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[] P R O G R A M C O F E C H A Version 6.06P 30049

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

Title of run: MMRB2200A\_BEAL\_Corr2-50

File of DATED series: MMRB2200A\_BEAL\_Corr2

CONTENTS:

Part 1: Title page, options selected, summary, absent rings by series

Part 2: Histogram of time spans

Part 3: Master series with sample depth and absent rings by year

Part 4: Bar plot of Master Dating Series

Part 5: Correlation by segment of each series with Master

Part 6: Potential problems: low correlation, divergent year-to-year changes, absent rings, outliers

Part 7: Descriptive statistics

RUN CONTROL OPTIONS SELECTED VALUE

1 Cubic smoothing spline 50% wavelength cutoff for filtering

32 years

2 Segments examined are 50 years lagged successively by 25 years

3 Autoregressive model applied A Residuals are used in master dating series and testing

4 Series transformed to logarithms Y Each series log-transformed for master dating series and testing

5 CORRELATION is Pearson (parametric, quantitative)

Critical correlation, 99% confidence level .3281

6 Master dating series saved N

7 Ring measurements listed Y

8 Parts printed 1234567

9 Absent rings are omitted from master series and segment correlations (Y)

Time span of Master dating series is 1863 to 2015 153 years

Continuous time span is 1863 to 2015 153 years

Portion with two or more series is 1878 to 2015 138 years

>> 1078A 2009 absent in 1 of 28 series, but is not usually narrow: master index is .685

>> 1087A 1956 absent in 1 of 28 series, but is not usually narrow: master index is .361

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

\*C\* Number of dated series 28 \*C\*

\*O\* Master series 1863 2015 153 yrs \*O\*

\*F\* Total rings in all series 2848 \*F\*

\*E\* Total dated rings checked 2833 \*E\*

\*C\* Series intercorrelation .559 \*C\*

\*H\* Average mean sensitivity .309 \*H\*

\*A\* Segments, possible problems 22 \*A\*

\*\*\* Mean length of series 101.7 \*\*\*

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

1078A 2 absent rings: 2009 2013

1079A 1 absent rings: 1948

1080A 2 absent rings: 2013 2015

1082A 2 absent rings: 1998 2001

1082B 1 absent rings: 2006

1084A 1 absent rings: 1936

1086A 2 absent rings: 1919 1936

1086B 1 absent rings: 1936 1087A 1 absent rings: 19561601A 2 absent rings: 1936 2015 15 absent rings .527%

1900 -1.197 5 1950 -.131 28 2000 -1.370 28

1901 1.201 5 1951 -.541 28 2001 -2.676 28 1

1902 .983 6 1952 .405 28 2002 -.036 28

1903 .706 7 1953 -.286 28 2003 -.110 28

1904 1.131 7 1954 .066 28 2004 .735 28

1905 -.320 7 1955 1.243 28 2005 .426 28

1906 .609 9 1956 .361 28 1<< 2006 -.415 28 1

1907 .067 9 1957 -.532 28 2007 -.414 28

1908 .819 9 1958 -.246 28 2008 .676 28

1909 -.516 9 1959 -1.655 28 2009 .685 28 1<<

1910 -.633 9 1960 -.145 28 2010 .672 28

1911 -.819 9 1961 .655 28 2011 1.079 28

1912 -.854 10 1962 .122 28 2012 1.169 28

1863 .113 1 1913 -.170 10 1963 .330 28 2013 -.829 28 2

1864 -.467 1 1914 .571 10 1964 .976 28 2014 .828 28

1865 1.427 1 1915 -.021 10 1965 .142 28 2015 -1.661 28 2

1866 -1.474 1 1916 .724 10 1966 .188 28

1867 1.532 1 1917 .695 13 1967 -.346 28

1868 -2.154 1 1918 .773 13 1968 -1.110 28

1869 .516 1 1919 -.905 14 1 1969 .293 28

1870 .866 1 1920 -.811 15 1970 .840 28

1871 .029 1 1921 -.387 17 1971 .120 28

1872 -1.591 1 1922 -.252 18 1972 .759 28

1873 2.191 1 1923 -1.521 18 1973 .909 28

1874 1.897 1 1924 .593 19 1974 .192 28

1875 1.396 1 1925 .073 21 1975 -.227 28

1876 .614 1 1926 -.701 23 1976 -.838 28

1877 1.531 1 1927 .272 23 1977 -.849 28

1878 1.432 2 1928 .281 23 1978 .797 28

1879 1.111 2 1929 .565 26 1979 -.293 28

1880 .099 2 1930 .462 27 1980 -1.343 28

1881 .748 2 1931 .757 27 1981 -.760 28

1882 -.105 2 1932 .715 27 1982 .380 28

1883 .217 2 1933 -.073 27 1983 .998 28

1884 -.611 2 1934 .964 27 1984 -.280 28

1885 -1.504 2 1935 .966 27 1985 .061 28

1886 -1.617 2 1936 -4.774 27 4 1986 -.101 28

1887 -.352 2 1937 -1.423 27 1987 .326 28

1888 .734 2 1938 .217 28 1988 .136 28

1889 -.339 2 1939 .789 28 1989 -.806 28

1890 -1.458 2 1940 .866 28 1990 .037 28

1891 -1.252 2 1941 .059 28 1991 .220 28

1892 -1.473 2 1942 .257 28 1992 -.216 28

1893 -1.304 2 1943 1.139 28 1993 -.180 28

1894 -2.185 2 1944 .885 28 1994 1.076 28

1895 -2.080 3 1945 -1.135 28 1995 1.020 28

1896 .489 3 1946 -.898 28 1996 -.008 28

1897 1.130 3 1947 -.052 28 1997 .588 28

1898 1.983 3 1948 -1.762 28 1 1998 -1.110 28 1

1899 .936 3 1949 .113 28 1999 -.044 28

PART 5: CORRELATION OF SERIES BY SEGMENTS: MMRB2200A\_BEAL\_Corr2-50 15:42 Fri 07 Apr 2017 Page 5

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Correlations of 50-year dated segments, lagged 25 years

