[] Dendrochronology Program Library Run BEAL Program COF 15:41 Mon 31 Jul 2017 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 30164

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

Title of run: LB2300C\_BEAL\_Corr2-50

File of DATED series: LB2300C\_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 1891 to 2015 125 years

Continuous time span is 1891 to 2015 125 years

Portion with two or more series is 1893 to 2015 123 years

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

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

\*O\* Master series 1891 2015 125 yrs \*O\*

\*F\* Total rings in all series 2028 \*F\*

\*E\* Total dated rings checked 2026 \*E\*

\*C\* Series intercorrelation .460 \*C\*

\*H\* Average mean sensitivity .285 \*H\*

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

\*\*\* Mean length of series 72.4 \*\*\*

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

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

1246A 1 absent rings: 1936

1 absent rings .049%

1900 1.015 3 1950 .867 13 2000 -.878 28

1901 .620 3 1951 .684 14 2001 -1.010 28

1902 .160 4 1952 1.074 14 2002 -.678 28

1903 -.934 5 1953 .478 14 2003 -.150 28

1904 1.165 5 1954 -.106 16 2004 .551 28

1905 .933 5 1955 .824 16 2005 .293 28

1906 .218 6 1956 .214 16 2006 -1.095 28

1907 -.468 7 1957 .028 16 2007 -.452 28

1908 -.109 7 1958 .372 16 2008 .598 28

1909 .347 7 1959 -.388 17 2009 1.058 28

1910 .712 7 1960 -.148 20 2010 1.352 28

1911 .344 7 1961 -.032 20 2011 .259 28

1912 .132 7 1962 -2.139 20 2012 .667 28

1913 -1.041 7 1963 -1.768 20 2013 -1.020 28

1914 -.735 7 1964 -1.381 20 2014 .542 28

1915 -.520 7 1965 .118 20 2015 -.355 28

1916 .084 7 1966 -1.204 21

1917 .911 7 1967 .857 22

1918 .240 7 1968 .274 22

1919 -.191 7 1969 .912 23

1920 .908 7 1970 .873 24

1921 1.019 7 1971 .511 24

1922 .150 7 1972 .952 24

1923 .858 7 1973 .656 24

1924 1.194 7 1974 .098 24

1925 -1.009 7 1975 .885 24

1926 -2.769 7 1976 -.989 26

1927 -.404 7 1977 .950 26

1928 .289 7 1978 .558 26

1929 -.763 7 1979 -1.023 26

1930 1.146 7 1980 .595 26

1931 1.171 7 1981 .401 27

1932 -.597 8 1982 1.187 28

1933 .119 9 1983 -2.104 28

1934 .349 9 1984 -1.071 28

1935 -.335 9 1985 -.188 28

1936 -2.857 9 1 1986 .528 28

1937 -1.793 9 1987 .189 28

1938 .503 9 1988 .440 28

1939 .504 10 1989 .873 28

1940 .489 10 1990 -.441 28

1891 1.625 1 1941 -.021 10 1991 -.638 28

1892 2.095 1 1942 1.330 11 1992 -.124 28

1893 .023 2 1943 .421 12 1993 -.829 28

1894 -1.966 2 1944 1.921 12 1994 .053 28

1895 .351 2 1945 -.026 13 1995 -.454 28

1896 -.940 2 1946 -.563 13 1996 -.053 28

1897 .100 2 1947 .797 13 1997 -.361 28

1898 -4.214 2 1948 -2.883 13 1998 .354 28

1899 -.225 3 1949 -.366 13 1999 .439 28

PART 5: CORRELATION OF SERIES BY SEGMENTS: LB2300C\_BEAL\_Corr2-50 15:41 Mon 31 Jul 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 1245A 1893 2015 .35 .44 .40 .34 .52

