.009 Higher 2010 .112 1962 .025

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

1978 -.242 10 1 >> WARNING: Ring is not usually narrow

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9b 1947 to 2011 65 years Series 6

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

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

1947 1996 6 .05 -.15 -.13 -.27 .14 -.06 .24 .15 .00 -.09 .36|-.13 .31 -.16 -.01 -.14 .37\* .09 .09 -.19 .07

[B] Entire series, effect on correlation ( .474) is:

Lower 1947< -.059 2000< -.025 1996> -.021 1988> -.017 2003< -.016 1999> -.015 Higher 2010 .144 1956 .024

1947 to 1996 segment:

Lower 1947< -.092 1988> -.023 1996> -.022 1948< -.021 1989< -.018 1980< -.017 Higher 1956 .051 1964 .034

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10a 1898 to 2011 114 years Series 7

[\*] Early part of series cannot be checked from 1898 to 1907 -- 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

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

1908 1957 1 .01 -.02 .17 -.04 -.07 -.27 -.18 -.09 -.28 -.06 .08| .19\*-.13 .06 .03 .05 -.06 .14 .09 -.04 -.08

1925 1974 -8 .11 -.06 .36\*-.06 .24 -.23 .22 -.20 -.19 -.23 .18|-.02 -.23 -.15 .09 -.02 .04 .03 .11 -.15 -.01

[B] Entire series, effect on correlation ( .205) is:

Lower 1936< -.036 1912> -.019 1944> -.014 1922> -.014 1972> -.013 1931< -.008 Higher 1962 .027 1986 .019

1908 to 1957 segment:

Lower 1936< -.098 1922> -.036 1944> -.028 1949< -.023 1921> -.019 1931< -.017 Higher 1924 .050 1910 .038

1925 to 1974 segment:

Lower 1936< -.060 1944> -.037 1972> -.028 1931< -.012 1949< -.011 1937> -.011 Higher 1962 .054 1973 .030

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

1972 1973 -4.3 SD

[D] 7 Absent rings: Year Master N series Absent

1973 -.968 10 1

1987 -1.294 10 1

2007 -.066 10 1 >> WARNING: Ring is not usually narrow

2008 1.028 10 1 >> WARNING: Ring is not usually narrow

2009 .732 10 1 >> WARNING: Ring is not usually narrow

2010 -1.771 10 1

2011 -1.555 10 2

>> WARNING: Last ring in series is ABSENT

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

1922 +3.9 SD; 1944 +3.5 SD; 1945 +3.2 SD; 1973 -5.1 SD

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10b 1908 to 2011 104 years Series 8

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

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

1908 1957 -8 -.09 .06 .27\*-.01 -.08 -.12 .04 -.02 -.13 .26 .05| .07 -.17 .03 -.04 -.22 .07 .03 .07 -.23 -.14

1925 1974 6 .11 .03 .22 -.12 -.05 -.01 .09 -.15 -.34 .21 .03| .06 -.17 -.02 .12 -.01 .25\* .05 .09 -.13 -.07

[B] Entire series, effect on correlation ( .259) is:

Lower 1937< -.080 1936> -.050 1922< -.019 1958> -.012 1921< -.010 1931> -.009 Higher 2010 .051 1996 .027

1908 to 1957 segment:

Lower 1937< -.102 1936> -.082 1922< -.025 1943> -.013 1921< -.013 1931> -.013 Higher 1924 .046 1944 .037

1925 to 1974 segment:

Lower 1937< -.136 1936> -.081 1958> -.015 1943> -.010 1960> -.010 1950< -.010 Higher 1964 .038 1944 .038

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

2011 -1.555 10 2

>> WARNING: Last ring in series is ABSENT

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

1936 +4.1 SD

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11a 1955 to 2011 57 years Series 9

[B] Entire series, effect on correlation ( .402) is:

Lower 1974< -.066 2001< -.039 1989> -.024 1973> -.018 1996> -.015 1969< -.014 Higher 1956 .042 1986 .040

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11b 1964 to 2011 48 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

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

1964 2011 -8 .20 -.23 .27\* .01 -.20 .00 -.02 -.16 .15 -.04 -.21| - - - - - - - - - -

[B] Entire series, effect on correlation ( -.213) is:

Lower 2010> -.094 1970< -.060 1964< -.037 1982< -.024 2011> -.018 2006> -.014 Higher 1965 .056 1996 .056

1964 to 2011 segment:

Lower 2010> -.094 1970< -.060 1964< -.037 1982< -.024 2011> -.018 2006> -.014 Higher 1965 .056 1996 .056

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

2009 2010 4.3 SD

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

1970 -5.6 SD; 1987 +3.0 SD; 2010 +3.5 SD; 2011 +3.9 SD

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PART 7: DESCRIPTIVE STATISTICS: 6 15:18 Tue 20 Mar 2012 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 7a 1958 2011 54 2 0 .419 2.28 4.01 .985 .702 .291 2.68 .587 .010 1

2 7b 1937 2011 75 3 3 .217 1.73 3.78 .727 .768 .244 2.86 .585 .025 1

3 8a 1962 2011 50 1 0 .522 2.27 6.30 1.291 .795 .294 2.57 .515 -.089 1

4 8b 1938 2011 74 3 1 .386 1.24 2.62 .701 .771 .344 2.66 .514 -.021 1

5 9a 1958 2011 54 2 0 .613 1.80 4.55 1.246 .915 .334 2.40 .349 .008 1

6 9b 1947 2011 65 3 1 .474 1.67 4.31 1.069 .895 .245 2.48 .432 .024 1

7 10a 1898 2011 114 4 2 .205 1.01 3.81 .941 .903 .426 2.38 .282 -.114 1

8 10b 1908 2011 104 4 2 .259 1.24 4.47 1.061 .888 .347 2.55 .417 -.061 1

9 11a 1955 2011 57 2 0 .402 2.11 5.23 1.208 .881 .230 2.70 .631 -.036 1

10 11b 1964 2011 48 1 1 -.213 2.00 5.46 1.452 .808 .307 2.91 .536 .054 1

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Total or mean: 695 25 10 .319 1.62 6.30 1.032 .841 .317 2.91 .466 -.029

- = [ COFECHA 6 COF ] = -