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[] P R O G R A M C O F E C H A Version 6.06P 30347

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

Title of run: QURU\_LEMP11\_EWLW\_ORIGINAL-50

File of DATED series: QURU\_LEMP11\_EWLW

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 1895 to 2015 121 years

Continuous time span is 1895 to 2015 121 years

Portion with two or more series is 1905 to 2015 111 years

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

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

\*O\* Master series 1895 2015 121 yrs \*O\*

\*F\* Total rings in all series 2739 \*F\*

\*E\* Total dated rings checked 2729 \*E\*

\*C\* Series intercorrelation .715 \*C\*

\*H\* Average mean sensitivity .191 \*H\*

\*A\* Segments, possible problems 0 \*A\*

\*\*\* Mean length of series 91.3 \*\*\*

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

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

No ring measurements of zero value

1900 -1.554 1 1950 .143 30 2000 1.358 30

1901 -.878 1 1951 .364 30 2001 .926 30

1902 -.220 1 1952 .095 30 2002 .562 30

1903 .166 1 1953 -1.177 30 2003 -.211 30

1904 1.312 1 1954 -4.391 30 2004 1.127 30

1905 .333 2 1955 1.056 30 2005 -1.297 30

1906 1.036 3 1956 .510 30 2006 -.700 30

1907 -.584 3 1957 -.701 30 2007 -1.154 30

1908 -1.328 3 1958 .926 30 2008 -2.098 30

1909 -1.294 4 1959 .678 30 2009 -.632 30

1910 -1.097 4 1960 .528 30 2010 -.369 30

1911 .924 4 1961 1.038 30 2011 -.289 30

1912 -.416 4 1962 -1.247 30 2012 .593 30

1913 .004 4 1963 -.080 30 2013 1.363 30

1914 -.310 4 1964 .061 30 2014 1.493 29

1915 -.772 4 1965 -.733 30 2015 -.854 29

1916 .312 4 1966 -.657 30

1917 .387 4 1967 -.005 30

1918 -1.669 4 1968 -1.017 30

1919 .278 6 1969 .656 30

1920 .495 8 1970 1.170 30

1921 -.339 11 1971 .057 30

1922 .073 11 1972 -.233 30

1923 .075 11 1973 .304 30

1924 .660 12 1974 1.304 30

1925 .917 13 1975 1.640 30

1926 -.580 16 1976 .945 30

1927 .163 18 1977 -.160 30

1928 .883 20 1978 .204 30

1929 .611 22 1979 -.542 30

1930 -1.521 22 1980 -1.583 30

1931 .573 23 1981 -3.428 30

1932 .917 25 1982 -1.068 30

1933 -.076 25 1983 -1.221 30

1934 -.187 26 1984 .448 30

1935 -.135 27 1985 .659 30

1936 -1.222 27 1986 .435 30

1937 .647 27 1987 1.055 30

1938 -.116 27 1988 1.194 30

1939 .364 27 1989 .643 30

1940 -.551 28 1990 -.111 30

1941 -1.998 29 1991 -1.231 30

1942 -.527 29 1992 .596 30

1943 .246 30 1993 .222 30

1944 1.075 30 1994 .509 30

1895 .167 1 1945 .503 30 1995 -.221 30

1896 2.017 1 1946 .493 30 1996 .149 30

1897 .927 1 1947 1.133 30 1997 .054 30

1898 1.323 1 1948 1.100 30 1998 .779 30

1899 -1.459 1 1949 -.362 30 1999 .644 30

PART 5: CORRELATION OF SERIES BY SEGMENTS: QURU\_LEMP11\_EWLW\_ORIGINAL-50 14:23 Tue 30 Jan 2018 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 1900 1925 1950 1975

