[] Dendrochronology Program Library Run S1AR1 Program COF 13:28 Mon 09 Jan 2012 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 28134

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

Title of run: SUG001\_ACRU\_Corr1-50

File of DATED series: SUG001\_ACRU\_Compact\_Corr1

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 1930 to 2011 82 years

Continuous time span is 1930 to 2011 82 years

Portion with two or more series is 1931 to 2011 81 years

>> 12a 1979 absent in 1 of 18 series, but is not usually narrow: master index is .916

>> 14b 1951 absent in 1 of 16 series, but is not usually narrow: master index is .091

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

\*C\* Number of dated series 18 \*C\*

\*O\* Master series 1930 2011 82 yrs \*O\*

\*F\* Total rings in all series 1276 \*F\*

\*E\* Total dated rings checked 1275 \*E\*

\*C\* Series intercorrelation .516 \*C\*

\*H\* Average mean sensitivity .306 \*H\*

\*A\* Segments, possible problems 8 \*A\*

\*\*\* Mean length of series 70.9 \*\*\*

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

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

12a 2 absent rings: 1979 1988

14b 1 absent rings: 1951

3 absent rings .235%

PART 2: TIME PLOT OF TREE-RING SERIES: SUG001\_ACRU\_Corr1-50 13:28 Mon 09 Jan 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