Flags: A = correlation under .3281 but highest as dated; B = correlation higher at other than dated position

Seq Series Time\_span 1875 1900 1925 1950 1975

1924 1949 1974 1999 2024

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

1 1076A 1917 2015 .50 .58 .48 .54

2 1076B 1912 2015 .57 .64 .30A .52

3 1078A 1917 2015 .77 .73 .30B .38

4 1078B 1926 2015 .73 .16B .34

5 1079A 1906 2015 .45 .41 .31B .44

6 1079B 1906 2015 .65 .66 .09B .40

7 1080A 1878 2015 .67 .85 .86 .64 .57

8 1080B 1863 2015 .50 .80 .83 .44B .57

9 1081A 1903 2015 .61 .71 .41 .48

10 1081B 1925 2015 .57 .42 .54

11 1082A 1922 2015 .68 .66 .40 .58

12 1082B 1902 2015 .27A .38 .56 .56

13 1083A 1895 2015 .45 .43 .53 .39 .33A

14 1083B 1919 2015 .59 .64 .27A .44

15 1084A 1921 2015 .45B .44B .49 .58

16 1084B 1921 2015 .70 .72 .51 .50

17 1085A 1938 2015 .29A .17B .42

18 1085B 1917 2015 .32A .30A .40 .36

19 1086A 1900 2015 .42 .48B .48B .56

20 1086B 1900 2015 .38 .52 .51 .52

21 1087A 1926 2015 .71 .25A .44

22 1087B 1929 2015 .31A .27B .33

23 1088A 1930 2015 .58 .34 .58

24 1088B 1925 2015 .31B .46 .69

25 1089A 1920 2015 .77 .81 .53 .40B

26 1089B 1924 2015 .79 .79 .40 .51

27 1601A 1929 2015 .45 .41 .58

28 1601B 1929 2015 .83 .55 .59

Av segment correlation .54 .58 .59 .39 .49

PART 6: POTENTIAL PROBLEMS: MMRB2200A\_BEAL\_Corr2-50 15:42 Fri 07 Apr 2017 Page 5

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For each series with potential problems the following diagnostics may appear:

[A] Correlations with master dating series of flagged 50-year segments of series filtered with 32-year spline,

at every point from ten years earlier (-10) to ten years later (+10) than dated

[B] Effect of those data values which most lower or raise correlation with master series

Symbol following year indicates value in series is greater (>) or lesser (<) than master series value

[C] Year-to-year changes very different from the mean change in other series

[D] Absent rings (zero values)

[E] Values which are statistical outliers from mean for the year

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

1076A 1917 to 2015 99 years Series 1

[B] Entire series, effect on correlation ( .508) is:

Lower 1920< -.026 1993< -.020 1971> -.007 1978< -.006 1952< -.006 1935< -.005 Higher 2015 .011 1998 .011

1076A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1917 149 147 151

1920 127 163 209 148 210 225 245 321 366 336

1930 335 436 300 370 435 303 136 208 469 489

1940 545 476 320 464 372 249 90 63 50 77

1950 50 58 51 73 103 124 123 123 77 80

1960 135 183 143 250 335 292 332 268 209 230

1970 301 326 251 203 179 112 130 94 100 72

1980 85 79 93 167 82 77 67 59 71 53

1990 68 56 66 30 41 44 26 58 17 44

2000 24 26 52 58 81 88 32 41 47 27

2010 35 27 58 18 58 16

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

1076B 1912 to 2015 104 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

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

1950 1999 0 .02 -.02 .17 .14 .13 .22 -.28 -.25 .08 .00 .30\* .00 .03 .13 -.16 .02 -.03 -.01 -.05 -.13 -.08

[B] Entire series, effect on correlation ( .559) is:

Lower 1923< -.024 1912> -.019 1945> -.014 1920< -.013 1989> -.012 1953< -.011 Higher 1936 .096 2015 .014

1950 to 1999 segment:

Lower 1989> -.042 1982< -.038 1971> -.035 1980> -.023 1958< -.022 1973< -.022 Higher 1998 .060 1994 .039

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

1912 +3.2 SD; 1923 -4.9 SD

1076B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1912 255 204 182 177 233 201 208 179

1920 117 210 232 107 183 237 271 360 339 291

1930 288 334 319 366 428 353 136 259 540 452

1940 431 423 348 426 437 373 240 299 196 314

1950 287 254 235 148 200 233 205 182 134 145

1960 166 201 185 191 205 169 206 147 157 144

1970 179 213 152 115 93 89 104 101 123 117

1980 106 88 67 113 69 73 67 66 103 118

1990 90 79 114 93 126 95 84 87 45 71

2000 36 29 44 59 89 86 67 54 65 49

2010 71 68 77 27 97 18

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

1078A 1917 to 2015 99 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

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

1950 1999 9 -.24 -.04 -.05 -.13 -.01 .23 .00 -.01 -.23 -.13 .30|-.12 -.04 .02 -.03 .04 .10 -.01 .30 .44\*-.22

[B] Entire series, effect on correlation ( .640) is:

Lower 1945> -.025 1972< -.025 1994< -.018 1923> -.016 1974< -.011 1968> -.009 Higher 1936 .194 1948 .013

1950 to 1999 segment:

Lower 1972< -.070 1994< -.053 1968> -.030 1979> -.029 1977> -.026 1976> -.025 Higher 1980 .062 1998 .060