2 1245B 1939 2015 .58 .46 .53

3 1246A 1891 2015 .32A .40 .48 .49 .41

4 1246B 1951 2015 .51 .44

5 1247A 1906 2015 .63 .78 .68 .57

6 1247B 1903 2015 .38 .60 .58 .33

7 1248A 1902 2015 .43 .73 .39 .40

8 1248B 1907 2015 .68 .66 .39 .49

9 1250A 1945 2015 .83 .77 .69

10 1250B 1899 2015 .51 .52 .70 .53 .43

11 125X1A 1954 2015 .30A .19B

12 125X1B 1954 2015 .35 .33A

13 125X2A 1960 2015 .51 .51

14 125X2B 1960 2015 .30A .32A

15 1253A 1942 2015 .65 .56 .52

16 1253B 1959 2015 .45 .47

17 1254A 1970 2015 .43

18 1254B 1966 2015 .54

19 1255A 1967 2015 .52

20 1255B 1943 2015 .55 .57 .68

21 1256A 1933 2015 .70 .47 .49

22 1256B 1932 2015 .59 .40B .43

23 1257A 1982 2015 .20B

24 1257B 1981 2015 .54

25 1258A 1960 2015 .35 .35

26 1258B 1969 2015 .25A

27 1259A 1976 2015 .27A

28 1259B 1976 2015 .22A

Av segment correlation .39 .50 .63 .46 .43

PART 6: POTENTIAL PROBLEMS: LB2300C\_BEAL\_Corr2-50 15:41 Mon 31 Jul 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

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1245A 1893 to 2015 123 years Series 1

[B] Entire series, effect on correlation ( .398) is:

Lower 1896> -.048 1907> -.020 1894< -.019 1925> -.013 1963> -.013 1973< -.012 Higher 1898 .061 1926 .021

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

1896 +4.3 SD; 1963 +3.0 SD

1245A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1893 150 114 178 194 164 109 146

1900 180 180 212 140 184 234 163 245 124 187

1910 148 207 190 140 201 93 83 93 110 73

1920 93 172 207 168 178 146 16 14 42 73

1930 133 170 44 66 140 102 27 115 229 183

1940 287 352 607 534 552 287 253 425 249 452

1950 465 388 417 192 212 472 292 182 153 112

1960 143 193 188 317 250 236 192 183 115 221

1970 258 241 181 115 205 223 134 184 156 103

1980 156 193 171 105 53 97 180 157 133 194

1990 145 182 136 88 71 70 61 59 69 73

2000 38 43 84 65 78 81 33 53 91 99

2010 130 78 80 76 104 74

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

1245B 1939 to 2015 77 years Series 2

[B] Entire series, effect on correlation ( .550) is:

Lower 1984< -.038 1999< -.034 1939< -.020 1963> -.016 1991> -.010 1973< -.010 Higher 1948 .053 1966 .013

1245B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1939 197

1940 319 346 430 489 413 184 206 236 124 213

1950 267 265 301 234 213 279 289 314 279 161

1960 112 146 109 211 180 175 93 355 253 260

1970 206 225 219 153 148 168 158 214 170 129

1980 203 216 232 139 60 129 136 127 145 226

1990 192 199 214 105 145 104 83 89 117 40

2000 29 35 29 24 39 40 8 43 59 73

2010 109 61 44 34 94 83

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1246A 1891 to 2015 125 years Series 3

[\*] Early part of series cannot be checked from 1891 to 1892 -- 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

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

1893 1942 0 - - - - - - - - -.08 -.08 .32\* .12 .15 -.07 -.02 .21 -.15 .06 -.13 -.25 .07

[B] Entire series, effect on correlation ( .365) is:

Lower 1896< -.035 1894> -.027 1948> -.011 2001> -.010 1895< -.010 1996< -.010 Higher 1898 .040 1962 .016

1893 to 1942 segment:

Lower 1896< -.083 1894> -.052 1895< -.020 1911< -.019 1934< -.016 1908< -.014 Higher 1898 .132 1936 .019

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

1894 1895 -4.2 SD

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

1936 -2.857 9 1

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

1894 +3.1 SD; 1976 -6.1 SD

1246A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1891 211 223 130 134 108 58 115 66 138