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

. . . . . . . . . . . . . . . . . . <=======> . 11a 1 1934 2011 78

. . . . . . . . . . . . . . . . . . <=======> . 11b 2 1932 2011 80

. . . . . . . . . . . . . . . . . . <=======> . 12a 3 1930 2011 82

. . . . . . . . . . . . . . . . . . <=======> . 12b 4 1931 2011 81

. . . . . . . . . . . . . . . . . . <=======> . 13a 5 1939 2011 73

. . . . . . . . . . . . . . . . . . <======> . 13b 6 1945 2011 67

. . . . . . . . . . . . . . . . . . <=======> . 14a 7 1939 2011 73

. . . . . . . . . . . . . . . . . . <======> . 14b 8 1941 2011 71

. . . . . . . . . . . . . . . . . . <=====> . 15a 9 1951 2011 61

. . . . . . . . . . . . . . . . . . .<====> . 15b 10 1962 2011 50

. . . . . . . . . . . . . . . . . . <=======> . 16a 11 1938 2011 74

. . . . . . . . . . . . . . . . . . <=======> . 16b 12 1938 2011 74

. . . . . . . . . . . . . . . . . . <=======> . 17a 13 1939 2011 73

. . . . . . . . . . . . . . . . . . <=======> . 17b 14 1936 2011 76

. . . . . . . . . . . . . . . . . . <=======> . 18a 15 1935 2011 77

. . . . . . . . . . . . . . . . . . <======> . 18b 16 1949 2011 63

. . . . . . . . . . . . . . . . . . <=====> . 19a 17 1958 2011 54

. . . . . . . . . . . . . . . . . . <======> . 19b 18 1943 2011 69

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

1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000 2050

1950 -.160 15 2000 -.173 18

1951 .091 16 1<< 2001 -.748 18

1952 .424 16 2002 1.048 18

1953 -2.384 16 2003 -.304 18

1954 -.117 16 2004 -.641 18

1955 2.270 16 2005 .616 18

1956 .105 16 2006 .897 18

1957 .884 16 2007 .743 18

1958 .356 17 2008 1.017 18

1959 -.139 17 2009 .530 18

1960 .267 17 2010 .705 18

1961 .740 17 2011 -2.754 18

1962 -.124 18

1963 .483 18

1964 .691 18

1965 -.906 18

1966 .135 18

1967 .157 18

1968 -1.350 18

1969 -.138 18

1970 .186 18

1971 .198 18

1972 1.762 18

1973 -1.305 18

1974 .493 18

1975 .977 18

1976 .101 18

1977 -.482 18

1978 -.311 18

1979 .916 18 1<<

1930 -2.559 1 1980 .608 18

1931 1.067 2 1981 -.185 18

1932 -.229 3 1982 .316 18

1933 -2.539 3 1983 -1.369 18

1934 -1.804 4 1984 .809 18

1935 .553 5 1985 -.016 18

1936 -1.781 6 1986 .735 18

1937 -.056 6 1987 -1.588 18

1938 .350 8 1988 -1.610 18 1

1939 .348 11 1989 -.353 18

1940 -.403 11 1990 -.458 18

1941 .257 12 1991 -.101 18

1942 .728 12 1992 .900 18

1943 1.122 13 1993 -.285 18

1944 1.518 13 1994 1.280 18

1945 1.215 14 1995 -.698 18

1946 .474 14 1996 .205 18

1947 -.426 14 1997 .129 18

1948 -1.927 14 1998 .909 18

1949 -.767 15 1999 .874 18

PART 5: CORRELATION OF SERIES BY SEGMENTS: SUG001\_ACRU\_Corr1-50 13:28 Mon 09 Jan 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 1925 1950 1975

1974 1999 2024

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

1 11a 1934 2011 .81 .68 .53

2 11b 1932 2011 .66 .56 .48

3 12a 1930 2011 .59 .50 .54

4 12b 1931 2011 .66 .63 .66

5 13a 1939 2011 .43 .40 .57

6 13b 1945 2011 .57 .64 .71

7 14a 1939 2011 .02B .12B .27A

8 14b 1941 2011 .10B .10B .15B

9 15a 1951 2011 .41 .47

10 15b 1962 2011 .34B

11 16a 1938 2011 .62 .56 .43

12 16b 1938 2011 .61 .54 .58

13 17a 1939 2011 .60 .61 .55

14 17b 1936 2011 .76 .65 .59

15 18a 1935 2011 .30A .62 .53

16 18b 1949 2011 .49 .49 .44

17 19a 1958 2011 .44 .58

18 19b 1943 2011 .54 .52 .62

Av segment correlation .52 .49 .51

PART 6: POTENTIAL PROBLEMS: SUG001\_ACRU\_Corr1-50 13:28 Mon 09 Jan 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

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

11a 1934 to 2011 78 years Series 1

[B] Entire series, effect on correlation ( .678) is:

Lower 2011> -.035 1988> -.031 2005< -.027 1995> -.012 1990> -.009 1967< -.008 Higher 1953 .037 1936 .031

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11b 1932 to 2011 80 years Series 2

[B] Entire series, effect on correlation ( .582) is:

Lower 1934> -.042 1983> -.022 1988> -.021 1959< -.021 2010< -.014 1980< -.012 Higher 1933 .033 1936 .029

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12a 1930 to 2011 82 years Series 3

[\*] Early part of series cannot be checked from 1930 to 1930 -- not matched by another series

[B] Entire series, effect on correlation ( .481) is:

Lower 1979< -.126 1975< -.026 1936> -.016 1952< -.011 2002< -.011 1957< -.008 Higher 2011 .057 1953 .032

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

1979 1980 4.7 SD

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

1979 .916 18 1 >> WARNING: Ring is not usually narrow

1988 -1.610 18 1

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

1979 -6.4 SD

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12b 1931 to 2011 81 years Series 4

[B] Entire series, effect on correlation ( .685) is:

Lower 1987> -.021 1975< -.018 1977> -.014 1963< -.012 1931< -.010 1979< -.009 Higher 2011 .029 1933 .023

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13a 1939 to 2011 73 years Series 5

[B] Entire series, effect on correlation ( .509) is:

Lower 1955< -.046 1983> -.036 1973> -.027 1947< -.020 2001> -.016 1998< -.011 Higher 2011 .073 1987 .026

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

1988 -5.2 SD

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

13b 1945 to 2011 67 years Series 6

[B] Entire series, effect on correlation ( .638) is:

Lower 1983> -.019 2000> -.018 1948> -.014 2001> -.013 1947< -.012 1969< -.010 Higher 2011 .070 1973 .035

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14a 1939 to 2011 73 years Series 7

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

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

1939 1988 -3 - .18 -.09 -.13 .27 .19 -.05 .45\*-.26 -.04 .02| .09 .20 -.13 -.26 -.02 -.02 -.02 -.05 .28 -.19

1950 1999 2 -.29 -.06 .02 -.17 .13 .00 -.04 .20 -.24 .05 .12| .08 .29\*-.10 -.15 .11 .07 -.01 -.07 .19 -.23