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

2009 .685 28 1 >> WARNING: Ring is not usually narrow

2013 -.829 28 2

1078A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1917 233 194 173

1920 213 193 202 243 304 296 194 249 283 269

1930 324 323 330 235 273 321 137 308 365 362

1940 411 324 300 355 356 370 263 210 141 248

1950 223 229 351 301 303 375 343 301 267 227

1960 319 394 333 227 246 236 199 151 202 220

1970 171 131 87 115 76 102 150 166 122 131

1980 64 72 89 135 66 103 126 94 92 72

1990 65 66 28 26 25 60 59 50 10 41

2000 29 6 46 67 92 57 17 15 15 0

2010 32 33 49 0 24 5

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

1078B 1926 to 2015 90 years Series 4

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

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

1950 1999 9 -.10 .02 -.06 -.12 .03 .04 -.02 -.05 -.15 -.08 .16|-.25 .03 .09 -.01 .12 -.09 .02 .32 .32\*-.10

[B] Entire series, effect on correlation ( .619) is:

Lower 2006> -.030 1945> -.025 1994< -.017 1963< -.014 1989> -.014 1959> -.013 Higher 1936 .292 2015 .016

1950 to 1999 segment:

Lower 1994< -.046 1989> -.046 1959> -.032 1963< -.031 1972< -.022 1964< -.021 Higher 1998 .048 1955 .035

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

2006 +3.2 SD

1078B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1926 155 223 319 215

1930 205 211 195 176 241 297 73 158 226 208

1940 274 196 256 257 282 275 188 195 191 231

1950 155 137 226 170 191 242 216 233 254 217

1960 235 266 226 88 94 96 60 50 82 97

1970 125 104 95 131 141 119 142 91 142 143

1980 147 157 187 209 171 194 236 174 156 193

1990 140 90 61 52 50 74 69 79 51 76

2000 66 62 85 108 147 96 167 70 79 58

2010 79 81 83 35 55 21

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

1079A 1906 to 2015 110 years Series 5

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

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

1950 1999 -9 -.19 .37\* .00 -.12 .06 -.02 -.15 .07 -.21 -.15 .31|-.16 .13 .07 -.20 .04 -.01 -.03 .03 .21 -.19

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

Lower 1936> -.016 1976> -.013 2007< -.011 1919> -.010 2012< -.010 2000> -.009 Higher 2001 .017 1998 .012

1950 to 1999 segment:

Lower 1976> -.053 1973< -.035 1982< -.030 1980> -.022 1966< -.021 1977> -.019 Higher 1998 .075 1978 .046

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

2000 2001 -4.1 SD

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

1948 -1.762 28 1

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

1936 +4.1 SD; 2001 -6.1 SD

1079A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1906 225 229 270 55

1910 92 68 98 123 98 90 108 183 286 239

1920 187 171 198 185 243 200 188 198 212 259

1930 213 215 214 187 238 288 105 37 29 49

1940 36 42 14 22 13 14 14 9 0 18

1950 20 24 26 27 26 32 40 21 37 27

1960 25 31 31 39 55 44 22 26 11 30

1970 39 25 45 30 27 45 77 74 100 59

1980 54 45 34 39 29 29 41 36 41 28

1990 35 35 38 38 32 28 25 24 17 24

2000 26 8 28 23 30 31 25 12 29 28

2010 40 37 25 23 28 22

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1079B 1906 to 2015 110 years Series 6

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

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

1950 1999 9 -.09 -.12 -.07 -.17 .03 -.08 .07 .23 -.11 .02 .09|-.01 -.10 -.22 -.12 .11 .17 -.20 -.02 .23\*-.05

[B] Entire series, effect on correlation ( .524) is:

Lower 1998> -.020 1945> -.018 2013> -.016 1918< -.014 1938< -.013 1995< -.012 Higher 1936 .184 2015 .028

1950 to 1999 segment:

Lower 1998> -.059 1995< -.039 1968> -.032 1961< -.030 1996> -.022 1990< -.017 Higher 1955 .063 1980 .057

1079B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1906 201 226 348 172

1910 99 212 166 245 414 353 367 322 253 223

1920 292 381 456 432 489 457 418 451 496 491

1930 430 473 472 345 395 419 140 130 104 114

1940 150 160 127 213 176 175 156 122 80 88

1950 109 89 125 158 170 236 204 157 159 128

1960 83 53 42 40 65 49 98 156 181 153

1970 125 109 142 156 185 105 106 115 144 124

1980 93 93 116 150 139 133 152 117 95 71

1990 59 63 73 103 109 78 106 118 133 108

2000 80 32 64 81 140 135 134 77 97 136

2010 220 197 166 180 185 75

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1080A 1878 to 2015 138 years Series 7

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

Lower 1880> -.015 1995< -.007 1944< -.006 1967< -.006 1939< -.006 1950< -.006 Higher 1936 .108 1898 .005

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

2013 -.829 28 2

2015 -1.661 28 2

>> WARNING: Last ring in series is ABSENT

1080A Ring measurements Annual values

Date 0 1 2 3 4 5 6 7 8 9

1878 25 25

1880 32 50 22 34 23 18 15 32 80 58

1890 40 61 52 57 41 33 144 183 290 226

1900 158 280 281 234 317 187 261 221 228 184

1910 173 94 103 152 264 292 245 285 280 183

1920 150 147 99 71 148 169 135 152 153 128

1930 93 107 130 121 151 179 13 64 91 65

1940 55 56 85 104 59 45 49 66 38 69

1950 41 66 100 82 94 137 133 89 95 49

1960 119 117 93 124 161 106 94 47 32 69

1970 100 111 152 150 110 137 102 64 125 101

1980 104 145 130 159 102 92 82 116 75 36

1990 58 46 31 24 37 26 28 34 8 22

2000 17 9 13 21 22 27 12 13 25 14

2010 4 8 6 0 7 0

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

1080B 1863 to 2015 153 years Series 8

[\*] Early part of series cannot be checked from 1863 to 1877 -- 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

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

1950 1999 -9 -.15 .48\* .11 -.38 -.05 .16 -.10 .07 .01 -.08 .44|-.05 -.27 .20 -.19 -.21 .01 -.02 .03 .26 -.36

[B] Entire series, effect on correlation ( .671) is:

Lower 1996> -.015 1880< -.011 1923> -.010 1912< -.009 1959> -.009 1900> -.008 Higher 1936 .158 2015 .008

