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[] P R O G R A M C O F E C H A Version 6.06P 30194

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENT

Title of run: VMC919\_BEAL\_Corr2

File of DATED series: VMC919\_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: escriptive 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 1871 to 2015 145 years

Continuous time span is 1871 to 2015 145 years

Portion with two or more series is 1876 to 2015 140 years

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

\*C\* Number of dated series 30 \*C\*

\*O\* Master series 1871 2015 145 yrs \*O\*

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

\*E\* Total dated rings checked 2843 \*E\*

\*C\* Series intercorrelation .417 \*C\*

\*H\* Average mean sensitivity .284 \*H\*

\*A\* Segments, possible problems 23 \*A\*

\*\*\* Mean length of series 94.9 \*\*\*

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

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

1224A 1 absent rings: 1936

1 absent rings .035%

PART 2: TIME PLOT OF TREE-RING SERIES: VMC919\_BEAL\_Corr2 12:27 Wed 30 Aug 2017 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

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

. . . . . . . . . . . . . . . . . .<=========> . 1223A 1 1916 2015 100

. . . . . . . . . . . . . . . . . .<=========> . 1223B 2 1916 2015 100

. . . . . . . . . . . . . . . . . <============> . 1224A 3 1884 2015 132

. . . . . . . . . . . . . . . . . <============> . 1224B 4 1881 2015 135

. . . . . . . . . . . . . . . . . <=============> . 1225A 5 1876 2015 140

. . . . . . . . . . . . . . . . . <=============> . 1225B 6 1871 2015 145

. . . . . . . . . . . . . . . . . . .<====> . 1270A 7 1961 2015 55

. . . . . . . . . . . . . . . . . . .<====> . 1270B 8 1966 2015 50

. . . . . . . . . . . . . . . . . .<=========> . 1275A 9 1913 2015 103

. . . . . . . . . . . . . . . . . <============> . 1275B 10 1880 2015 136

. . . . . . . . . . . . . . . . . <============> . 1284A 11 1884 2015 132

. . . . . . . . . . . . . . . . . <============> . 1284B 12 1884 2015 132

. . . . . . . . . . . . . . . . . <===========> . 1359A 13 1896 2015 120

. . . . . . . . . . . . . . . . . <===========> . 1359B 14 1896 2015 120

. . . . . . . . . . . . . . . . . . <=====> . 1360A 15 1959 2015 57

. . . . . . . . . . . . . . . . . . . <===> . 1360B 16 1978 2015 38

. . . . . . . . . . . . . . . . . . <========> . 1365A 17 1920 2015 96

. . . . . . . . . . . . . . . . . .<=========> . 1365B 18 1912 2015 104

. . . . . . . . . . . . . . . . . . .<====> . 1386A 19 1969 2015 47

. . . . . . . . . . . . . . . . . . .<====> . 1386B 20 1961 2015 55

. . . . . . . . . . . . . . . . . .<=========> . 1389A 21 1916 2015 100

. . . . . . . . . . . . . . . . . . <======> . 1389B 22 1947 2015 69

. . . . . . . . . . . . . . . . . <==========> . 1394A 23 1901 2015 115

. . . . . . . . . . . . . . . . . <==========> . 1394B 24 1901 2015 115

. . . . . . . . . . . . . . . . . . <========> . 1398A 25 1920 2015 96

. . . . . . . . . . . . . . . . . . <========> . 1398B 26 1920 2015 96

. . . . . . . . . . . . . . . . . . <=======> . 1399A 27 1936 2015 80

. . . . . . . . . . . . . . . . . .<=========> . 1399B 28 1916 2015 100

. . . . . . . . . . . . . . . . . . . <===> . 1400A 29 1976 2015 40

. . . . . . . . . . . . . . . . . . . <===> . 1400B 30 1976 2015 40

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

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

1900 -1.063 9 1950 -.959 22 2000 -.885 30

1901 .713 11 1951 .874 22 2001 -1.478 30

1902 -.121 11 1952 .780 22 2002 -.752 30

1903 -.281 11 1953 -1.098 22 2003 -.179 30

1904 1.017 11 1954 .029 22 2004 .811 30

1905 .104 11 1955 .843 22 2005 .290 30

1906 -.320 11 1956 .294 22 2006 -.116 30

1907 -1.853 11 1957 -.067 22 2007 .261 30

1908 .207 11 1958 .735 22 2008 .175 30

1909 .752 11 1959 .249 23 2009 1.349 30

1910 .050 11 1960 1.150 23 2010 .247 30

1911 .809 11 1961 .697 25 2011 .214 30

1912 .435 12 1962 -1.452 25 2012 .491 30

1913 -1.120 13 1963 .060 25 2013 -1.418 30

1914 .690 13 1964 .692 25 2014 .592 30

1915 .641 13 1965 -.485 25 2015 -.314 30

1916 1.201 17 1966 -1.040 26

1917 .220 17 1967 .283 26

1918 1.182 17 1968 .299 26

1919 -.836 17 1969 .647 27

1920 1.244 20 1970 .270 27

1871 .341 1 1921 1.089 20 1971 .793 27

1872 .194 1 1922 .010 20 1972 .766 27

1873 .132 1 1923 -1.101 20 1973 .274 27

1874 -1.724 1 1924 -.333 20 1974 -.669 27

1875 -3.177 1 1925 -.343 20 1975 -.434 27

1876 -.738 2 1926 -.143 20 1976 -1.048 29

1877 2.516 2 1927 .396 20 1977 -1.716 29