1900 151 118 110 86 142 160 108 106 65 122

1910 142 89 199 128 82 162 179 278 260 247

1920 182 156 109 136 196 32 16 17 29 35

1930 52 70 49 69 21 10 0 13 33 115

1940 82 70 86 117 128 7 24 69 48 49

1950 101 232 172 122 80 80 61 75 203 161

1960 186 167 91 88 126 255 250 338 274 426

1970 343 311 399 441 296 307 127 321 429 362

1980 440 443 425 356 276 289 399 417 432 400

1990 322 288 316 256 295 136 46 130 123 206

2000 284 420 283 360 322 226 141 154 174 248

2010 249 248 166 128 257 199

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1246B 1951 to 2015 65 years Series 4

[B] Entire series, effect on correlation ( .419) is:

Lower 1996< -.028 2001> -.026 2000> -.024 2015> -.020 2013> -.013 2010< -.013 Higher 1983 .089 1966 .021

1246B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1951 106 264 234 226 212 147 116 172 187

1960 197 210 193 261 296 383 259 363 425 542

1970 480 374 429 549 510 529 216 435 479 382

1980 419 409 438 239 215 284 340 419 435 353

1990 317 309 390 370 385 286 114 191 157 179

2000 271 354 266 262 156 121 83 80 101 95

2010 81 73 74 78 117 143

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1247A 1906 to 2015 110 years Series 5

[B] Entire series, effect on correlation ( .612) is:

Lower 1986< -.037 2005< -.022 1906> -.015 1908> -.014 1919> -.012 2000> -.011 Higher 1948 .062 1983 .039

1247A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1906 157 67 141 113

1910 150 112 66 58 64 72 86 127 126 171

1920 198 141 152 148 106 34 34 74 86 37

1930 95 187 124 94 107 78 35 32 63 70

1940 112 65 106 49 164 136 111 111 19 62

1950 158 141 147 148 139 153 121 97 131 93

1960 107 106 30 20 87 99 129 317 325 341

1970 309 266 419 361 366 391 267 388 485 285

1980 322 377 357 230 299 324 233 250 245 297

1990 281 279 275 210 232 215 257 213 194 276

2000 263 180 222 176 189 123 161 250 283 282

2010 297 196 221 153 213 168

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1247B 1903 to 2015 113 years Series 6

[B] Entire series, effect on correlation ( .384) is:

Lower 2008< -.062 1907< -.016 1919> -.012 1923< -.011 1906> -.010 1966> -.009 Higher 1962 .027 1983 .019

1247B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1903 108 158 130 146 75 118 93

1910 106 115 88 88 84 110 132 161 115 155

1920 115 128 101 92 101 92 79 129 148 78

1930 124 118 89 109 80 91 65 52 113 56

1940 59 47 85 42 130 75 67 58 35 48

1950 107 109 86 88 79 129 78 87 120 67

1960 83 74 37 62 109 149 211 335 307 350

1970 254 274 372 336 292 377 295 324 372 243

1980 256 212 300 194 281 249 340 254 281 279

1990 137 181 223 114 142 145 154 103 144 178

2000 168 148 182 166 139 124 124 149 72 172

2010 225 215 226 140 174 130

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1248A 1902 to 2015 114 years Series 7

[B] Entire series, effect on correlation ( .410) is:

Lower 1919< -.040 1902< -.037 1905< -.028 1903> -.025 2011< -.020 1958< -.018 Higher 1948 .100 1936 .023

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

1902 1903 4.1 SD

1248A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1902 122 188 214 144 171 188 241 242

1910 249 198 183 174 227 170 162 173 157 69

1920 122 113 76 105 176 91 60 141 104 103

1930 177 115 72 80 132 121 65 81 115 144

1940 172 136 190 166 230 137 116 171 73 188

1950 193 158 156 163 134 155 125 150 114 144

1960 178 168 135 144 193 250 157 252 291 253

1970 266 183 209 153 218 233 173 196 169 156

1980 218 196 247 148 85 103 95 81 107 114

1990 66 48 47 49 72 100 80 91 89 42

2000 3 3 44 59 54 54 14 32 55 55

2010 50 8 48 42 43 52

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1248B 1907 to 2015 109 years Series 8

[B] Entire series, effect on correlation ( .572) is:

Lower 1964> -.022 1976> -.021 1986< -.019 1917< -.017 2011< -.014 1908> -.012 Higher 1948 .091 1983 .023

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

1964 +3.1 SD

1248B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1907 178 263 224

1910 259 232 189 135 116 106 111 100 92 117

1920 183 183 122 156 165 79 53 102 164 143

1930 207 176 139 115 161 162 113 89 166 150

1940 148 116 133 121 181 107 56 112 67 143

1950 137 117 132 161 155 211 158 151 120 114

1960 131 122 84 108 209 148 78 109 151 145

1970 169 152 206 175 171 228 231 248 228 177

1980 184 204 212 127 164 156 112 153 259 181

1990 139 92 116 101 139 112 97 120 96 75

2000 45 46 61 71 83 86 35 59 91 77

2010 64 27 45 43 43 42

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1250A 1945 to 2015 71 years Series 9

[B] Entire series, effect on correlation ( .757) is:

Lower 2015> -.024 1998< -.021 1946> -.015 2000> -.010 2014< -.005 2007> -.005 Higher 1948 .076 1983 .025

1250A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1945 211 281 274 139 126

1950 201 220 306 373 341 299 297 285 324 243

1960 206 225 92 56 90 173 182 383 452 538

1970 420 304 300 315 350 408 257 317 315 254

1980 288 293 327 208 135 191 273 314 300 386

1990 297 216 230 122 114 104 114 76 38 44

2000 67 48 51 51 55 73 45 70 94 108

2010 116 75 72 61 60 100

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1250B 1899 to 2015 117 years Series 10

[B] Entire series, effect on correlation ( .507) is:

Lower 1907> -.023 1902> -.016 1906< -.013 1995> -.012 2013> -.010 1984< -.009 Higher 1948 .036 1962 .026

1250B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1899 170

1900 193 189 236 123 149 176 97 138 79 84

1910 68 64 73 39 37 42 53 53 31 23

1920 42 38 32 57 34 28 11 33 44 32

1930 44 40 10 43 50 34 12 60 166 159

1940 217 150 199 146 170 107 178 213 99 119

1950 255 240 281 251 246 193 225 186 230 201

1960 160 164 70 61 91 136 180 291 302 382

1970 373 263 331 404 335 328 240 407 396 324

1980 363 352 273 160 84 116 185 228 177 188

1990 211 148 166 155 195 232 159 161 101 72

2000 67 36 24 51 50 62 29 38 26 42

2010 61 35 59 59 89 83

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125X1A 1954 to 2015 62 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

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1954 2003 0 -.20 -.12 -.09 .10 .07 -.04 .15 -.17 .14 -.27 .30\*-.11 .17 .28 -.16 .10 -.08 -.05 -.10 -.20 .19

1966 2015 -7 -.20 -.19 -.05 .28\* .18 .00 .15 -.12 .23 -.28 .19| - - - - - - - - - -

[B] Entire series, effect on correlation ( .233) is:

Lower 1980< -.039 2008< -.034 1968< -.028 1979> -.022 1984> -.022 2002> -.021 Higher 1983 .044 1976 .026

1954 to 2003 segment:

Lower 1980< -.054 1968< -.046 1981< -.029 1979> -.028 1984> -.027 2002> -.026 Higher 1983 .046 1976 .029

1966 to 2015 segment:

Lower 1980< -.042 2008< -.036 1984> -.027 1979> -.027 2002> -.026 1968< -.024 Higher 1983 .058 1976 .033

125X1A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1954 82 158 144 79 79 41

1960 14 13 9 20 57 234 172 283 101 113

1970 186 235 362 387 314 400 256 344 271 300

1980 211 173 233 196 319 270 296 268 291 285

1990 193 145 156 190 205 207 153 149 199 206

2000 139 160 244 179 105 62 61 75 43 74

2010 80 100 80 62 107 116

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125X1B 1954 to 2015 62 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

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

1966 2015 0 .00 -.19 .17 .01 -.08 .11 .17 -.08 .06 -.25 .33\* - - - - - - - - - -

[B] Entire series, effect on correlation ( .339) is:

Lower 1991< -.034 1996< -.025 1978< -.021 2006> -.019 1984> -.017 1969< -.014 Higher 1976 .019 1982 .018

1966 to 2015 segment:

Lower 1991< -.029 2006> -.025 1996< -.024 1984> -.022 1978< -.021 1983> -.014 Higher 1982 .021 1976 .021

125X1B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1954 27 86 75 67 65 26

1960 11 12 4 3 61 201 90 157 61 83

1970 188 206 342 357 365 433 267 343 225 239

1980 288 236 360 278 340 345 341 246 267 224

1990 229 142 177 168 223 192 136 178 249 225

2000 161 150 202 261 221 167 209 197 269 336

2010 253 170 262 211 207 176

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125X2A 1960 to 2015 56 years Series 13

[B] Entire series, effect on correlation ( .522) is:

Lower 1968< -.084 1972< -.029 1998< -.019 1994< -.013 1961> -.013 2005> -.011 Higher 1962 .030 1976 .025

125X2A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1960 672 829 529 535 441 492 395 452 315 441

1970 418 368 295 289 328 416 232 337 261 160

1980 267 284 298 149 149 116 199 202 142 157

1990 79 59 46 17 20 33 31 37 14 16

2000 10 13 22 21 37 66 31 28 53 29

2010 60 42 30 10 18 28

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

125X2B 1960 to 2015 56 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

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1960 2009 0 .12 -.04 .04 .01 -.19 -.07 -.05 -.24 .29 .03 .30\*-.20 .23 .06 .02 -.15 -.04 - - - -

1966 2015 0 .13 .01 .08 .00 -.15 -.03 -.06 -.25 -.01 -.08 .32\* - - - - - - - - - -

[B] Entire series, effect on correlation ( .243) is:

Lower 1962> -.056 2006> -.049 1979> -.027 2015> -.025 1972< -.021 1964< -.014 Higher 1983 .101 1976 .040

1960 to 2009 segment:

Lower 1962> -.068 2006> -.056 1964< -.032 1979> -.031 1972< -.026 2003< -.015 Higher 1983 .104 1976 .042

1966 to 2015 segment:

Lower 2006> -.071 2015> -.039 1979> -.038 1972< -.031 2003< -.018 2014< -.015 Higher 1983 .138 1976 .054

125X2B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1960 431 511 515 446 264 425 392 536 448 516

1970 396 362 281 280 271 380 209 308 341 311

1980 294 201 211 138 173 173 268 192 169 198

1990 156 119 124 132 109 106 108 102 140 111

2000 81 96 63 54 108 92 110 73 75 66

2010 61 40 58 58 48 87

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1253A 1942 to 2015 74 years Series 15

[B] Entire series, effect on correlation ( .591) is:

Lower 1976> -.024 1989< -.022 2009< -.015 1984> -.014 2006> -.012 1967< -.011 Higher 1983 .068 1948 .044

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

1983 -5.1 SD

1253A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1942 147 149 194 111 119 184 63 72

1950 90 100 118 125 108 168 84 130 268 109

1960 180 228 34 13 82 82 65 105 156 177

1970 267 254 263 279 270 325 280 341 219 185

1980 193 222 209 106 230 209 201 229 207 165

1990 161 181 195 189 224 213 265 237 217 214

2000 174 119 115 113 153 223 194 162 226 156

2010 212 177 196 162 199 122

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1253B 1959 to 2015 57 years Series 16

[B] Entire series, effect on correlation ( .424) is:

Lower 2009< -.053 2000> -.036 1992< -.033 1967< -.033 2006> -.027 1965< -.026 Higher 1983 .219 2014 .014

1253B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1959 69

1960 75 97 46 51 102 51 61 70 143 135

1970 183 172 232 269 255 246 196 257 268 226

1980 217 251 253 119 196 247 239 207 181 185

1990 160 146 114 136 143 133 145 168 157 149

2000 164 122 116 100 112 110 125 98 126 72

2010 98 82 134 78 158 87

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1254A 1970 to 2015 46 years Series 17

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

Lower 1976> -.056 1975< -.053 1974< -.033 1984> -.022 2000> -.018 1992< -.016 Higher 1983 .124 1979 .024