1962 2011 0 -.30 -.07 .22 .00 .06 -.12 -.12 .09 -.18 .06 .27\* - - - - - - - - - -

[B] Entire series, effect on correlation ( .184) is:

Lower 1939< -.089 1988> -.028 1951< -.026 1973> -.026 1948> -.023 1987> -.023 Higher 2011 .107 1955 .050

1939 to 1988 segment:

Lower 1939< -.099 1988> -.034 1973> -.027 1948> -.026 1987> -.026 1951< -.025 Higher 1955 .088 1953 .038

1950 to 1999 segment:

Lower 1988> -.044 1951< -.041 1973> -.037 1987> -.034 1986< -.034 1994< -.030 Higher 1955 .094 1953 .039

1962 to 2011 segment:

Lower 1988> -.047 1973> -.045 1986< -.044 1994< -.039 1987> -.039 1984< -.021 Higher 2011 .181 1968 .025

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

1939 1940 4.3 SD

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

1939 -6.2 SD

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14b 1941 to 2011 71 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

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

1941 1990 6 -.21 .04 .18 -.02 .21 .15 -.05 .06 -.22 -.17 .10|-.13 -.05 -.04 .02 .15 .29\*-.03 .03 .12 -.21

1950 1999 6 -.23 .02 .21 .03 .19 .08 -.08 .05 -.27 -.15 .10|-.09 -.02 -.01 .04 .22 .27\*-.08 .04 .19 -.21

1962 2011 -8 -.22 -.07 .22\* .00 .07 -.02 -.08 .05 -.27 -.16 .15| - - - - - - - - - -

[B] Entire series, effect on correlation ( .146) is:

Lower 1973> -.040 1988> -.037 1994< -.030 1948> -.027 1951< -.026 1987> -.021 Higher 2011 .052 1983 .050

1941 to 1990 segment:

Lower 1973> -.049 1988> -.045 1948> -.032 1987> -.025 1951< -.024 1984< -.019 Higher 1983 .074 1953 .057

1950 to 1999 segment:

Lower 1973> -.055 1988> -.050 1994< -.037 1987> -.029 1951< -.020 1984< -.017 Higher 1983 .075 1953 .054

1962 to 2011 segment:

Lower 1973> -.059 1988> -.054 1994< -.051 1987> -.030 1984< -.025 1982< -.024 Higher 2011 .087 1983 .078

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

1950 1951 -4.0 SD

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

1951 .091 16 1 >> WARNING: Ring is not usually narrow

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

1951 -5.5 SD; 1988 +3.3 SD

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15a 1951 to 2011 61 years Series 9

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

Lower 1995> -.036 1955< -.023 1987> -.021 1973> -.017 1962< -.017 1968> -.016 Higher 2011 .058 1953 .052

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15b 1962 to 2011 50 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

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

1962 2011 -8 -.03 .19 .41\*-.08 .07 -.08 -.19 .20 -.08 -.18 .34| - - - - - - - - - -

[B] Entire series, effect on correlation ( .344) is:

Lower 1996< -.156 1983> -.026 1987> -.024 1988> -.016 1974< -.013 1976< -.012 Higher 2011 .065 1973 .065

1962 to 2011 segment:

Lower 1996< -.156 1983> -.026 1987> -.024 1988> -.016 1974< -.013 1976< -.012 Higher 2011 .065 1973 .065

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16a 1938 to 2011 74 years Series 11

[B] Entire series, effect on correlation ( .520) is:

Lower 1980< -.041 1990< -.025 2011> -.022 1988> -.018 1958< -.018 1983> -.017 Higher 1953 .051 1973 .046

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16b 1938 to 2011 74 years Series 12

[B] Entire series, effect on correlation ( .582) is:

Lower 1988> -.031 1953> -.021 1980< -.012 1969< -.009 2010< -.008 1979< -.008 Higher 1955 .018 1948 .017

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17a 1939 to 2011 73 years Series 13

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

Lower 1977< -.080 2010< -.023 1976> -.017 1956> -.009 1996> -.008 1947> -.008 Higher 1953 .031 1955 .023

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17b 1936 to 2011 76 years Series 14

