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[] P R O G R A M C O F E C H A Version 6.06P 30109

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

Title of run: VMC593\_BEAL\_Corr4-50

File of DATED series: VMC593\_BEAL\_Corr4

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 1922 to 2015 94 years

Continuous time span is 1922 to 2015 94 years

Portion with two or more series is 1925 to 2015 91 years

>> 1285A 1956 absent in 1 of 15 series, but is not usually narrow: master index is -.109

>> 1294A 1982 absent in 2 of 28 series, but is not usually narrow: master index is -.161

>> 1294B 1982 absent in 2 of 28 series, but is not usually narrow: master index is -.161

>> 1295B 1963 absent in 1 of 15 series, but is not usually narrow: master index is -.313

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

\*C\* Number of dated series 29 \*C\*

\*O\* Master series 1922 2015 94 yrs \*O\*

\*F\* Total rings in all series 1805 \*F\*

\*E\* Total dated rings checked 1802 \*E\*

\*C\* Series intercorrelation .573 \*C\*

\*H\* Average mean sensitivity .319 \*H\*

\*A\* Segments, possible problems 8 \*A\*

\*\*\* Mean length of series 62.2 \*\*\*

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

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

1274B 1 absent rings: 1945 1285A 2 absent rings: 1956 1966

1294A 3 absent rings: 1981 1982 19831294B 2 absent rings: 1982 1983 1295B 2 absent rings: 1962 1963

1297B 2 absent rings: 1944 1945

12 absent rings .665%

1950 -.799 15 2000 .264 29

1951 1.482 15 2001 .097 29

1952 .539 15 2002 -.031 29

1953 .850 15 2003 -2.907 29

1954 -.746 15 2004 -.639 29

1955 -.167 15 2005 -.815 29

1956 -.109 15 1<< 2006 -.903 29

1957 -1.067 15 2007 -.214 29

1958 .323 15 2008 .190 29

1959 .016 15 2009 1.265 29

1960 .223 15 2010 .814 29

1961 -1.542 15 2011 .452 29

1962 -.682 15 1 2012 .866 29

1963 -.313 15 1<< 2013 -.378 29

1964 -.122 15 2014 .204 29

1965 -.924 15 2015 -1.594 29

1966 -1.176 15 1

1967 -.919 15

1968 .257 15

1969 .803 15

1970 .251 15

1971 .361 16

1922 2.280 1 1972 .456 17

1923 -.594 1 1973 .816 18

1924 1.093 1 1974 .910 20

1925 -.477 3 1975 .759 20

1926 -1.864 3 1976 .806 24

1927 .993 5 1977 .852 24

1928 .185 6 1978 .828 26

1929 .825 6 1979 -.027 26

1930 .217 6 1980 .003 27

1931 1.175 8 1981 -.951 27 1

1932 .704 8 1982 -.161 28 2<<

1933 .012 10 1983 -1.003 28 2

1934 .476 10 1984 -.986 28

1935 .187 10 1985 -1.644 29

1936 -4.977 10 1986 -1.305 29

1937 .304 10 1987 -1.649 29

1938 .717 11 1988 -.054 29

1939 1.107 11 1989 .390 29

1940 .543 12 1990 1.167 29

1941 .434 13 1991 .613 29

1942 .669 14 1992 1.110 29

1943 -.694 14 1993 .492 29

1944 -.401 14 1 1994 .810 29

1945 -.848 15 2 1995 -.136 29

1946 -.187 15 1996 .777 29

1947 .943 15 1997 -.274 29

1948 -.579 15 1998 .706 29

1949 .564 15 1999 .681 29

PART 5: CORRELATION OF SERIES BY SEGMENTS: VMC593\_BEAL\_Corr4-50 15:30 Tue 06 Jun 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 1925 1950 1975

