[] Dendrochronology Program Library Run BALD3 Program COF 11:38 Mon 25 Feb 2013 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 28547

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

Title of run: BALD3\_3

File of DATED series: BALD3\_2COMP

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 1951 to 2012 62 years

Continuous time span is 1951 to 2012 62 years

Portion with two or more series is 1954 to 2012 59 years

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

\*C\* Number of dated series 23 \*C\*

\*O\* Master series 1951 2012 62 yrs \*O\*

\*F\* Total rings in all series 1233 \*F\*

\*E\* Total dated rings checked 1230 \*E\*

\*C\* Series intercorrelation .662 \*C\*

\*H\* Average mean sensitivity .203 \*H\*

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

\*\*\* Mean length of series 53.6 \*\*\*

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

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

192A 1 absent rings: 1996

192B 1 absent rings: 1996

2 absent rings .162%

PART 2: TIME PLOT OF TREE-RING SERIES: BALD3\_3 11:38 Mon 25 Feb 2013 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

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

. . . . . . . . . . . . . . . . . . .<====> . 189A 1 1960 2012 53

. . . . . . . . . . . . . . . . . . <=====> . 189B 2 1958 2012 55

. . . . . . . . . . . . . . . . . . .<====> . 190A 3 1969 2012 44

. . . . . . . . . . . . . . . . . . .<====> . 190B 4 1964 2012 49

. . . . . . . . . . . . . . . . . . <=====> . 191A 5 1958 2012 55

. . . . . . . . . . . . . . . . . . <=====> . 191B 6 1958 2012 55

. . . . . . . . . . . . . . . . . . <=====> . 192A 7 1951 2012 62

. . . . . . . . . . . . . . . . . . <=====> . 192B 8 1956 2012 57

. . . . . . . . . . . . . . . . . . .<====> . 193A 9 1966 2012 47

. . . . . . . . . . . . . . . . . . .<====> . 193B 10 1962 2012 51

. . . . . . . . . . . . . . . . . . .<====> . 194A 11 1967 2012 46

. . . . . . . . . . . . . . . . . . .<====> . 194B 12 1962 2012 51

. . . . . . . . . . . . . . . . . . <=====> . 195A 13 1959 2012 54

. . . . . . . . . . . . . . . . . . <=====> . 196A 14 1957 2012 56

. . . . . . . . . . . . . . . . . . <=====> . 196B 15 1954 2012 59

. . . . . . . . . . . . . . . . . . .<====> . 197A 16 1965 2012 48

. . . . . . . . . . . . . . . . . . <=====> . 198A 17 1955 2012 58

. . . . . . . . . . . . . . . . . . .<====> . 198B 18 1961 2012 52

. . . . . . . . . . . . . . . . . . <=====> . 199A 19 1957 2012 56

. . . . . . . . . . . . . . . . . . <=====> . 199B 20 1959 2012 54

. . . . . . . . . . . . . . . . . . <=====> . 200A 21 1958 2012 55

. . . . . . . . . . . . . . . . . . <=====> . 200B 22 1956 2012 57

. . . . . . . . . . . . . . . . . . <=====> . 197B 23 1954 2012 59

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

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: BALD3\_3 11:38 Mon 25 Feb 2013 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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2000 -.647 23

1951 -.704 1 2001 .691 23

1952 1.413 1 2002 2.099 23

1953 1.018 1 2003 -.357 23

1954 .492 3 2004 -1.131 23

1955 -.095 4 2005 -.461 23

1956 -1.641 6 2006 -.456 23

1957 -.754 8 2007 1.419 23

1958 -.496 12 2008 .759 23

1959 -1.691 14 2009 .289 23

1960 1.106 15 2010 1.378 23

1961 .858 16 2011 -.290 23

1962 -.239 18 2012 -.259 23

1963 -.574 18

1964 -1.096 19

1965 .074 20

1966 -.168 21

1967 .979 22

1968 .813 22

1969 .507 23

1970 1.086 23

1971 2.033 23

1972 .056 23

1973 -.001 23

1974 -.565 23

1975 .790 23

1976 .763 23

1977 -.906 23

1978 -1.472 23

1979 -.587 23

1980 -.442 23

1981 -2.151 23

1982 .283 23

1983 -.910 23

1984 -.560 23

1985 -.580 23

1986 .645 23

1987 1.100 23

1988 .885 23

1989 .377 23

1990 -.052 23

1991 .770 23

1992 1.308 23

1993 .984 23

1994 .050 23

1995 .460 23

1996 -2.413 23 2

1997 -1.538 23

1998 -1.912 23

1999 -.335 23

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PART 4: Master Bar Plot: BALD3\_3 11:38 Mon 25 Feb 2013 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

