[] Dendrochronology Program Library Run S2B5 Program COF 12:52 Fri 30 Dec 2011 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 28124

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 QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

 Title of run: SUG002\_BEAL\_Corr5-40

 File of DATED series: SUG002\_BEAL\_Compact\_Corr5

 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 1859 to 2011 153 years

 Continuous time span is 1859 to 2011 153 years

 Portion with two or more series is 1869 to 2011 143 years

 >> 19a 2002 absent in 2 of 20 series, but is not usually narrow: master index is -.102

 >> 51a 2004 absent in 2 of 20 series, but is not usually narrow: master index is .645

 >> 51a 2005 absent in 2 of 20 series, but is not usually narrow: master index is .232

 >> 51a 2007 absent in 2 of 20 series, but is not usually narrow: master index is 1.407

 >> 51a 2008 absent in 2 of 20 series, but is not usually narrow: master index is .863

 >> 51a 2009 absent in 2 of 20 series, but is not usually narrow: master index is 1.326

 >> 51a 2010 absent in 2 of 20 series, but is not usually narrow: master index is 1.076

 >> 51b 2002 absent in 2 of 20 series, but is not usually narrow: master index is -.102

 >> 51b 2004 absent in 2 of 20 series, but is not usually narrow: master index is .645

 >> 51b 2005 absent in 2 of 20 series, but is not usually narrow: master index is .232

 >> 51b 2007 absent in 2 of 20 series, but is not usually narrow: master index is 1.407

 >> 51b 2008 absent in 2 of 20 series, but is not usually narrow: master index is .863

 >> 51b 2009 absent in 2 of 20 series, but is not usually narrow: master index is 1.326

 >> 51b 2010 absent in 2 of 20 series, but is not usually narrow: master index is 1.076

 >> 52a 1988 absent in 1 of 20 series, but is not usually narrow: master index is -.036

 >> 52a 1991 absent in 1 of 20 series, but is not usually narrow: master index is .024

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

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

 \*O\* Master series 1859 2011 153 yrs \*O\*

 \*F\* Total rings in all series 1934 \*F\*

 \*E\* Total dated rings checked 1924 \*E\*

 \*C\* Series intercorrelation .458 \*C\*

 \*H\* Average mean sensitivity .354 \*H\*

 \*A\* Segments, possible problems 30 \*A\*

 \*\*\* Mean length of series 96.7 \*\*\*

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

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

 16a 1 absent rings: 2011

 16b 1 absent rings: 2011

 17a 3 absent rings: 1985 1998 2006

 17b 1 absent rings: 2006

 18a 1 absent rings: 1959

 18b 2 absent rings: 2006 2011

 19a 1 absent rings: 2002

 51a 10 absent rings: 1948 2003 2004 2005 2006 2007 2008 2009 2010 2011

 51b 10 absent rings: 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011

 52a 2 absent rings: 1988 1991

 32 absent rings 1.655%

PART 2: TIME PLOT OF TREE-RING SERIES: SUG002\_BEAL\_Corr5-40 12:52 Fri 30 Dec 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

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

 . . . . . . . . . . . . . . . . . . <=====> . 15a 1 1954 2011 58

 . . . . . . . . . . . . . . . . . . <=====> . 15b 2 1956 2011 56

 . . . . . . . . . . . . . . . . . <============> . 16a 3 1880 2011 132

 . . . . . . . . . . . . . . . . . <============> . 16b 4 1881 2011 131

 . . . . . . . . . . . . . . . . <===============> . 17a 5 1859 2011 153

 . . . . . . . . . . . . . . . . .<==============> . 17b 6 1869 2011 143

 . . . . . . . . . . . . . . . . . . <=======> . 18a 7 1931 2011 81

 . . . . . . . . . . . . . . . . . . <=======> . 18b 8 1932 2011 80

 . . . . . . . . . . . . . . . . . .<=========> . 19a 9 1910 2011 102

 . . . . . . . . . . . . . . . . . <=============> . 19b 10 1876 2011 136

 . . . . . . . . . . . . . . . . . . .<====> . 21a 11 1960 2011 52

 . . . . . . . . . . . . . . . . . . <======> . 21b 12 1948 2011 64

 . . . . . . . . . . . . . . . . . . <======> . 50a 13 1944 2011 68

 . . . . . . . . . . . . . . . . . . <=====> . 50b 14 1950 2011 62

 . . . . . . . . . . . . . . . . . . <=======> . 51a 15 1930 2011 82

 . . . . . . . . . . . . . . . . . . <========> . 51b 16 1929 2011 83

 . . . . . . . . . . . . . . . . . .<=========> . 52a 17 1917 2011 95

 . . . . . . . . . . . . . . . . . <===========> . 52b 18 1890 2011 122

 . . . . . . . . . . . . . . . . . <==========> . 53a 19 1906 2011 106

 . . . . . . . . . . . . . . . . . <============> . 53b 20 1884 2011 128

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

 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: SUG002\_BEAL\_Corr5-40 12:52 Fri 30 Dec 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