1878 1.971 2 1928 -.887 20 1978 .549 30

1879 -.991 2 1929 -.351 20 1979 .222 30

1880 -.664 3 1930 .134 20 1980 1.285 30

1881 2.331 4 1931 .339 20 1981 .071 30

1882 -.732 4 1932 -.027 20 1982 1.177 30

1883 1.270 4 1933 .274 20 1983 -.450 30

1884 -1.535 7 1934 -1.422 20 1984 .749 30

1885 .751 7 1935 -1.406 20 1985 .237 30

1886 .867 7 1936 -2.500 21 1 1986 .240 30

1887 1.293 7 1937 -1.641 21 1987 .180 30

1888 .003 7 1938 .821 21 1988 -1.478 30

1889 .958 7 1939 1.441 21 1989 -.698 30

1890 -1.396 7 1940 1.542 21 1990 .211 30

1891 -1.046 7 1941 .897 21 1991 -.685 30

1892 .135 7 1942 1.827 21 1992 -.970 30

1893 .403 7 1943 1.106 21 1993 -.672 30

1894 .440 7 1944 .933 21 1994 1.923 30

1895 -.882 7 1945 -.460 21 1995 -.446 30

1896 .167 9 1946 -.903 21 1996 1.036 30

1897 -1.695 9 1947 -.328 22 1997 -.158 30

1898 .648 9 1948 -2.419 22 1998 1.198 30

1899 -1.306 9 1949 -2.152 22 1999 -.180 30

PART 5: CORRELATION OF SERIES BY SEGMENTS: VMC919\_BEAL\_Corr2 12:27 Wed 30 Aug 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 1223A 1916 2015 .49 .47 .47 .31A

2 1223B 1916 2015 .53 .53 .46 .35

3 1224A 1884 2015 .49 .47 .32A .37 .47

4 1224B 1881 2015 .30B .16B .35 .38 .46

5 1225A 1876 2015 .50 .42 .48 .11B .06B

6 1225B 1871 2015 .34 .50 .51 .35 .43

7 1270A 1961 2015 .41 .46

8 1270B 1966 2015 .60

9 1275A 1913 2015 .64 .66 .54 .56

10 1275B 1880 2015 .34B .44 .69 .60 .30A

11 1284A 1884 2015 .46 .49 .36 .27A .34

12 1284B 1884 2015 .41 .20B .21B .23A .33

13 1359A 1896 2015 .39 .36 .51 .52 .51

14 1359B 1896 2015 .36 .39 .43 .43 .48

15 1360A 1959 2015 .33A .31A

16 1360B 1978 2015 .34

17 1365A 1920 2015 .38B .39B .38 .47

18 1365B 1912 2015 .43 .50 .43 .29A

19 1386A 1969 2015 .35

20 1386B 1961 2015 .33 .33

21 1389A 1916 2015 .66 .62 .61 .53

22 1389B 1947 2015 .53 .46 .20A

23 1394A 1901 2015 .49 .51 .51 .44

24 1394B 1901 2015 .45 .36 .42 .31A

25 1398A 1920 2015 .66 .58 .58 .59

26 1398B 1920 2015 .53 .50 .52 .54

27 1399A 1936 2015 .41 .26B .13B

28 1399B 1916 2015 .49 .39 .22B .08B

29 1400A 1976 2015 .39

30 1400B 1976 2015 .55

Av segment correlation .40 .46 .47 .41 .38

PART 6: POTENTIAL PROBLEMS: VMC919\_BEAL\_Corr2 12:27 Wed 30 Aug 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

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

1223A 1916 to 2015 100 years Series 1

[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 0 .07 .07 -.16 .17 -.20 -.12 -.03 .09 -.07 -.18 .31\* - - - - - - - - - -

[B] Entire series, effect on correlation ( .399) is:

Lower 2011< -.030 1990< -.025 1969< -.024 1922< -.016 1941< -.015 1934> -.013 Higher 1948 .022 1942 .017

1966 to 2015 segment:

Lower 2011< -.051 1990< -.044 1969< -.044 2001> -.024 2013> -.024 1988> -.021 Higher 1994 .039 1995 .037

1223A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1916 76 74 147 77

1920 104 111 49 79 84 106 65 91 96 129

1930 84 139 92 85 83 86 44 40 102 110

1940 117 37 168 54 87 54 43 77 41 45

1950 92 217 198 151 161 295 226 237 310 222

1960 288 235 218 304 432 342 253 320 298 155

1970 244 216 223 132 128 140 83 99 251 188

1980 145 195 202 148 162 129 127 132 122 103

1990 60 59 85 110 226 97 253 177 192 195

2000 178 213 185 426 250 189 110 115 124 153

2010 82 54 168 128 149 121

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

1223B 1916 to 2015 100 years Series 2

[B] Entire series, effect on correlation ( .432) is:

Lower 1988> -.019 1943< -.018 2000> -.015 1922> -.014 1916< -.013 1994< -.013 Higher 1936 .021 1942 .017

1223B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1916 91 91 152 98

1920 72 116 120 64 73 65 53 42 26 34

1930 45 47 39 28 30 22 15 24 91 110

1940 72 66 150 61 73 64 70 51 51 41

1950 96 206 267 163 134 103 121 146 174 187

1960 253 192 132 162 276 230 96 96 192 159

1970 144 154 199 105 100 95 65 81 210 193

1980 130 159 184 96 157 182 155 162 139 97

1990 78 70 49 74 113 87 256 176 214 187

2000 216 149 104 222 153 149 90 132 122 136

2010 76 66 263 191 147 122

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

1224A 1884 to 2015 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

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

1925 1974 0 -.09 .24 .03 -.18 -.14 -.09 .11 -.12 -.04 .10 .32\* .22 .21 .18 .03 .05 -.42 -.22 -.17 -.16 -.29

[B] Entire series, effect on correlation ( .474) is:

Lower 1901< -.018 1961< -.017 1962> -.013 1949> -.013 2013> -.010 1915< -.009 Higher 1936 .023 1994 .017

1925 to 1974 segment:

Lower 1961< -.051 1949> -.037 1962> -.035 1951< -.023 1953> -.022 1971< -.020 Higher 1936 .086 1942 .037