2000--c

1951--c 2001-------C

1952----------F 2002----------H

1953---------D 2003----a

1954------B 2004-e

1955-----@ 2005---b

1956g 2006---b

1957--c 2007----------F

1958---b 2008-------C

1959g 2009------A

1960---------D 2010----------F

1961--------C 2011----a

1962----a 2012----a

1963--b

1964-d

1965-----@

1966----a

1967--------D

1968--------C

1969------B

1970---------D

1971----------H

1972-----@

1973-----@

1974--b

1975--------C

1976-------C

1977-d

1978f

1979--b

1980---b

1981i

1982------A

1983-d

1984--b

1985--b

1986-------C

1987---------D

1988--------D

1989------B

1990-----@

1991-------C

1992----------E

1993---------D

1994-----@

1995------B

1996j

1997f

1998h

1999----a

PART 5: CORRELATION OF SERIES BY SEGMENTS: BALD3\_3 11:38 Mon 25 Feb 2013 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 1950 1965 1980 1995

1979 1994 2009 2024

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

1 189A 1960 2012 .43 .63 .67 .77

2 189B 1958 2012 .34A .46 .75 .75

3 190A 1969 2012 .74 .73 .74

4 190B 1964 2012 .64 .66 .79 .76

5 191A 1958 2012 .64 .76 .80 .75

6 191B 1958 2012 .56 .59 .87 .83

7 192A 1951 2012 .44 .59 .65 .64

8 192B 1956 2012 .53 .74 .76 .78

9 193A 1966 2012 .52 .66 .62

10 193B 1962 2012 .55 .55 .72 .78

11 194A 1967 2012 .71 .78 .73

12 194B 1962 2012 .47 .63 .79 .79

13 195A 1959 2012 .81 .81 .86 .83

14 196A 1957 2012 .66 .68 .66 .58

15 196B 1954 2012 .52 .58 .65 .63

16 197A 1965 2012 .56 .62 .65

17 198A 1955 2012 .68 .73 .82 .81

18 198B 1961 2012 .46 .47 .74 .67

19 199A 1957 2012 .59 .69 .76 .67

20 199B 1959 2012 .76 .72 .71 .68

21 200A 1958 2012 .73 .78 .85 .81

22 200B 1956 2012 .69 .65 .62 .62

23 197B 1954 2012 .66 .75 .88 .86

Av segment correlation .59 .65 .75 .73

PART 6: POTENTIAL PROBLEMS: BALD3\_3 11:38 Mon 25 Feb 2013 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

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

189A 1960 to 2012 53 years Series 1

[B] Entire series, effect on correlation ( .578) is:

Lower 1960< -.095 1981> -.065 2011> -.011 1962> -.009 2005< -.008 2006< -.007 Higher 1996 .042 1971 .019

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

1982 +3.1 SD

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

189B 1958 to 2012 55 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

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

1958 1987 0 - - - .03 -.19 -.27 -.07 -.20 -.24 -.35 .34\* .22 .04 -.04 .14 .25 .25 .22 .10 .18 -.15

[B] Entire series, effect on correlation ( .603) is:

Lower 1959> -.096 1983> -.029 1992< -.016 1987< -.012 1976< -.010 2012> -.010 Higher 1996 .124 2003 .019

1958 to 1987 segment:

Lower 1959> -.171 1983> -.050 1987< -.022 1976< -.021 1973< -.015 1985> -.009 Higher 1972 .050 1977 .032

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

1959 +3.5 SD; 1983 +3.2 SD

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

190A 1969 to 2012 44 years Series 3

[B] Entire series, effect on correlation ( .744) is:

Lower 1998> -.024 1990< -.016 2004< -.012 1985< -.010 1973> -.010 1993< -.010 Higher 1996 .066 1971 .013