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

 1900 .159 7 1950 -1.057 17 2000 -.563 20

 1901 -.042 7 1951 .026 17 2001 -.351 20

 1902 .608 7 1952 .333 17 2002 -.102 20 2<<

 1903 1.562 7 1953 -1.410 17 2003 -1.056 20 2

 1904 .184 7 1954 -.661 18 2004 .645 20 2<<

 1905 -.476 7 1955 .255 18 2005 .232 20 2<<

 1906 .658 8 1956 .813 19 2006 -.992 20 5

 1907 .100 8 1957 .882 19 2007 1.407 20 2<<

 1908 .524 8 1958 .570 19 2008 .863 20 2<<

 1859 1.218 1 1909 .156 8 1959 -.454 19 1 2009 1.326 20 2<<

 1860 -2.276 1 1910 -.126 9 1960 .050 20 2010 1.076 20 2<<

 1861 -.286 1 1911 .746 9 1961 -.272 20 2011 -1.102 20 5

 1862 1.484 1 1912 -.632 9 1962 -1.239 20

 1863 .398 1 1913 -2.801 9 1963 -1.768 20

 1864 -.545 1 1914 -.271 9 1964 .414 20

 1865 .366 1 1915 1.059 9 1965 -.197 20

 1866 1.487 1 1916 .852 9 1966 -.625 20

 1867 2.252 1 1917 .082 10 1967 .581 20

 1868 -1.798 1 1918 -.030 10 1968 1.714 20

 1869 -.081 2 1919 -.048 10 1969 .763 20

 1870 2.502 2 1920 -.717 10 1970 -.417 20

 1871 .711 2 1921 -1.294 10 1971 -.092 20

 1872 -.733 2 1922 -3.973 10 1972 1.033 20

 1873 -.085 2 1923 -.214 10 1973 .525 20

 1874 -1.710 2 1924 .104 10 1974 -1.088 20

 1875 -1.787 2 1925 .291 10 1975 .536 20

 1876 -1.592 3 1926 .222 10 1976 -.585 20

 1877 1.617 3 1927 1.188 10 1977 -.996 20

 1878 -.042 3 1928 1.387 10 1978 .207 20

 1879 .529 3 1929 .538 11 1979 -.765 20

 1880 .183 4 1930 1.112 12 1980 .395 20

 1881 1.735 5 1931 1.289 13 1981 -.048 20

 1882 .250 5 1932 .100 14 1982 1.472 20

 1883 -.598 5 1933 .614 14 1983 .075 20

 1884 -1.583 6 1934 .207 14 1984 -.476 20

 1885 -.719 6 1935 .278 14 1985 -2.080 20 1

 1886 -.503 6 1936 -2.022 14 1986 -.695 20

 1887 .298 6 1937 -1.198 14 1987 -.352 20

 1888 .438 6 1938 .296 14 1988 -.036 20 1<<

 1889 .046 6 1939 .457 14 1989 1.346 20

 1890 -.099 7 1940 .422 14 1990 1.413 20

 1891 -2.040 7 1941 -.686 14 1991 .024 20 1<<

 1892 1.592 7 1942 .053 14 1992 1.764 20

 1893 1.042 7 1943 .226 14 1993 .054 20

 1894 .280 7 1944 .988 15 1994 .348 20

 1895 -.671 7 1945 -.732 15 1995 -1.225 20

 1896 .665 7 1946 -1.129 15 1996 -.804 20

 1897 .498 7 1947 .153 15 1997 -.174 20

 1898 .296 7 1948 -.770 16 1 1998 -1.303 20 1

 1899 .124 7 1949 -.234 16 1999 -.238 20

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PART 4: Master Bar Plot: SUG002\_BEAL\_Corr5-40 12:52 Fri 30 Dec 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

 1900------A 1950-d 2000--b

 1901----@ 1951-----@ 2001---a

 1902--------B 1952-------A 2002----@

 1903----------F 1953-f 2003-d

 1904------A 1954--c 2004--------C

 1905--b 1955------A 2005------A

 1906--------C 1956--------C 2006-d

 1907-----@ 1957---------D 2007----------F

 1908-------B 1958--------B 2008---------C

 1859---------E 1909-----A 1959---b 2009---------E

 1860i 1910----a 1960-----@ 2010---------D

 1861---a 1911--------C 1961---a 2011-d

 1862----------F 1912--c 1962-e

 1863-------B 1913k 1963g

 1864--b 1914---a 1964-------B

 1865-------A 1915---------D 1965---a

 1866----------F 1916--------C 1966--b

 1867----------I 1917-----@ 1967--------B

 1868g 1918----@ 1968----------G

 1869----@ 1919----@ 1969--------C

 1870----------J 1920--c 1970---b

 1871--------C 1921-e 1971----@

 1872--c 1922p 1972---------D

 1873----@ 1923---a 1973-------B

 1874g 1924-----@ 1974-d

 1875g 1925------A 1975--------B

 1876f 1926------A 1976--b

 1877----------F 1927---------E 1977-d

 1878----@ 1928----------F 1978------A

 1879-------B 1929--------B 1979--c

 1880------A 1930---------D 1980-------B

 1881----------G 1931---------E 1981----@

 1882------A 1932-----@ 1982----------F

 1883--b 1933--------B 1983-----@

 1884f 1934------A 1984--b

 1885--c 1935------A 1985h

 1886--b 1936h 1986--c

 1887------A 1937-e 1987---a

 1888-------B 1938------A 1988----@

 1889-----@ 1939-------B 1989----------E

 1890----@ 1940-------B 1990----------F

 1891h 1941--c 1991-----@

 1892----------F 1942-----@ 1992----------G

 1893---------D 1943------A 1993-----@

 1894------A 1944---------D 1994-------A

 1895--c 1945--c 1995-e

 1896--------C 1946-e 1996--c

 1897-------B 1947-----A 1997---a

 1898------A 1948--c 1998-e

 1899-----@ 1949---a 1999---a

PART 5: CORRELATION OF SERIES BY SEGMENTS: SUG002\_BEAL\_Corr5-40 12:52 Fri 30 Dec 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 1860 1880 1900 1920 1940 1960 1980

