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[] P R O G R A M C O F E C H A Version 6.06P 27834

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

Title of run: 84\_ELL\_corr3-40

File of DATED series: 84\_ELL\_corr3

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 40 years lagged successively by 20 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 .3665

6 Master dating series saved N

7 Ring measurements listed Y

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 2010 96 years

Continuous time span is 1915 to 2010 96 years

Portion with two or more series is 1925 to 2010 86 years

>> 222-a 2003 absent in 1 of 20 series, but is not usually narrow: master index is .736

>> 222-a 2007 absent in 5 of 20 series, but is not usually narrow: master index is .916

>> 222-a 2008 absent in 5 of 20 series, but is not usually narrow: master index is .709

>> 222-a 2009 absent in 6 of 20 series, but is not usually narrow: master index is .047

>> 222-a 2010 absent in 6 of 20 series, but is not usually narrow: master index is .937

>> 222-b 2007 absent in 5 of 20 series, but is not usually narrow: master index is .916

>> 222-b 2008 absent in 5 of 20 series, but is not usually narrow: master index is .709

>> 222-b 2009 absent in 6 of 20 series, but is not usually narrow: master index is .047

>> 222-b 2010 absent in 6 of 20 series, but is not usually narrow: master index is .937

>> 225-b 1995 absent in 1 of 20 series, but is not usually narrow: master index is .062

>> 225-b 2007 absent in 5 of 20 series, but is not usually narrow: master index is .916

>> 225-b 2008 absent in 5 of 20 series, but is not usually narrow: master index is .709

>> 225-b 2009 absent in 6 of 20 series, but is not usually narrow: master index is .047

>> 225-b 2010 absent in 6 of 20 series, but is not usually narrow: master index is .937

>> 229-b 2009 absent in 6 of 20 series, but is not usually narrow: master index is .047

>> 229-b 2010 absent in 6 of 20 series, but is not usually narrow: master index is .937

>> 230-a 2007 absent in 5 of 20 series, but is not usually narrow: master index is .916

>> 230-a 2008 absent in 5 of 20 series, but is not usually narrow: master index is .709

>> 230-a 2009 absent in 6 of 20 series, but is not usually narrow: master index is .047

>> 230-a 2010 absent in 6 of 20 series, but is not usually narrow: master index is .937

>> 230-b 2007 absent in 5 of 20 series, but is not usually narrow: master index is .916

>> 230-b 2008 absent in 5 of 20 series, but is not usually narrow: master index is .709

>> 230-b 2009 absent in 6 of 20 series, but is not usually narrow: master index is .047

>> 230-b 2010 absent in 6 of 20 series, but is not usually narrow: master index is .937

>> 231-a 1988 absent in 2 of 20 series, but is not usually narrow: master index is .976

>> 231-b 1988 absent in 2 of 20 series, but is not usually narrow: master index is .976

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

\*C\* Number of dated series 20 \*C\*

\*O\* Master series 1915 2010 96 yrs \*O\*

\*F\* Total rings in all series 1529 \*F\*

\*E\* Total dated rings checked 1519 \*E\*

\*C\* Series intercorrelation .453 \*C\*

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

\*A\* Segments, possible problems 11 \*A\*

\*\*\* Mean length of series 76.4 \*\*\*

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

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

222-a 8 absent rings: 2003 2004 2005 2006 2007 2008 2009 2010

222-b 5 absent rings: 2006 2007 2008 2009 2010

223-b 2 absent rings: 2004 2005

225-a 1 absent rings: 1982

225-b 8 absent rings: 1989 1995 1996 1998 2007 2008 2009 2010

229-b 2 absent rings: 2009 2010

230-a 6 absent rings: 2005 2006 2007 2008 2009 2010

230-b 7 absent rings: 2004 2005 2006 2007 2008 2009 2010

231-a 1 absent rings: 1988

231-b 1 absent rings: 1988

541-a 1 absent rings: 2005

42 absent rings 2.747%

PART 2: TIME PLOT OF TREE-RING SERIES: 84\_ELL\_corr3-40 13:59 Tue 15 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

