[] Dendrochronology Program Library Run M2 Program COF 10:28 Thu 15 Feb 2012 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 28172

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

File of DATED series: MIC002\_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 1915 to 2011 97 years

Continuous time span is 1915 to 2011 97 years

Portion with two or more series is 1916 to 2011 96 years

>> 8a 2010 absent in 2 of 10 series, but is not usually narrow: master index is .041

>> 8b 2010 absent in 2 of 10 series, but is not usually narrow: master index is .041

>> 9b 1969 absent in 1 of 10 series, but is not usually narrow: master index is -.048

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

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

\*O\* Master series 1915 2011 97 yrs \*O\*

\*F\* Total rings in all series 688 \*F\*

\*E\* Total dated rings checked 687 \*E\*

\*C\* Series intercorrelation .491 \*C\*

\*H\* Average mean sensitivity .360 \*H\*

\*A\* Segments, possible problems 6 \*A\*

\*\*\* Mean length of series 68.8 \*\*\*

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

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

8a 2 absent rings: 2010 2011

8b 2 absent rings: 2010 2011

9b 6 absent rings: 1960 1962 1963 1965 1969 2011

32a 4 absent rings: 1959 1960 1962 1963

14 absent rings 2.035%

PART 2: TIME PLOT OF TREE-RING SERIES: 10:28 Thu 15 Feb 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 1966 2011 46

. . . . . . . . . . . . . . . . . . <======> . 7b 2 1946 2011 66

. . . . . . . . . . . . . . . . . . <======> . 8a 3 1944 2011 68

. . . . . . . . . . . . . . . . . . <======> . 8b 4 1942 2011 70

. . . . . . . . . . . . . . . . . . .<====> . 9a 5 1968 2011 44

. . . . . . . . . . . . . . . . . . <=======> . 9b 6 1935 2011 77

. . . . . . . . . . . . . . . . . . <=====> . 10a 7 1956 2011 56

. . . . . . . . . . . . . . . . . .<=========> . 10b 8 1915 2011 97

. . . . . . . . . . . . . . . . . . <======> . 32a 9 1944 2011 68

. . . . . . . . . . . . . . . . . .<=========> . 32b 10 1916 2011 96

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

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: 10:28 Thu 15 Feb 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

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

1950 1.483 7 2000 -.451 10

1951 1.305 7 2001 .029 10

1952 1.026 7 2002 1.145 10

1953 -.005 7 2003 -.134 10

1954 .033 7 2004 -.023 10

1955 .601 7 2005 .297 10

1956 -.621 8 2006 -.618 10

1957 .353 8 2007 .240 10

1958 -.634 8 2008 .794 10

1959 -.590 8 1 2009 .555 10

1960 -1.622 8 2 2010 .041 10 2<<

1961 .059 8 2011 -3.498 10 3

1962 -3.095 8 2

1963 -1.182 8 2

1964 .484 8

1915 1.203 1 1965 -.559 8 1

1916 1.243 2 1966 .443 9

1917 -.257 2 1967 .075 9

1918 .276 2 1968 .376 10

1919 -.497 2 1969 -.048 10 1<<

1920 -.815 2 1970 .513 10

1921 1.005 2 1971 -.312 10

1922 .122 2 1972 .369 10

1923 1.862 2 1973 -.098 10

1924 -1.464 2 1974 -.020 10

1925 -.153 2 1975 .885 10

1926 1.180 2 1976 .473 10

1927 .401 2 1977 1.077 10

1928 -1.454 2 1978 1.315 10

1929 1.089 2 1979 .160 10

1930 -.969 2 1980 .334 10

1931 .444 2 1981 .181 10

1932 -1.908 2 1982 .368 10

1933 .442 2 1983 -.120 10

1934 .700 2 1984 -.260 10

1935 .254 3 1985 -.020 10

1936 .101 3 1986 -.549 10

1937 .335 3 1987 -2.566 10

1938 -1.478 3 1988 -2.844 10

1939 .387 3 1989 -2.012 10

1940 -.083 3 1990 .188 10

1941 -.624 3 1991 .108 10

1942 -.395 4 1992 -.195 10

1943 -1.138 4 1993 .388 10

1944 -1.437 6 1994 1.061 10

1945 -.536 6 1995 .442 10

1946 .376 7 1996 1.364 10

1947 .719 7 1997 1.088 10

1948 .701 7 1998 .523 10

1949 1.653 7 1999 .616 10

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PART 4: Master Bar Plot: 10:28 Thu 15 Feb 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