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190B 1964 to 2012 49 years Series 4

[B] Entire series, effect on correlation ( .699) is:

Lower 1964< -.026 1972> -.025 1977> -.014 1988< -.011 1970< -.011 1966> -.010 Higher 1981 .047 2003 .017

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

191A 1958 to 2012 55 years Series 5

[B] Entire series, effect on correlation ( .694) is:

Lower 1959> -.034 2004< -.026 1962> -.018 1966< -.016 2011> -.013 1998> -.012 Higher 1996 .056 1981 .040

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191B 1958 to 2012 55 years Series 6

[B] Entire series, effect on correlation ( .690) is:

Lower 1976< -.054 1977< -.027 1959> -.019 1972> -.017 2009> -.009 1995< -.008 Higher 1996 .089 1981 .025

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192A 1951 to 2012 62 years Series 7

[\*] Early part of series cannot be checked from 1951 to 1953 -- not matched by another series

[B] Entire series, effect on correlation ( .539) is:

Lower 1959< -.095 1958> -.037 1987< -.011 1961< -.009 1977> -.007 2011> -.006 Higher 1996 .066 1978 .010

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

1958 1959 -4.0 SD

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

1996 -2.413 23 2

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

1958 +3.2 SD

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192B 1956 to 2012 57 years Series 8

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

Lower 1959< -.102 1956> -.030 1957> -.013 1958> -.011 1982< -.010 1994> -.006 Higher 1996 .061 2007 .013

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

1996 -2.413 23 2

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

1959 -4.6 SD

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193A 1966 to 2012 47 years Series 9

[B] Entire series, effect on correlation ( .578) is:

Lower 1975< -.047 1972> -.037 1985< -.018 2007< -.017 1966< -.009 1978> -.009 Higher 1981 .061 2002 .018

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193B 1962 to 2012 51 years Series 10

[B] Entire series, effect on correlation ( .713) is:

Lower 1983< -.061 1981> -.036 1978> -.014 1972> -.013 2008> -.007 1965< -.007 Higher 1996 .058 2007 .014

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194A 1967 to 2012 46 years Series 11

[B] Entire series, effect on correlation ( .643) is:

Lower 1967< -.071 2003> -.033 1969< -.027 2012< -.022 2004> -.016 2008< -.009 Higher 1996 .120 2002 .019

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194B 1962 to 2012 51 years Series 12

[B] Entire series, effect on correlation ( .615) is:

Lower 1963< -.094 2004> -.028 1976< -.019 1962> -.015 1978> -.015 1972> -.010 Higher 1996 .129 2007 .018

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195A 1959 to 2012 54 years Series 13

[B] Entire series, effect on correlation ( .833) is:

Lower 1962> -.018 1998> -.017 1984< -.010 1972< -.008 1971< -.008 1985> -.007 Higher 1996 .043 1981 .021

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196A 1957 to 2012 56 years Series 14

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

Lower 1959> -.023 1978> -.021 1989< -.021 2004> -.021 1991< -.017 1976< -.017 Higher 1981 .049 2002 .018

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

196B 1954 to 2012 59 years Series 15

[B] Entire series, effect on correlation ( .571) is:

Lower 1959> -.041 1967< -.018 1972> -.012 1979< -.012 1985< -.012 2009< -.011 Higher 1981 .028 2002 .025

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

197A 1965 to 2012 48 years Series 16

[B] Entire series, effect on correlation ( .621) is:

Lower 2008< -.100 1981> -.043 2011> -.021 1966> -.011 1975< -.011 1998> -.010 Higher 1996 .134 1978 .016

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198A 1955 to 2012 58 years Series 17

[B] Entire series, effect on correlation ( .742) is:

Lower 2003< -.038 1956> -.015 1982< -.011 1955< -.011 1977> -.011 1978> -.011 Higher 1981 .029 2002 .016

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198B 1961 to 2012 52 years Series 18

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

Lower 1973< -.039 1983> -.025 2011> -.024 1972< -.017 1993< -.014 1962< -.012 Higher 1996 .048 2002 .030

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199A 1957 to 2012 56 years Series 19

[B] Entire series, effect on correlation ( .630) is:

Lower 1957< -.062 1958> -.021 1972< -.016 1994< -.016 1983> -.014 1985> -.010 Higher 1981 .023 2007 .017

