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[] P R O G R A M C O F E C H A Version 6.06P 30377

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

Title of run: QURU\_STAL\_EWLWTOTAL\_ORIGINAL-50

File of DATED series: QURU\_STAL\_EWLWTOTAL

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 1893 to 2016 124 years

Continuous time span is 1893 to 2016 124 years

Portion with two or more series is 1894 to 2016 123 years

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

\*C\* Number of dated series 35 \*C\*

\*O\* Master series 1893 2016 124 yrs \*O\*

\*F\* Total rings in all series 2827 \*F\*

\*E\* Total dated rings checked 2826 \*E\*

\*C\* Series intercorrelation .775 \*C\*

\*H\* Average mean sensitivity .220 \*H\*

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

\*\*\* Mean length of series 80.8 \*\*\*

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

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

No ring measurements of zero value

1900 .587 5 1950 -.542 25 2000 -.678 35

1901 -1.571 5 1951 1.516 26 2001 -1.092 35

1902 2.050 5 1952 .404 27 2002 -.053 35

1903 -.324 7 1953 -2.315 29 2003 -2.274 35

1904 -.814 7 1954 -2.086 29 2004 .279 35

1905 1.786 8 1955 -.656 29 2005 .622 35

1906 1.061 8 1956 .699 30 2006 .321 35

1907 .061 8 1957 .133 31 2007 .430 35

1908 -1.519 8 1958 1.059 31 2008 1.165 35

1909 -.847 8 1959 .711 32 2009 .950 35

1910 .391 8 1960 -.669 32 2010 .195 35

1911 -.914 8 1961 -.064 32 2011 -1.029 35

1912 -.464 8 1962 -.411 32 2012 -.343 35

1913 -.166 8 1963 -.565 32 2013 -.258 35

1914 -.578 8 1964 .177 32 2014 .475 35

1915 -.534 8 1965 -.460 32 2015 1.554 35

1916 .468 8 1966 -1.325 32 2016 -1.452 35

1917 .890 8 1967 .795 33

1918 .713 9 1968 -.020 34

1919 -1.154 9 1969 1.034 34

1920 1.734 10 1970 .294 34

1921 -.477 10 1971 1.042 34

1922 .936 10 1972 1.254 34

1923 -.458 10 1973 1.667 34

1924 .222 10 1974 .811 35

1925 1.101 10 1975 .012 35

1926 .373 10 1976 .319 35

1927 -.020 10 1977 -.446 35

1928 .641 10 1978 .242 35

1929 .424 10 1979 -1.767 35

1930 .436 10 1980 -2.390 35

1931 .342 10 1981 -.441 35

1932 -.405 10 1982 .032 35

1933 -2.322 10 1983 -2.050 35

1934 -1.537 10 1984 -.356 35

1935 -1.237 10 1985 .674 35

1936 -1.753 10 1986 .398 35

1937 -1.158 10 1987 1.370 35

1938 -.096 10 1988 -.593 35

1939 1.125 10 1989 -.041 35

1940 .679 12 1990 1.353 35

1941 -.210 13 1991 -.081 35

1942 .353 18 1992 .558 35

1893 -1.976 1 1943 .618 19 1993 -.209 35

1894 .065 3 1944 -.536 21 1994 .321 35

1895 -1.039 5 1945 1.034 21 1995 -1.879 35

1896 -.030 5 1946 -.025 21 1996 .847 35

1897 .758 5 1947 1.862 21 1997 -.168 35

1898 .467 5 1948 .908 22 1998 2.100 35

1899 .462 5 1949 -.174 24 1999 .692 35

PART 5: CORRELATION OF SERIES BY SEGMENTS: QURU\_STAL\_EWLWTOTAL\_ORIGINAL-50 12:17 Thu 01 Mar 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 1875 1900 1925 1950 1975