1950----------F 2000--b

1951----------E 2001----@

1952---------D 2002---------E

1953----@ 2003---a

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

1955--------B 2005------A

1956--b 2006--b

1957------A 2007-----A

1958--c 2008--------C

1959--b 2009--------B

1960f 2010----@

1961----@ 2011n

1962l

1963-e

1964-------B

1915---------E 1965--b

1916----------E 1966-------B

1917---a 1967----@

1918------A 1968------B

1919--b 1969----@

1920-c 1970-------B

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

1922-----@ 1972------A

1923----------G 1973---@

1924-f 1974----@

1925---a 1975---------D

1926---------E 1976-------B

1927-------B 1977---------D

1928-f 1978----------E

1929---------D 1979-----A

1930-d 1980------A

1931-------B 1981-----A

1932h 1982------A

1933-------B 1983---@

1934--------C 1984---a

1935-----A 1985----@

1936-----@ 1986--b

1937------A 1987j

1938-f 1988k

1939------B 1989h

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

1941--b 1991-----@

1942--b 1992---a

1943-e 1993------B

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

1945--b 1995-------B

1946------B 1996----------E

1947--------C 1997---------D

1948--------C 1998-------B

1949----------G 1999--------B

PART 5: CORRELATION OF SERIES BY SEGMENTS: 10:28 Thu 15 Feb 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 1966 2011 .57

2 7b 1946 2011 .37B .39 .51

3 8a 1944 2011 .35 .34 .36

4 8b 1942 2011 .33 .29A .27A

5 9a 1968 2011 .65

6 9b 1935 2011 .41 .37B .34

7 10a 1956 2011 .61 .61

8 10b 1915 2011 .49 .55 .68 .64

9 32a 1944 2011 .42 .37 .57

10 32b 1916 2011 .34 .24A .31A .44

Av segment correlation .42 .38 .46 .47

PART 6: POTENTIAL PROBLEMS: 10:28 Thu 15 Feb 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 1966 to 2011 46 years Series 1

[B] Entire series, effect on correlation ( .570) is:

Lower 1988> -.117 2010> -.023 1989> -.021 2008< -.017 1976< -.017 1969< -.016 Higher 2011 .254 1987 .041

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

1988 +3.8 SD

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

7b 1946 to 2011 66 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

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

1946 1995 2 -.18 -.06 -.21 .10 -.02 -.19 .03 -.01 .11 .10 .37| .21 .39\* .04 -.11 .07 -.14 .00 -.05 -.12 -.28

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

Lower 1951< -.057 1988> -.042 1958> -.022 1970> -.016 1969< -.014 2007< -.011 Higher 2011 .064 1962 .046

1946 to 1995 segment:

Lower 1951< -.071 1988> -.060 1958> -.031 1970> -.018 1953> -.014 1969< -.013 Higher 1987 .082 1962 .072

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

1987 1988 4.6 SD

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

8a 1944 to 2011 68 years Series 3

[B] Entire series, effect on correlation ( .405) is:

Lower 1987> -.055 1969> -.025 1992< -.020 1953< -.017 1986> -.013 1991< -.010 Higher 1962 .044 1988 .040

[D] 2 Absent rings: Year Master N series Absent

2010 .041 10 2 >> WARNING: Ring is not usually narrow

2011 -3.498 10 3

>> WARNING: Last ring in series is ABSENT

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

1969 +3.3 SD; 1987 +4.6 SD

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

8b 1942 to 2011 70 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

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

1950 1999 0 -.07 .01 .19 -.15 -.10 .09 -.03 .22 .14 .17 .29\* .09 -.16 -.03 .00 -.17 -.19 -.18 -.18 .01 -.12

1962 2011 0 .02 .08 .26 -.16 -.08 .06 -.10 .26 .07 .13 .27\* - - - - - - - - - -

[B] Entire series, effect on correlation ( .316) is:

Lower 1970< -.073 1986> -.019 1999< -.019 1969> -.014 2000> -.011 2004> -.010 Higher 1988 .050 1962 .018

1950 to 1999 segment:

Lower 1970< -.098 1986> -.029 1999< -.025 1969> -.021 1967> -.012 1973> -.009 Higher 1988 .098 1962 .021

1962 to 2011 segment:

Lower 1970< -.089 1999< -.023 1986> -.023 1969> -.017 2000> -.013 2004> -.011 Higher 1988 .077 1962 .026

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

1987 1988 -4.4 SD

[D] 2 Absent rings: Year Master N series Absent

2010 .041 10 2 >> WARNING: Ring is not usually narrow

2011 -3.498 10 3

>> WARNING: Last ring in series is ABSENT

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

1986 +3.0 SD; 1987 +3.6 SD

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9a 1968 to 2011 44 years Series 5

[B] Entire series, effect on correlation ( .650) is:

Lower 2003> -.042 2001< -.041 2000> -.020 1998> -.018 2008< -.014 2005< -.010 Higher 2011 .196 1987 .045