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199B 1959 to 2012 54 years Series 20

[B] Entire series, effect on correlation ( .728) is:

Lower 2000< -.019 1994< -.019 1985> -.015 1977> -.010 1962< -.010 2003> -.009 Higher 1996 .039 1981 .029

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

200A 1958 to 2012 55 years Series 21

[B] Entire series, effect on correlation ( .764) is:

Lower 1959> -.016 2003> -.016 1964> -.016 1994< -.010 2009> -.010 1977> -.010 Higher 1996 .058 1981 .028

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

200B 1956 to 2012 57 years Series 22

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

Lower 1996> -.037 1977> -.019 2003> -.016 1961< -.014 1995< -.012 2009> -.011 Higher 1956 .025 1959 .020

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197B 1954 to 2012 59 years Series 23

[B] Entire series, effect on correlation ( .753) is:

Lower 1958< -.055 1959> -.016 1972> -.010 1985> -.010 1964> -.010 2004> -.007 Higher 1996 .058 1981 .026

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PART 7: DESCRIPTIVE STATISTICS: BALD3\_3 11:38 Mon 25 Feb 2013 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 189A 1960 2012 53 4 0 .578 2.19 3.49 .693 .771 .174 2.82 .624 -.002 1

2 189B 1958 2012 55 4 1 .603 1.82 3.19 .660 .853 .161 2.46 .475 .049 1

3 190A 1969 2012 44 3 0 .744 1.25 3.19 .639 .898 .186 2.69 .649 .049 1

4 190B 1964 2012 49 4 0 .699 1.48 2.95 .685 .921 .149 2.65 .580 -.024 1

5 191A 1958 2012 55 4 0 .694 1.29 4.07 1.035 .953 .224 2.51 .563 .034 1

6 191B 1958 2012 55 4 0 .690 1.23 3.24 .777 .940 .174 2.56 .509 .160 1

7 192A 1951 2012 62 4 0 .539 1.11 2.92 .709 .832 .343 2.47 .324 -.133 1

8 192B 1956 2012 57 4 0 .655 1.19 3.04 .802 .845 .346 2.39 .357 -.100 1

9 193A 1966 2012 47 3 0 .578 1.25 3.30 .641 .862 .175 2.86 .567 -.078 1

10 193B 1962 2012 51 4 0 .713 1.56 3.10 .689 .875 .150 2.65 .499 .018 1

11 194A 1967 2012 46 3 0 .643 1.54 3.30 .676 .857 .182 2.63 .546 -.029 1

12 194B 1962 2012 51 4 0 .615 1.63 3.31 .627 .678 .245 2.63 .502 -.046 1

13 195A 1959 2012 54 4 0 .833 1.16 2.02 .365 .662 .196 2.60 .573 -.022 1

14 196A 1957 2012 56 4 0 .613 1.44 2.92 .626 .829 .189 2.53 .463 -.042 1

15 196B 1954 2012 59 4 0 .571 1.39 3.33 .636 .865 .174 2.75 .486 .013 1

16 197A 1965 2012 48 3 0 .621 1.39 3.29 .630 .886 .181 2.53 .518 .003 1

17 198A 1955 2012 58 4 0 .742 1.57 3.59 .880 .926 .185 2.78 .477 .028 1

18 198B 1961 2012 52 4 0 .576 1.56 3.61 .905 .905 .217 2.88 .513 .178 1

19 199A 1957 2012 56 4 0 .630 1.60 3.83 .959 .906 .179 2.83 .550 -.129 1

20 199B 1959 2012 54 4 0 .728 1.67 3.74 .925 .905 .184 2.82 .649 -.052 1

21 200A 1958 2012 55 4 0 .764 1.78 3.71 .811 .884 .192 2.68 .584 -.023 1

22 200B 1956 2012 57 4 0 .650 1.67 3.71 .957 .892 .228 2.72 .561 -.028 1

23 197B 1954 2012 59 4 0 .753 1.50 2.55 .528 .826 .190 2.62 .560 -.002 2

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Total or mean: 1233 88 1 .662 1.49 4.07 .736 .860 .203 2.88 .524 -.009

- = [ COFECHA BALD3COF ] = -