1254A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1970 381 439 387 415 281 280 375 383 418 271

1980 338 358 302 218 337 321 347 275 237 282

1990 199 193 201 222 293 253 276 228 422 302

2000 278 266 259 286 276 306 191 198 320 236

2010 192 224 169 120 128 86

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1254B 1966 to 2015 50 years Series 18

[B] Entire series, effect on correlation ( .537) is:

Lower 1967< -.052 1984> -.031 2014< -.027 2006> -.024 1976> -.019 1988< -.017 Higher 1983 .103 1979 .028

1254B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1966 153 140 222 317

1970 271 300 378 369 289 270 257 295 305 191

1980 248 312 278 175 310 302 392 254 194 227

1990 142 169 180 189 231 213 366 247 361 274

2000 235 199 213 299 336 323 290 236 271 296

2010 344 289 246 143 108 99

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1255A 1967 to 2015 49 years Series 19

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

Lower 1976> -.045 1979> -.032 1997> -.025 2011> -.018 1995> -.016 1987< -.013 Higher 1983 .064 2013 .022

1255A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1967 511 434 416

1970 425 417 413 382 318 319 342 369 289 281

1980 312 309 325 193 145 202 199 155 191 176

1990 116 164 169 132 165 190 217 219 170 151

2000 131 115 92 98 120 111 77 105 165 185

2010 140 181 180 52 177 147

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1255B 1943 to 2015 73 years Series 20

[B] Entire series, effect on correlation ( .540) is:

Lower 1945> -.045 1955< -.019 1953< -.017 1998< -.015 1990> -.009 2011> -.008 Higher 1983 .046 1948 .027

1255B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1943 100 148 296 206 170 79 113

1950 144 154 163 119 137 150 195 252 345 271

1960 356 311 274 320 290 433 298 424 465 440

1970 476 480 451 470 430 458 359 383 391 318

1980 415 429 420 284 265 289 361 272 277 242

1990 237 222 169 131 126 97 159 150 78 156

2000 118 69 39 40 118 72 23 53 78 176

2010 168 197 195 106 191 160

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1256A 1933 to 2015 83 years Series 21

[B] Entire series, effect on correlation ( .639) is:

Lower 1978< -.034 1990> -.015 1945> -.014 2002> -.013 1986< -.013 1954< -.012 Higher 1948 .093 1936 .030

1256A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1933 78 80 76 19 68 118 228

1940 133 124 234 236 295 313 204 362 151 347

1950 370 412 411 339 220 314 358 305 310 336

1960 425 482 286 289 205 264 277 517 501 522

1970 550 480 383 375 378 483 327 455 210 227

1980 311 388 318 192 113 147 121 165 175 189

1990 191 158 128 88 94 65 69 98 106 128

2000 92 112 135 79 93 69 38 72 95 144

2010 151 123 116 45 120 87

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1256B 1932 to 2015 84 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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1950 1999 -1 .00 -.12 .13 -.15 -.04 .06 -.19 -.05 -.17 .44\* .40|-.16 .08 -.18 .14 -.13 .16 .10 .04 -.01 -.06

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

Lower 1984< -.058 1977< -.028 1940< -.019 1932> -.017 1966> -.017 1955< -.015 Higher 1948 .052 1936 .032

1950 to 1999 segment:

Lower 1984< -.064 1977< -.047 1966> -.035 1955< -.023 1959> -.021 1997> -.019 Higher 1962 .064 1979 .032

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

1983 1984 -4.4 SD

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

1984 -5.0 SD

1256B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1932 66 72 90 64 22 55 121 208

1940 76 178 252 179 263 145 117 295 78 344

1950 275 217 244 207 132 158 235 266 244 338

1960 304 332 191 217 204 425 411 362 490 546

1970 500 410 341 334 337 399 282 208 251 164

1980 254 304 315 167 89 123 167 141 145 131

1990 107 93 101 81 86 72 67 90 58 76

2000 79 59 52 47 94 70 29 66 136 125

2010 163 59 63 56 110 58

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

1257A 1982 to 2015 34 years Series 23

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

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

1982 2015 -7 -.12 -.06 -.18 .36\*-.21 -.04 .27 -.05 .06 -.11 .20| - - - - - - - - - -