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

1936 -2.500 21 1

1224A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1884 118 224 251 296 207 210

1890 96 72 73 102 139 116 114 82 99 23

1900 41 29 47 78 85 97 105 57 110 121

1910 153 204 112 65 79 53 97 82 74 41

1920 50 53 55 46 47 48 58 51 44 36

1930 40 39 24 46 32 29 0 18 61 95

1940 117 122 193 182 179 103 77 111 93 144

1950 116 115 110 141 143 166 186 161 194 216

1960 270 173 196 174 266 255 216 255 261 242

1970 228 150 155 94 56 40 62 61 111 110

1980 127 131 146 108 94 99 119 103 99 121

1990 123 104 117 78 157 115 147 92 137 84

2000 67 74 55 54 85 103 150 114 88 149

2010 105 136 155 143 146 129

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

1224B 1881 to 2015 135 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 1930 6 -.01 .06 -.02 -.02 .12 -.04 .00 -.13 .32 -.13 .30|-.22 .04 -.27 .06 -.05 .46\*-.25 -.09 .02 .00

1900 1949 -2 -.11 -.17 -.21 -.15 .12 .05 .08 .01 .34\* .16 .16| .07 -.13 -.32 -.01 .00 .26 -.15 -.13 .07 .05

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

Lower 1901< -.145 1984< -.018 1962> -.011 1895> -.011 1934> -.009 1917> -.008 Higher 1884 .020 1897 .016

1881 to 1930 segment:

Lower 1901< -.307 1895> -.024 1899> -.018 1917> -.016 1919> -.012 1888> -.012 Higher 1884 .045 1897 .035

1900 to 1949 segment:

Lower 1901< -.361 1934> -.019 1945> -.016 1917> -.015 1919> -.010 1924< -.009 Higher 1913 .042 1942 .041

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

1900 1901 -6.8 SD 1901 1902 4.6 SD

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

1901 -7.6 SD

1224B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1881 215 114 174 93 161 159 184 181 188

1890 125 93 131 147 168 165 141 78 126 106

1900 91 29 60 83 100 90 93 63 64 81

1910 95 123 76 37 71 67 81 118 96 79

1920 96 92 53 25 23 43 61 82 52 95

1930 76 90 111 134 131 110 109 108 145 155

1940 146 133 248 231 276 259 199 162 107 91

1950 79 140 129 148 152 311 242 322 345 363

1960 318 206 262 201 267 244 257 277 303 255

1970 290 278 203 204 156 158 126 79 145 182

1980 195 227 199 103 47 108 91 64 65 36

1990 64 56 39 43 74 54 104 58 109 58

2000 56 58 61 70 56 53 59 58 48 80

2010 48 56 61 44 94 111

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1225A 1876 to 2015 140 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

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1950 1999 9 -.23 .16 .15 -.04 -.23 .15 .15 .18 -.11 -.01 .11|-.22 -.21 -.15 .04 .11 -.02 .04 -.04 .43\*-.06

1966 2015 -5 -.18 .12 -.06 .07 -.27 .32\* .11 .15 .15 -.03 .06| - - - - - - - - - -

[B] Entire series, effect on correlation ( .341) is:

Lower 1996< -.058 1979< -.029 1940< -.014 1923> -.011 1980< -.009 1897> -.009 Higher 1884 .019 1881 .017

1950 to 1999 segment:

Lower 1996< -.124 1979< -.034 1999> -.020 1980< -.020 1988> -.018 1990< -.014 Higher 1998 .028 1965 .027

1966 to 2015 segment:

Lower 1996< -.131 1979< -.035 1980< -.023 1990< -.016 1999> -.016 1984< -.013 Higher 2013 .038 1998 .030

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

1995 1996 -4.2 SD

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

1996 -5.2 SD

1225A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1876 307 425 378 291

1880 331 448 287 298 183 220 189 240 242 293

1890 166 166 155 192 252 157 179 155 162 103

1900 94 128 87 176 176 157 72 55 83 132

1910 121 236 225 187 239 234 206 204 225 136

1920 241 228 188 229 197 257 158 105 79 74

1930 80 83 100 131 61 56 23 28 43 56

1940 27 50 69 98 118 52 46 36 45 32

1950 50 100 109 66 77 106 77 67 124 117

1960 145 114 109 178 228 108 121 219 233 239

1970 238 303 405 421 313 328 228 117 218 41

1980 78 126 167 124 88 99 77 104 87 115

1990 53 61 49 28 42 44 14 31 68 73

2000 56 47 44 78 57 59 73 71 64 83

2010 73 77 88 72 97 72

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

1225B 1871 to 2015 145 years Series 6

[\*] Early part of series cannot be checked from 1871 to 1875 -- not matched by another series

[B] Entire series, effect on correlation ( .416) is:

Lower 1894< -.051 1895< -.032 1984< -.020 1910< -.016 1937> -.014 1988> -.009 Higher 1936 .018 1884 .014

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

1895 -7.1 SD

1225B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1871 226 221 218 182 157 209 309 291 174

1880 202 283 202 215 136 199 158 164 169 183

1890 142 158 187 179 79 35 111 164 307 202

1900 217 280 242 272 294 229 250 231 352 272

1910 177 269 283 234 328 273 329 272 286 270

1920 346 287 223 231 204 209 200 188 155 191

1930 242 279 272 236 202 202 58 341 449 418

1940 319 282 252 248 293 217 177 231 164 177

1950 134 195 252 155 257 361 186 97 133 138

1960 190 172 151 203 285 173 264 327 355 335

1970 273 309 361 332 299 276 269 172 370 313

1980 368 209 160 133 49 97 51 77 120 133

1990 71 73 54 69 221 119 65 153 143 100

2000 69 78 115 213 265 191 151 125 145 256

2010 216 147 170 130 185 166

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1270A 1961 to 2015 55 years Series 7