1950 to 1999 segment:

Lower 1996> -.057 1959> -.040 1980> -.028 1985< -.027 1957> -.026 1956> -.017 Higher 1968 .033 1994 .021

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

1936 -5.5 SD

1080B Ring measurements Annual values

Date 0 1 2 3 4 5 6 7 8 9

1863 155 139 182 107 180 82 140

1870 147 116 71 180 161 136 104 124 98 91

1880 45 56 49 52 37 20 23 55 73 55

1890 37 36 50 74 68 53 176 221 358 263

1900 236 352 277 317 428 297 370 221 264 243

1910 221 154 97 149 239 251 250 261 289 218

1920 199 219 231 230 225 229 221 254 285 248

1930 212 234 193 186 224 239 24 137 187 211

1940 218 159 159 138 149 119 99 102 87 150

1950 87 101 116 103 118 161 194 192 200 164

1960 130 149 114 157 166 114 128 94 40 94

1970 122 104 126 104 73 58 66 34 70 50

1980 65 89 123 104 38 20 53 83 89 13

1990 87 105 97 112 148 120 191 120 71 119

2000 82 55 64 79 80 97 33 52 87 91

2010 61 94 78 61 111 43

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1081A 1903 to 2015 113 years Series 9

[B] Entire series, effect on correlation ( .563) is:

Lower 2001> -.030 1919< -.022 1935< -.015 1966< -.011 1977> -.011 1911< -.008 Higher 1936 .082 2015 .019

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

2000 2001 4.2 SD

1081A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1903 141 169 118 160 158 217 151

1910 158 88 98 115 136 130 139 119 150 58

1920 101 88 67 75 125 119 97 73 64 85

1930 77 100 97 91 114 70 16 95 113 155

1940 166 155 160 209 189 102 73 104 65 118

1950 121 100 113 156 217 320 271 171 135 106

1960 204 257 185 179 152 161 92 109 93 111

1970 170 137 128 176 174 201 173 245 322 240

1980 193 144 156 158 85 105 108 138 98 81

1990 104 82 79 101 118 119 56 67 61 63

2000 29 70 87 65 83 91 51 63 80 101

2010 103 105 100 68 86 28

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1081B 1925 to 2015 91 years Series 10

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

Lower 1928< -.013 1948< -.013 1998> -.010 1990< -.010 1925> -.009 2004< -.007 Higher 1936 .054 2015 .020

1081B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1925 145 127 115 106 146

1930 147 186 167 192 230 197 98 190 232 315

1940 242 175 171 226 280 190 160 258 148 276

1950 301 228 295 306 311 389 305 294 330 319

1960 311 319 293 332 365 400 312 334 329 438

1970 484 403 305 317 221 217 185 255 359 278

1980 199 170 213 189 113 108 114 143 97 75

1990 59 62 69 105 130 127 88 96 85 96

2000 57 49 85 58 58 72 71 66 91 149

2010 141 197 176 105 145 40

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1082A 1922 to 2015 94 years Series 11

[B] Entire series, effect on correlation ( .666) is:

Lower 1955< -.020 1953< -.012 1925< -.012 1978< -.011 1945> -.010 1974> -.010 Higher 1936 .110 2001 .008

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

1998 -1.110 28 1

2001 -2.676 28 1

1082A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1922 164 137 221 173 192 240 230 249

1930 230 276 286 229 225 285 121 127 312 341

1940 251 173 168 195 335 267 221 212 193 256

1950 229 218 217 160 194 199 274 254 239 238

1960 372 424 373 340 351 391 399 248 209 221

1970 346 269 318 304 364 233 173 171 162 120

1980 131 157 178 214 159 143 88 103 163 107

1990 109 109 89 73 83 81 39 48 0 6

2000 8 0 10 5 26 39 13 14 16 45

2010 71 110 89 22 64 16

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1082B 1902 to 2015 114 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

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1902 1951 0 .25 -.07 -.16 .03 .10 -.01 -.04 .03 -.05 .21 .27\*-.22 -.10 .11 -.18 .02 -.06 -.16 -.07 -.04 .08

[B] Entire series, effect on correlation ( .386) is:

Lower 1936> -.041 1902< -.023 1911> -.013 2013> -.013 1937< -.012 1925< -.010 Higher 2015 .026 1959 .016

1902 to 1951 segment:

Lower 1902< -.046 1937< -.027 1911> -.023 1925< -.023 1917< -.018 1908< -.017 Higher 1909 .024 1948 .022

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

1936 1937 -5.1 SD

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

2006 -.415 28 1

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

1936 +3.9 SD; 1959 -5.1 SD

1082B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1902 248 339 415 360 397 333 260 192

1910 211 361 303 346 314 298 315 205 250 220

1920 189 192 150 144 224 129 129 163 201 186

1930 171 169 243 188 240 273 164 102 193 178

1940 177 166 141 175 308 232 166 254 184 363

1950 329 300 263 223 249 304 287 297 173 117

1960 204 311 241 234 255 222 277 188 124 217

1970 166 204 233 315 161 192 122 49 75 69

1980 50 42 69 97 54 60 30 75 36 28

1990 28 46 28 67 74 65 67 81 10 13

2000 17 8 38 32 37 55 0 23 27 78

2010 46 40 63 61 57 13

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

1083A 1895 to 2015 121 years Series 13

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

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1966 2015 0 .09 -.06 .30 -.10 .19 .31 -.17 -.07 -.16 .06 .33\* - - - - - - - - - -

[B] Entire series, effect on correlation ( .364) is:

Lower 1919> -.025 1900> -.019 2011< -.018 1965< -.017 2000> -.013 1920> -.010 Higher 1936 .096 1945 .014

1966 to 2015 segment:

Lower 2011< -.067 2000> -.043 1980> -.027 1977> -.022 1987< -.021 1975> -.014 Higher 1978 .028 1994 .026