[B] Entire series, effect on correlation ( .196) is:

Lower 1986< -.050 1993> -.046 1984> -.026 1988< -.023 2007< -.020 1987< -.018 Higher 2010 .045 1982 .041

1982 to 2015 segment:

Lower 1986< -.050 1993> -.046 1984> -.026 1988< -.023 2007< -.020 1987< -.018 Higher 2010 .045 1982 .041

1257A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1982 734 485 602 498 342 301 298 378

1990 343 315 336 407 349 317 361 258 338 333

2000 259 265 287 367 357 292 244 206 256 230

2010 278 273 237 209 192 166

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1257B 1981 to 2015 35 years Series 24

[B] Entire series, effect on correlation ( .544) is:

Lower 1986< -.034 2006> -.028 2001> -.024 2002< -.020 1990> -.019 2011> -.017 Higher 1983 .237 1989 .016

1257B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1981 383 316 183 306 365 257 327 305 365

1990 299 269 291 280 296 309 326 246 284 322

2000 254 279 238 240 281 308 245 216 290 267

2010 236 259 267 200 211 175

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1258A 1960 to 2015 56 years Series 25

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

Lower 1997< -.040 1969< -.039 1983> -.027 1998< -.025 1984> -.019 1966> -.017 Higher 2013 .035 1979 .031

1258A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1960 35 17 19 25 42 139 134 255 202 140

1970 159 189 232 191 132 156 119 202 220 164

1980 364 335 404 306 380 277 303 302 281 287

1990 229 223 267 218 270 210 273 155 170 202

2000 169 266 245 274 326 398 328 328 245 321

2010 291 304 341 166 225 195

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

1258B 1969 to 2015 47 years Series 26

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

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

1969 2015 0 -.13 -.05 -.25 .03 -.25 .02 .05 .08 .17 -.18 .25\* - - - - - - - - - -

[B] Entire series, effect on correlation ( .247) is:

Lower 1983> -.051 1976> -.046 1975< -.035 1984> -.027 2004< -.021 2000> -.021 Higher 1979 .074 2010 .025

1969 to 2015 segment:

Lower 1983> -.051 1976> -.046 1975< -.035 1984> -.027 2004< -.021 2000> -.021 Higher 1979 .074 2010 .025

1258B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1969 151

1970 165 195 303 266 150 154 266 289 226 143

1980 334 211 305 257 348 288 288 243 260 302

1990 246 306 279 233 201 178 249 182 260 243

2000 226 209 148 186 150 152 165 159 191 207

2010 209 183 168 115 147 93

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

1259A 1976 to 2015 40 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

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

1976 2015 0 .04 .13 -.29 .16 -.03 -.02 .03 -.21 .21 -.32 .27\* - - - - - - - - - -

[B] Entire series, effect on correlation ( .270) is:

Lower 1984> -.048 1993> -.033 1991> -.029 1981< -.029 2006> -.026 1979> -.022 Higher 1976 .042 1977 .024

1976 to 2015 segment:

Lower 1984> -.048 1993> -.033 1991> -.029 1981< -.029 2006> -.026 1979> -.022 Higher 1976 .042 1977 .024

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

1984 +3.2 SD

1259A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1976 44 92 109 106

1980 89 63 106 94 215 128 163 147 158 139

1990 131 241 206 244 206 149 159 194 246 230

2000 94 99 170 263 281 353 345 354 390 430

2010 395 366 372 307 343 297

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

1259B 1976 to 2015 40 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

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

1976 2015 0 .08 .03 -.19 .18 -.09 .10 .02 -.20 .16 -.33 .22\* - - - - - - - - - -

[B] Entire series, effect on correlation ( .222) is:

Lower 1981< -.106 2006> -.039 1976> -.034 1984> -.029 1989< -.014 1991> -.012 Higher 1983 .097 2000 .039

1976 to 2015 segment:

Lower 1981< -.106 2006> -.039 1976> -.034 1984> -.029 1989< -.014 1991> -.012 Higher 1983 .097 2000 .039