1924 1949 1974 1999 2024

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

1 1631A 1949 2016 .86 .86 .81

2 1631B 1940 2016 .80 .84 .72

3 1632A 1952 2016 .83 .86

4 1632B 1957 2016 .83 .86

5 1633A 1943 2016 .87 .90 .90

6 1633B 1944 2016 .85 .86 .75

7 1634A 1953 2016 .62 .71

8 1634B 1968 2016 .73

9 1651A 1895 2016 .77 .78 .89 .88 .85

10 1651B 1905 2016 .90 .93 .92 .86

11 1652A 1942 2016 .93 .94 .94

12 1652B 1942 2016 .86 .87 .84

13 1653A 1940 2016 .83 .87 .87

14 1653B 1942 2016 .84 .85 .83

15 1744A 1942 2016 .45 .39 .38

16 1744B 1974 2016 .66

17 1744C 1941 2016 .61 .49 .35

18 1745A 1944 2016 .80 .83 .84

19 1745B 1951 2016 .81 .82

20 1746A 1967 2016 .82

21 1746B 1959 2016 .84 .83

22 1747A 1956 2016 .84 .81

23 1747B 1953 2016 .79 .92

24 1748A 1894 2016 .66 .72 .73 .70 .71

25 1748B 1894 2016 .73 .76 .79 .74 .75

26 1750A 1918 2016 .79 .84 .89 .89

27 1750B 1895 2016 .58 .65 .76 .86 .88

28 1751A 1903 2016 .63 .80 .90 .85

29 1751B 1893 2016 .65 .72 .82 .87 .88

30 1752A 1942 2016 .90 .90 .94

31 1752B 1948 2016 .82 .83 .84

32 1753A 1950 2016 .61 .66

33 1753B 1949 2016 .67 .66 .76

34 1754A 1903 2016 .68 .81 .78 .74

35 1754B 1920 2016 .64 .64 .77 .81

Av segment correlation .68 .73 .80 .79 .80

PART 6: POTENTIAL PROBLEMS: QURU\_STAL\_EWLWTOTAL\_ORIGINAL-50 12:17 Thu 01 Mar 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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1631A 1949 to 2016 68 years Series 1

[B] Entire series, effect on correlation ( .832) is:

Lower 2009< -.016 1986< -.012 2003> -.010 2002< -.010 1957< -.007 1995> -.006 Higher 1953 .029 1980 .008

1631A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1949 223

1950 203 357 222 106 140 202 254 170 243 189

1960 164 178 156 179 210 200 153 243 209 192

1970 192 205 228 259 198 173 162 123 159 107

1980 80 115 140 94 103 124 95 160 113 116

1990 154 132 169 127 110 89 131 139 201 163

2000 97 77 76 74 120 129 106 148 153 100

2010 105 96 109 103 125 157 98

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1631B 1940 to 2016 77 years Series 2

[B] Entire series, effect on correlation ( .760) is:

Lower 1986< -.030 2003> -.023 2009< -.018 1944< -.012 1946< -.010 1969< -.008 Higher 1953 .041 1980 .014

1631B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1940 318 232 237 272 147 274 153 252 219 181

1950 189 287 168 81 97 181 226 157 197 188

1960 131 139 133 154 179 149 115 157 122 123

1970 131 152 160 159 146 124 126 88 94 71

1980 59 90 95 67 75 79 55 103 76 82

1990 108 79 105 91 75 54 99 83 122 108

2000 76 64 63 68 75 89 76 82 92 68

2010 68 80 83 100 105 134 68

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1632A 1952 to 2016 65 years Series 3

[B] Entire series, effect on correlation ( .817) is:

Lower 1953> -.036 2016> -.012 1980< -.006 2006< -.005 1964< -.005 2010> -.004 Higher 1983 .017 1995 .012

1632A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1952 243 115 78 151 228 201 241 196

1960 123 140 155 116 126 142 122 168 123 138

1970 123 126 133 180 132 97 123 89 106 65

1980 56 94 99 59 86 115 92 92 75 82

1990 121 76 91 85 103 64 120 85 169 128

2000 89 100 110 80 129 127 101 113 156 178

2010 161 101 109 118 135 208 109

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1632B 1957 to 2016 60 years Series 4

[B] Entire series, effect on correlation ( .845) is:

Lower 2003> -.023 1964< -.007 1993< -.006 1988< -.006 1966> -.004 1976> -.003 Higher 1983 .018 2016 .012

1632B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1957 267 312 246

1960 133 144 121 94 97 116 103 142 130 173

1970 132 154 164 157 146 111 148 105 115 72

1980 75 108 110 74 115 131 124 126 82 113

1990 127 102 113 83 104 74 136 99 161 129

2000 90 100 106 89 164 149 168 144 156 133

2010 111 96 113 110 110 154 85

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1633A 1943 to 2016 74 years Series 5

[B] Entire series, effect on correlation ( .886) is:

Lower 1980> -.010 1943< -.007 2002> -.007 2012< -.005 1949> -.005 1963< -.004 Higher 2003 .009 1983 .008

1633A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1943 168 110 324 238 492 400 317