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

. . . . . . . . . . . . . . . . . . <=======> . 222-a 1 1934 2010 77

. . . . . . . . . . . . . . . . . . <========> . 222-b 2 1928 2010 83

. . . . . . . . . . . . . . . . . . <=======> . 223-a 3 1935 2010 76

. . . . . . . . . . . . . . . . . . <=======> . 223-b 4 1930 2010 81

. . . . . . . . . . . . . . . . . . <=====> . 224-a 5 1950 2010 61

. . . . . . . . . . . . . . . . . . <========> . 224-b 6 1925 2010 86

. . . . . . . . . . . . . . . . . .<=========> . 225-a 7 1915 2010 96

. . . . . . . . . . . . . . . . . . <=======> . 225-b 8 1931 2010 80

. . . . . . . . . . . . . . . . . . <=======> . 226-a 9 1930 2010 81

. . . . . . . . . . . . . . . . . . <=======> . 226-b 10 1937 2010 74

. . . . . . . . . . . . . . . . . . <=======> . 228-a 11 1936 2010 75

. . . . . . . . . . . . . . . . . . <=======> . 228-b 12 1933 2010 78

. . . . . . . . . . . . . . . . . . <=======> . 229-a 13 1939 2010 72

. . . . . . . . . . . . . . . . . . <======> . 229-b 14 1940 2010 71

. . . . . . . . . . . . . . . . . . <=======> . 230-a 15 1937 2010 74

. . . . . . . . . . . . . . . . . . <=======> . 230-b 16 1935 2010 76

. . . . . . . . . . . . . . . . . . <======> . 231-a 17 1942 2010 69

. . . . . . . . . . . . . . . . . . <======> . 231-b 18 1941 2010 70

. . . . . . . . . . . . . . . . . . <=======> . 541-a 19 1936 2010 75

. . . . . . . . . . . . . . . . . . <=======> . 541-b 20 1937 2010 74

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

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: 84\_ELL\_corr3-40 13:59 Tue 15 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

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

1950 -.537 20 2000 .618 20

1951 .557 20 2001 .595 20

1952 -.108 20 2002 1.326 20

1953 -.817 20 2003 .736 20 1<<

1954 .443 20 2004 -1.164 20 3

1955 1.230 20 2005 -1.408 20 5

1956 -1.365 20 2006 -.459 20 4

1957 .879 20 2007 .916 20 5<<

1958 1.647 20 2008 .709 20 5<<

1959 .537 20 2009 .047 20 6<<

1960 -.729 20 2010 .937 20 6<<

1961 .803 20

1962 -1.202 20

1963 -2.378 20

1964 -1.572 20

1915 -3.465 1 1965 -.607 20

1916 .103 1 1966 -.825 20

1917 -1.035 1 1967 .678 20

1918 .741 1 1968 .165 20

1919 .799 1 1969 .367 20

1920 -1.124 1 1970 1.290 20

1921 2.064 1 1971 1.678 20

1922 2.010 1 1972 -.551 20

1923 1.408 1 1973 -.510 20

1924 1.185 1 1974 .110 20

1925 .056 2 1975 1.782 20

1926 .072 2 1976 -.172 20

1927 .610 2 1977 -1.192 20

1928 -1.336 3 1978 .267 20

1929 -1.483 3 1979 .433 20

1930 -.099 5 1980 .395 20

1931 .141 6 1981 -1.880 20

1932 .961 6 1982 -1.220 20 1

1933 .071 7 1983 -.100 20

1934 .168 8 1984 -.267 20

1935 .063 10 1985 -.903 20

1936 -1.508 12 1986 -1.137 20

1937 -.237 15 1987 .560 20

1938 .274 15 1988 .976 20 2<<

1939 .247 16 1989 -.452 20 1

1940 -1.492 17 1990 -.551 20

1941 .401 18 1991 .480 20

1942 -.383 19 1992 .474 20

1943 -1.000 19 1993 .892 20

1944 .642 19 1994 .604 20

1945 .822 19 1995 .062 20 1<<

1946 .651 19 1996 -.927 20 1

1947 1.155 19 1997 .419 20

1948 -1.169 19 1998 -1.128 20 1

1949 -.291 19 1999 .524 20

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PART 4: Master Bar Plot: 84\_ELL\_corr3-40 13:59 Tue 15 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---b 2000-------B