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

1959 -6.0 SD; 1965 -4.9 SD

1083A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1895 24 35 47 41 32

1900 40 56 32 49 37 26 15 26 24 34

1910 21 25 27 28 54 56 53 66 29 331

1920 409 341 382 189 198 299 228 260 329 366

1930 359 325 418 275 265 267 116 140 178 203

1940 210 107 142 167 126 77 53 79 72 60

1950 81 58 55 65 50 45 38 23 32 5

1960 23 26 26 14 22 4 19 21 11 29

1970 25 20 36 30 26 39 18 45 58 37

1980 44 25 28 40 14 21 20 14 19 39

1990 48 56 75 61 99 116 72 67 49 46

2000 69 42 51 49 55 64 18 37 41 54

2010 58 25 61 27 34 23

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

1083B 1919 to 2015 97 years Series 14

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

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

1950 1999 0 -.29 .23 .02 -.05 .05 -.09 -.07 .20 -.22 -.15 .27\*-.13 -.19 .06 -.08 .19 .02 -.15 -.02 .11 -.11

[B] Entire series, effect on correlation ( .525) is:

Lower 1923> -.023 1945> -.021 1998> -.017 2015> -.013 1980> -.012 2011< -.012 Higher 1936 .103 1948 .015

1950 to 1999 segment:

Lower 1998> -.060 1980> -.043 1979> -.030 1995< -.029 1983< -.027 1960< -.017 Higher 1959 .105 1994 .042

1083B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1919 24

1920 183 204 317 350 321 248 223 330 468 286

1930 348 383 323 245 346 314 138 186 213 285

1940 359 296 290 308 287 263 160 235 112 124

1950 151 129 106 128 131 118 113 84 59 11

1960 19 43 11 34 43 15 27 73 23 117

1970 73 72 143 146 92 99 87 111 223 199

1980 170 166 131 98 59 131 160 205 219 117

1990 142 144 143 82 196 84 39 62 108 82

2000 45 33 92 65 104 63 62 59 63 54

2010 59 29 43 6 53 28

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

1084A 1921 to 2015 95 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

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

1921 1970 -9 -.10 .66\* .05 -.08 -.11 .02 -.07 -.10 -.16 -.14 .45| .16 .04 .19 -.08 .06 -.03 -.20 .00 -.03 -.18

1925 1974 -9 -.12 .65\* .05 -.05 -.12 .07 -.06 -.10 -.20 -.14 .44| .17 .02 .22 -.09 .02 -.01 -.17 .00 -.04 -.18

[B] Entire series, effect on correlation ( .601) is:

Lower 1945< -.068 2001> -.009 1926> -.009 1923> -.009 1968> -.008 1967> -.008 Higher 1936 .093 2015 .012

1921 to 1970 segment:

Lower 1945< -.112 1923> -.013 1926> -.012 1968> -.011 1967> -.011 1921< -.011 Higher 1936 .144 1959 .007

1925 to 1974 segment:

Lower 1945< -.117 1926> -.013 1968> -.012 1967> -.012 1973< -.011 1935< -.010 Higher 1936 .152 1959 .007

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

1945 1946 4.1 SD

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

1936 -4.774 27 4

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

1945 -7.7 SD

1084A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1921 41 73 94 148 115 157 157 178 208

1930 200 183 169 153 159 113 0 101 135 182

1940 174 106 145 128 115 11 88 150 120 154

1950 172 147 185 168 206 230 226 181 196 190

1960 258 276 299 295 297 361 285 381 368 428

1970 410 385 307 205 201 165 117 127 153 136

1980 80 97 103 156 105 166 91 143 146 127

1990 149 188 144 198 179 260 155 145 93 99

2000 52 78 131 91 105 104 146 146 187 147

2010 135 185 163 57 168 52

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1084B 1921 to 2015 95 years Series 16

[B] Entire series, effect on correlation ( .626) is:

Lower 2010< -.035 1979< -.013 1986< -.012 1968> -.010 1957< -.009 1928< -.009 Higher 1936 .095 1945 .010

1084B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1921 60 85 71 73 73 79 95 70 142

1930 176 178 145 141 173 123 14 96 155 269

1940 229 139 143 154 126 28 77 71 67 92

1950 110 120 185 167 175 197 159 89 129 105

1960 139 163 185 204 215 234 190 197 209 166

1970 214 162 229 214 212 133 135 123 191 104

1980 97 121 124 135 144 156 94 112 122 101

1990 91 133 122 97 126 118 67 72 46 46

2000 29 27 68 60 55 55 59 69 84 80

2010 25 80 55 16 48 32

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

1085A 1938 to 2015 78 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

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

1938 1987 0 -.10 .07 .28 -.02 .02 .15 -.25 .11 -.23 -.29 .29\* .09 -.01 .17 .19 .06 -.04 -.34 -.21 .17 -.11

1950 1999 -8 -.16 .10 .20\* .11 -.01 -.04 .02 .09 -.13 -.26 .17| .03 -.14 .00 .07 .17 -.12 -.36 -.05 .11 .11

[B] Entire series, effect on correlation ( .380) is:

Lower 1998> -.044 1955< -.029 1963< -.023 1944< -.019 2011< -.016 1980> -.015 Higher 2015 .096 1948 .025

1938 to 1987 segment:

Lower 1955< -.051 1963< -.038 1944< -.033 1980> -.025 1984> -.018 1987< -.017 Higher 1948 .059 1979 .020

1950 to 1999 segment:

Lower 1998> -.086 1955< -.053 1963< -.037 1980> -.025 1984> -.020 1987< -.017 Higher 1979 .031 1976 .031