1974 1999 2024

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

1 1263A 1978 2015 .85

2 1263B 1980 2015 .70

3 1266A 1976 2015 .56

4 1266B 1982 2015 .77

5 1267A 1971 2015 .48

6 1267B 1978 2015 .47

7 1268A 1985 2015 .78

8 1268B 1973 2015 .74

9 1269A 1976 2015 .16B

10 1269B 1976 2015 .48

11 1273A 1972 2015 .75

12 1273B 1976 2015 .64

13 1274A 1933 2015 .27A .34 .43

14 1274B 1931 2015 .32A .24B .46

15 1280A 1974 2015 .78

16 1280B 1974 2015 .65

17 1285A 1922 2015 .65 .48 .54

18 1285B 1927 2015 .76 .44B .48

19 1294A 1928 2015 .83 .69 .53

20 1294B 1933 2015 .84 .66 .50

21 1295A 1941 2015 .52 .48 .45

22 1295B 1925 2015 .66 .46 .41

23 1296A 1938 2015 .46 .42 .56

24 1297A 1925 2015 .33B .39B .55

25 1297B 1927 2015 .65 .43B .55

26 1299A 1931 2015 .75 .39 .60

27 1299B 1945 2015 .43 .42 .65

28 1300A 1942 2015 .53 .42 .45

29 1300B 1940 2015 .49 .42 .40

Av segment correlation .57 .50 .54

PART 6: POTENTIAL PROBLEMS: VMC593\_BEAL\_Corr4-50 15:30 Tue 06 Jun 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

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

1263A 1978 to 2015 38 years Series 1

[B] Entire series, effect on correlation ( .846) is:

Lower 1995> -.015 2009< -.014 1983> -.010 1985> -.009 1999< -.009 1988< -.008 Higher 2003 .067 2015 .009

1263A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1978 171 158

1980 182 61 134 154 118 144 205 149 208 438

1990 514 578 538 436 470 516 573 356 506 405

2000 364 348 356 126 291 242 242 259 344 344

2010 307 357 407 256 257 148

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

1263B 1980 to 2015 36 years Series 2

[B] Entire series, effect on correlation ( .703) is:

Lower 2015> -.026 2006< -.021 1995> -.017 1981< -.017 1988< -.013 2005< -.013 Higher 2003 .037 2009 .017

1263B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1980 259 124 206 157 196 154 199 194 208 455

1990 579 533 534 426 461 478 513 327 384 392

2000 299 282 299 201 296 199 142 195 171 267

2010 217 255 238 142 125 96

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

1266A 1976 to 2015 40 years Series 3

[B] Entire series, effect on correlation ( .562) is:

Lower 2013> -.036 2010< -.033 2004< -.028 2003> -.018 2005> -.016 1995> -.011 Higher 2015 .091 1990 .017

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

2003 2004 -4.1 SD

1266A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1976 125 117 97 76

1980 97 54 57 25 74 37 59 43 199 263

1990 432 418 387 435 429 426 439 301 356 400

2000 334 310 362 312 283 346 345 326 366 347

2010 272 251 327 339 341 171

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

1266B 1982 to 2015 34 years Series 4

[B] Entire series, effect on correlation ( .774) is:

Lower 2000< -.030 2002< -.016 2003> -.006 1997> -.006 2010< -.005 2006> -.004 Higher 2015 .017 2009 .012

1266B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1982 224 74 76 48 53 22 375 335

1990 409 294 329 343 350 320 384 335 407 410

2000 295 312 275 231 274 297 311 365 412 467

2010 382 369 388 304 353 196

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1267A 1971 to 2015 45 years Series 5

[B] Entire series, effect on correlation ( .479) is:

Lower 2003> -.092 2013> -.056 1977< -.030 1995> -.010 2001< -.009 2009< -.009 Higher 2015 .131 1985 .014

1267A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1971 295 398 345 374 357 352 244 309 233

1980 270 201 211 167 199 120 157 124 299 338

1990 471 405 599 476 626 505 526 304 325 326

2000 343 233 280 227 306 184 161 211 252 255

2010 232 253 255 318 314 161

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1267B 1978 to 2015 38 years Series 6