1951-------B 2001-------B

1952----@ 2002----------E

1953--c 2003--------C

1954------B 2004-e

1955---------E 2005f

1956e 2006---b

1957---------D 2007---------D

1958----------G 2008--------C

1959-------B 2009-----@

1960--c 2010---------D

1961--------C

1962-e

1963j

1964f

1915n 1965---b

1916-----@ 1966--c

1917-d 1967--------C

1918--------C 1968-----A

1919--------C 1969------A

1920-d 1970---------E

1921----------H 1971----------G

1922----------H 1972---b

1923----------F 1973---b

1924---------E 1974-----@

1925-----@ 1975----------G

1926-----@ 1976----a

1927-------B 1977-e

1928-e 1978-----A

1929f 1979------B

1930----@ 1980------B

1931-----A 1981h

1932---------D 1982-e

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

1934-----A 1984----a

1935-----@ 1985--d

1936f 1986-e

1937----a 1987-------B

1938-----A 1988---------D

1939-----A 1989---b

1940f 1990---b

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

1942---b 1992------B

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

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

1945--------C 1995-----@

1946--------C 1996--d

1947---------E 1997------B

1948-e 1998-e

1949---a 1999-------B

PART 5: CORRELATION OF SERIES BY SEGMENTS: 84\_ELL\_corr3-40 13:59 Tue 15 Mar 2011 Page 5

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Correlations of 40-year dated segments, lagged 20 years

Flags: A = correlation under .3665 but highest as dated; B = correlation higher at other than dated position

Seq Series Time\_span 1920 1940 1960 1980

1959 1979 1999 2019

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

1 222-a 1934 2010 .72 .77 .76 .75

2 222-b 1928 2010 .59 .67 .36B .29B

3 223-a 1935 2010 .52 .54 .47 .42

4 223-b 1930 2010 .24B .62 .57 .45

5 224-a 1950 2010 .55 .48 .49

6 224-b 1925 2010 .38 .52 .47 .38

7 225-a 1915 2010 .24A .52 .44 .49

8 225-b 1931 2010 .43 .49 .25B .21B

9 226-a 1930 2010 .40 .68 .66 .69

10 226-b 1937 2010 .56 .58 .45 .50

11 228-a 1936 2010 .64 .59 .59 .39

12 228-b 1933 2010 .14B .33A .38 .44

13 229-a 1939 2010 .58 .58 .76 .76

14 229-b 1940 2010 .73 .80 .76

15 230-a 1937 2010 .39 .41 .47 .43

16 230-b 1935 2010 .47 .50 .68 .53

17 231-a 1942 2010 .43 .65 .44

18 231-b 1941 2010 .29A .50 .32B

19 541-a 1936 2010 .45B .41 .50 .54

20 541-b 1937 2010 .45 .45 .45 .59

Av segment correlation .45 .53 .53 .49

PART 6: POTENTIAL PROBLEMS: 84\_ELL\_corr3-40 13:59 Tue 15 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 40-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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222-a 1934 to 2010 77 years Series 1

[B] Entire series, effect on correlation ( .609) is:

Lower 2003< -.085 1943> -.013 1950> -.011 1937< -.010 2004> -.010 1956> -.009 Higher 1981 .032 1948 .021

[D] 8 Absent rings: Year Master N series Absent

2003 .736 20 1 >> WARNING: Ring is not usually narrow

2004 -1.164 20 3

2005 -1.408 20 5

2006 -.459 20 4

2007 .916 20 5 >> WARNING: Ring is not usually narrow

2008 .709 20 5 >> WARNING: Ring is not usually narrow

2009 .047 20 6 >> WARNING: Ring is not usually narrow

2010 .937 20 6 >> WARNING: Ring is not usually narrow

>> WARNING: Last ring in series is ABSENT

222-a Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1934 126 148 124 103 129 153

1940 127 156 182 220 288 276 290 289 207 232

1950 273 335 285 220 250 298 230 229 252 175

1960 104 147 69 47 41 30 29 37 48 57

1970 116 153 86 75 55 77 49 41 46 52

1980 68 24 24 34 31 28 30 43 38 37

1990 35 50 44 42 31 23 11 16 9 17

2000 12 13 13 0 0 0 0 0 0 0

2010 0

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

222-b 1928 to 2010 83 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

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

1960 1999 -4 .11 -.12 -.12 -.11 -.21 -.03 .43\*-.05 -.26 .39 .36|-.20 .12 -.16 .28 .02 -.26 -.24 .22 .13 -.16

1971 2010 -1 .11 -.05 -.04 -.11 -.04 .03 .36 -.07 -.39 .38\* .29| - - - - - - - - - -

[B] Entire series, effect on correlation ( .447) is:

Lower 1999< -.039 2006< -.022 1998> -.021 2002< -.017 1943> -.016 2005> -.012 Higher 1948 .034 1940 .023

1960 to 1999 segment:

Lower 1999< -.080 1998> -.048 1995> -.013 1976> -.013 1962> -.012 1972> -.009 Higher 1971 .035 1975 .030

1971 to 2010 segment:

Lower 1999< -.076 1998> -.043 2002< -.032 2006< -.032 2005> -.024 2007< -.015 Higher 1971 .037 2004 .034