1949 1974 1999 2024

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

1 134A 1919 2015 .62 .64 .63 .60

2 134B 1921 2015 .82 .79 .76 .63

3 141A 1927 2015 .72 .77 .66

4 141B 1926 2015 .77 .78 .66

5 152A 1940 2015 .69 .78 .82

6 152B 1919 2015 .54 .59 .62 .68

7 169A 1905 2015 .68 .78 .78 .69

8 169B 1906 2013 .66 .71 .68 .59

9 182A 1929 2015 .86 .80 .69

10 182B 1920 2015 .85 .86 .82 .74

11 183A 1921 2015 .81 .84 .86 .84

12 183B 1927 2015 .77 .79 .73

13 189A 1924 2015 .66 .67 .71 .74

14 189B 1926 2015 .61 .82 .84

15 192A 1909 2015 .81 .84 .84 .69

16 192B 1895 2015 .68 .80 .82 .75

17 226A 1921 2015 .66 .67 .74 .79

18 226B 1928 2015 .71 .68 .58

19 228A 1929 2015 .36 .63 .76

20 228B 1926 2015 .78 .87 .84

21 231A 1934 2015 .87 .79 .64

22 231B 1920 2015 .76 .82 .77 .83

23 232A 1935 2015 .67 .67 .66

24 232B 1932 2015 .71 .65 .59

25 234A 1943 2015 .83 .83 .78

26 234B 1928 2015 .50 .69 .76

27 238A 1925 2015 .61 .70 .75

28 238B 1931 2015 .86 .83 .78

29 239A 1941 2015 .70 .66 .79

30 239B 1932 2015 .71 .72 .84

Av segment correlation .71 .72 .75 .72

PART 6: POTENTIAL PROBLEMS: QURU\_LEMP11\_EWLW\_ORIGINAL-50 14:23 Tue 30 Jan 2018 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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134A 1919 to 2015 97 years Series 1

[B] Entire series, effect on correlation ( .609) is:

Lower 1962< -.024 1988< -.012 1925< -.011 1974< -.009 1985< -.009 1935< -.007 Higher 1954 .016 1981 .010

134A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1919 395

1920 252 209 185 176 179 160 142 192 217 266

1930 220 258 326 281 278 195 198 381 347 382

1940 302 211 226 296 400 271 255 234 233 192

1950 172 186 178 150 116 174 157 124 185 155

1960 148 155 77 133 135 115 125 142 111 165

1970 162 103 86 103 90 116 108 80 105 96

1980 79 55 52 44 74 66 82 102 83 94

1990 115 101 161 146 149 134 138 130 138 132

2000 132 164 116 111 146 93 57 58 43 54

2010 40 45 49 93 97 57

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134B 1921 to 2015 95 years Series 2

[B] Entire series, effect on correlation ( .743) is:

Lower 1988< -.014 1974< -.013 1960< -.009 1995> -.007 2005> -.007 1949> -.006 Higher 1954 .077 1962 .009

134B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1921 275 283 285 287 345 249 312 333 284

1930 228 291 324 221 235 193 139 256 216 260

1940 187 157 171 194 211 228 230 190 195 189

1950 166 181 170 158 101 218 210 169 177 148

1960 124 171 104 145 138 131 129 149 115 133

1970 127 104 84 106 89 99 122 89 100 74

1980 62 53 59 49 75 85 106 94 74 86

1990 90 76 111 106 112 111 101 98 95 104

2000 105 103 88 81 118 70 47 42 40 46

2010 32 54 77 98 111 55

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141A 1927 to 2015 89 years Series 3

[B] Entire series, effect on correlation ( .715) is:

Lower 1936> -.026 2009< -.014 1972< -.010 2011< -.009 1927< -.009 1933> -.008 Higher 1954 .038 1962 .014

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

1936 +3.3 SD

141A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1927 200 246 232

1930 174 257 247 269 287 217 261 233 243 225

1940 182 165 204 205 209 183 206 231 196 152

1950 179 180 192 155 117 258 195 125 185 185

1960 189 241 132 161 179 173 188 205 162 157

1970 186 146 102 118 137 165 133 102 104 104

1980 91 82 93 110 162 187 162 208 229 191

1990 164 149 189 169 157 183 165 153 163 173

2000 176 171 159 153 199 123 152 123 96 85

2010 112 82 106 122 119 81

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141B 1926 to 2015 90 years Series 4

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

Lower 1944< -.022 2015> -.015 1991> -.014 1972< -.014 1938> -.010 1934> -.009 Higher 1954 .090 1930 .012