 1899 1919 1939 1959 1979 1999 2019

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

 1 15a 1954 2011 .57 .57 .60

 2 15b 1956 2011 .64 .63 .65

 3 16a 1880 2011 .31A .33A .39 .35A .38 .49

 4 16b 1881 2011 .30A .33A .34B .41 .55 .54

 5 17a 1859 2011 .48 .28A .25B .36B .48 .42 .45

 6 17b 1869 2011 .53 .58 .48 .38B .50 .68 .66

 7 18a 1931 2011 .11B .11B .46 .32A

 8 18b 1932 2011 .36A .27A .63 .66

 9 19a 1910 2011 .67 .61 .09B .26B .31A

 10 19b 1876 2011 .51 .53 .56 .47 .45 .60 .62

 11 21a 1960 2011 .65 .64

 12 21b 1948 2011 .69 .64 .58

 13 50a 1944 2011 .60 .61 .57

 14 50b 1950 2011 .44 .42 .51

 15 51a 1930 2011 .49 .32A .44 .31B

 16 51b 1929 2011 .48 .36A .54 .55

 17 52a 1917 2011 .56 .58 .23B .25B .50

 18 52b 1890 2011 .39 .49 .66 .32A .32A .46

 19 53a 1906 2011 .55 .59 .45 .29A .28A

 20 53b 1884 2011 .32A .30A .22B .51 .65 .61

 Av segment correlation .51 .39 .45 .43 .41 .50 .52

PART 6: POTENTIAL PROBLEMS: SUG002\_BEAL\_Corr5-40 12:52 Fri 30 Dec 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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 15a 1954 to 2011 58 years Series 1

 [B] Entire series, effect on correlation ( .608) is:

 Lower 1985> -.028 1979< -.026 1974> -.023 1970> -.014 2000> -.014 1998> -.012 Higher 2011 .023 2007 .019

 15a Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1954 151 407 478 458 303 241

 1960 281 191 77 69 143 98 160 311 388 325

 1970 343 273 369 325 293 438 347 210 231 102

 1980 147 163 194 136 119 113 149 205 209 289

 1990 328 157 180 75 67 32 34 65 61 79

 2000 102 92 59 47 65 50 22 118 147 149

 2010 112 35

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

 15b 1956 to 2011 56 years Series 2

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

 Lower 1989< -.031 1990< -.021 2003> -.021 1961< -.017 1966> -.013 1996> -.009 Higher 1985 .041 1995 .020

 15b Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1956 497 588 510 393

 1960 433 328 309 343 440 419 498 587 647 556

 1970 433 350 387 501 341 473 388 356 491 327

 1980 488 430 346 224 151 103 222 176 214 150

 1990 117 94 128 82 87 49 88 77 46 52

 2000 58 46 68 78 178 115 57 84 90 78

 2010 77 42

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

 16a 1880 to 2011 132 years Series 3

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

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

 1880 1919 0 .10 .13 .25 .07 .15 -.19 .15 -.31 -.12 -.23 .31\*-.13 .01 -.25 .03 -.13 -.07 .19 .12 .08 -.27

 1900 1939 0 -.06 .10 .21 -.01 -.14 -.10 -.03 -.11 .12 .22 .33\* .18 .18 -.04 -.15 -.18 -.30 .08 .08 -.26 -.25

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

 1940 1979 0 -.38 .10 .29 .00 -.46 .08 .19 .07 -.45 -.08 .35\*-.18 -.04 .01 -.03 .06 .00 -.01 -.17 .25 -.01

 [B] Entire series, effect on correlation ( .374) is:

 Lower 1970< -.017 1936> -.015 1968< -.014 1882< -.013 1985> -.012 1893< -.011 Higher 1953 .016 1989 .014

 1880 to 1919 segment:

 Lower 1882< -.060 1893< -.049 1904> -.041 1897< -.025 1917> -.014 1894< -.012 Higher 1892 .062 1881 .052

 1900 to 1939 segment:

 Lower 1937> -.039 1904> -.035 1936> -.034 1938< -.030 1934< -.021 1923< -.014 Higher 1913 .041 1903 .035

 1940 to 1979 segment:

 Lower 1968< -.046 1976> -.035 1970< -.026 1963> -.024 1959> -.022 1940< -.019 Higher 1974 .055 1953 .045

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

 2011 -1.102 20 5

 >> WARNING: Last ring in series is ABSENT

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

 1970 -5.0 SD; 1974 -5.0 SD

 16a Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1880 160 193 147 150 144 165 167 197 222 207

 1890 189 163 220 148 131 106 146 129 134 165

 1900 172 198 200 222 228 159 156 149 173 162

 1910 149 154 151 122 140 195 217 227 179 201

 1920 105 36 46 65 64 101 114 150 153 113

 1930 123 127 114 110 65 76 76 106 66 79

 1940 41 41 57 35 31 8 14 30 15 34

 1950 32 52 74 14 42 143 154 144 145 142

 1960 157 137 89 98 113 97 56 59 51 93

 1970 23 65 82 96 23 56 92 86 94 69

 1980 72 114 131 102 42 64 69 78 97 185

 1990 159 75 83 69 53 16 17 26 6 17

 2000 6 30 18 14 26 25 6 17 38 32

 2010 12 0

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

 16b 1881 to 2011 131 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

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

 1881 1920 0 -.08 .10 .08 .04 -.12 -.05 .05 .06 .01 -.13 .30\* .10 .24 -.29 -.11 -.14 -.21 .03 -.01 -.09 -.15

 1900 1939 0 .03 .27 .28 .29 -.08 .05 .10 .06 -.05 -.05 .33\*-.09 .16 -.27 -.30 -.21 -.30 -.11 -.10 .01 -.04

 1920 1959 -8 .10 .15 .48\* .38 -.12 .03 .09 .16 .07 -.15 .34|-.05 .06 -.23 -.27 .01 -.06 -.10 -.13 -.02 -.06

 [B] Entire series, effect on correlation ( .409) is:

 Lower 1936> -.013 1893< -.013 1895> -.012 1956< -.011 1894< -.010 1959> -.010 Higher 1922 .030 1892 .018

 1881 to 1920 segment:

 Lower 1893< -.049 1894< -.039 1895> -.036 1902< -.022 1890< -.018 1912> -.015 Higher 1892 .079 1881 .056

 1900 to 1939 segment:

 Lower 1924< -.035 1937> -.026 1936> -.025 1929< -.022 1902< -.022 1930< -.015 Higher 1922 .170 1913 .047

 1920 to 1959 segment:

 Lower 1936> -.057 1959> -.042 1937> -.038 1941> -.031 1956< -.030 1924< -.026 Higher 1922 .136 1953 .074

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

 2011 -1.102 20 5

 >> WARNING: Last ring in series is ABSENT

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

 1998 -4.7 SD

 16b Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1881 274 194 164 132 168 188 174 172 169

 1890 157 167 253 204 175 213 233 222 222 243

 1900 222 241 223 241 243 233 264 269 268 237

 1910 187 181 199 163 200 217 240 227 217 231

 1920 105 83 46 112 88 113 109 122 134 95

 1930 111 160 177 224 169 180 169 233 333 256

 1940 159 150 121 71 54 30 46 62 48 49

 1950 36 58 81 24 11 22 25 66 64 122

 1960 134 193 112 101 174 192 87 109 227 167

 1970 123 239 218 183 39 51 78 136 145 90

 1980 83 141 141 145 103 64 64 75 76 83

 1990 112 75 86 69 70 38 33 51 17 35

 2000 43 69 50 47 66 86 38 54 99 87

 2010 30 0

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

 17a 1859 to 2011 153 years Series 5

 [\*] Early part of series cannot be checked from 1859 to 1868 -- 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

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

 1880 1919 0 -.17 -.01 -.05 -.05 -.05 .19 .15 -.17 -.21 .01 .28\*-.11 -.22 .22 .18 .23 -.09 -.13 -.03 -.14 -.02

 1900 1939 3 -.04 -.08 -.04 -.37 -.19 .09 .05 -.14 -.09 .19 .25| .08 .05 .36\* .23 .15 -.29 -.21 .01 -.17 -.24

 1920 1959 3 .08 .16 -.08 -.36 -.14 -.07 -.01 -.17 .02 .22 .36| .12 .11 .38\* .18 -.14 -.30 -.10 .13 -.14 -.17

 [B] Entire series, effect on correlation ( .449) is:

 Lower 1936> -.021 1913> -.018 1882> -.011 1980< -.010 1908< -.009 1974> -.008 Higher 1985 .019 1870 .013

 1880 to 1919 segment:

 Lower 1913> -.065 1882> -.047 1908< -.035 1917< -.025 1890< -.025 1887< -.024 Higher 1891 .081 1903 .057

 1900 to 1939 segment:

 Lower 1936> -.061 1913> -.042 1908< -.033 1917< -.025 1910< -.023 1920> -.019 Higher 1903 .052 1922 .031

 1920 to 1959 segment:

 Lower 1936> -.080 1920> -.023 1934< -.023 1948> -.019 1941> -.019 1923< -.016 Higher 1945 .038 1927 .029

 [D] 3 Absent rings: Year Master N series Absent

 1985 -2.080 20 1

 1998 -1.303 20 1

 2006 -.992 20 5

 17a Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1859 193

 1860 115 144 194 154 125 145 180 211 83 100

 1870 201 109 80 91 76 62 73 130 102 96

 1880 110 124 134 94 70 60 76 65 67 86

 1890 58 40 122 140 140 113 152 128 121 114

 1900 123 143 137 182 141 111 119 109 95 96

 1910 86 145 130 125 153 179 177 103 118 139

 1920 163 117 116 134 166 195 171 212 209 212

 1930 223 202 134 144 109 135 148 95 92 118

 1940 120 106 87 74 86 51 43 64 80 61

 1950 48 65 73 60 74 113 105 83 81 42

 1960 52 75 64 30 253 93 58 65 133 73

 1970 34 47 92 73 55 48 28 35 30 15

 1980 11 21 34 26 5 0 20 24 9 21

 1990 21 19 30 23 24 20 20 28 0 19

 2000 29 34 35 11 21 23 0 41 38 49

 2010 50 24

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

 17b 1869 to 2011 143 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

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

 1920 1959 -4 -.05 -.06 -.15 -.21 -.13 -.16 .41\* .02 -.06 .06 .38|-.07 .05 .02 .05 -.08 -.22 -.24 .05 .14 .25

 [B] Entire series, effect on correlation ( .536) is:

 Lower 1916< -.022 1878> -.017 1941> -.014 1919< -.013 1921> -.013 1990< -.011 Higher 1913 .017 1985 .013

 1920 to 1959 segment:

 Lower 1941> -.050 1949< -.046 1921> -.043 1926< -.037 1951< -.025 1957< -.014 Higher 1922 .074 1953 .042

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

 2006 -.992 20 5

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

 1913 -5.1 SD

 17b Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1869 168

 1870 238 177 123 128 79 83 66 122 122 89

 1880 77 111 85 65 57 68 70 99 124 102

 1890 105 97 165 183 183 132 150 154 178 136

 1900 152 130 141 175 129 139 144 121 136 128

 1910 118 147 104 75 110 150 103 103 129 99

 1920 114 152 120 169 150 165 128 167 181 201

 1930 213 212 138 140 175 168 137 131 128 137

 1940 115 206 246 219 230 135 87 126 104 41

 1950 35 38 58 36 32 129 140 88 132 102

 1960 122 146 64 47 94 86 84 116 274 232

 1970 137 127 151 109 106 187 93 91 137 72

 1980 74 26 116 46 28 5 16 30 24 98

 1990 37 24 54 31 31 23 28 48 31 49

 2000 55 38 38 12 21 20 0 48 37 58

 2010 43 13

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

 18a 1931 to 2011 81 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

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

 1931 1970 -10 .23\*-.05 -.05 .06 .09 .17 .00 -.27 .04 .06 .11| .01 -.19 .04 .05 -.06 -.04 .07 -.08 .09 -.24

 1940 1979 -1 .03 -.21 -.14 .02 .09 .12 .06 -.19 -.03 .21\* .11| .13 -.21 .09 .01 -.26 .00 .09 .06 -.03 -.12

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

 1972 2011 0 .14 -.09 .06 -.13 .07 -.05 -.05 .13 .17 -.07 .32\* - - - - - - - - - -