[D] 5 Absent rings: Year Master N series Absent

2006 -.459 20 4

2007 .916 20 5 >> WARNING: Ring is not usually narrow

2008 .709 20 5 >> WARNING: Ring is not usually narrow

2009 .047 20 6 >> WARNING: Ring is not usually narrow

2010 .937 20 6 >> WARNING: Ring is not usually narrow

>> WARNING: Last ring in series is ABSENT

222-b Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1928 15 65

1930 158 164 217 176 139 197 142 148 156 149

1940 84 157 177 233 309 252 263 302 170 191

1950 163 185 160 141 186 226 149 186 239 204

1960 91 125 101 76 54 38 37 51 58 76

1970 88 119 73 49 64 69 50 26 40 45

1980 32 23 14 17 14 12 12 11 10 10

1990 9 14 20 16 10 14 5 11 11 4

2000 12 11 6 6 2 4 0 0 0 0

2010 0

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223-a 1935 to 2010 76 years Series 3

[B] Entire series, effect on correlation ( .458) is:

Lower 1942< -.037 1940> -.026 1997< -.015 1996> -.012 1960> -.012 2004> -.011 Higher 1963 .029 1972 .015

223-a Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1935 220 228 278 297 274

1940 286 334 170 169 315 316 347 334 228 268

1950 252 232 203 147 180 187 151 188 219 146

1960 134 140 103 52 59 99 120 136 106 69

1970 78 97 59 67 69 67 36 41 59 55

1980 47 30 28 33 37 15 18 21 18 10

1990 9 11 13 14 20 15 12 7 7 13

2000 15 14 19 13 8 5 8 11 10 9

2010 18

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223-b 1930 to 2010 81 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

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

1930 1969 6 -.01 -.15 -.06 -.11 .08 .01 -.15 .22 -.17 .03 .24|-.09 .12 .11 -.26 -.22 .28\*-.17 .14 .25 .09

[B] Entire series, effect on correlation ( .351) is:

Lower 1934< -.130 1960> -.016 1943> -.015 1955< -.015 1933> -.014 1930< -.014 Higher 1963 .028 1940 .025

1930 to 1969 segment:

Lower 1934< -.209 1960> -.025 1943> -.024 1955< -.023 1930< -.022 1933> -.021 Higher 1963 .051 1940 .047

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

2004 -1.164 20 3

2005 -1.408 20 5

223-b Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1930 107 170 228 267 130 178 204 199 216 236

1940 187 280 284 342 396 415 344 371 297 396

1950 370 320 358 245 241 229 189 240 310 260

1960 272 283 228 139 135 142 158 175 157 149

1970 177 142 74 58 59 82 46 37 38 43

1980 27 19 14 20 14 10 11 13 12 6

1990 4 14 14 18 19 9 8 5 4 8

2000 7 10 7 4 0 0 22 39 29 22

2010 15

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224-a 1950 to 2010 61 years Series 5

[B] Entire series, effect on correlation ( .558) is:

Lower 1962> -.045 2002< -.020 2005> -.019 1972> -.017 1985> -.016 1978< -.015 Higher 2004 .035 1963 .021

224-a Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1950 154 163 150 137 167 178 146 182 209 154

1960 142 156 164 101 130 113 102 162 145 144

1970 157 148 132 157 165 156 119 112 91 76

1980 85 69 80 115 94 126 105 132 161 128

1990 179 168 212 183 145 150 107 130 87 117

2000 141 129 116 120 80 133 119 208 166 144

2010 159

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224-b 1925 to 2010 86 years Series 6

[B] Entire series, effect on correlation ( .381) is:

Lower 1926> -.022 1948> -.022 1931> -.018 1968< -.013 1991< -.010 1972> -.010 Higher 1956 .022 1963 .021

224-b Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1925 71 103 106 87 61

1930 70 141 145 112 116 124 118 101 126 119

1940 73 184 183 164 168 179 171 159 168 171

1950 182 172 167 150 188 212 144 189 187 136

1960 149 192 145 113 141 158 135 182 135 147

1970 164 154 154 159 168 180 139 124 157 193

1980 211 133 138 127 98 118 96 122 138 124

1990 109 88 103 112 99 105 79 82 72 88

2000 98 100 107 110 99 98 164 178 224 217

2010 225

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225-a 1915 to 2010 96 years Series 7

[\*] Early part of series cannot be checked from 1915 to 1924 -- 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