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9b 1935 to 2011 77 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

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

1950 1999 2 -.16 -.12 -.11 -.22 .04 -.07 -.19 .27 .08 .09 .37| .27 .39\* .04 .08 -.06 -.10 -.22 -.19 -.31 -.27

[B] Entire series, effect on correlation ( .562) is:

Lower 1968< -.033 1996< -.026 2006> -.016 1936> -.015 1953> -.014 1990< -.012 Higher 2011 .090 1987 .025

1950 to 1999 segment:

Lower 1968< -.052 1996< -.042 1953> -.025 1990< -.019 1998< -.017 1971> -.013 Higher 1987 .055 1962 .045

[D] 6 Absent rings: Year Master N series Absent

1960 -1.622 8 2

1962 -3.095 8 2

1963 -1.182 8 2

1965 -.559 8 1

1969 -.048 10 1 >> WARNING: Ring is not usually narrow

2011 -3.498 10 3

>> WARNING: Last ring in series is ABSENT

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10a 1956 to 2011 56 years Series 7

[B] Entire series, effect on correlation ( .618) is:

Lower 1987> -.035 1967< -.029 1982< -.025 1969> -.020 1963< -.017 1973> -.013 Higher 1962 .052 1988 .030

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10b 1915 to 2011 97 years Series 8

[\*] Early part of series cannot be checked from 1915 to 1915 -- not matched by another series

[B] Entire series, effect on correlation ( .514) is:

Lower 1930> -.029 1921> -.023 1927> -.021 1989< -.017 1939< -.012 1965< -.011 Higher 1962 .037 2011 .027

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

1921 +3.7 SD; 1927 +3.2 SD; 1930 +3.3 SD

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32a 1944 to 2011 68 years Series 9

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

Lower 1959< -.019 2010< -.016 1954< -.012 1979> -.011 1975< -.010 1985< -.008 Higher 1962 .100 2011 .021

[D] 4 Absent rings: Year Master N series Absent

1959 -.590 8 1

1960 -1.622 8 2

1962 -3.095 8 2

1963 -1.182 8 2

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

32b 1916 to 2011 96 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

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

1925 1974 0 -.04 -.22 .12 -.28 .00 -.27 .08 -.18 .10 -.37 .24\* .02 .14 .11 .19 .18 .19 .09 .09 -.09 .06

1950 1999 0 -.28 -.10 -.04 .03 -.06 -.30 -.07 -.08 .15 -.24 .31\* .09 .13 .24 .17 .30 .19 -.09 -.07 .02 -.12

[B] Entire series, effect on correlation ( .354) is:

Lower 1995< -.048 1921< -.028 1936< -.025 1927< -.022 1930< -.021 1971> -.014 Higher 1924 .057 1962 .047

1925 to 1974 segment:

Lower 1936< -.053 1927< -.044 1930< -.042 1971> -.028 1940> -.026 1963> -.020 Higher 1962 .137 1938 .033

1950 to 1999 segment:

Lower 1995< -.120 1971> -.034 1960> -.028 1963> -.024 1965> -.016 1950< -.012 Higher 1962 .145 1987 .041

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

1963 +3.0 SD; 1995 -4.5 SD

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PART 7: DESCRIPTIVE STATISTICS: 10:28 Thu 15 Feb 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 1966 2011 46 1 0 .570 2.01 3.48 .785 .732 .241 2.54 .418 -.062 1

2 7b 1946 2011 66 3 1 .432 1.61 4.38 1.017 .879 .272 2.84 .472 -.027 1

3 8a 1944 2011 68 3 0 .405 2.25 3.75 .865 .757 .229 2.79 .644 .064 1

4 8b 1942 2011 70 3 2 .316 2.05 4.26 1.094 .774 .351 2.51 .408 .081 1

5 9a 1968 2011 44 1 0 .650 2.51 5.67 1.306 .839 .267 2.52 .469 .131 1

6 9b 1935 2011 77 3 1 .562 1.36 3.50 .984 .764 .569 2.70 .550 -.027 1

7 10a 1956 2011 56 2 0 .618 2.35 5.52 1.360 .756 .393 2.76 .701 .033 1

8 10b 1915 2011 97 4 0 .514 1.35 5.85 .963 .769 .356 2.86 .504 -.001 1

9 32a 1944 2011 68 3 0 .631 1.50 3.85 .991 .870 .348 2.53 .385 .033 1

10 32b 1916 2011 96 4 2 .354 1.07 4.50 .806 .727 .446 2.87 .441 -.092 1

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Total or mean: 688 27 6 .491 1.71 5.85 .997 .783 .360 2.87 .498 .006

- = [ COFECHA M2 COF ] = -