141B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1926 143 186 237 231

1930 129 268 285 297 351 287 248 302 329 321

1940 239 189 237 246 200 204 221 226 230 172

1950 225 180 210 195 110 257 210 139 227 218

1960 183 225 165 211 193 189 170 167 132 173

1970 183 150 90 100 117 153 125 97 100 89

1980 84 64 96 86 108 164 122 166 180 156

1990 154 152 149 143 159 133 128 121 128 121

2000 154 126 131 121 136 90 83 81 65 63

2010 58 53 69 77 73 58

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152A 1940 to 2015 76 years Series 5

[B] Entire series, effect on correlation ( .727) is:

Lower 1949< -.024 1941> -.017 1968> -.013 1962> -.008 1954> -.007 2002< -.006 Higher 1981 .017 2005 .016

152A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1940 234 222 204 203 280 262 204 191 239 148

1950 168 172 157 116 99 149 162 130 185 171

1960 191 155 133 151 140 117 105 124 147 168

1970 209 154 135 178 200 178 167 109 133 149

1980 101 63 93 80 140 162 194 206 194 148

1990 129 82 158 129 138 125 174 164 187 160

2000 264 203 144 124 156 93 128 144 87 156

2010 157 184 180 260 249 94

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152B 1919 to 2015 97 years Series 6

[B] Entire series, effect on correlation ( .610) is:

Lower 1953< -.027 1919< -.012 1968> -.010 2001< -.007 1940> -.006 2014< -.006 Higher 2008 .014 2005 .013

152B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1919 141

1920 147 143 263 178 230 321 256 383 445 350

1930 243 254 249 168 167 196 164 224 252 204

1940 228 178 206 201 268 272 223 263 225 155

1950 196 188 200 122 109 160 183 182 206 183

1960 222 201 152 197 177 140 136 131 169 192

1970 215 162 209 253 324 266 233 140 163 160

1980 114 73 85 91 153 188 229 263 192 171

1990 138 84 149 137 158 134 165 152 152 149

2000 207 150 134 106 117 89 118 134 86 160

2010 135 180 179 245 186 102

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169A 1905 to 2015 111 years Series 7

[B] Entire series, effect on correlation ( .689) is:

Lower 1905> -.046 1986< -.015 1968> -.014 1936< -.010 1963< -.008 1916< -.007 Higher 1954 .081 1981 .012

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

1905 +4.2 SD

169A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1905 230 214 195 194 204

1910 218 248 229 282 258 264 279 301 272 336

1920 347 359 424 407 418 366 387 438 493 437

1930 316 377 414 369 328 330 224 407 398 399

1940 342 276 357 426 473 407 389 368 312 312

1950 276 347 379 309 190 334 334 249 284 271

1960 294 296 221 205 258 213 229 231 269 285

1970 266 208 181 242 243 269 241 142 190 143

1980 160 111 166 149 202 199 131 174 208 225

1990 200 126 182 165 199 161 158 159 160 174

2000 197 168 178 145 158 113 135 114 86 82

2010 69 92 96 125 127 76

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169B 1906 to 2013 108 years Series 8

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

Lower 1996< -.011 1941> -.011 1986< -.010 2008> -.010 1995> -.009 1917< -.007 Higher 1954 .053 1981 .022

169B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1906 288 248 205 200

1910 237 262 265 275 271 266 296 289 278 315

1920 350 374 388 410 397 402 377 413 431 412

1930 303 324 344 290 249 266 203 296 297 371

1940 285 281 333 349 340 276 326 336 288 263

1950 218 317 330 269 164 205 186 139 183 168

1960 181 200 122 153 204 156 191 161 110 152

1970 178 154 123 167 234 251 221 197 195 134

1980 144 96 130 135 166 186 136 166 205 227

1990 154 136 144 150 167 206 141 187 155 186

2000 176 190 212 125 157 101 76 49 60 48

2010 43 41 51 53

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182A 1929 to 2015 87 years Series 9

[B] Entire series, effect on correlation ( .796) is:

Lower 1981> -.027 1964< -.009 1991> -.008 1932< -.007 1971> -.006 1944< -.004 Higher 1954 .074 1930 .010