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

1925 1964 0 .03 -.05 .10 .03 .14 -.25 -.05 -.04 -.05 .02 .24\* .00 -.05 -.08 .04 .09 -.20 -.22 .23 -.31 -.03

[B] Entire series, effect on correlation ( .304) is:

Lower 1936> -.050 1982< -.029 1933> -.024 1926< -.019 1932< -.014 1956> -.012 Higher 1948 .054 2002 .017

1925 to 1964 segment:

Lower 1936> -.088 1926< -.040 1933> -.038 1932< -.028 1935< -.022 1944< -.022 Higher 1948 .131 1957 .031

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

1981 1982 -4.5 SD

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

1982 -1.220 20 1

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

1982 -6.0 SD

225-a Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1915 11 49 39 68 74

1920 50 109 111 100 98 93 68 83 80 86

1930 79 89 79 130 136 83 125 95 98 99

1940 94 114 94 75 76 123 137 150 42 80

1950 107 135 123 113 163 204 158 196 178 121

1960 109 135 106 83 83 104 108 154 96 50

1970 108 66 33 27 35 33 15 20 16 29

1980 19 21 0 28 39 27 30 39 37 30

1990 33 36 37 41 45 27 21 41 36 71

2000 67 75 116 57 24 16 26 33 29 32

2010 43

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225-b 1931 to 2010 80 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

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

1960 1999 3 .28 .02 -.24 .03 -.08 -.18 -.18 -.14 -.26 .21 .25|-.25 .02 .38\* .26 -.13 -.10 .15 .20 -.04 .02

1971 2010 -1 .19 .13 -.06 -.09 -.16 -.02 -.32 -.19 -.29 .29\* .21| - - - - - - - - - -

[B] Entire series, effect on correlation ( .343) is:

Lower 1936> -.035 2007< -.020 1934> -.019 1942> -.017 1981> -.017 1969< -.017 Higher 1948 .056 1957 .021

1960 to 1999 segment:

Lower 1981> -.039 1969< -.038 1979< -.036 1985> -.031 1976> -.021 1984> -.019 Higher 1987 .030 1967 .027

1971 to 2010 segment:

Lower 2007< -.039 1981> -.035 1985> -.032 1979< -.032 1976> -.021 1984> -.020 Higher 2002 .032 1998 .031

[D] 8 Absent rings: Year Master N series Absent

1989 -.452 20 1

1995 .062 20 1 >> WARNING: Ring is not usually narrow

1996 -.927 20 1

1998 -1.128 20 1

2007 .916 20 5 >> WARNING: Ring is not usually narrow

2008 .709 20 5 >> WARNING: Ring is not usually narrow

2009 .047 20 6 >> WARNING: Ring is not usually narrow

2010 .937 20 6 >> WARNING: Ring is not usually narrow

>> WARNING: Last ring in series is ABSENT

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

1948 -5.1 SD

225-b Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1931 25 91 63 134 64 99 93 119 111

1940 63 131 150 123 110 142 85 102 30 56

1950 85 132 113 127 175 205 135 251 213 140

1960 103 132 95 75 71 93 72 99 86 46

1970 66 58 47 21 16 26 29 11 26 5

1980 8 14 3 14 45 45 31 64 60 0

1990 22 17 16 13 17 0 0 16 0 16

2000 49 38 44 45 12 11 16 0 0 0

2010 0

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

226-a 1930 to 2010 81 years Series 9

[B] Entire series, effect on correlation ( .549) is:

Lower 1936> -.031 1930> -.029 1993< -.019 1952> -.014 1948> -.013 1987< -.009 Higher 1956 .025 2004 .024

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

1930 +3.2 SD

226-a Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1930 74 34 41 68 67 118 114 79 118 103

1940 88 170 113 131 185 174 241 400 295 215

1950 293 533 549 379 326 365 190 359 312 288

1960 182 196 150 175 160 187 179 235 188 237

1970 318 328 180 135 136 200 112 89 142 137

1980 145 64 71 112 66 26 19 38 52 57

1990 72 144 73 47 75 92 70 118 80 138

2000 115 131 158 118 44 43 90 92 103 61

2010 146

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226-b 1937 to 2010 74 years Series 10

[B] Entire series, effect on correlation ( .541) is:

Lower 1974< -.033 1953> -.020 1981> -.018 1993< -.015 1989> -.011 1985> -.011 Higher 1940 .022 2004 .015