 [B] Entire series, effect on correlation ( .239) is:

 Lower 2009< -.061 1942< -.037 2011> -.032 1990< -.026 1945> -.022 1931< -.021 Higher 1985 .070 1992 .033

 1931 to 1970 segment:

 Lower 1942< -.077 1945> -.048 1931< -.045 1948> -.045 1947< -.029 1952< -.024 Higher 1968 .069 1953 .049

 1940 to 1979 segment:

 Lower 1942< -.093 1945> -.054 1948> -.050 1947< -.034 1952< -.027 1958< -.026 Higher 1968 .080 1953 .054

 1972 to 2011 segment:

 Lower 2009< -.127 2011> -.064 1990< -.052 1998> -.022 1987< -.010 1993> -.010 Higher 1985 .123 1992 .057

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

 1959 -.454 19 1

 18a Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1931 156 150 180 137 194 129 131 131 111

 1940 111 82 51 99 96 106 75 44 107 119

 1950 76 106 37 29 40 54 66 50 20 0

 1960 4 24 23 22 65 73 88 142 357 262

 1970 338 335 328 313 237 215 215 159 177 178

 1980 247 293 384 259 228 98 117 88 128 146

 1990 97 135 213 152 164 108 115 90 100 111

 2000 88 70 103 47 78 43 33 58 27 12

 2010 24 16

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

 18b 1932 to 2011 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

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

 1932 1971 0 .01 .02 -.12 -.03 -.09 .08 .06 -.36 .05 .16 .36\* .15 -.26 -.07 .18 -.20 -.20 -.12 -.12 .11 -.12

 1940 1979 0 -.23 .00 -.04 .04 -.12 .08 .20 -.21 .03 .23 .27\* .06 -.27 .01 .08 -.33 -.07 .03 -.03 -.04 -.09

 [B] Entire series, effect on correlation ( .513) is:

 Lower 1952< -.029 2011> -.028 1976> -.021 1964< -.017 1948> -.017 1942< -.016 Higher 1985 .039 1992 .025

 1932 to 1971 segment:

 Lower 1952< -.073 1964< -.041 1948> -.038 1942< -.038 1947< -.024 1945> -.023 Higher 1968 .083 1936 .068

 1940 to 1979 segment:

 Lower 1952< -.071 1976> -.046 1964< -.039 1942< -.037 1948> -.036 1947< -.024 Higher 1968 .096 1972 .032

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

 2006 -.992 20 5

 2011 -1.102 20 5

 >> WARNING: Last ring in series is ABSENT

 18b Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1932 100 129 93 96 68 71 114 130

 1940 124 63 45 80 64 58 61 38 57 58

 1950 32 49 11 18 22 22 71 47 42 18

 1960 22 15 19 27 33 37 38 90 229 205

 1970 146 124 180 166 131 183 206 135 128 141

 1980 156 123 199 113 125 59 115 142 149 145

 1990 131 126 184 92 80 54 30 39 27 57

 2000 15 25 41 14 42 7 0 35 8 6

 2010 6 0

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

 19a 1910 to 2011 102 years Series 9

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

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

 1940 1979 4 .12 -.05 .05 .09 -.12 -.13 .03 .07 -.20 -.25 .09| .00 -.38 .15 .25\*-.06 .14 -.04 .24 -.17 .03

 1960 1999 4 .16 -.33 .10 .16 -.15 -.17 -.10 .19 -.11 -.14 .26|-.01 -.06 -.05 .31\*-.24 -.04 -.09 .11 -.15 .15

 1972 2011 0 .14 -.36 .13 .05 -.16 -.06 -.22 .21 .02 -.03 .31\* - - - - - - - - - -

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

 Lower 1973< -.083 1995> -.021 2002< -.017 2004< -.015 1975< -.015 1956< -.013 Higher 1922 .048 1936 .028

 1940 to 1979 segment:

 Lower 1973< -.149 1975< -.033 1956< -.029 1974> -.023 1955< -.016 1968< -.013 Higher 1964 .056 1972 .053

 1960 to 1999 segment:

 Lower 1973< -.175 1995> -.045 1975< -.032 1974> -.023 1968< -.020 1993> -.006 Higher 1998 .039 1964 .034

 1972 to 2011 segment:

 Lower 1973< -.147 1995> -.046 2004< -.027 1975< -.026 1974> -.025 2002< -.022 Higher 1998 .032 1992 .031

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

 2002 -.102 20 2 >> WARNING: Ring is not usually narrow

 19a Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1910 127 51 3 9 128 147 107 177 190 136

 1920 104 106 44 144 159 177 194 256 279 237

 1930 222 308 163 204 191 166 73 67 137 109

 1940 111 119 184 118 252 174 135 164 172 210

 1950 126 260 279 148 54 40 36 63 60 52

 1960 80 97 67 59 138 69 56 53 42 31

 1970 21 35 77 12 34 23 27 22 57 40

 1980 57 32 53 56 53 47 35 44 84 101

 1990 170 62 109 87 104 105 67 79 20 53

 2000 47 64 0 5 5 40 22 57 35 68

 2010 64 14

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 19b 1876 to 2011 136 years Series 10

 [B] Entire series, effect on correlation ( .502) is:

 Lower 1938< -.029 1878< -.020 1892< -.016 1901< -.013 1962> -.009 1985> -.008 Higher 1913 .025 1936 .017

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

 1891 -4.8 SD

 19b Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1876 162 238 131 195

 1880 172 178 143 133 121 130 110 149 141 108

 1890 87 47 76 85 114 66 97 121 96 112

 1900 80 51 90 158 68 76 110 92 121 95

 1910 98 130 109 19 82 159 153 134 122 74

 1920 44 51 61 136 143 126 197 204 200 198

 1930 301 227 146 152 152 105 50 140 52 105

 1940 127 150 131 201 296 153 112 166 140 248

 1950 120 89 76 52 51 75 89 99 114 69

 1960 131 139 130 125 235 140 76 80 145 98

 1970 31 44 73 146 51 127 98 56 60 20

 1980 52 91 144 96 75 79 99 139 90 165

 1990 238 83 203 88 82 44 25 89 35 61

 2000 36 75 22 28 35 38 23 53 46 73

 2010 60 35

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

 21a 1960 to 2011 52 years Series 11

 [B] Entire series, effect on correlation ( .642) is:

 Lower 2011> -.038 1991> -.027 1970> -.013 1965> -.012 1960< -.010 1989< -.010 Higher 2007 .020 1968 .014

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

 1985 -4.7 SD

 21a Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1960 186 267 195 235 483 558 414 610 697 513

 1970 565 484 552 621 486 544 395 425 480 376

 1980 678 468 511 405 389 203 313 319 292 295

 1990 322 313 333 183 155 109 125 136 99 119

 2000 52 50 99 60 128 65 35 115 91 80

 2010 42 41

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

 21b 1948 to 2011 64 years Series 12

 [B] Entire series, effect on correlation ( .602) is:

 Lower 1998> -.057 2000< -.018 2003> -.017 1974> -.014 1948> -.013 1961< -.010 Higher 1985 .029 1953 .024

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

 1998 +3.0 SD

 21b Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1948 92 89

 1950 98 122 124 81 135 278 201 283 310 179

 1960 203 110 86 108 270 221 297 400 450 273

 1970 290 310 456 482 360 480 254 252 349 296

 1980 382 437 479 281 349 235 283 283 345 337

 1990 370 249 396 268 240 188 199 196 306 261

 2000 135 124 170 200 206 192 91 153 143 212

 2010 215 116

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 50a 1944 to 2011 68 years Series 13

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

 Lower 1983> -.024 2008< -.021 1978< -.018 1997< -.016 1959> -.013 2006> -.012 Higher 2007 .020 1968 .020

 50a Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1944 230 176 224 319 248 189

 1950 133 260 298 113 229 325 328 383 248 302

 1960 348 278 209 192 282 218 187 325 462 251

 1970 160 127 301 254 137 232 151 145 118 140

 1980 230 155 218 288 218 131 179 124 163 273

 1990 343 207 279 107 124 119 107 59 66 63

 2000 71 115 129 73 90 128 96 192 63 115

 2010 128 35

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 50b 1950 to 2011 62 years Series 14

 [B] Entire series, effect on correlation ( .486) is:

 Lower 1985> -.041 1962> -.035 2004< -.025 1965> -.021 1987< -.015 2006> -.014 Higher 1953 .034 2007 .026

 50b Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1950 230 322 465 294 385 487 420 545 417 297

 1960 468 484 577 401 470 664 453 547 470 270

 1970 192 168 285 333 89 129 90 103 195 145

 1980 239 260 239 187 153 171 208 85 83 196

 1990 342 199 264 188 143 89 97 99 55 47

 2000 43 97 101 80 51 53 85 232 134 154

 2010 213 68

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

 51a 1930 to 2011 82 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

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

 1940 1979 0 .31 .22 -.09 .05 -.26 -.13 -.03 .19 .08 -.03 .32\*-.30 -.16 .14 .03 -.22 -.09 .17 .00 -.40 -.07

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

 1972 2011 -10 .39\*-.29 .21 .15 .09 -.07 .18 .03 .01 -.19 .31| - - - - - - - - - -

 [B] Entire series, effect on correlation ( .345) is:

 Lower 2011> -.041 1998> -.035 1953> -.025 1955< -.018 1985> -.015 1976> -.014 Higher 1936 .041 1982 .028

 1940 to 1979 segment:

 Lower 1953> -.055 1955< -.042 1976> -.028 1941> -.022 1974> -.016 1964< -.015 Higher 1975 .032 1968 .031

 1972 to 2011 segment:

 Lower 2011> -.078 1998> -.065 1976> -.026 1989< -.024 2001< -.021 2004< -.018 Higher 1982 .069 1992 .060

 [D] 10 Absent rings: Year Master N series Absent

 1948 -.770 16 1

 2003 -1.056 20 2

 2004 .645 20 2 >> WARNING: Ring is not usually narrow

 2005 .232 20 2 >> WARNING: Ring is not usually narrow

 2006 -.992 20 5

 2007 1.407 20 2 >> WARNING: Ring is not usually narrow

 2008 .863 20 2 >> WARNING: Ring is not usually narrow

 2009 1.326 20 2 >> WARNING: Ring is not usually narrow

 2010 1.076 20 2 >> WARNING: Ring is not usually narrow

 2011 -1.102 20 5

 >> WARNING: Last ring in series is ABSENT

 51a Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1930 265 296 214 191 158 93 45 59 122 153

 1940 143 138 124 96 132 80 53 109 0 56

 1950 41 55 111 116 154 61 70 115 212 134

 1960 106 104 59 30 62 78 72 129 161 117

 1970 92 102 113 86 103 205 194 167 136 93

 1980 94 44 220 116 55 74 70 57 70 61

 1990 94 39 102 76 80 40 40 56 71 49

 2000 42 5 5 0 0 0 0 0 0 0

 2010 0 0

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

 51b 1929 to 2011 83 years Series 16

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

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

 1940 1979 0 .23 .04 -.10 .26 -.13 -.39 -.16 .04 -.04 -.18 .36\* .08 .09 .01 .10 -.05 -.11 -.13 -.12 .12 -.16

 [B] Entire series, effect on correlation ( .453) is:

 Lower 2011> -.059 1972< -.017 1932< -.015 1989< -.015 2006> -.014 1941> -.012 Higher 1936 .045 1985 .026

 1940 to 1979 segment:

 Lower 1972< -.054 1979> -.031 1941> -.031 1960< -.030 1966> -.028 1973< -.016 Higher 1968 .050 1945 .041