[B] Entire series, effect on correlation ( .472) is:

Lower 2003> -.143 1997< -.050 1995> -.016 1983> -.015 1988< -.013 1993< -.012 Higher 2015 .094 1990 .029

1267B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1978 412 366

1980 379 238 336 346 265 227 239 217 253 310

1990 653 513 557 349 485 548 526 270 424 496

2000 548 496 409 438 467 413 373 598 515 532

2010 372 317 355 286 259 152

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1268A 1985 to 2015 31 years Series 7

[B] Entire series, effect on correlation ( .785) is:

Lower 1997> -.053 1988< -.038 2005> -.026 2000< -.011 2009< -.009 2002> -.007 Higher 2003 .128 2015 .028

1268A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1985 37 68 70 106 245

1990 385 329 440 337 412 205 439 356 601 453

2000 376 309 350 110 288 294 296 358 340 349

2010 322 316 304 226 243 155

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

1268B 1973 to 2015 43 years Series 8

[B] Entire series, effect on correlation ( .736) is:

Lower 2013> -.054 2014< -.030 2010< -.015 1978< -.013 2006> -.012 1999< -.008 Higher 2003 .154 2015 .032

1268B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1973 117 96 94 76 82 54 77

1980 90 51 40 40 80 50 86 44 87 318

1990 558 588 456 264 329 181 427 216 432 298

2000 226 218 250 76 254 234 267 252 306 344

2010 250 263 282 299 210 152

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

1269A 1976 to 2015 40 years Series 9

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

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

1976 2015 -5 -.21 .01 .08 .06 .11 .21\*-.01 -.12 .18 -.21 .16| - - - - - - - - - -

[B] Entire series, effect on correlation ( .160) is:

Lower 2012< -.078 2015> -.046 2008< -.044 1993< -.033 2013> -.029 2010< -.018 Higher 2009 .034 1998 .029

1976 to 2015 segment:

Lower 2012< -.078 2015> -.046 2008< -.044 1993< -.033 2013> -.029 2010< -.018 Higher 2009 .034 1998 .029

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

2015 +3.2 SD

1269A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1976 226 197 143 124

1980 125 68 76 71 90 55 84 42 205 510

1990 570 534 502 244 293 301 540 464 591 463

2000 377 248 229 226 323 260 210 225 162 201

2010 152 136 98 113 141 107

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

1269B 1976 to 2015 40 years Series 10

[B] Entire series, effect on correlation ( .477) is:

Lower 2008< -.177 2003> -.052 1996< -.018 2014< -.010 1979> -.007 1990< -.007 Higher 2015 .037 1981 .023

1269B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1976 226 218 177 165

1980 184 80 101 79 94 33 51 21 248 420

1990 482 455 503 403 518 470 402 348 403 461

2000 406 387 351 297 273 223 220 231 175 219

2010 233 260 336 282 231 149

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1273A 1972 to 2015 44 years Series 11

[B] Entire series, effect on correlation ( .746) is:

Lower 1983< -.036 1985> -.016 1994< -.013 1974< -.012 2001> -.012 1995> -.010 Higher 2003 .112 2015 .029

1273A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1972 255 271 260 261 333 327 319 298

1980 253 225 332 205 262 278 267 233 346 354

1990 506 402 380 296 281 319 331 296 360 369

2000 254 372 320 150 200 163 221 256 324 341

2010 317 346 360 220 241 108

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1273B 1976 to 2015 40 years Series 12

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

Lower 2013< -.052 2015> -.038 1992< -.021 1979> -.020 2006> -.015 2002< -.011 Higher 2003 .078 2009 .017

1273B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1976 313 356 351 384

1980 316 258 357 307 256 231 254 165 337 453

1990 462 392 318 404 445 358 391 284 387 312

2000 261 295 223 157 209 186 225 203 227 246

2010 205 189 162 111 139 119

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1274A 1933 to 2015 83 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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1933 1982 0 .03 .25 -.21 .04 .01 -.01 -.08 -.08 -.04 -.11 .27\* .11 -.09 -.17 .08 .15 .06 -.02 .00 -.06 .05