182A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1929 301

1930 183 245 220 228 212 231 218 290 241 262

1940 202 173 197 213 215 220 212 248 256 207

1950 252 234 228 184 87 185 198 173 216 187

1960 170 210 140 156 121 134 137 153 98 149

1970 146 151 132 131 140 128 108 100 90 58

1980 54 63 77 60 94 111 93 154 143 113

1990 103 115 129 161 186 150 126 140 159 166

2000 157 127 110 74 107 70 96 81 61 97

2010 129 130 148 184 174 84

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182B 1920 to 2015 96 years Series 10

[B] Entire series, effect on correlation ( .803) is:

Lower 1991> -.015 1929< -.014 1984< -.012 1990< -.008 1986< -.008 1942< -.007 Higher 1954 .055 1941 .008

182B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1920 255 209 209 205 234 233 192 206 197 169

1930 153 226 201 173 186 205 173 254 178 185

1940 180 138 147 197 232 195 209 264 281 234

1950 242 281 235 195 94 250 248 158 251 211

1960 189 197 108 136 152 156 169 191 131 183

1970 173 140 101 123 164 154 124 109 110 81

1980 76 62 93 74 84 114 95 167 167 149

1990 111 159 175 190 204 182 176 173 247 236

2000 210 299 260 188 230 122 146 115 101 114

2010 148 149 173 204 226 89

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183A 1921 to 2015 95 years Series 11

[B] Entire series, effect on correlation ( .825) is:

Lower 1923> -.018 1962> -.015 1937< -.007 1965< -.007 1993< -.006 1949> -.004 Higher 1954 .060 1981 .012

183A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1921 212 190 494 314 293 185 173 197 158

1930 92 142 160 111 110 107 106 108 103 109

1940 107 88 139 138 173 182 189 201 221 195

1950 212 235 214 166 72 235 267 217 263 231

1960 250 233 199 199 171 124 178 167 149 215

1970 202 146 159 179 201 192 154 120 167 133

1980 84 57 112 118 172 152 145 163 155 138

1990 123 80 150 112 134 116 148 114 180 158

2000 186 143 135 133 193 98 91 78 55 57

2010 53 75 106 124 141 71

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183B 1927 to 2015 89 years Series 12

[B] Entire series, effect on correlation ( .773) is:

Lower 1962> -.020 1948< -.012 1986< -.012 1965< -.011 1968> -.010 1973< -.009 Higher 1954 .085 1981 .013

183B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1927 330 452 446

1930 220 412 395 271 212 188 167 250 261 244

1940 193 169 268 327 404 376 363 367 257 291

1950 335 299 254 233 118 266 284 243 287 280

1960 298 288 270 342 286 180 209 219 238 318

1970 303 233 214 164 197 187 193 139 155 131

1980 94 65 127 137 205 171 117 149 200 207

1990 196 123 194 173 215 146 209 166 171 174

2000 206 144 145 144 177 108 88 81 68 79

2010 69 63 125 134 153 76

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189A 1924 to 2015 92 years Series 13

[B] Entire series, effect on correlation ( .700) is:

Lower 1956< -.025 1991> -.018 1927< -.015 2000< -.011 1941> -.010 1990> -.008 Higher 1981 .037 1954 .030

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

1991 +3.2 SD

189A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1924 327 302 207 149 239 257

1930 150 273 343 294 214 351 234 409 277 424

1940 214 202 258 229 230 169 189 215 182 154

1950 152 184 138 101 73 144 96 98 178 239

1960 223 196 169 223 236 253 218 315 262 399

1970 391 380 396 306 394 449 508 432 397 315

1980 304 204 357 344 455 507 538 492 516 474

1990 522 495 474 440 390 398 388 335 343 355

2000 316 328 331 303 349 196 231 215 119 244

2010 331 275 322 313 334 153

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189B 1926 to 2015 90 years Series 14

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

Lower 1931< -.026 1953> -.013 1936> -.011 1952< -.010 1946< -.010 1926> -.006 Higher 1954 .032 1981 .032

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

1939 +3.0 SD

189B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1926 339 409 365 274

1930 224 165 215 219 300 318 295 373 336 446

1940 208 169 174 201 227 179 141 159 175 152

1950 175 192 139 177 121 259 199 171 237 238

1960 201 223 188 198 216 204 203 216 157 250

1970 286 259 233 324 434 373 353 289 270 215

1980 206 131 246 203 304 334 313 294 321 276

1990 248 221 271 295 309 293 295 292 322 314

2000 298 301 231 198 260 163 215 194 112 192

2010 204 143 177 186 274 129

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192A 1909 to 2015 107 years Series 15