[B] Entire series, effect on correlation ( .439) is:

Lower 1989< -.029 1983> -.025 1975> -.022 1976> -.021 1974> -.017 2003< -.012 Higher 1988 .076 1995 .041

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

1989 -4.5 SD

1270A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1961 372 25 94 90 146 132 273 244 287

1970 281 345 356 442 464 630 513 474 486 439

1980 588 432 489 475 448 388 431 343 245 230

1990 323 300 312 276 327 211 272 203 238 242

2000 232 236 266 198 235 230 191 245 288 344

2010 229 231 242 183 318 259

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1270B 1966 to 2015 50 years Series 8

[B] Entire series, effect on correlation ( .597) is:

Lower 1976> -.054 1966< -.044 1983> -.033 1977> -.023 1978< -.011 1998< -.011 Higher 2013 .049 1988 .047

1270B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1966 138 272 274 375

1970 338 363 297 327 288 353 437 360 344 340

1980 441 328 385 390 421 400 361 303 211 246

1990 260 234 266 255 302 205 321 219 242 260

2000 203 179 235 222 371 265 200 281 272 365

2010 239 265 250 176 274 240

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

1275A 1913 to 2015 103 years Series 9

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

Lower 1913> -.035 1964< -.027 1982< -.024 1977> -.019 1968< -.018 1919> -.017 Higher 2013 .021 1988 .021

1275A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1913 57 57 43 52 31 31 46

1920 98 82 43 31 44 76 63 70 55 64

1930 88 107 103 131 55 71 65 99 223 248

1940 316 338 428 411 279 257 212 234 119 113

1950 213 306 250 137 339 320 333 327 446 351

1960 451 382 299 385 315 368 353 454 356 498

1970 511 617 613 549 455 509 521 548 556 443

1980 476 370 323 307 406 489 439 399 278 321

1990 427 368 314 484 517 306 445 373 370 356

2000 382 258 208 261 362 301 286 406 371 392

2010 415 327 272 112 206 185

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

1275B 1880 to 2015 136 years Series 10

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

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1880 1929 2 - -.08 .11 .01 .00 .21 -.10 -.08 -.12 -.14 .34|-.27 .38\*-.18 .10 -.07 .26 -.18 .22 .00 -.04

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

1966 2015 0 -.03 .00 -.15 .12 -.12 .04 -.12 .09 -.05 -.03 .30\* - - - - - - - - - -

[B] Entire series, effect on correlation ( .414) is:

Lower 2006< -.054 2009< -.023 1880< -.020 1984< -.014 1913> -.012 1899> -.012 Higher 1994 .016 2013 .015

1880 to 1929 segment:

Lower 1880< -.059 1913> -.028 1918< -.027 1904< -.025 1899> -.024 1888> -.023 Higher 1881 .039 1882 .033

1966 to 2015 segment:

Lower 2006< -.113 2009< -.062 1984< -.036 1998< -.024 2001> -.020 1983> -.014 Higher 1994 .057 2013 .053

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

2005 2006 -4.4 SD

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

2006 -6.1 SD

1275B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1880 92 159 107 175 127 151 155 147 150 127

1890 89 71 94 90 94 72 77 55 57 71

1900 77 143 118 131 69 47 68 31 33 45

1910 28 25 48 53 82 84 98 40 24 24

1920 31 26 18 20 47 35 41 37 37 51

1930 75 85 81 99 63 74 36 79 199 181

1940 261 286 360 400 167 140 107 211 117 126

1950 188 263 211 95 224 314 197 205 206 198

1960 244 280 179 253 238 171 162 212 233 202

1970 194 266 407 316 196 171 183 150 241 176

1980 279 274 236 217 142 157 164 154 132 129

1990 162 137 128 145 243 167 224 197 144 132

2000 146 167 116 155 232 156 34 114 151 83

2010 159 217 187 87 142 119

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1284A 1884 to 2015 132 years Series 11

[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 -.19 .00 .15 -.03 -.03 .21 -.13 .12 -.24 .27\*-.08 .17 -.17 -.15 -.06 -.07 .27 -.12 -.05 .02

[B] Entire series, effect on correlation ( .387) is:

Lower 1981< -.042 1936> -.029 1884> -.020 1888< -.018 1988> -.014 1895> -.012 Higher 1897 .020 1907 .020

1950 to 1999 segment:

Lower 1981< -.099 1988> -.038 1966> -.018 1997> -.017 1953> -.013 1990< -.009 Higher 1976 .028 1998 .024

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

1981 -4.7 SD

1284A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1884 148 160 191 170 76 121

1890 103 165 178 181 202 233 184 105 209 161

1900 167 289 227 211 274 237 274 175 279 244

1910 327 294 269 255 267 324 323 293 293 272

1920 326 340 233 207 250 244 238 237 208 224

1930 268 239 263 223 113 123 295 269 304 277

1940 317 243 221 97 43 28 68 114 59 62

1950 91 114 108 122 111 121 122 175 304 285

1960 235 148 96 109 122 104 144 164 123 132

1970 85 110 93 70 83 92 54 57 98 117

1980 115 37 83 83 117 121 109 111 112 115

1990 86 100 90 66 91 89 127 139 158 95

2000 91 30 74 68 85 70 59 87 86 105

2010 49 90 64 14 21 30

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

1284B 1884 to 2015 132 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

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

1900 1949 2 .20 -.09 -.03 -.09 -.12 -.22 -.14 -.16 .10 -.06 .20| .28 .32\* .14 -.22 -.02 -.04 -.08 -.18 -.11 .14

1925 1974 1 .09 -.01 -.09 -.12 .05 -.20 -.11 -.18 .00 -.05 .21| .28\* .27 .21 -.18 -.06 -.14 -.14 -.12 .02 .00