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

Lower 1973< -.053 2015> -.044 1948> -.025 1950> -.018 1967> -.016 1965> -.014 Higher 2003 .091 1961 .017

1933 to 1982 segment:

Lower 1973< -.072 1948> -.036 1950> -.026 1967> -.023 1965> -.021 1933> -.018 Higher 1936 .077 1961 .030

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

1936 +3.4 SD; 2015 +3.5 SD

1274A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1933 352 348 235 141 254 216 169

1940 140 117 69 38 62 17 27 41 141 173

1950 200 201 155 239 132 77 98 79 131 118

1960 133 85 89 131 158 188 100 191 215 192

1970 151 135 191 109 105 123 122 108 137 94

1980 87 67 62 81 85 53 77 128 207 207

1990 328 280 263 239 374 221 271 140 104 88

2000 152 84 109 16 21 38 26 43 53 70

2010 45 52 50 21 31 29

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

1274B 1931 to 2015 85 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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1931 1980 0 - .13 -.13 .17 -.07 -.16 -.15 .10 -.10 .01 .32\* .05 -.14 -.04 .03 -.04 .12 .10 .14 .05 .00

1950 1999 2 -.18 -.06 -.11 -.13 -.21 -.23 -.14 -.17 -.05 .05 .24| .02 .38\*-.04 .27 .04 .25 -.15 .21 -.05 .03

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

Lower 2015> -.033 1948> -.031 1950> -.022 1973< -.020 1975< -.013 1961> -.013 Higher 2003 .104 1936 .070

1931 to 1980 segment:

Lower 1948> -.052 1973< -.037 1950> -.036 1975< -.024 1961> -.017 1939< -.015 Higher 1936 .252 1957 .015

1950 to 1999 segment:

Lower 1950> -.058 1973< -.049 1975< -.033 1961> -.030 1967> -.021 1966> -.017 Higher 1990 .045 1985 .043

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

1945 -.848 15 2

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

2015 +3.2 SD

1274B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1931 280 260 220 276 154 55 102 126 88

1940 96 87 56 31 47 0 26 49 164 172

1950 201 183 126 196 141 94 168 113 148 163

1960 138 153 123 144 170 165 168 189 179 221

1970 164 225 190 126 151 109 130 153 120 97

1980 125 81 59 64 86 33 63 95 211 175

1990 309 148 162 121 113 55 78 85 73 60

2000 94 136 133 30 45 45 68 47 29 51

2010 40 34 40 23 41 35

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1280A 1974 to 2015 42 years Series 15

[B] Entire series, effect on correlation ( .778) is:

Lower 1992< -.021 2004< -.021 2006> -.011 1995> -.009 2005> -.007 1979> -.007 Higher 2015 .021 2003 .015

1280A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1974 133 139 127 130 130 132

1980 118 93 112 95 77 54 64 69 232 296

1990 291 259 228 245 310 306 330 250 365 328

2000 316 303 281 205 187 232 260 292 331 388

2010 328 276 299 214 258 157

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1280B 1974 to 2015 42 years Series 16

[B] Entire series, effect on correlation ( .647) is:

Lower 2003> -.126 2011< -.018 2005< -.015 1990< -.014 1995> -.011 1980< -.007 Higher 2015 .072 2009 .016

1280B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1974 182 114 108 126 117 90

1980 58 49 46 40 37 36 33 33 147 205

1990 177 212 282 235 284 285 377 230 329 327

2000 276 297 323 287 308 242 239 295 312 369

2010 376 294 381 288 320 195

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1285A 1922 to 2015 94 years Series 17

[\*] Early part of series cannot be checked from 1922 to 1924 -- not matched by another series

[B] Entire series, effect on correlation ( .587) is:

Lower 1956< -.048 1926> -.046 1949< -.020 1925< -.014 1955> -.011 1993> -.010 Higher 1936 .159 1951 .009

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

1956 -.109 15 1 >> WARNING: Ring is not usually narrow

1966 -1.176 15 1

1285A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1922 180 146 165 129 134 158 143 172

1930 163 176 167 119 130 161 41 179 169 188

1940 126 137 119 77 55 57 48 42 19 9

1950 18 41 26 27 8 43 0 17 28 4

1960 19 5 11 23 30 17 0 18 152 227

1970 192 223 127 81 74 178 167 104 98 93

1980 78 86 72 65 61 39 53 34 45 59

1990 99 96 180 322 261 210 262 169 218 223

2000 93 74 102 33 69 84 97 135 131 233

2010 308 216 220 131 111 70

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1285B 1927 to 2015 89 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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1950 1999 -4 -.36 .00 -.09 -.09 .17 -.05 .46\*-.04 .27 -.14 .44| .07 .17 .14 .20 .05 .02 -.23 -.23 -.27 -.22

[B] Entire series, effect on correlation ( .658) is:

Lower 1990< -.025 1951< -.018 1927< -.016 2005> -.011 1995> -.009 1944> -.009 Higher 1936 .181 1961 .011

1950 to 1999 segment:

Lower 1990< -.073 1951< -.048 1995> -.027 1986> -.025 1950> -.024 1997> -.017 Higher 1961 .063 1954 .039

1285B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1927 273 286 310

1930 220 320 243 199 191 230 65 152 179 168

1940 139 104 132 58 126 60 84 70 49 86

1950 48 45 22 41 9 41 21 23 32 19

1960 25 2 11 19 11 11 2 11 62 92

1970 85 141 154 168 163 103 114 127 94 55

1980 68 65 66 40 64 64 105 38 106 64

1990 64 74 119 144 171 209 265 212 294 180

2000 138 123 156 68 244 232 238 211 225 265

2010 219 147 189 121 125 97

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1294A 1928 to 2015 88 years Series 19

[B] Entire series, effect on correlation ( .733) is:

Lower 2015> -.041 1928< -.022 2006> -.017 2014< -.015 1958< -.015 1999< -.011 Higher 1936 .149 2003 .015

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

1981 -.951 27 1

1982 -.161 28 2 >> WARNING: Ring is not usually narrow

1983 -1.003 28 2

1294A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1928 75 191

1930 238 315 267 175 223 213 8 219 215 320

1940 254 262 309 245 225 122 153 213 110 171

1950 134 202 161 127 80 91 91 62 37 33

1960 59 5 33 30 30 15 13 19 45 49

1970 58 80 55 59 65 35 38 37 30 20

1980 7 0 0 0 5 11 21 12 84 109

1990 154 147 159 163 175 97 148 111 206 108

2000 105 128 128 64 104 83 140 92 75 99

2010 116 104 135 77 56 83

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1294B 1933 to 2015 83 years Series 20

[B] Entire series, effect on correlation ( .735) is:

Lower 2003> -.028 2006> -.018 1943> -.017 2015> -.011 1955< -.009 1999< -.007 Higher 1936 .172 1947 .005

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

1982 -.161 28 2 >> WARNING: Ring is not usually narrow

1983 -1.003 28 2

1294B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1933 207 225 232 12 177 256 275

1940 191 143 177 201 138 100 164 207 111 173

1950 92 115 107 97 46 26 46 26 33 32

1960 29 16 15 11 11 13 13 8 30 62

1970 44 61 23 63 88 40 43 46 39 30

1980 5 4 0 0 18 11 15 17 65 119

1990 166 149 143 89 139 60 85 79 94 76

2000 76 100 94 77 118 76 121 78 82 110

2010 145 87 76 38 40 37

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1295A 1941 to 2015 75 years Series 21

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

Lower 2006< -.043 1984> -.016 1998< -.013 2009< -.012 2000> -.011 1950> -.011 Higher 1951 .024 1948 .021