[B] Entire series, effect on correlation ( .754) is:

Lower 1996< -.015 2000< -.012 1910< -.010 1913< -.010 1934> -.008 1909> -.006 Higher 1954 .083 1981 .016

192A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1909 208

1910 176 267 229 210 225 222 266 298 246 276

1920 302 304 275 296 357 344 291 325 316 273

1930 223 287 327 333 373 306 245 268 215 248

1940 221 158 222 256 296 220 233 296 227 211

1950 242 223 229 164 100 210 220 212 231 249

1960 235 225 190 190 217 213 203 203 199 214

1970 219 178 188 229 319 333 243 178 210 145

1980 156 85 155 149 198 170 169 180 239 227

1990 196 175 211 195 179 183 142 164 195 215

2000 173 224 231 187 224 151 153 156 105 115

2010 119 85 156 154 198 118

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192B 1895 to 2015 121 years Series 16

[\*] Early part of series cannot be checked from 1895 to 1904 -- not matched by another series

[B] Entire series, effect on correlation ( .705) is:

Lower 1905< -.044 1928< -.016 1914> -.009 1915> -.008 1993< -.007 1980> -.005 Higher 1954 .078 1981 .030

192B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1895 169 242 194 207 118

1900 116 134 153 166 206 128 165 122 143 137

1910 172 244 203 224 264 262 307 292 217 259

1920 287 282 258 278 248 239 182 220 195 236

1930 167 247 278 251 267 258 230 253 215 233

1940 185 154 187 258 266 205 253 262 226 212

1950 218 191 211 183 117 279 212 201 226 242

1960 190 223 181 191 196 206 169 185 168 197

1970 215 220 217 283 346 361 261 259 255 224

1980 214 119 176 175 237 216 236 218 298 260

1990 196 191 212 176 199 208 184 227 294 243

2000 219 230 229 222 260 152 177 178 130 142

2010 142 102 196 215 231 106

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226A 1921 to 2015 95 years Series 17

[B] Entire series, effect on correlation ( .716) is:

Lower 1995< -.030 1930> -.019 1936< -.013 1957> -.008 1923< -.007 1955< -.006 Higher 1981 .037 1954 .023

226A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1921 155 170 143 299 369 277 343 424 409

1930 359 473 484 293 336 423 236 317 356 350

1940 349 294 285 350 437 334 291 358 428 261

1950 288 281 233 157 107 189 155 194 188 191

1960 222 259 163 165 141 120 131 135 149 175

1970 250 183 205 176 243 258 251 172 197 180

1980 151 90 181 147 197 173 158 216 203 196

1990 180 119 155 171 155 95 156 131 167 136

2000 189 153 142 102 137 80 98 92 75 92

2010 100 89 123 176 166 92

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226B 1928 to 2015 88 years Series 18

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

Lower 1995< -.028 1977< -.024 1956< -.015 2005> -.014 1999< -.013 2008> -.010 Higher 1954 .073 1981 .019

226B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1928 278 254

1930 182 273 305 178 191 179 133 167 172 191

1940 192 159 178 170 183 202 184 197 193 131

1950 173 123 130 101 69 119 86 122 140 123

1960 141 158 96 125 106 96 106 96 98 123

1970 143 106 121 89 126 117 97 55 83 78

1980 63 54 98 89 99 100 78 102 92 123

1990 84 61 82 88 88 56 79 86 85 62

2000 108 76 74 56 68 62 58 51 56 53

2010 46 52 60 82 84 49

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228A 1929 to 2015 87 years Series 19

[B] Entire series, effect on correlation ( .539) is:

Lower 1949> -.030 1954> -.024 1937< -.022 1940> -.020 1950< -.020 1944< -.019 Higher 1981 .053 2005 .021

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

1940 +3.3 SD; 1949 +3.8 SD; 1954 +3.7 SD

228A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1929 292

1930 256 232 254 231 161 174 148 127 161 191

1940 252 163 133 166 138 152 176 209 211 277

1950 178 204 209 186 151 248 192 149 203 191

1960 171 143 123 133 138 143 129 139 92 146

1970 167 160 182 155 208 232 208 190 172 145

1980 99 57 117 145 188 225 258 257 221 219

1990 185 160 235 212 228 180 222 214 216 195

2000 234 220 204 246 251 141 129 97 104 82

2010 101 130 153 173 146 86

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228B 1926 to 2015 90 years Series 20