1950 225 347 261 128 125 215 290 289 297 254

1960 185 200 219 168 187 184 162 277 222 281

1970 239 256 256 234 224 185 204 155 200 138

1980 142 163 152 109 138 171 172 169 112 126

1990 160 127 148 117 145 97 175 149 240 181

2000 137 141 221 120 179 187 174 154 189 173

2010 155 139 130 150 165 205 123

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1633B 1944 to 2016 73 years Series 6

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

Lower 2008< -.031 1979> -.013 2001> -.012 1977< -.011 2007< -.008 2000> -.007 Higher 1983 .019 1953 .019

1633B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1944 143 297 188 405 261 248

1950 205 314 214 115 127 172 233 220 220 205

1960 137 124 115 123 139 140 111 193 138 171

1970 134 142 129 139 136 102 120 88 108 98

1980 81 114 109 77 94 117 106 139 86 94

1990 145 103 117 105 140 87 142 141 177 166

2000 133 146 174 94 160 149 107 105 97 112

2010 131 98 123 127 158 149 98

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1634A 1953 to 2016 64 years Series 7

[B] Entire series, effect on correlation ( .672) is:

Lower 1983> -.062 1974< -.025 1953> -.022 1993> -.012 1964< -.007 1997< -.006 Higher 2016 .032 1979 .022

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

1983 +3.8 SD

1634A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1953 193 186 222 304 257 291 234

1960 179 215 200 192 182 223 208 258 202 285

1970 270 271 271 247 161 165 213 192 179 116

1980 121 158 193 238 256 244 253 262 192 232

1990 302 228 249 297 266 220 266 211 307 260

2000 217 196 232 204 223 269 227 223 274 305

2010 267 203 232 222 238 245 167

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1634B 1968 to 2016 49 years Series 8

[B] Entire series, effect on correlation ( .725) is:

Lower 1978< -.023 2000< -.020 1983> -.019 1995> -.017 1972< -.009 1993> -.006 Higher 2016 .036 1979 .020

1634B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1968 205 278

1970 257 280 235 242 218 185 245 192 159 135

1980 140 213 224 202 246 278 288 292 239 281

1990 330 287 319 313 308 257 289 234 322 263

2000 183 168 224 196 245 249 260 261 302 279

2010 245 212 228 203 232 221 167

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1651A 1895 to 2016 122 years Series 9

[B] Entire series, effect on correlation ( .830) is:

Lower 1995> -.011 1903< -.008 1904< -.007 1901> -.006 2011> -.004 2013> -.004 Higher 1953 .010 2016 .009

1651A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1895 255 304 287 242 237

1900 232 171 250 119 98 159 170 132 85 73

1910 91 69 83 85 85 83 84 98 111 80

1920 142 83 117 86 93 109 80 84 91 97

1930 102 108 91 59 77 77 69 74 98 221

1940 195 184 242 295 197 245 189 295 241 145

1950 149 279 189 89 82 108 158 135 181 191

1960 136 146 128 141 146 106 105 178 163 152

1970 137 165 174 184 161 142 124 117 143 103

1980 85 94 104 76 104 118 95 119 95 100

1990 120 104 113 95 113 97 121 103 141 117

2000 97 86 104 71 101 117 110 117 121 120

2010 101 109 104 129 119 138 83

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1651B 1905 to 2016 112 years Series 10

[B] Entire series, effect on correlation ( .872) is:

Lower 2006< -.011 1908> -.010 2011> -.008 1916< -.008 2013> -.005 1997> -.003 Higher 1953 .010 2003 .008

1651B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1905 206 151 122 105 82

1910 94 72 89 87 84 73 70 84 87 62

1920 130 76 99 81 99 125 91 88 104 111

1930 119 119 110 74 87 90 83 96 135 195

1940 182 158 212 232 189 235 194 305 263 170

1950 156 314 218 100 90 104 153 180 237 226

1960 172 174 176 180 208 149 155 239 220 218

1970 218 239 241 292 239 197 174 144 163 115

1980 92 112 122 88 116 136 131 147 102 114

1990 119 105 115 102 117 78 141 125 169 137

2000 119 112 115 80 104 111 91 123 122 130

2010 107 118 117 138 116 149 70

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1652A 1942 to 2016 75 years Series 11

[B] Entire series, effect on correlation ( .921) is:

Lower 1994< -.005 1961> -.005 2000< -.005 1942< -.004 1960> -.004 2010> -.003 Higher 1953 .011 1995 .006