1295A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1941 388 326 215 197 161 146 212 78 125

1950 128 210 169 103 66 80 89 74 66 46

1960 91 49 23 28 44 52 36 42 81 121

1970 181 186 143 256 327 370 260 387 291 273

1980 288 207 349 228 345 207 243 218 267 213

1990 284 204 339 189 199 144 222 165 147 246

2000 280 189 116 87 193 143 45 114 138 126

2010 218 146 162 130 202 105

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1295B 1925 to 2015 91 years Series 22

[B] Entire series, effect on correlation ( .511) is:

Lower 1988< -.022 1940< -.016 1996< -.009 1998< -.009 2013< -.008 1976< -.008 Higher 1936 .055 1927 .009

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

1962 -.682 15 1

1963 -.313 15 1 >> WARNING: Ring is not usually narrow

1295B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1925 185 178 269 243 263

1930 219 208 233 191 173 153 114 152 194 218

1940 137 179 222 133 175 164 149 159 98 122

1950 71 109 71 79 39 74 72 37 31 21

1960 12 20 0 0 42 30 11 12 53 166

1970 182 188 230 334 324 364 232 272 336 210

1980 245 263 291 199 271 230 266 263 213 273

1990 386 285 425 292 296 245 210 180 171 243

2000 287 233 230 160 125 139 105 105 103 158

2010 175 277 226 80 104 78

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1296A 1938 to 2015 78 years Series 23

[B] Entire series, effect on correlation ( .472) is:

Lower 1957< -.066 1950> -.016 1938< -.014 1966> -.014 1994< -.010 2002< -.009 Higher 1948 .021 2009 .019

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

1957 -6.6 SD

1296A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1938 274 286

1940 490 415 404 278 231 230 286 339 154 221

1950 229 238 198 237 180 166 175 73 144 138

1960 163 127 141 126 178 90 151 94 159 320

1970 213 228 172 164 147 179 223 228 176 135

1980 160 124 195 124 102 82 57 58 77 113

1990 104 122 134 105 79 76 94 117 185 190

2000 172 148 51 39 99 66 81 94 114 200

2010 106 105 122 71 92 70

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

1297A 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

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1925 1974 10 - - - - - - - .04 -.10 -.01 .33| .14 .01 -.09 .15 -.23 -.12 -.03 -.11 -.11 .49\*

1950 1999 -4 -.21 -.13 .06 -.01 .21 .00 .44\* .06 .36 .07 .39| .14 .00 -.12 -.08 .00 -.24 -.11 -.32 -.19 -.25

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

Lower 1936> -.061 1925> -.039 1935< -.029 1990< -.011 1981> -.010 1969< -.010 Higher 2003 .060 2015 .017

1925 to 1974 segment:

Lower 1936> -.072 1925> -.054 1935< -.039 1969< -.014 1944< -.009 1959> -.006 Higher 1951 .029 1927 .018

1950 to 1999 segment:

Lower 1990< -.042 1981> -.040 1969< -.038 1989< -.030 1995> -.024 1959> -.021 Higher 1951 .063 1987 .032

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

1935 1936 5.2 SD

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

1925 +3.1 SD

1297A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1925 314 188 260 239 220

1930 205 276 199 150 165 91 88 157 159 136

1940 123 89 89 77 41 47 58 118 93 124

1950 88 146 97 105 63 52 39 37 59 103

1960 94 74 58 62 63 25 46 54 58 46

1970 104 129 163 354 304 342 245 335 213 128

1980 58 155 183 99 109 135 102 29 93 72

1990 77 145 271 275 285 354 360 345 375 357

2000 391 319 354 98 139 177 153 278 307 426

2010 303 163 124 67 225 87

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

1297B 1927 to 2015 89 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

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1950 1999 -2 -.15 .05 .00 -.02 .21 .15 .40 .01 .44\*-.08 .43|-.03 .09 -.24 .02 -.23 -.23 -.37 -.20 -.19 -.35