[B] Entire series, effect on correlation ( .802) is:

Lower 1959< -.021 1930> -.018 1946> -.007 1935< -.007 1943< -.006 2001< -.006 Higher 1954 .070 2005 .009

228B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1926 302 356 368 303

1930 279 324 282 213 198 180 182 222 200 215

1940 193 171 215 185 224 232 288 249 216 185

1950 213 196 196 139 94 183 183 171 218 160

1960 161 180 155 185 186 166 152 164 141 194

1970 179 179 152 150 207 220 213 182 175 145

1980 104 73 118 133 201 212 224 220 195 191

1990 152 145 200 200 216 182 167 185 192 184

2000 177 144 157 133 186 102 132 87 66 74

2010 66 109 117 123 125 72

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231A 1934 to 2015 82 years Series 21

[B] Entire series, effect on correlation ( .767) is:

Lower 1991> -.020 1998< -.019 2003< -.018 1989< -.012 1962> -.009 1982> -.006 Higher 1954 .087 1981 .023

231A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1934 422 445 335 488 390 441

1940 281 255 285 298 335 359 395 404 415 280

1950 273 268 268 201 129 254 297 237 261 244

1960 228 269 219 228 226 180 174 220 176 256

1970 248 181 172 200 247 236 216 170 174 192

1980 175 127 222 209 242 230 187 191 197 159

1990 170 212 243 259 255 199 204 191 148 184

2000 214 165 157 99 158 115 118 119 111 187

2010 201 160 174 176 205 108

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231B 1920 to 2015 96 years Series 22

[B] Entire series, effect on correlation ( .781) is:

Lower 1954> -.019 1998< -.010 1921< -.007 1923< -.007 1962> -.006 1920< -.006 Higher 1981 .020 1941 .009

231B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1920 221 173 276 232 292 413 349 417 526 458

1930 315 420 506 387 339 401 358 525 326 362

1940 293 225 268 311 368 335 333 368 386 248

1950 256 265 249 204 159 356 318 248 292 254

1960 286 326 231 223 211 181 177 242 191 298

1970 324 208 227 242 305 307 229 176 183 209

1980 199 115 197 228 268 249 237 285 300 235

1990 227 194 285 229 251 239 210 226 199 221

2000 285 247 194 169 231 159 161 162 114 231

2010 252 247 216 313 296 144

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232A 1935 to 2015 81 years Series 23

[B] Entire series, effect on correlation ( .670) is:

Lower 1969< -.020 1954> -.019 2003> -.009 1989< -.008 1941< -.007 1963< -.006 Higher 1962 .014 1955 .010

232A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1935 209 150 266 187 205

1940 213 128 198 204 205 245 199 218 273 205

1950 195 173 174 117 103 198 166 138 162 158

1960 171 148 89 98 123 103 124 131 119 103

1970 137 130 127 128 134 177 147 148 138 123

1980 82 65 92 105 161 190 232 225 185 120

1990 126 134 145 136 154 143 131 157 175 180

2000 172 229 191 225 202 119 96 82 78 190

2010 200 186 203 252 254 110

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232B 1932 to 2015 84 years Series 24

[B] Entire series, effect on correlation ( .669) is:

Lower 1991> -.028 1989< -.027 1951< -.024 1969< -.018 1939< -.014 1965> -.014 Higher 1954 .092 1981 .020

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

1991 +3.1 SD

232B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1932 371 321 258 152 113 155 152 108

1940 126 123 158 184 238 191 192 201 205 146

1950 188 133 134 122 83 184 174 165 185 208

1960 169 170 131 163 171 198 193 197 129 103

1970 148 198 139 130 198 189 198 198 166 157

1980 107 59 73 73 146 198 192 179 169 114

1990 152 206 203 170 187 164 172 199 212 223

2000 213 232 231 224 200 141 138 120 109 217

2010 223 210 240 289 277 112

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234A 1943 to 2015 73 years Series 25