1950 1999 0 -.08 .06 -.06 -.09 .07 .17 .21 -.20 -.02 .06 .23\*-.23 .05 .09 .03 -.35 -.09 -.12 .10 -.02 .05

[B] Entire series, effect on correlation ( .318) is:

Lower 1947< -.026 1936> -.020 1988> -.020 1938< -.018 1995> -.014 1913> -.014 Higher 2013 .027 1948 .022

1900 to 1949 segment:

Lower 1947< -.047 1936> -.042 1938< -.038 1913> -.029 1949> -.026 1937> -.021 Higher 1934 .070 1948 .061

1925 to 1974 segment:

Lower 1947< -.053 1936> -.048 1938< -.044 1949> -.030 1954< -.026 1937> -.024 Higher 1934 .086 1948 .073

1950 to 1999 segment:

Lower 1988> -.070 1983> -.050 1995> -.048 1954< -.045 1965> -.026 1980< -.018 Higher 1994 .068 1962 .049

1284B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1884 135 167 204 173 115 135

1890 117 165 201 147 137 150 178 118 146 119

1900 112 263 257 200 179 170 199 161 246 225

1910 278 281 233 257 234 270 360 310 324 293

1920 300 238 187 212 223 217 230 238 265 257

1930 320 283 264 261 131 186 247 282 167 197

1940 239 185 190 121 71 85 104 44 26 101

1950 104 138 109 68 40 87 130 132 119 86

1960 108 110 82 154 228 236 194 178 146 129

1970 230 256 184 66 89 79 64 27 53 59

1980 79 58 113 222 295 206 138 153 192 136

1990 113 149 149 113 192 199 145 96 117 104

2000 98 55 120 158 124 117 232 192 171 205

2010 183 168 147 29 98 60

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

1359A 1896 to 2015 120 years Series 13

[B] Entire series, effect on correlation ( .427) is:

Lower 1920< -.022 1907> -.021 1996< -.018 1913> -.015 1921< -.014 1934> -.014 Higher 1995 .017 1936 .016

1359A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1896 50 46 61 36

1900 48 95 49 43 123 94 55 84 98 165

1910 80 71 68 77 67 84 68 57 70 20

1920 24 21 50 41 36 53 61 90 17 23

1930 42 42 60 117 85 47 5 14 40 83

1940 100 151 180 92 123 82 68 68 61 55

1950 91 78 119 85 94 205 288 279 296 327

1960 417 356 260 234 196 122 137 286 319 372

1970 377 419 408 424 310 343 389 261 413 326

1980 472 345 330 196 217 222 262 253 181 260

1990 277 141 176 237 298 87 93 179 338 262

2000 167 187 200 220 290 200 181 293 246 212

2010 297 241 344 272 329 194

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

1359B 1896 to 2015 120 years Series 14

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

Lower 1954< -.033 1899> -.030 1923> -.019 1907> -.018 1986< -.013 2011< -.013 Higher 1936 .024 1995 .021

1359B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1896 57 47 70 79

1900 71 103 50 33 94 58 44 57 82 79

1910 35 30 42 38 42 54 34 31 60 16

1920 57 165 163 154 65 71 57 60 12 25

1930 22 32 32 53 48 39 18 33 68 121

1940 83 79 91 81 130 66 70 81 66 89

1950 131 203 112 85 40 74 167 184 262 214

1960 254 199 159 120 166 132 110 196 227 333

1970 255 192 230 192 261 213 245 142 268 246

1980 324 335 342 271 299 123 45 86 74 115

1990 166 160 188 166 418 130 341 246 311 126

2000 140 189 170 150 250 127 99 117 190 177

2010 160 101 134 115 190 140

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

1360A 1959 to 2015 57 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

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1959 2008 0 .22 .02 -.11 -.23 .22 -.23 .12 -.26 .10 -.10 .33\* .02 -.11 .09 .06 -.02 -.19 -.06 - - -

1966 2015 0 .19 -.09 -.10 -.17 .16 -.27 .09 -.28 .14 -.16 .31\* - - - - - - - - - -

[B] Entire series, effect on correlation ( .334) is:

Lower 1972< -.158 1980< -.060 2006> -.013 1965> -.013 2012< -.013 1995> -.009 Higher 1994 .041 2013 .031

1959 to 2008 segment:

Lower 1972< -.178 1980< -.070 2006> -.014 1965> -.014 1968< -.010 1993> -.009 Higher 1994 .045 2001 .030

1966 to 2015 segment:

Lower 1972< -.171 1980< -.065 2006> -.015 2012< -.013 1995> -.011 1993> -.010 Higher 1994 .050 2013 .035

1360A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1959 82

1960 251 194 106 92 111 112 68 67 52 81

1970 70 105 41 69 73 79 56 71 131 144

1980 98 163 210 186 407 284 357 248 188 222

1990 292 237 217 303 434 325 321 221 316 274

2000 213 129 269 332 442 431 469 349 369 290

2010 272 306 208 149 185 157

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1360B 1978 to 2015 38 years Series 16

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

Lower 1981< -.156 1995> -.040 2014< -.024 1978< -.017 1993> -.016 1983> -.015 Higher 2013 .036 1982 .028

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

1981 -4.5 SD

1360B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1978 316 329

1980 353 248 424 418 498 452 485 488 403 392

1990 525 416 387 527 533 532 617 484 534 396

2000 277 323 363 561 609 584 593 483 489 536

2010 449 510 357 218 205 221

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

1365A 1920 to 2015 96 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

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

1920 1969 2 .03 .09 -.17 -.21 -.04 -.33 -.11 -.18 -.12 .03 .38| .23 .41\* .28 -.04 -.03 -.21 -.17 -.30 -.14 -.14