[B] Entire series, effect on correlation ( .700) is:

Lower 1968> -.023 1986< -.014 1984< -.012 2010< -.011 2004> -.011 2008< -.007 Higher 1936 .030 1953 .019

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18a 1935 to 2011 77 years Series 15

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

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

1935 1984 0 - - - - - .06 -.11 -.16 -.19 .08 .30\*-.41 .00 .19 .02 .15 .01 .04 .12 -.10 .06

[B] Entire series, effect on correlation ( .398) is:

Lower 1936> -.079 1937< -.021 1968> -.020 1943< -.020 1947> -.018 1966< -.013 Higher 1953 .038 1955 .031

1935 to 1984 segment:

Lower 1936> -.121 1937< -.035 1943< -.033 1947> -.031 1968> -.030 1966< -.023 Higher 1953 .089 1955 .065

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

1936 +3.1 SD

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18b 1949 to 2011 63 years Series 16

[B] Entire series, effect on correlation ( .509) is:

Lower 1978< -.100 1996< -.030 1968> -.029 1954< -.011 1966< -.010 1997< -.009 Higher 1953 .046 1987 .032

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19a 1958 to 2011 54 years Series 17

[B] Entire series, effect on correlation ( .567) is:

Lower 1969< -.029 1963< -.022 2000> -.019 1995> -.018 2003> -.014 1999< -.014 Higher 2011 .117 1968 .024

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19b 1943 to 2011 69 years Series 18

[B] Entire series, effect on correlation ( .576) is:

Lower 1995> -.019 1962> -.016 1948> -.014 1969< -.013 2003> -.012 1956> -.011 Higher 2011 .074 1973 .018

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PART 7: DESCRIPTIVE STATISTICS: SUG001\_ACRU\_Corr1-50 13:28 Mon 09 Jan 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 11a 1934 2011 78 3 0 .678 1.51 4.41 .941 .799 .317 2.55 .591 -.050 2

2 11b 1932 2011 80 3 0 .582 1.47 4.23 .993 .844 .287 2.68 .496 -.056 2

3 12a 1930 2011 82 3 0 .481 1.26 3.95 .731 .629 .474 2.78 .449 -.006 1

4 12b 1931 2011 81 3 0 .685 1.56 4.51 .688 .639 .261 2.71 .470 -.029 1

5 13a 1939 2011 73 3 0 .509 1.28 2.51 .529 .586 .272 2.50 .450 .109 1

6 13b 1945 2011 67 3 0 .638 1.67 4.37 .986 .817 .258 2.66 .538 -.055 1

7 14a 1939 2011 73 3 3 .184 2.20 7.15 1.238 .487 .432 2.81 .461 -.004 1

8 14b 1941 2011 71 3 3 .146 2.16 4.58 1.156 .423 .469 2.48 .465 .030 1

9 15a 1951 2011 61 2 0 .494 2.44 3.71 .531 .277 .211 2.62 .509 .011 2

10 15b 1962 2011 50 1 1 .344 3.04 4.35 .603 .332 .186 2.46 .455 .038 1

11 16a 1938 2011 74 3 0 .520 1.72 3.41 .562 .530 .257 2.70 .604 -.072 3

12 16b 1938 2011 74 3 0 .582 1.82 3.40 .607 .533 .268 2.60 .487 .064 1

13 17a 1939 2011 73 3 0 .613 1.39 4.40 .917 .790 .278 2.73 .448 -.047 1

14 17b 1936 2011 76 3 0 .700 1.60 5.04 1.189 .889 .263 2.52 .394 -.088 1

15 18a 1935 2011 77 3 1 .398 2.12 6.81 1.257 .704 .339 2.70 .443 .047 1

16 18b 1949 2011 63 3 0 .509 2.15 5.92 1.126 .695 .295 2.63 .462 .046 1

17 19a 1958 2011 54 2 0 .567 2.18 3.44 .610 .318 .276 2.53 .548 .044 1

18 19b 1943 2011 69 3 0 .576 1.99 3.75 .908 .673 .292 2.58 .486 .043 1

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Total or mean: 1276 50 8 .516 1.82 7.15 .874 .623 .306 2.81 .486 -.001

- = [ COFECHA S1AR1COF ] = -