[B] Entire series, effect on correlation ( .800) is:

Lower 2001< -.019 1952< -.007 1949> -.007 2014< -.007 1996> -.006 1994< -.006 Higher 1954 .038 1981 .029

234A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1943 219 247 225 233 363 345 296

1950 274 297 232 227 179 316 294 263 275 277

1960 296 287 229 286 258 259 245 307 235 309

1970 308 308 357 399 463 417 322 312 437 335

1980 212 98 163 198 278 304 383 432 434 296

1990 274 238 309 299 253 242 331 268 300 272

2000 281 208 220 234 258 155 182 175 123 224

2010 267 281 323 352 258 138

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234B 1928 to 2015 88 years Series 26

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

Lower 1939< -.031 1936> -.014 1994< -.010 1958< -.009 1969< -.008 2002< -.008 Higher 1981 .031 1955 .014

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

1939 -4.8 SD

234B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1928 249 228

1930 178 184 167 165 138 172 170 155 115 97

1940 143 90 136 169 159 155 142 194 200 176

1950 186 239 210 187 156 299 265 224 207 218

1960 211 250 214 245 245 201 190 200 205 193

1970 200 158 226 210 278 300 243 208 216 197

1980 130 83 138 167 181 199 250 286 268 249

1990 228 143 192 186 155 174 197 171 223 181

2000 202 169 138 140 178 125 141 117 93 156

2010 174 187 192 219 265 90

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238A 1925 to 2015 91 years Series 27

[B] Entire series, effect on correlation ( .664) is:

Lower 1962> -.033 1927< -.020 1936> -.015 1957< -.014 1960< -.011 1941> -.008 Higher 1954 .071 1981 .025

238A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1925 373 288 222 245 332

1930 218 351 302 319 319 308 326 344 299 261

1940 234 241 259 341 389 328 313 268 374 201

1950 188 194 157 170 94 229 194 111 157 173

1960 129 156 163 140 158 135 126 125 120 147

1970 161 133 127 109 115 147 132 129 109 96

1980 67 55 77 81 102 113 126 123 166 161

1990 126 116 163 173 136 150 121 125 145 142

2000 166 159 125 96 110 86 75 76 71 79

2010 96 104 171 146 184 77

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238B 1931 to 2015 85 years Series 28

[B] Entire series, effect on correlation ( .824) is:

Lower 1953> -.013 1981> -.012 1933< -.008 2004< -.007 1962> -.006 1977> -.005 Higher 1954 .060 1955 .005

238B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1931 306 299 192 223 260 238 349 308 302

1940 239 206 320 371 482 465 430 471 388 297

1950 333 344 319 314 142 299 263 223 286 246

1960 220 214 179 167 187 141 131 134 110 134

1970 166 135 150 144 153 176 156 154 159 150

1980 76 67 91 110 139 164 145 147 179 155

1990 124 101 176 159 191 158 145 117 156 141

2000 183 170 180 129 120 78 85 81 69 81

2010 95 94 105 181 194 97

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239A 1941 to 2015 75 years Series 29

[B] Entire series, effect on correlation ( .694) is:

Lower 1954> -.074 2007< -.014 1993< -.011 2006> -.010 1994< -.006 1983> -.006 Higher 1981 .032 2005 .018

239A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1941 298 367 395 459 365 279 319 345 196

1950 210 228 190 152 144 292 236 194 245 271

1960 325 299 205 206 160 138 148 205 206 271

1970 283 218 236 358 361 388 308 257 236 200

1980 152 110 301 286 352 273 315 307 282 301

1990 257 176 204 171 177 185 233 206 246 209

2000 222 218 202 181 268 146 236 119 72 186

2010 150 148 199 203 240 74

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239B 1932 to 2015 84 years Series 30

[B] Entire series, effect on correlation ( .743) is:

Lower 1954> -.069 1938< -.024 1992< -.010 1933> -.010 1937< -.007 1973> -.005 Higher 1981 .030 2005 .014

239B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1932 472 504 440 408 336 309 222 313