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

1998 +3.3 SD

1085A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1938 118 95

1940 135 89 98 106 76 81 94 126 86 143

1950 149 131 129 97 116 100 93 104 141 138

1960 216 270 343 203 259 250 265 322 301 554

1970 505 327 346 433 351 335 214 265 249 181

1980 225 246 248 251 245 256 186 148 115 111

1990 175 163 128 128 155 149 137 216 254 240

2000 196 127 159 109 173 131 148 210 276 253

2010 256 151 155 128 145 32

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

1085B 1917 to 2015 99 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

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

1917 1966 0 -.10 .17 -.20 -.25 -.09 -.06 .04 .21 .14 .05 .32\*-.16 -.19 .05 -.10 .00 -.14 -.28 .23 .10 -.23

1925 1974 0 -.14 .21 -.10 -.22 -.05 -.02 -.03 .18 .14 .01 .30\*-.12 -.17 .03 -.14 .05 -.06 -.31 .20 .16 -.17

[B] Entire series, effect on correlation ( .325) is:

Lower 1936> -.110 1996< -.043 2001> -.020 1926> -.011 1963< -.009 1970< -.008 Higher 2015 .024 1959 .018

1917 to 1966 segment:

Lower 1936> -.209 1926> -.021 1963< -.020 1938< -.012 1922< -.011 1939< -.010 Higher 1945 .033 1959 .032

1925 to 1974 segment:

Lower 1936> -.212 1926> -.021 1963< -.020 1970< -.017 1938< -.013 1939< -.011 Higher 1945 .039 1959 .038

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

1935 1936 4.2 SD

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

1936 +5.1 SD; 1996 -7.3 SD; 2001 +3.0 SD

1085B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1917 178 169 120

1920 119 95 67 61 80 65 114 98 86 122

1930 126 102 89 89 113 128 103 93 83 84

1940 87 103 125 123 120 82 99 104 82 104

1950 98 77 120 103 148 184 178 119 153 106

1960 160 230 233 148 197 197 219 166 198 223

1970 157 201 349 288 185 125 103 90 127 133

1980 133 116 232 329 227 178 202 140 119 76

1990 183 139 117 83 101 101 46 116 112 147

2000 110 134 138 113 193 118 115 157 164 146

2010 109 135 300 86 127 29

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

1086A 1900 to 2015 116 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

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

1925 1974 -9 -.17 .58\* .13 -.30 .02 -.03 -.14 .16 .01 -.13 .48|-.14 -.26 .29 -.18 -.07 .03 -.09 .15 .14 -.12

1950 1999 -9 -.19 .51\* .24 -.41 .04 -.07 -.18 .21 .00 -.08 .48| .03 -.02 .23 -.19 -.04 -.11 -.23 .02 .02 -.23

[B] Entire series, effect on correlation ( .579) is:

Lower 1961< -.025 1911> -.014 2012< -.012 1909> -.010 1928< -.009 1954< -.007 Higher 1936 .115 1945 .012

1925 to 1974 segment:

Lower 1961< -.052 1928< -.020 1954< -.016 1946> -.015 1959> -.014 1929< -.008 Higher 1936 .213 1945 .010

1950 to 1999 segment:

Lower 1961< -.105 1959> -.029 1954< -.027 1999< -.023 1960< -.015 1996> -.011 Higher 1998 .043 1964 .025

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

1919 -.905 14 1

1936 -4.774 27 4

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

1919 -5.9 SD

1086A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1900 57 120 202 113 108 92 102 72 90 91

1910 90 113 96 97 95 58 82 59 45 0

1920 26 48 59 20 29 21 14 13 5 10

1930 21 26 32 19 63 86 0 60 62 91

1940 133 100 120 189 150 36 113 101 75 98

1950 80 92 137 135 92 150 108 118 159 149

1960 128 99 131 196 262 177 227 192 148 251

1970 277 231 251 299 209 200 140 155 195 161

1980 142 193 183 190 131 124 119 195 143 132

1990 193 211 198 203 261 173 162 163 33 9

2000 17 5 32 52 45 124 86 68 171 203

2010 227 242 55 43 47 16

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1086B 1900 to 2015 116 years Series 20

[B] Entire series, effect on correlation ( .627) is:

Lower 1909> -.015 1904< -.011 1996> -.009 1973< -.009 1920> -.009 1921> -.009 Higher 1936 .155 2013 .007

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

1936 -4.774 27 4

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

1976 -4.5 SD

1086B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1900 63 131 214 186 136 117 129 128 159 154

1910 175 143 143 130 119 84 119 100 130 77

1920 108 134 88 59 73 34 25 38 24 28

1930 45 42 73 69 106 96 0 63 59 73

1940 49 62 68 158 106 62 79 61 52 67

1950 94 96 108 96 82 132 132 82 146 122

1960 172 272 217 295 391 250 241 222 193 247

1970 312 209 246 204 176 199 165 212 308 337

1980 286 325 342 379 375 326 443 565 496 428

1990 413 351 311 348 392 299 412 385 72 87

2000 60 63 127 86 73 83 84 94 117 84

2010 76 210 133 27 87 28

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

1087A 1926 to 2015 90 years Series 21

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

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

1950 1999 0 -.09 -.10 .06 -.21 -.02 -.11 .12 .14 -.02 .22 .25\* .05 -.21 -.16 -.03 .04 .03 -.22 .15 .18 -.10

[B] Entire series, effect on correlation ( .595) is:

Lower 1956< -.033 1948> -.024 1961< -.011 1989> -.011 1997< -.010 1943< -.009 Higher 1936 .215 2001 .022

1950 to 1999 segment:

Lower 1989> -.031 1961< -.027 1997< -.023 1967> -.020 1996> -.018 1956< -.017 Higher 1980 .069 1959 .061

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

1956 .361 28 1 >> WARNING: Ring is not usually narrow

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

1956 -5.3 SD

1087A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1926 153 253 254 184

1930 183 200 227 142 203 243 102 114 171 173

1940 179 124 129 112 132 113 103 118 114 115

1950 109 84 90 79 50 57 0 46 46 16

1960 22 23 33 60 92 111 159 197 175 145

1970 157 169 207 198 208 112 157 155 185 104

1980 67 66 149 160 172 214 251 214 202 226

1990 188 213 192 203 227 265 267 216 214 220

2000 191 118 200 219 264 206 251 226 312 342

2010 318 186 121 61 71 29

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

1087B 1929 to 2015 87 years Series 22

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

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

1929 1978 0 -.09 -.01 -.02 -.07 .23 -.18 -.13 -.05 -.12 .21 .31\*-.32 -.01 .06 .11 .12 -.11 -.23 .05 .14 -.10