226-b Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1937 75 112 109

1940 88 171 117 137 212 202 216 274 234 269

1950 338 326 391 426 404 497 342 424 443 394

1960 336 352 288 259 240 287 232 229 218 227

1970 216 212 113 138 97 165 121 79 110 130

1980 137 103 125 155 120 111 75 107 120 109

1990 63 82 43 31 34 42 31 65 30 78

2000 45 108 192 101 31 34 66 65 94 73

2010 156

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228-a 1936 to 2010 75 years Series 11

[B] Entire series, effect on correlation ( .505) is:

Lower 2004> -.042 1949< -.018 2010< -.017 2008< -.016 1943> -.015 1950< -.015 Higher 1948 .038 1936 .032

228-a Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1936 73 129 171 193

1940 146 180 172 184 187 221 183 209 85 75

1950 83 147 167 155 181 179 136 163 170 161

1960 134 193 145 149 159 190 211 186 171 197

1970 189 228 150 141 166 257 190 134 160 159

1980 156 107 133 105 104 116 95 160 155 98

1990 72 79 81 126 125 68 96 156 110 111

2000 138 103 140 131 125 94 82 121 93 103

2010 94

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

228-b 1933 to 2010 78 years Series 12

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

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

1933 1972 10 -.03 -.11 .14 -.06 -.13 .01 .02 .03 .02 -.20 .14|-.08 -.08 .03 .01 -.09 .06 .18 -.09 .17 .22\*

1940 1979 0 .08 -.11 .13 -.08 -.17 -.26 .09 .09 -.08 -.27 .33\*-.06 -.08 -.24 -.07 .24 .06 -.05 .00 .16 .21

[B] Entire series, effect on correlation ( .263) is:

Lower 1933< -.092 1963> -.031 1942> -.028 1962> -.017 1960> -.015 2010< -.014 Higher 1981 .030 1948 .026

1933 to 1972 segment:

Lower 1933< -.183 1963> -.045 1942> -.042 1962> -.023 1960> -.021 1971< -.013 Higher 1948 .059 1936 .040

1940 to 1979 segment:

Lower 1963> -.063 1942> -.061 1962> -.034 1960> -.030 1971< -.018 1979< -.013 Higher 1948 .055 1975 .030

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

1933 -4.7 SD; 1963 +3.7 SD

228-b Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1933 17 64 110 75 105 115 122

1940 108 148 224 131 148 195 192 140 76 68

1950 58 79 86 89 100 109 93 122 145 153

1960 187 218 199 213 187 160 130 169 160 232

1970 184 149 115 127 112 133 79 79 95 76

1980 76 56 70 71 57 61 69 95 61 38

1990 29 37 33 32 34 38 35 44 32 56

2000 60 53 65 76 77 75 78 94 113 111

2010 102

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

229-a 1939 to 2010 72 years Series 13

[B] Entire series, effect on correlation ( .644) is:

Lower 1940> -.063 1946< -.040 1994< -.011 1948> -.011 1941< -.009 1976> -.008 Higher 1981 .035 2004 .020

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

1940 +3.0 SD

229-a Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1939 295

1940 356 276 270 207 336 276 186 299 220 221

1950 168 241 206 161 205 216 149 191 225 209

1960 160 172 95 82 88 104 92 153 154 135

1970 161 166 106 100 101 126 93 72 88 92

1980 77 43 54 58 49 40 33 50 44 33

1990 36 41 43 56 38 47 42 49 41 70

2000 65 80 112 56 24 28 48 54 46 59

2010 81

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229-b 1940 to 2010 71 years Series 14

[B] Entire series, effect on correlation ( .682) is:

Lower 1948> -.030 2009< -.017 1958< -.016 1940> -.011 2010< -.010 1986> -.009 Higher 1981 .028 1962 .017

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

2009 .047 20 6 >> WARNING: Ring is not usually narrow

2010 .937 20 6 >> WARNING: Ring is not usually narrow

>> WARNING: Last ring in series is ABSENT

229-b Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1940 267 293 212 190 293 343 306 378 279 280

1950 242 218 171 147 163 175 124 134 121 133

1960 85 102 65 61 80 91 76 101 94 86

1970 101 115 70 66 74 120 73 51 78 66

1980 61 36 52 62 53 48 50 70 58 33

1990 32 33 28 30 22 24 15 21 17 28

2000 30 36 35 22 4 12 13 18 26 0

2010 0

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230-a 1937 to 2010 74 years Series 15

[B] Entire series, effect on correlation ( .412) is:

Lower 2004> -.054 1943< -.045 1963> -.023 1976> -.022 1968< -.017 1989> -.012 Higher 1981 .037 1998 .017