1940 274 211 248 282 407 361 313 350 378 269

1950 362 369 312 248 228 441 405 303 338 328

1960 296 318 226 268 266 273 239 235 218 367

1970 367 330 317 469 374 416 300 301 274 220

1980 160 113 240 214 340 257 286 235 242 226

1990 177 126 133 143 159 133 192 175 208 175

2000 172 180 177 139 194 108 119 88 69 116

2010 138 146 174 250 223 91

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[\*] All segments correlate highest as dated with correlation with master series over .3281

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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 134A 1919 2015 97 4 0 .609 1.57 4.00 .843 .858 .200 2.50 .332 -.035 1

2 134B 1921 2015 95 4 0 .743 1.46 3.45 .771 .892 .185 2.57 .414 -.025 1

3 141A 1927 2015 89 3 0 .715 1.70 2.87 .484 .703 .171 2.75 .578 .008 1

4 141B 1926 2015 90 3 0 .736 1.65 3.51 .692 .821 .181 2.52 .385 -.050 1

5 152A 1940 2015 76 3 0 .727 1.60 2.80 .462 .560 .222 2.82 .575 -.006 1

6 152B 1919 2015 97 4 0 .610 1.86 4.45 .647 .720 .212 2.62 .405 .023 1

7 169A 1905 2015 111 4 0 .689 2.52 4.93 1.008 .883 .157 2.41 .390 -.052 1

8 169B 1906 2013 108 4 0 .642 2.22 4.31 .951 .908 .167 2.53 .483 -.041 1

9 182A 1929 2015 87 3 0 .796 1.56 3.01 .585 .806 .190 2.40 .319 -.035 1

10 182B 1920 2015 96 4 0 .803 1.76 2.99 .536 .639 .198 2.57 .426 .000 1

11 183A 1921 2015 95 4 0 .825 1.58 4.94 .646 .646 .221 2.56 .367 .013 1

12 183B 1927 2015 89 3 0 .773 2.15 4.52 .915 .782 .218 2.43 .349 .003 1

13 189A 1924 2015 92 4 0 .700 2.94 5.38 1.138 .795 .218 2.71 .541 .004 1

14 189B 1926 2015 90 3 0 .703 2.43 4.45 .726 .659 .198 2.74 .487 -.075 1

15 192A 1909 2015 107 4 0 .754 2.19 3.73 .600 .751 .166 2.42 .315 .054 1

16 192B 1895 2015 121 4 0 .705 2.12 3.61 .496 .581 .170 2.68 .384 -.053 1

17 226A 1921 2015 95 4 0 .716 2.15 4.84 .997 .819 .219 2.54 .472 -.035 1

18 226B 1928 2015 88 3 0 .671 1.17 3.05 .559 .842 .204 2.76 .512 -.013 1

19 228A 1929 2015 87 3 0 .539 1.78 2.92 .494 .683 .187 2.70 .471 .021 1

20 228B 1926 2015 90 3 0 .802 1.82 3.68 .588 .830 .161 2.49 .369 .072 1

21 231A 1934 2015 82 3 0 .767 2.31 4.88 .837 .805 .169 2.42 .393 .027 1

22 231B 1920 2015 96 4 0 .781 2.69 5.26 .841 .664 .200 2.52 .389 .030 1

23 232A 1935 2015 81 3 0 .670 1.61 2.73 .479 .614 .189 2.56 .419 .013 1

24 232B 1932 2015 84 3 0 .669 1.75 3.71 .528 .654 .190 2.60 .470 .000 2

25 234A 1943 2015 73 3 0 .800 2.77 4.63 .726 .638 .184 2.66 .562 -.013 1

26 234B 1928 2015 88 3 0 .619 1.88 3.00 .478 .612 .178 2.74 .408 -.001 1

27 238A 1925 2015 91 3 0 .664 1.77 3.89 .856 .851 .182 2.57 .505 -.037 1

28 238B 1931 2015 85 3 0 .824 1.97 4.82 .981 .876 .183 2.33 .304 -.047 1

29 239A 1941 2015 75 3 0 .694 2.37 4.59 .773 .648 .222 2.67 .654 .026 1

30 239B 1932 2015 84 3 0 .743 2.60 5.03 1.000 .790 .199 2.88 .624 .028 1

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Total or mean: 2739 102 0 .715 2.00 5.38 .724 .747 .191 2.88 .439 -.008

- = [ COFECHA QURU COF ] = -