1652A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1942 87 110 78 261 175 208 191 122

1950 107 232 167 60 82 106 199 194 227 244

1960 202 267 206 191 208 177 178 305 241 284

1970 240 310 330 384 351 253 256 218 280 164

1980 148 233 260 158 257 275 267 335 226 263

1990 363 237 279 250 220 162 267 250 380 298

2000 194 216 254 189 303 317 340 301 383 425

2010 383 249 265 266 307 404 207

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1652B 1942 to 2016 75 years Series 12

[B] Entire series, effect on correlation ( .857) is:

Lower 1969< -.016 2000< -.013 1943< -.010 2003> -.006 1970< -.004 1998< -.004 Higher 1953 .022 1983 .012

1652B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1942 195 116 79 202 150 258 187 109

1950 112 204 153 56 51 127 194 123 146 153

1960 127 127 110 101 132 114 105 140 110 102

1970 99 130 190 184 181 144 136 127 142 96

1980 93 141 154 104 145 155 164 198 155 183

1990 199 175 187 142 149 111 150 136 175 180

2000 109 117 144 112 153 190 194 208 243 237

2010 219 144 144 159 169 208 118

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1653A 1940 to 2016 77 years Series 13

[B] Entire series, effect on correlation ( .856) is:

Lower 1941< -.020 1967< -.012 2007< -.007 1974> -.004 1948< -.003 1963> -.003 Higher 1953 .023 2016 .010

1653A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1940 537 354 425 590 446 472 380 597 393 349

1950 253 383 287 127 108 209 303 268 313 349

1960 240 222 199 209 180 150 147 147 153 192

1970 175 192 231 248 265 210 174 134 147 108

1980 87 127 128 85 121 147 167 177 130 132

1990 156 115 130 109 152 99 223 151 180 147

2000 101 90 131 91 127 146 147 129 167 205

2010 170 147 170 166 196 243 140

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1653B 1942 to 2016 75 years Series 14

[B] Entire series, effect on correlation ( .840) is:

Lower 1967< -.017 2003< -.014 1942< -.007 1988> -.006 1982< -.005 1948< -.003 Higher 1983 .012 1953 .010

1653B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1942 340 492 344 433 318 496 337 275

1950 247 365 282 126 117 152 247 300 334 364

1960 243 238 188 195 208 174 156 156 190 227

1970 208 220 236 238 245 210 203 170 192 141

1980 113 146 133 100 130 171 155 195 164 163

1990 177 167 168 144 192 130 214 160 186 184

2000 126 137 150 79 146 189 174 157 186 216

2010 187 146 148 139 169 233 119

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1744A 1942 to 2016 75 years Series 15

[B] Entire series, effect on correlation ( .456) is:

Lower 1996< -.051 1983> -.028 1974< -.018 1943< -.015 2011> -.013 1976< -.012 Higher 1953 .102 2016 .038

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

1983 +3.7 SD; 1996 -4.7 SD

1744A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1942 141 90 127 119 158 289 233 218

1950 144 182 200 58 49 126 128 113 129 111

1960 142 180 220 221 211 216 186 194 176 226

1970 208 195 219 231 191 238 197 229 200 185

1980 190 204 247 230 263 271 256 234 175 181

1990 185 180 200 172 164 160 130 129 161 164

2000 161 132 155 146 209 221 202 203 224 251

2010 202 227 254 200 223 285 211

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1744B 1974 to 2016 43 years Series 16

[B] Entire series, effect on correlation ( .659) is:

Lower 1983> -.056 1977> -.020 2012> -.017 1975> -.012 1996< -.012 1991> -.011 Higher 2016 .056 1979 .029

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

2012 +3.8 SD

1744B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1974 269 342 299 356 295 245

1980 245 287 322 329 344 430 406 406 289 341

1990 398 412 383 395 337 289 331 310 404 346

2000 354 316 422 346 456 486 475 435 445 552

2010 500 463 619 445 450 507 341

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1744C 1941 to 2016 76 years Series 17

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

Lower 1996< -.065 2003> -.039 1995> -.036 1983> -.035 1943< -.015 1941> -.008 Higher 1953 .103 1979 .027

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

1995 1996 -4.4 SD

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

1983 +4.6 SD; 1995 +3.3 SD; 2003 +3.4 SD

1744C Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1941 257 214 131 101 147 198 282 232 206