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

2005 -1.408 20 5

2006 -.459 20 4

2007 .916 20 5 >> WARNING: Ring is not usually narrow

2008 .709 20 5 >> WARNING: Ring is not usually narrow

2009 .047 20 6 >> WARNING: Ring is not usually narrow

2010 .937 20 6 >> WARNING: Ring is not usually narrow

>> WARNING: Last ring in series is ABSENT

230-a Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1937 228 258 229

1940 208 224 185 135 179 172 189 174 147 174

1950 136 164 157 140 167 196 140 175 183 175

1960 126 153 124 128 100 118 78 90 63 76

1970 86 105 79 71 81 76 76 54 73 61

1980 48 30 32 37 37 28 27 32 27 35

1990 25 32 31 40 30 22 21 23 10 18

2000 13 8 11 12 13 0 0 0 0 0

2010 0

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

230-b 1935 to 2010 76 years Series 16

[B] Entire series, effect on correlation ( .516) is:

Lower 1948> -.058 2001< -.019 1976> -.014 1936< -.011 1937> -.010 1952< -.009 Higher 2004 .031 1981 .018

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

2004 -1.164 20 3

2005 -1.408 20 5

2006 -.459 20 4

2007 .916 20 5 >> WARNING: Ring is not usually narrow

2008 .709 20 5 >> WARNING: Ring is not usually narrow

2009 .047 20 6 >> WARNING: Ring is not usually narrow

2010 .937 20 6 >> WARNING: Ring is not usually narrow

>> WARNING: Last ring in series is ABSENT

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

1949 +3.1 SD

230-b Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1935 223 158 238 234 250

1940 220 252 230 200 206 194 187 186 213 248

1950 189 188 132 128 140 146 117 158 153 121

1960 69 103 57 48 59 75 68 85 123 119

1970 121 131 87 84 64 75 71 41 44 46

1980 37 13 9 10 7 8 15 32 33 33

1990 36 39 31 27 28 12 15 21 9 15

2000 11 4 6 9 0 0 0 0 0 0

2010 0

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231-a 1942 to 2010 69 years Series 17

[B] Entire series, effect on correlation ( .363) is:

Lower 1948> -.097 2004> -.029 1988< -.017 1977> -.014 1950> -.012 1966> -.011 Higher 1962 .045 1956 .037

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

1988 .976 20 2 >> WARNING: Ring is not usually narrow

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

1948 +3.2 SD

231-a Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1942 11 37 75 54 73 77 145 107

1950 120 98 70 79 112 105 84 115 135 151

1960 128 143 104 103 135 152 189 200 210 227

1970 222 252 160 206 224 193 136 164 190 151

1980 122 58 66 71 47 16 15 17 0 7

1990 7 12 10 12 16 15 7 9 6 10

2000 6 4 5 4 12 9 19 68 39 26

2010 20

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

231-b 1941 to 2010 70 years Series 18

[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 1980 0 .03 .06 .09 -.07 .22 .03 -.18 .12 -.27 .02 .29\* .03 -.01 -.07 .05 -.08 -.16 .25 .02 -.01 -.01

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

1971 2010 -9 .00 .36\* .17 .09 -.18 .20 .20 .06 -.08 -.08 .32| - - - - - - - - - -

[B] Entire series, effect on correlation ( .258) is:

Lower 1941< -.133 2004> -.037 1950> -.016 1988< -.015 1952> -.014 1987< -.013 Higher 1948 .048 1962 .040

1941 to 1980 segment:

Lower 1941< -.220 1950> -.023 1971< -.021 1952> -.020 1970< -.013 1942> -.013 Higher 1948 .072 1962 .059

1971 to 2010 segment:

Lower 2004> -.090 1988< -.039 1987< -.033 1971< -.032 2007< -.028 2000< -.026 Higher 2002 .058 1975 .051

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

1941 1942 4.6 SD

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

1988 .976 20 2 >> WARNING: Ring is not usually narrow

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

1941 -5.7 SD

231-b Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1941 11 61 72 87 83 91 230 97 79

1950 142 145 183 115 93 94 62 80 109 71

1960 81 127 70 70 92 75 101 134 141 123

1970 96 78 65 75 126 142 89 79 126 106

1980 94 53 67 57 46 10 5 5 0 4

1990 3 4 4 7 12 9 4 11 8 9

2000 5 18 55 31 34 27 27 23 34 31

2010 35

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

541-a 1936 to 2010 75 years Series 19

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

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

1936 1975 4 .13 -.27 .28 .07 -.18 -.10 .16 -.06 .12 .06 .45|-.09 -.17 -.09 .45\*-.26 -.01 -.06 -.10 -.10 -.07