 [D] 10 Absent rings: Year Master N series Absent

 2002 -.102 20 2 >> WARNING: Ring is not usually narrow

 2003 -1.056 20 2

 2004 .645 20 2 >> WARNING: Ring is not usually narrow

 2005 .232 20 2 >> WARNING: Ring is not usually narrow

 2006 -.992 20 5

 2007 1.407 20 2 >> WARNING: Ring is not usually narrow

 2008 .863 20 2 >> WARNING: Ring is not usually narrow

 2009 1.326 20 2 >> WARNING: Ring is not usually narrow

 2010 1.076 20 2 >> WARNING: Ring is not usually narrow

 2011 -1.102 20 5

 >> WARNING: Last ring in series is ABSENT

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

 2011 +4.0 SD

 51b Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1929 94

 1930 119 150 54 104 213 171 28 68 235 226

 1940 253 249 262 205 205 84 24 44 4 18

 1950 26 24 63 64 112 114 165 137 225 177

 1960 121 110 115 111 159 107 156 179 207 176

 1970 108 114 92 71 81 126 94 93 145 162

 1980 224 163 286 142 108 36 18 25 52 42

 1990 59 38 53 46 78 19 12 35 10 22

 2000 18 4 0 0 0 0 0 0 0 0

 2010 0 0

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 52a 1917 to 2011 95 years Series 17

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

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

 1940 1979 -3 -.05 -.06 .12 .15 -.16 -.11 -.07 .24\*-.12 -.03 .23|-.07 .15 -.26 -.21 .00 -.21 -.20 -.05 .06 .00

 1960 1999 -2 -.05 -.12 -.10 .13 -.14 .07 -.09 .14 .25\* .04 .25|-.13 .06 -.08 -.40 -.06 -.44 -.16 .02 -.05 .11

 [B] Entire series, effect on correlation ( .434) is:

 Lower 1988< -.030 1950> -.018 1964< -.016 1990< -.012 1985> -.012 1982< -.011 Higher 1922 .085 1936 .029

 1940 to 1979 segment:

 Lower 1964< -.063 1950> -.059 1944< -.037 1967< -.034 1960< -.033 1970> -.024 Higher 1953 .057 1963 .040

 1960 to 1999 segment:

 Lower 1988< -.046 1964< -.029 1974> -.022 1990< -.020 1985> -.018 1970> -.018 Higher 1992 .058 1989 .050

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

 1988 -.036 20 1 >> WARNING: Ring is not usually narrow

 1991 .024 20 1 >> WARNING: Ring is not usually narrow

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

 1991 -4.6 SD

 52a Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1917 119 106 159

 1920 126 143 77 166 175 140 151 173 171 177

 1930 244 290 259 207 272 251 174 222 314 326

 1940 287 297 341 312 249 211 225 371 207 308

 1950 386 333 307 151 194 240 245 161 136 96

 1960 36 4 20 13 22 34 26 41 81 111

 1970 148 150 142 188 155 195 169 123 180 176

 1980 274 181 126 106 163 121 47 114 0 187

 1990 92 0 158 134 177 100 114 96 73 82

 2000 80 89 79 79 116 102 67 146 166 263

 2010 275 72

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 52b 1890 to 2011 122 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

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

 1940 1979 0 -.14 -.04 -.03 .06 -.10 .15 -.13 .23 -.07 -.12 .32\* .03 .16 -.30 -.01 .14 -.28 -.05 .05 .12 -.17

 1960 1999 0 -.02 -.14 .01 .16 -.31 .09 -.13 .29 .18 -.10 .32\*-.12 .06 .15 -.33 .16 -.41 .19 .01 -.16 .08

 [B] Entire series, effect on correlation ( .429) is:

 Lower 1903< -.063 1918< -.023 1988< -.019 1950> -.015 1974> -.013 1985> -.010 Higher 1922 .059 1936 .026

 1940 to 1979 segment:

 Lower 1950> -.058 1974> -.048 1970> -.031 1944< -.028 1968< -.026 1958< -.023 Higher 1972 .030 1956 .030

 1960 to 1999 segment:

 Lower 1988< -.065 1974> -.041 1985> -.027 1970> -.027 1968< -.013 1983> -.013 Higher 1998 .053 1989 .051

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

 1903 -4.7 SD

 52b Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1890 109 102 112 106 100 97 101 109 105 72

 1900 80 85 74 49 52 50 78 73 116 121

 1910 120 148 117 77 104 129 186 163 87 109

 1920 112 138 84 158 158 151 164 185 214 180

 1930 204 232 211 171 157 164 124 117 183 195

 1940 195 146 181 182 163 154 146 278 143 189

 1950 251 190 220 136 142 182 246 152 79 61

 1960 62 34 35 30 60 76 80 97 105 139

 1970 203 252 258 238 211 209 118 115 123 123

 1980 122 108 120 135 115 117 109 152 93 154

 1990 144 124 134 83 103 89 106 101 63 64

 2000 83 68 63 42 92 82 62 77 81 85

 2010 78 42

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

 53a 1906 to 2011 106 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

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

 1960 1999 0 .04 -.09 -.17 .04 .22 -.43 .11 -.05 .05 -.33 .29\* .20 -.07 .13 .29 .01 -.21 -.13 .20 -.13 -.09

 1972 2011 0 -.02 -.26 -.11 .13 .25 -.20 .02 -.23 .03 -.31 .28\* - - - - - - - - - -

 [B] Entire series, effect on correlation ( .415) is:

 Lower 1998> -.024 2006> -.018 1913> -.017 1979> -.015 1953> -.013 1980< -.012 Higher 1922 .040 1936 .023

 1960 to 1999 segment:

 Lower 1998> -.057 1980< -.037 1979> -.035 1997< -.030 1981< -.019 1963> -.013 Higher 1968 .038 1989 .037

 1972 to 2011 segment:

 Lower 1998> -.062 2006> -.046 1979> -.039 1980< -.030 1997< -.025 1981< -.016 Higher 2011 .068 1989 .040

 53a Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1906 95 92 78 73

 1910 77 87 54 52 53 56 40 27 45 42

 1920 54 27 10 24 37 54 62 103 99 73

 1930 59 62 48 45 59 56 18 22 29 11

 1940 27 4 22 20 72 22 16 20 4 15

 1950 21 31 50 57 47 36 77 79 107 63

 1960 193 183 103 131 148 122 153 292 287 198

 1970 180 162 199 120 128 152 85 61 129 199

 1980 115 63 144 81 140 135 228 231 331 378

 1990 261 146 243 177 175 168 281 154 322 268

 2000 217 174 143 193 403 475 502 445 446 523

 2010 374 154

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 53b 1884 to 2011 128 years Series 20

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

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

 1884 1923 0 .09 .10 .03 -.09 -.06 .20 .05 -.20 -.17 .08 .32\*-.05 -.02 .02 .13 .04 .00 .10 .22 .05 -.15

 1900 1939 0 .02 .13 .02 .03 -.12 .11 -.04 -.11 -.22 .17 .30\* .23 -.07 .12 .10 .11 .14 .13 .10 .00 -.16

 1920 1959 -5 -.13 .22 -.19 .04 -.15 .30\*-.12 -.06 -.07 -.01 .22| .01 .05 -.03 .20 .18 .04 .17 -.19 -.25 -.07

 [B] Entire series, effect on correlation ( .396) is:

 Lower 1941< -.025 1890> -.020 1984> -.013 2003> -.013 1936> -.011 1932> -.011 Higher 1974 .015 2007 .014

 1884 to 1923 segment:

 Lower 1890> -.101 1896< -.029 1914< -.026 1898< -.023 1893> -.017 1911< -.016 Higher 1903 .065 1892 .058

 1900 to 1939 segment:

 Lower 1932> -.042 1939< -.035 1914< -.027 1924> -.026 1931< -.025 1936> -.022 Higher 1913 .058 1903 .057

 1920 to 1959 segment:

 Lower 1941< -.028 1932> -.023 1955< -.022 1936> -.021 1953> -.020 1939< -.019 Higher 1944 .031 1956 .024

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

 1891 +3.0 SD; 1941 -6.0 SD

 53b Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1884 50 52 56 67 51 62

 1890 205 116 145 153 75 55 36 31 18 32

 1900 45 33 92 126 68 39 34 30 23 21

 1910 17 14 6 4 4 11 24 13 9 15

 1920 20 15 13 31 84 73 62 66 74 48

 1930 39 32 63 62 61 38 35 32 38 21

 1940 22 3 19 19 41 30 22 20 8 21

 1950 26 34 45 49 71 49 99 103 87 62

 1960 90 90 85 49 152 146 102 156 227 191

 1970 196 194 247 176 103 191 119 123 227 238

 1980 286 278 367 213 373 223 306 239 237 451

 1990 353 196 216 134 101 51 79 64 70 62

 2000 100 110 200 252 298 143 106 280 209 208

 2010 151 93

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PART 7: DESCRIPTIVE STATISTICS: SUG002\_BEAL\_Corr5-40 12:52 Fri 30 Dec 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 15a 1954 2011 58 3 0 .608 1.86 4.78 1.223 .803 .346 2.66 .548 -.018 1

 2 15b 1956 2011 56 3 0 .650 2.66 6.47 1.841 .913 .273 3.11 .635 .025 1

 3 16a 1880 2011 132 6 3 .374 1.01 2.28 .622 .873 .356 2.59 .351 -.038 1

 4 16b 1881 2011 131 6 3 .409 1.34 3.33 .754 .844 .296 2.71 .376 .005 2

 5 17a 1859 2011 153 7 3 .449 .91 2.53 .564 .778 .351 2.91 .380 .005 3

 6 17b 1869 2011 143 7 1 .536 1.07 2.74 .576 .769 .338 2.71 .405 .048 1

 7 18a 1931 2011 81 4 3 .239 1.25 3.84 .905 .857 .373 2.84 .544 .067 2

 8 18b 1932 2011 80 4 2 .513 .80 2.29 .588 .812 .443 2.66 .422 -.014 1

 9 19a 1910 2011 102 5 3 .402 .99 3.08 .719 .758 .465 2.68 .404 -.050 1

 10 19b 1876 2011 136 7 0 .502 1.09 3.01 .566 .571 .398 2.63 .419 .002 1

 11 21a 1960 2011 52 2 0 .642 3.02 6.97 1.958 .867 .293 2.66 .407 -.021 1

 12 21b 1948 2011 64 3 0 .602 2.50 4.82 1.104 .695 .268 2.68 .595 .024 1

 13 50a 1944 2011 68 3 0 .582 1.94 4.62 .912 .573 .360 2.62 .437 -.017 1

 14 50b 1950 2011 62 3 0 .486 2.43 6.64 1.599 .806 .343 2.72 .524 -.009 1

 15 51a 1930 2011 82 4 2 .345 .90 2.96 .637 .735 .393 2.73 .399 .009 1

 16 51b 1929 2011 83 4 1 .453 .96 2.86 .780 .796 .426 2.73 .497 -.031 1

 17 52a 1917 2011 95 5 2 .434 1.62 3.86 .905 .750 .386 2.47 .395 -.062 1

 18 52b 1890 2011 122 6 2 .429 1.26 2.78 .546 .777 .204 2.68 .485 -.059 1

 19 53a 1906 2011 106 5 2 .415 1.31 5.23 1.190 .872 .382 3.02 .589 -.039 1

 20 53b 1884 2011 128 6 3 .396 1.02 4.51 .936 .826 .363 2.71 .403 -.022 1

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

 Total or mean: 1934 93 30 .458 1.35 6.97 .850 .781 .354 3.11 .445 -.010

 - = [ COFECHA S2B5 COF ] = -