1950 1999 -9 -.14 .29\* .00 -.18 .08 -.02 .19 .18 -.28 .04 .27|-.08 -.20 -.03 .05 -.10 -.04 -.13 -.08 .17 -.08

[B] Entire series, effect on correlation ( .302) is:

Lower 1983< -.032 1945> -.029 1948> -.028 1998> -.018 2015> -.017 1932< -.011 Higher 1936 .115 2001 .026

1929 to 1978 segment:

Lower 1945> -.051 1948> -.049 1932< -.023 1967> -.017 1931< -.014 1941> -.014 Higher 1936 .306 1978 .018

1950 to 1999 segment:

Lower 1983< -.077 1998> -.060 1979> -.028 1967> -.025 1955< -.022 1976> -.015 Higher 1980 .117 1978 .032

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

1936 1937 -4.8 SD

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

1936 +3.3 SD; 1948 +3.4 SD; 2015 +3.0 SD

1087B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1929 57

1930 60 42 27 31 33 72 39 24 37 62

1940 68 87 65 64 65 85 90 81 89 80

1950 84 65 55 54 53 46 25 14 36 31

1960 30 39 42 48 76 105 127 155 118 121

1970 109 85 125 106 83 97 113 75 137 154

1980 81 85 163 107 107 108 123 157 124 92

1990 146 170 165 205 253 347 301 231 264 316

2000 234 118 116 136 155 94 35 51 45 41

2010 62 67 77 46 67 42

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1088A 1930 to 2015 86 years Series 23

[B] Entire series, effect on correlation ( .607) is:

Lower 1958< -.018 1959> -.017 1967< -.016 2009< -.015 1969< -.014 1940< -.011 Higher 1936 .070 2015 .024

1088A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1930 323 417 419 267 296 235 128 166 273 397

1940 250 178 315 362 335 221 250 318 244 330

1950 345 287 332 326 265 393 288 263 195 265

1960 234 311 331 326 277 215 220 144 198 175

1970 298 336 345 459 420 375 324 395 436 342

1980 185 218 299 239 260 221 218 203 249 300

1990 288 334 282 249 379 497 369 287 182 308

2000 170 122 231 197 200 129 125 155 160 99

2010 179 155 174 101 180 59

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

1088B 1925 to 2015 91 years Series 24

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

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

1925 1974 10 .03 .05 .10 .03 -.10 -.06 -.11 .10 -.20 .05 .31| .06 -.09 .02 -.18 -.07 -.04 .01 -.09 -.03 .58\*

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

Lower 1926< -.067 1936> -.061 1959> -.016 1969< -.015 1984> -.010 1925> -.010 Higher 2001 .027 2015 .020

1925 to 1974 segment:

Lower 1926< -.087 1969< -.022 1959> -.020 1925> -.014 1957> -.009 1974> -.007 Higher 1955 .023 1948 .022

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

1935 1936 4.1 SD

1088B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1925 385 154 282 290 286

1930 287 270 407 320 396 318 201 305 515 610

1940 549 528 527 456 287 159 186 219 132 180

1950 150 149 215 220 222 411 205 282 251 274

1960 269 309 302 333 261 224 206 118 118 86

1970 134 201 189 192 249 146 100 97 131 157

1980 74 106 225 235 262 267 219 220 253 176

1990 216 187 103 99 195 171 98 119 64 160

2000 100 51 132 141 137 130 88 135 148 123

2010 165 167 199 78 120 44

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

1089A 1920 to 2015 96 years Series 25

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

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

1966 2015 -9 -.26 .53\*-.02 -.04 -.19 -.18 .01 -.11 -.12 -.09 .40| - - - - - - - - - -

[B] Entire series, effect on correlation ( .633) is:

Lower 1923> -.027 2013> -.024 2010< -.024 2001> -.016 2012< -.009 2007< -.008 Higher 1936 .181 1945 .009

1966 to 2015 segment:

Lower 2013> -.061 2010< -.051 2001> -.036 2012< -.021 2006> -.017 1997< -.016 Higher 2015 .046 1980 .035

1089A Ring measurements Annual values

Date 0 1 2 3 4 5 6 7 8 9

1920 329 300 292 378 394 418 414 463 422 387

1930 269 267 380 288 358 384 21 104 249 335

1940 370 324 305 451 259 23 111 174 98 110

1950 123 129 205 196 183 219 129 148 142 158

1960 264 342 247 215 223 163 132 160 126 155

1970 137 116 161 178 185 109 76 58 122 95

1980 52 109 127 171 142 125 128 147 79 64

1990 74 63 46 42 68 62 44 37 42 41

2000 34 41 67 63 72 53 59 36 52 52

2010 34 81 59 74 79 52

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1089B 1924 to 2015 92 years Series 26

[B] Entire series, effect on correlation ( .698) is:

Lower 2006> -.021 1980> -.019 1946> -.011 1977> -.011 2010< -.011 1957> -.010 Higher 1936 .154 2001 .015

1089B Ring measurements Annual values

Date 0 1 2 3 4 5 6 7 8 9

1924 529 410 366 310 273 338

1930 376 353 262 160 344 328 28 87 156 247

1940 281 260 279 430 254 84 267 362 197 278

1950 221 191 212 152 176 234 268 285 241 164

1960 172 191 175 225 308 262 267 291 267 272

1970 312 255 313 325 281 241 236 287 365 247

1980 252 213 176 169 143 155 116 130 116 100

1990 110 125 117 156 219 188 210 208 169 203

2000 163 112 178 215 238 216 293 225 280 285

2010 202 267 209 194 201 148

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

1601A 1929 to 2015 87 years Series 27

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

Lower 1956< -.018 1959> -.018 1980< -.016 2004< -.014 1975> -.013 1935< -.011 Higher 1936 .119 1948 .015