1259B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1976 137 144 126 132

1980 150 80 149 103 230 196 229 163 202 153

1990 157 212 205 172 199 185 200 184 240 198

2000 90 89 127 216 236 225 262 241 207 267

2010 249 256 220 234 278 222

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

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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 1245A 1893 2015 123 5 0 .398 1.70 6.07 1.115 .763 .350 2.62 .493 .010 1

2 1245B 1939 2015 77 3 0 .550 1.71 4.89 1.016 .795 .319 2.84 .504 .024 1

3 1246A 1891 2015 125 5 1 .365 1.82 4.43 1.208 .843 .389 2.50 .347 .023 1

4 1246B 1951 2015 65 2 0 .419 2.73 5.49 1.359 .809 .226 2.37 .356 -.030 1

5 1247A 1906 2015 110 4 0 .612 1.77 4.85 1.030 .842 .310 2.67 .523 -.033 1

6 1247B 1903 2015 113 4 0 .384 1.51 3.77 .856 .833 .280 2.68 .495 -.031 2

7 1248A 1902 2015 114 4 0 .410 1.33 2.91 .660 .781 .316 2.54 .472 -.039 1

8 1248B 1907 2015 109 4 0 .572 1.34 2.63 .547 .727 .256 2.66 .423 -.022 2

9 1250A 1945 2015 71 3 0 .757 2.08 5.38 1.218 .867 .245 2.56 .479 -.029 2

10 1250B 1899 2015 117 5 0 .507 1.43 4.07 1.043 .889 .326 2.74 .520 -.008 1

11 125X1A 1954 2015 62 2 2 .233 1.72 4.00 1.001 .796 .318 2.77 .592 .100 1

12 125X1B 1954 2015 62 2 1 .339 1.98 4.33 1.037 .801 .336 2.59 .482 -.035 1

13 125X2A 1960 2015 56 2 0 .522 1.97 8.29 1.958 .924 .339 2.74 .526 -.102 1

14 125X2B 1960 2015 56 2 2 .243 2.15 5.36 1.460 .902 .219 2.54 .442 -.003 1

15 1253A 1942 2015 74 3 0 .591 1.74 3.41 .669 .621 .282 2.46 .366 -.017 1

16 1253B 1959 2015 57 2 0 .424 1.50 2.69 .636 .802 .230 2.40 .366 -.059 1

17 1254A 1970 2015 46 1 0 .429 2.78 4.39 .825 .626 .193 2.96 .689 .109 1

18 1254B 1966 2015 50 1 0 .537 2.55 3.92 .719 .531 .215 2.67 .570 -.005 1

19 1255A 1967 2015 49 1 0 .525 2.22 5.11 1.127 .913 .201 2.60 .503 -.044 2

20 1255B 1943 2015 73 3 0 .540 2.39 4.80 1.310 .892 .268 2.72 .537 -.032 1

21 1256A 1933 2015 83 3 0 .639 2.28 5.50 1.398 .836 .295 2.42 .476 -.039 1

22 1256B 1932 2015 84 3 1 .548 1.85 5.46 1.238 .810 .342 2.52 .437 .054 1

23 1257A 1982 2015 34 1 1 .196 3.27 7.34 1.147 .766 .157 2.71 .625 -.030 1

24 1257B 1981 2015 35 1 0 .544 2.77 3.83 .489 .262 .165 2.57 .558 -.005 2

25 1258A 1960 2015 56 2 0 .389 2.26 4.04 .947 .755 .252 2.54 .545 .050 4

26 1258B 1969 2015 47 1 1 .247 2.18 3.48 .615 .472 .218 2.53 .597 -.046 1

27 1259A 1976 2015 40 1 1 .270 2.13 4.30 1.081 .883 .230 2.68 .458 .129 1

28 1259B 1976 2015 40 1 1 .222 1.89 2.78 .524 .599 .213 2.53 .548 .117 1

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Total or mean: 2028 71 11 .460 1.91 8.29 1.015 .783 .285 2.96 .485 -.004

- = [ COFECHA BEAL COF ] = -