1925 1974 2 -.06 .07 -.19 -.17 -.06 -.30 -.21 -.25 -.07 .18 .39| .21 .45\* .32 -.06 -.05 -.33 -.21 -.27 -.09 -.06

[B] Entire series, effect on correlation ( .411) is:

Lower 1998< -.040 1928> -.027 1937> -.026 1995> -.025 1983> -.014 1962> -.011 Higher 2013 .035 1988 .035

1920 to 1969 segment:

Lower 1937> -.056 1928> -.055 1924> -.020 1962> -.018 1963< -.018 1954< -.016 Higher 1948 .034 1934 .032

1925 to 1974 segment:

Lower 1937> -.059 1928> -.058 1963< -.019 1962> -.019 1954< -.018 1943< -.018 Higher 1948 .036 1934 .035

1365A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1920 136 120 89 77 178 134 90 160 206 173

1930 139 141 93 111 62 35 54 185 194 179

1940 189 167 174 106 118 94 52 52 42 45

1950 96 148 211 189 155 235 323 349 365 288

1960 378 293 292 243 268 235 226 310 346 482

1970 548 447 446 409 248 272 159 135 238 413

1980 570 369 362 385 362 258 233 287 187 262

1990 323 272 234 231 260 258 215 168 105 73

2000 57 72 114 107 122 149 204 202 137 190

2010 148 118 180 111 104 108

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

1365B 1912 to 2015 104 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

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1966 2015 0 .11 -.09 -.05 -.21 .07 -.06 -.03 -.23 .17 .06 .29\* - - - - - - - - - -

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

Lower 2007< -.024 1967< -.020 2004< -.019 2000> -.018 1995> -.017 1989< -.016 Higher 1942 .020 1994 .016

1966 to 2015 segment:

Lower 2007< -.048 1967< -.043 2004< -.041 2000> -.040 1995> -.038 1989< -.030 Higher 1994 .043 1988 .036

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

1988 1989 -4.3 SD

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

1989 -5.1 SD

1365B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1912 187 71 165 121 160 168 160 138

1920 122 96 79 65 166 147 86 104 117 99

1930 80 75 59 44 28 28 10 30 82 123

1940 217 226 365 205 151 94 58 107 50 54

1950 130 178 136 78 102 109 128 110 112 185

1960 252 298 278 350 406 268 219 121 212 336

1970 506 434 507 428 225 199 142 221 363 436

1980 587 380 388 229 332 258 190 255 141 21

1990 110 102 178 164 257 236 262 162 182 165

2000 240 149 114 86 53 70 161 61 124 168

2010 97 118 142 118 208 266

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1386A 1969 to 2015 47 years Series 19

[B] Entire series, effect on correlation ( .354) is:

Lower 1995> -.040 1988> -.025 2015> -.024 2000< -.024 1977> -.018 1994< -.014 Higher 2013 .043 1998 .027

1386A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1969 165

1970 159 192 176 173 168 253 157 252 309 304

1980 358 282 325 328 438 368 381 357 361 345

1990 389 376 289 352 382 419 409 382 579 439

2000 137 229 395 411 339 370 318 292 200 238

2010 203 247 198 108 158 237

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1386B 1961 to 2015 55 years Series 20

[B] Entire series, effect on correlation ( .355) is:

Lower 2000< -.047 1988> -.033 1995> -.031 2012< -.028 1983> -.019 1964< -.014 Higher 2013 .051 1962 .028

1386B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1961 129 70 125 99 92 123 200 138 185

1970 199 199 191 200 180 264 182 249 423 413

1980 487 352 414 416 468 347 320 280 345 338

1990 383 367 293 376 369 387 345 318 459 411

2000 144 165 267 389 401 367 487 500 416 430

2010 335 351 209 138 280 281

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1389A 1916 to 2015 100 years Series 21

[B] Entire series, effect on correlation ( .589) is:

Lower 1936> -.016 1992> -.015 1983< -.015 1948> -.013 2010> -.012 1965> -.011 Higher 1962 .017 1995 .016

1389A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1916 114 68 62 19

1920 115 123 72 55 47 51 43 74 51 64

1930 49 59 38 51 28 39 66 51 83 114

1940 232 253 288 214 258 139 154 149 140 95

1950 116 303 358 228 328 347 279 320 383 396

1960 414 412 220 309 291 378 303 404 428 491

1970 284 318 324 347 203 172 193 125 159 151

1980 186 200 189 96 178 188 219 152 127 183

1990 211 129 208 165 276 99 247 173 143 104

2000 95 60 71 43 184 168 118 201 157 239

2010 287 251 153 123 153 140

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1389B 1947 to 2015 69 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

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1966 2015 0 -.07 -.15 .06 -.13 .16 -.07 .12 -.04 .12 -.01 .20\* - - - - - - - - - -

[B] Entire series, effect on correlation ( .305) is:

Lower 2003< -.070 2006< -.024 1967< -.024 2013> -.024 2008< -.021 1988> -.017 Higher 1994 .039 1948 .034

1966 to 2015 segment:

Lower 2003< -.076 2013> -.032 1967< -.030 2015> -.022 1988> -.022 2008< -.022 Higher 1994 .067 1980 .037

1389B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1947 285 133 171

1950 165 276 369 288 428 480 277 259 221 318

1960 373 450 364 502 431 422 400 266 324 301

1970 351 399 407 390 316 258 260 285 307 309

1980 459 316 373 216 413 240 313 227 234 228

1990 260 193 159 147 310 176 335 210 194 133

2000 116 99 136 54 164 126 101 145 75 206

2010 173 203 260 204 219 234

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1394A 1901 to 2015 115 years Series 23

[B] Entire series, effect on correlation ( .461) is:

Lower 2013> -.020 1908< -.018 1941< -.014 1922> -.013 1981> -.013 2000> -.011 Higher 1948 .047 1994 .020

1394A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1901 148 104 66 96 92 80 74 62 76