[B] Entire series, effect on correlation ( .462) is:

Lower 1944< -.046 1940> -.023 1953> -.018 1978< -.013 1948> -.011 1942> -.011 Higher 2004 .033 1975 .027

1936 to 1975 segment:

Lower 1944< -.073 1940> -.035 1953> -.027 1948> -.018 1942> -.017 1943> -.016 Higher 1975 .045 1936 .040

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

1936 1937 4.1 SD

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

2005 -1.408 20 5

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

1936 -4.8 SD

541-a Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1936 203 341 289 303

1940 297 259 275 280 196 254 312 287 214 219

1950 140 198 145 209 228 230 97 127 154 92

1960 61 73 67 36 26 33 33 46 42 43

1970 58 76 41 27 63 134 46 27 9 15

1980 15 12 7 16 27 27 30 24 36 22

1990 17 25 36 64 45 25 23 25 18 18

2000 23 20 17 24 4 0 7 14 10 6

2010 13

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

541-b 1937 to 2010 74 years Series 20

[B] Entire series, effect on correlation ( .469) is:

Lower 1947< -.077 1942> -.020 1938< -.017 1996> -.017 1960> -.015 1998> -.015 Higher 1956 .036 2004 .036

541-b Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1937 423 361 416

1940 363 431 403 279 321 316 284 187 178 200

1950 150 170 138 162 153 210 111 152 220 193

1960 166 150 102 81 87 84 71 68 51 52

1970 76 93 54 40 76 214 87 67 38 40

1980 52 27 20 25 37 41 26 28 50 36

1990 62 72 48 41 33 29 45 55 46 52

2000 40 48 54 36 11 6 10 18 14 11

2010 19

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PART 7: DESCRIPTIVE STATISTICS: 84\_ELL\_corr3-40 13:59 Tue 15 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 ()

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

1 222-a 1934 2010 77 4 0 .609 .99 3.35 .961 .947 .250 2.57 .432 -.002 1

2 222-b 1928 2010 83 4 2 .447 .88 3.09 .847 .910 .321 2.67 .537 -.102 1

3 223-a 1935 2010 76 4 0 .458 1.07 3.47 1.046 .941 .240 2.50 .442 .008 2

4 223-b 1930 2010 81 4 1 .351 1.36 4.15 1.268 .952 .295 2.50 .400 -.094 2

5 224-a 1950 2010 61 3 0 .558 1.38 2.12 .330 .578 .187 2.73 .490 -.093 1

6 224-b 1925 2010 86 4 0 .381 1.38 2.25 .395 .717 .160 2.54 .377 -.018 2

7 225-a 1915 2010 96 4 1 .304 .75 2.04 .454 .811 .318 2.54 .380 -.042 1

8 225-b 1931 2010 80 4 2 .343 .64 2.51 .562 .822 .547 2.71 .453 -.094 1

9 226-a 1930 2010 81 4 0 .549 1.57 5.49 1.098 .819 .329 2.84 .557 .026 1

10 226-b 1937 2010 74 4 0 .541 1.74 4.97 1.186 .920 .287 2.66 .456 -.056 1

11 228-a 1936 2010 75 4 0 .505 1.43 2.57 .424 .604 .206 2.76 .540 .057 2

12 228-b 1933 2010 78 4 2 .263 1.03 2.32 .529 .858 .205 2.69 .431 -.033 1

13 229-a 1939 2010 72 4 0 .644 1.23 3.56 .849 .887 .236 2.70 .478 .016 1

14 229-b 1940 2010 71 3 0 .682 1.00 3.78 .918 .946 .267 2.78 .479 .007 1

15 230-a 1937 2010 74 4 0 .412 .89 2.58 .718 .959 .209 2.51 .394 -.020 1

16 230-b 1935 2010 76 4 0 .516 .89 2.52 .804 .958 .253 2.54 .372 -.051 1

17 231-a 1942 2010 69 3 0 .363 .85 2.52 .725 .931 .355 2.89 .502 .021 1

18 231-b 1941 2010 70 3 2 .258 .66 2.30 .498 .769 .404 2.90 .445 -.003 1

19 541-a 1936 2010 75 4 1 .462 .93 3.41 .999 .928 .392 2.79 .429 -.056 2

20 541-b 1937 2010 74 4 0 .469 1.16 4.31 1.136 .936 .292 3.21 .569 .022 1

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Total or mean: 1529 76 11 .453 1.09 5.49 .787 .861 .289 3.21 .456 -.026

- = [ COFECHA 84\_ELCOF ] = -