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

1936 -4.774 27 4 2015 -1.661 28 2

>> WARNING: Last ring in series is ABSENT

[E] Outliers 1 3.0 SD above or -4.5 SD below mean for year 1980 -5.1 SD

1601A Ring measurements Annual values

Date 0 1 2 3 4 5 6 7 8 9

1929 271

1930 255 257 242 179 139 92 0 107 106 81

1940 83 119 140 162 152 69 65 111 44 126

1950 123 157 191 172 213 267 138 195 267 265

1960 287 283 206 318 255 279 233 159 110 191

1970 185 124 168 205 197 251 180 165 174 135

1980 67 101 225 190 196 205 157 156 206 192

1990 197 208 198 165 180 179 161 161 90 110

2000 34 18 52 79 33 22 25 44 85 70

2010 56 58 110 10 19 0

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

1601B 1929 to 2015 87 years Series 28

[B] Entire series, effect on correlation ( .788) is:

Lower 1937> -.014 1984> -.012 1942< -.011 1972< -.011 1978< -.008 2015> -.008 Higher 1936 .187 1945 .006

[E] Outliers 1 3.0 SD above or -4.5 SD below mean for year 1936 -5.8 SD

1601B Ring measurements Annual values

Date 0 1 2 3 4 5 6 7 8 9

1929 226

1930 205 214 185 183 160 154 16 172 156 137

1940 116 107 80 122 141 81 100 120 83 130

1950 104 130 172 121 164 246 127 136 199 147

1960 181 213 178 233 221 171 224 116 88 188

1970 191 76 69 90 100 161 101 44 80 41

1980 31 80 196 216 237 245 233 177 161 77

1990 81 117 115 128 174 164 153 170 34 42

2000 18 8 46 48 48 67 43 54 111 92

2010 143 157 170 53 70 27

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PART 7: DESCRIPTIVE STATISTICS: MMRB2200A\_BEAL\_Corr2-50 15:42 Fri 07 Apr 2017 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 1076A 1917 2015 99 4 0 .508 1.61 5.45 1.325 .890 .323 2.83 .491 -.044 2

2 1076B 1912 2015 104 4 1 .559 1.80 5.40 1.143 .869 .256 2.47 .379 .014 1

3 1078A 1917 2015 99 4 1 .640 1.77 4.11 1.185 .905 .368 2.40 .342 -.073 2

4 1078B 1926 2015 90 3 1 .619 1.52 3.19 .727 .763 .256 2.47 .302 -.067 1

5 1079A 1906 2015 110 4 1 .405 .74 2.88 .776 .891 .326 2.45 .308 -.084 1

6 1079B 1906 2015 110 4 1 .524 1.85 4.96 1.235 .898 .240 2.45 .389 -.041 2

7 1080A 1878 2015 138 5 0 .742 .98 3.16 .754 .852 .388 2.39 .300 -.034 1

8 1080B 1863 2015 153 5 1 .671 1.38 4.28 .815 .817 .316 2.36 .256 -.033 1

9 1081A 1903 2015 113 4 0 .563 1.24 3.22 .561 .744 .271 2.60 .408 -.050 1

10 1081B 1925 2015 91 3 0 .576 1.99 4.84 1.053 .873 .224 2.50 .375 -.088 2

11 1082A 1922 2015 94 4 0 .666 1.80 4.24 1.090 .873 .351 2.56 .441 -.020 2

12 1082B 1902 2015 114 4 1 .386 1.68 4.15 1.068 .858 .341 2.68 .513 .064 1

13 1083A 1895 2015 121 5 1 .364 .87 4.18 1.002 .891 .365 2.46 .376 -.053 2

14 1083B 1919 2015 97 4 1 .525 1.47 4.68 1.056 .840 .408 2.58 .504 .001 1

15 1084A 1921 2015 95 4 2 .601 1.67 4.28 .833 .823 .309 2.44 .317 -.043 1

16 1084B 1921 2015 95 4 0 .626 1.20 2.69 .577 .765 .292 2.58 .489 -.029 1

17 1085A 1938 2015 78 3 2 .380 1.93 5.54 .975 .815 .217 2.76 .456 -.062 1

18 1085B 1917 2015 99 4 2 .325 1.36 3.49 .574 .576 .264 2.65 .391 -.030 1

19 1086A 1900 2015 116 4 2 .579 1.15 2.99 .723 .793 .408 2.67 .427 -.045 1

20 1086B 1900 2015 116 4 0 .627 1.64 5.65 1.203 .883 .312 2.68 .355 -.048 1

21 1087A 1926 2015 90 3 1 .595 1.57 3.42 .741 .823 .266 2.36 .372 -.011 1

22 1087B 1929 2015 87 3 2 .302 .99 3.47 .678 .876 .261 2.52 .416 .053 1

23 1088A 1930 2015 86 3 0 .607 2.66 4.97 .907 .642 .256 2.75 .568 .029 1

24 1088B 1925 2015 91 3 1 .469 2.18 6.10 1.175 .795 .286 2.49 .365 -.084 1

25 1089A 1920 2015 96 4 1 .633 1.68 4.63 1.207 .837 .296 2.54 .368 .022 1

26 1089B 1924 2015 92 4 0 .698 2.32 5.29 .838 .602 .243 2.57 .372 .030 1

27 1601A 1929 2015 87 3 0 .643 1.49 3.18 .779 .801 .361 2.53 .461 .036 1

28 1601B 1929 2015 87 3 0 .788 1.29 2.46 .624 .647 .360 2.37 .281 -.070 1

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Total or mean: 2848 106 22 .559 1.54 6.10 .915 .813 .309 2.83 .389 -.028

- = [ COFECHA BEAL COF ] = -