1910 92 104 100 63 92 102 153 156 169 129

1920 164 159 179 90 57 54 89 87 84 93

1930 93 89 105 76 62 37 40 14 93 113

1940 116 69 103 142 119 111 155 283 83 92

1950 216 318 320 244 411 516 361 476 432 307

1960 279 289 276 286 327 340 287 343 396 415

1970 424 419 376 409 301 292 341 307 416 328

1980 323 412 329 236 249 221 258 312 250 274

1990 359 255 201 234 440 286 308 345 413 320

2000 359 276 196 194 279 268 256 224 248 271

2010 327 325 391 384 446 265

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1394B 1901 to 2015 115 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

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

1966 2015 0 .03 .10 -.26 .04 -.01 -.07 .20 -.13 .22 -.12 .31\* - - - - - - - - - -

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

Lower 1925< -.045 1978< -.030 2000> -.017 1922> -.016 1928> -.013 1936> -.013 Higher 1962 .019 1913 .017

1966 to 2015 segment:

Lower 1978< -.078 2000> -.043 1998< -.023 1976> -.021 2013> -.020 1975< -.017 Higher 1995 .049 1996 .030

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

1925 -4.5 SD

1394B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1901 146 98 71 76 80 76 71 104 136

1910 109 97 101 74 119 116 115 95 140 100

1920 124 118 140 93 99 66 106 109 113 97

1930 98 84 101 99 92 75 94 52 128 195

1940 207 124 118 113 137 98 91 99 89 49

1950 94 215 202 148 271 366 305 475 331 197

1960 193 252 144 260 311 294 229 213 300 254

1970 247 224 315 300 228 143 200 145 114 129

1980 195 174 181 113 150 124 152 147 94 104

1990 95 93 49 60 93 47 146 115 70 39

2000 112 83 69 90 102 72 49 50 70 63

2010 49 43 62 81 189 147

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1398A 1920 to 2015 96 years Series 25

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

Lower 1953> -.018 1955< -.018 1992> -.017 1973< -.015 1937> -.008 1971< -.008 Higher 1962 .019 1936 .016

1398A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1920 64 74 41 34 30 18 28 36 24 23

1930 47 49 56 47 41 53 9 89 180 237

1940 231 204 269 233 168 136 129 155 69 71

1950 120 242 214 185 272 137 119 84 125 106

1960 103 84 30 42 98 61 72 125 131 148

1970 91 79 153 81 101 100 109 72 133 131

1980 154 158 209 108 143 188 149 163 72 143

1990 158 118 171 117 211 133 121 71 122 50

2000 49 58 50 47 97 104 99 88 122 158

2010 115 76 52 22 29 17

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1398B 1920 to 2015 96 years Series 26

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

Lower 1968< -.026 1995> -.019 1955< -.018 1974> -.012 1966> -.011 1962< -.010 Higher 1936 .023 1994 .016

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

1962 -4.8 SD

1398B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1920 104 108 62 48 34 26 37 51 34 37

1930 62 63 72 76 61 111 21 114 219 254

1940 277 221 283 404 271 253 249 312 120 59

1950 76 134 152 127 221 126 106 129 166 145

1960 151 158 68 131 130 98 130 149 97 131

1970 128 178 153 157 153 128 108 83 110 113

1980 129 108 130 104 134 153 142 131 70 83

1990 87 85 121 86 203 171 211 105 155 92

2000 115 114 100 138 247 242 237 287 360 388

2010 382 287 348 334 478 339

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

1399A 1936 to 2015 80 years Series 27

[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 5 -.04 .19 .21 .28 -.11 -.12 .25 .02 -.16 -.26 .26|-.37 -.11 -.15 .22 .36\* .19 .00 .07 .10 -.06

1966 2015 -4 -.03 -.09 .16 .24 .02 -.23 .26\*-.03 .03 -.13 .13| - - - - - - - - - -

[B] Entire series, effect on correlation ( .311) is:

Lower 2013> -.035 1996< -.031 1969< -.029 1988> -.027 2014< -.024 1942< -.019 Higher 1948 .089 1995 .038

1950 to 1999 segment:

Lower 1996< -.051 1988> -.049 1969< -.048 1976> -.025 1962> -.023 1975> -.016 Higher 1995 .082 1994 .042

1966 to 2015 segment:

Lower 2013> -.057 1996< -.051 1969< -.047 1988> -.042 2014< -.039 1976> -.022 Higher 1995 .099 1994 .056

1399A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1936 154 241 341 289

1940 349 300 250 446 418 260 251 306 172 241

1950 253 297 340 264 297 246 239 179 196 213

1960 215 219 211 258 273 200 181 197 177 109

1970 84 104 134 152 192 285 259 194 206 177

1980 224 200 261 117 167 167 131 158 152 95

1990 91 69 53 75 116 45 31 46 60 67

2000 71 63 55 50 90 94 134 81 110 108

2010 100 106 66 103 51 42

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

1399B 1916 to 2015 100 years Series 28

[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 4 .01 .13 .22 .21 -.11 .06 .23 -.11 -.12 -.36 .22|-.39 -.10 .02 .27\* .18 .15 .09 -.02 .12 -.24

1966 2015 -8 .11 .10 .32\* .10 .00 -.17 .18 -.20 -.02 -.32 .08| - - - - - - - - - -

[B] Entire series, effect on correlation ( .314) is:

Lower 2013> -.020 1962> -.018 1970< -.016 1936> -.016 1991> -.013 2015> -.013 Higher 1948 .029 1953 .023

1950 to 1999 segment:

Lower 1962> -.036 1970< -.036 1991> -.029 1976> -.026 1972< -.023 1966> -.022 Higher 1953 .074 1995 .070

1966 to 2015 segment:

Lower 2013> -.033 1970< -.025 1991> -.025 2015> -.024 1976> -.022 1972< -.019 Higher 1995 .074 1994 .068