[B] Entire series, effect on correlation ( .575) is:

Lower 1944< -.039 1948> -.018 2007< -.014 2005> -.013 1961> -.012 1985> -.011 Higher 1936 .124 2003 .048

1950 to 1999 segment:

Lower 1961> -.034 1985> -.031 1989< -.030 1954> -.029 1969< -.023 1991< -.020 Higher 1951 .064 1998 .022

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

1944 -.401 14 1

1945 -.848 15 2

1297B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1927 339 278 213

1930 173 186 141 126 177 241 47 176 190 147

1940 116 53 113 99 0 0 23 67 72 55

1950 47 129 70 59 52 57 36 28 61 56

1960 85 70 63 38 73 33 43 53 83 87

1970 95 130 179 198 420 443 246 300 406 239

1980 253 170 202 167 147 213 127 166 181 153

1990 187 150 218 257 294 242 357 251 411 269

2000 421 362 308 98 185 408 270 117 254 477

2010 358 212 149 155 220 94

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1299A 1931 to 2015 85 years Series 26

[B] Entire series, effect on correlation ( .709) is:

Lower 1981> -.016 1995< -.014 1954> -.012 1997> -.011 1983> -.010 1948> -.009 Higher 1936 .132 2003 .043

1299A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1931 341 337 329 311 409 169 321 317 563

1940 394 374 415 260 290 332 393 476 344 298

1950 217 416 257 269 281 258 217 202 271 298

1960 249 154 246 235 175 167 178 193 265 245

1970 169 190 316 383 280 190 172 198 201 186

1980 309 295 306 268 218 164 143 176 155 170

1990 331 238 253 173 177 85 220 274 244 327

2000 313 288 200 82 267 263 265 348 343 377

2010 337 308 403 318 290 191

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1299B 1945 to 2015 71 years Series 27

[B] Entire series, effect on correlation ( .584) is:

Lower 1987> -.026 1990< -.022 1963> -.017 1971< -.014 1957> -.013 1945> -.013 Higher 2003 .118 1961 .022

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

1963 +3.2 SD

1299B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1945 425 405 397 289 304

1950 123 308 225 220 144 135 226 196 181 183

1960 136 46 173 263 189 155 103 139 113 130

1970 137 101 115 128 159 153 141 134 180 150

1980 133 74 103 121 115 132 129 213 258 218

1990 136 131 211 209 224 150 148 133 140 147

2000 137 146 178 72 176 158 128 128 174 224

2010 182 159 190 128 130 97

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1300A 1942 to 2015 74 years Series 28

[B] Entire series, effect on correlation ( .530) is:

Lower 1974< -.029 1987> -.015 1956< -.015 2015> -.013 1997> -.012 1977< -.009 Higher 2003 .046 1961 .017

1300A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1942 144 88 120 89 148 306 108 181

1950 60 185 208 215 76 100 56 97 188 150

1960 123 76 128 184 194 152 132 134 182 143

1970 93 80 89 141 87 89 88 75 116 66

1980 83 72 78 76 59 61 104 140 208 183

1990 218 210 188 184 168 96 93 132 152 181

2000 144 127 97 37 41 67 30 49 99 122

2010 167 139 142 105 74 63

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1300B 1940 to 2015 76 years Series 29

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

Lower 1995< -.036 1957> -.018 1987> -.017 2015> -.011 1950< -.010 1953< -.007 Higher 2003 .040 1961 .020

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

1950 -4.8 SD; 1995 -5.1 SD

1300B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1940 383 425 289 158 218 177 270 299 128 239

1950 39 250 244 175 134 174 191 216 347 271

1960 231 110 173 141 132 116 109 80 123 108

1970 80 77 87 96 95 135 180 184 164 80

1980 102 97 123 116 56 57 90 139 180 136

1990 148 129 143 166 154 67 136 123 163 238

2000 130 161 217 93 213 208 183 191 267 208

2010 133 68 67 60 45 39

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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 ()

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1 1263A 1978 2015 38 1 0 .846 3.07 5.78 1.443 .781 .271 2.35 .408 -.110 1

2 1263B 1980 2015 36 1 0 .703 2.83 5.79 1.357 .816 .243 2.60 .658 -.161 1

3 1266A 1976 2015 40 1 0 .562 2.59 4.39 1.382 .897 .254 2.50 .435 -.006 1

4 1266B 1982 2015 34 1 0 .774 2.95 4.67 1.165 .713 .249 2.54 .494 -.053 1

5 1267A 1971 2015 45 1 0 .479 3.01 6.26 1.178 .734 .223 2.37 .407 .014 3

6 1267B 1978 2015 38 1 0 .472 3.93 6.53 1.228 .558 .216 2.67 .506 -.019 1

7 1268A 1985 2015 31 1 0 .785 2.94 6.01 1.271 .570 .309 2.68 .557 .039 5

8 1268B 1973 2015 43 1 0 .736 2.12 5.88 1.416 .720 .365 2.47 .421 -.070 1

9 1269A 1976 2015 40 1 1 .160 2.43 5.91 1.617 .825 .287 2.84 .693 -.049 1

10 1269B 1976 2015 40 1 0 .477 2.70 5.18 1.399 .880 .262 2.60 .511 .025 3

11 1273A 1972 2015 44 1 0 .746 2.91 5.06 .726 .490 .193 2.69 .528 -.055 1

12 1273B 1976 2015 40 1 0 .640 2.81 4.62 .947 .764 .198 2.43 .498 -.037 1

13 1274A 1933 2015 83 3 1 .380 1.32 3.74 .837 .786 .337 2.61 .497 -.102 1

14 1274B 1931 2015 85 3 2 .414 1.18 3.09 .669 .738 .367 2.64 .399 -.060 1

15 1280A 1974 2015 42 1 0 .778 2.20 3.88 .944 .857 .173 2.53 .473 .005 1

16 1280B 1974 2015 42 1 0 .647 2.13 3.81 1.130 .874 .203 2.49 .505 .006 2

17 1285A 1922 2015 94 3 0 .587 1.08 3.22 .759 .795 .463 2.54 .378 -.080 2

18 1285B 1927 2015 89 3 1 .658 1.20 3.20 .834 .828 .416 2.41 .341 -.046 2

19 1294A 1928 2015 88 3 0 .733 1.09 3.20 .820 .786 .422 2.41 .337 -.075 1

20 1294B 1933 2015 83 3 0 .735 .84 2.75 .665 .753 .422 2.41 .305 -.085 1

21 1295A 1941 2015 75 3 0 .469 1.76 3.88 .941 .717 .344 2.62 .451 .002 1

22 1295B 1925 2015 91 3 0 .511 1.76 4.25 .962 .836 .310 2.82 .527 -.037 2

23 1296A 1938 2015 78 3 0 .472 1.63 4.90 .864 .766 .275 2.61 .355 -.053 1

24 1297A 1925 2015 91 3 2 .412 1.63 4.26 1.064 .799 .334 2.56 .383 -.088 1

25 1297B 1927 2015 89 3 1 .575 1.73 4.77 1.155 .716 .403 2.83 .483 -.042 1

26 1299A 1931 2015 85 3 0 .709 2.69 5.63 .863 .522 .242 2.56 .390 -.012 1

27 1299B 1945 2015 71 3 0 .584 1.71 4.25 .719 .659 .251 2.60 .449 -.083 1

28 1300A 1942 2015 74 3 0 .530 1.23 3.06 .535 .503 .325 2.79 .548 -.090 1

29 1300B 1940 2015 76 3 0 .453 1.57 4.25 .784 .599 .313 2.60 .443 -.102 1

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Total or mean: 1805 59 8 .573 1.88 6.53 .955 .733 .319 2.84 .444 -.054

- = [ COFECHA BEAL COF ] = -