1399B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1916 105 85 121 121

1920 184 137 196 119 148 187 218 273 208 220

1930 270 291 241 276 189 260 284 161 279 359

1940 374 362 378 300 426 280 199 263 162 195

1950 276 341 320 134 330 330 317 179 213 188

1960 231 317 266 325 218 172 234 216 158 124

1970 71 104 93 142 167 218 201 142 119 179

1980 179 179 169 113 110 108 157 193 152 188

1990 215 217 156 104 205 84 123 108 130 80

2000 84 65 111 68 85 89 132 74 57 63

2010 27 45 38 46 41 50

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1400A 1976 to 2015 40 years Series 29

[B] Entire series, effect on correlation ( .389) is:

Lower 1976> -.054 1977> -.043 2004< -.042 2001> -.017 2010> -.017 1980< -.013 Higher 1988 .117 1995 .031

1400A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1976 223 200 185 172

1980 163 137 173 167 220 163 154 169 87 196

1990 233 166 208 234 326 194 319 198 422 377

2000 355 366 431 501 270 377 331 327 294 401

2010 560 648 487 315 429 357

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1400B 1976 to 2015 40 years Series 30

[B] Entire series, effect on correlation ( .548) is:

Lower 1983> -.039 2004< -.026 1999> -.025 1977> -.024 2001> -.020 2012< -.013 Higher 1988 .069 2009 .021

1400B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1976 173 294 355 354

1980 349 237 339 333 312 232 259 242 157 336

1990 352 225 165 184 401 277 370 169 367 349

2000 217 221 240 368 216 191 178 192 256 381

2010 294 261 87 90 178 194

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PART 7: DESCRIPTIVE STATISTICS: VMC919\_BEAL\_Corr2 12:27 Wed 30 Aug 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 1223A 1916 2015 100 4 1 .399 1.51 4.32 .838 .676 .339 2.92 .538 .058 1

2 1223B 1916 2015 100 4 0 .432 1.21 2.76 .630 .621 .321 2.93 .652 .098 2

3 1224A 1884 2015 132 5 1 .474 1.15 2.96 .621 .828 .284 2.67 .412 -.040 1

4 1224B 1881 2015 135 5 2 .345 1.29 3.63 .781 .867 .273 2.68 .354 -.014 1

5 1225A 1876 2015 140 5 2 .341 1.42 4.48 .948 .849 .295 2.62 .459 .002 1

6 1225B 1871 2015 145 5 0 .416 2.11 4.49 .834 .664 .283 2.58 .424 .034 2

7 1270A 1961 2015 55 2 0 .439 3.05 6.30 1.246 .777 .225 2.63 .442 .134 2

8 1270B 1966 2015 50 1 0 .597 2.92 4.41 .719 .526 .198 2.62 .507 -.006 1

9 1275A 1913 2015 103 4 0 .567 2.87 6.17 1.596 .890 .238 2.76 .539 -.019 1

10 1275B 1880 2015 136 5 2 .414 1.42 4.07 .820 .772 .296 2.61 .360 -.019 1

11 1284A 1884 2015 132 5 1 .387 1.58 3.40 .854 .852 .261 2.54 .374 -.041 1

12 1284B 1884 2015 132 5 3 .318 1.66 3.60 .732 .779 .276 2.72 .480 -.022 2

13 1359A 1896 2015 120 5 0 .427 1.71 4.72 1.205 .862 .330 2.77 .462 .046 1

14 1359B 1896 2015 120 5 0 .374 1.31 4.18 .884 .722 .365 2.82 .628 .007 1

15 1360A 1959 2015 57 2 2 .334 2.09 4.69 1.173 .803 .293 2.80 .451 -.047 1

16 1360B 1978 2015 38 1 0 .345 4.35 6.17 1.132 .680 .163 2.40 .414 -.051 1

17 1365A 1920 2015 96 4 2 .411 2.07 5.70 1.170 .857 .252 2.80 .558 .056 1

18 1365B 1912 2015 104 4 1 .364 1.79 5.87 1.166 .797 .369 2.58 .371 -.056 1

19 1386A 1969 2015 47 1 0 .354 2.97 5.79 1.020 .675 .213 2.53 .478 -.005 1

20 1386B 1961 2015 55 2 0 .355 2.96 5.00 1.184 .774 .224 2.45 .414 .041 1

21 1389A 1916 2015 100 4 0 .589 1.84 4.91 1.107 .812 .314 2.65 .486 -.102 1

22 1389B 1947 2015 69 3 1 .305 2.67 5.02 1.068 .671 .280 2.66 .473 -.005 4

23 1394A 1901 2015 115 4 0 .461 2.28 5.16 1.254 .866 .228 2.66 .417 .049 1

24 1394B 1901 2015 115 4 1 .402 1.37 4.75 .791 .796 .272 2.65 .422 -.040 1

25 1398A 1920 2015 96 4 0 .608 1.08 2.72 .619 .727 .346 2.62 .439 -.091 1

26 1398B 1920 2015 96 4 0 .558 1.55 4.78 .953 .829 .282 2.50 .356 -.092 1

27 1399A 1936 2015 80 3 2 .311 1.75 4.46 .945 .839 .237 2.64 .478 -.004 1

28 1399B 1916 2015 100 4 2 .314 1.82 4.26 .912 .772 .271 2.70 .521 -.043 1

29 1400A 1976 2015 40 1 0 .389 2.88 6.48 1.286 .735 .254 2.41 .425 -.058 1

30 1400B 1976 2015 40 1 0 .548 2.60 4.01 .832 .271 .298 2.48 .527 -.033 3

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Total or mean: 2848 106 23 .417 1.84 6.48 .950 .775 .284 2.93 .458 -.008

- = [ COFECHA BEAL COF ] = -