1950 158 188 210 66 41 98 108 93 115 115

1960 125 166 171 184 181 174 147 182 183 216

1970 198 218 201 218 196 215 202 200 196 167

1980 174 206 262 242 213 245 262 241 173 158

1990 170 164 184 146 169 182 133 137 179 161

2000 142 144 171 184 220 243 222 212 199 214

2010 182 172 213 181 204 263 217

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1745A 1944 to 2016 73 years Series 18

[B] Entire series, effect on correlation ( .818) is:

Lower 1976< -.011 1947< -.009 1974< -.007 1995< -.007 1948< -.006 1959< -.005 Higher 2003 .019 1983 .012

1745A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1944 195 313 186 224 178 169

1950 171 391 218 101 143 234 321 286 298 189

1960 150 195 165 166 175 198 162 224 177 189

1970 186 222 261 211 149 150 123 141 192 129

1980 114 145 171 108 197 236 253 258 157 191

1990 225 204 254 215 262 137 254 204 346 271

2000 243 234 262 159 236 262 321 302 356 276

2010 310 181 198 212 249 278 168

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1745B 1951 to 2016 66 years Series 19

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

Lower 1995< -.025 1953> -.015 2004< -.009 1994> -.007 2010> -.006 2006> -.005 Higher 1983 .015 1979 .010

1745B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1951 427 197 109 134 192 248 241 288 210

1960 146 158 163 157 158 187 159 232 173 252

1970 219 275 267 228 197 154 185 128 142 87

1980 83 107 125 74 126 168 144 161 103 101

1990 124 105 136 116 172 80 128 118 169 137

2000 125 120 128 106 119 171 192 160 180 156

2010 186 123 139 137 173 201 135

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1746A 1967 to 2016 50 years Series 20

[B] Entire series, effect on correlation ( .823) is:

Lower 1967< -.022 2001< -.015 1995> -.012 1978< -.010 1993> -.009 2012< -.008 Higher 2003 .025 2016 .024

1746A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1967 268 255 343

1970 324 316 300 286 303 217 248 173 144 106

1980 101 147 174 122 159 232 253 216 134 148

1990 215 176 218 234 210 167 300 233 331 259

2000 187 142 204 152 268 255 224 249 297 294

2010 232 218 204 271 301 361 240

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1746B 1959 to 2016 58 years Series 21

[B] Entire series, effect on correlation ( .822) is:

Lower 2000> -.014 2016> -.010 1985< -.008 2010< -.005 2005< -.004 1984< -.004 Higher 1983 .017 1980 .011

1746B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1959 380

1960 210 290 273 225 241 223 170 248 241 323

1970 271 267 227 222 228 186 184 156 173 100

1980 90 145 178 108 128 143 163 190 141 169

1990 219 170 242 227 257 173 354 234 372 291

2000 279 231 234 183 306 252 249 249 371 314

2010 209 200 203 254 324 360 191

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1747A 1956 to 2016 61 years Series 22

[B] Entire series, effect on correlation ( .770) is:

Lower 2016> -.076 1962> -.010 1966< -.009 1965> -.008 2000> -.006 1959< -.005 Higher 2003 .035 1980 .019

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

2016 +3.1 SD

1747A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1956 298 236 244 229

1960 201 232 273 214 267 261 168 270 231 251

1970 217 273 277 309 283 258 238 185 190 150

1980 127 203 205 144 209 217 248 241 161 188

1990 291 209 240 204 224 159 245 218 275 205

2000 201 153 204 124 270 229 227 223 283 322

2010 216 155 207 187 310 376 354

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1747B 1953 to 2016 64 years Series 23

[B] Entire series, effect on correlation ( .822) is:

Lower 1966< -.046 1953> -.032 1962> -.008 1965> -.004 1978< -.004 1970< -.004 Higher 2003 .019 1995 .014

1747B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1953 140 106 202 350 352 372 362

1960 272 335 391 303 359 366 233 406 348 436

1970 330 362 409 427 381 303 355 251 243 179

1980 175 229 234 174 252 283 314 309 215 259

1990 338 226 223 191 224 149 269 238 307 236

2000 198 180 224 139 190 199 221 239 263 264

2010 197 137 158 140 169 209 125

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1748A 1894 to 2016 123 years Series 24

[B] Entire series, effect on correlation ( .711) is:

Lower 1939< -.015 1982< -.009 2009< -.008 1979> -.008 1995> -.007 1940< -.006 Higher 2003 .016 1933 .014

1748A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1894 238 169 220 239 258 350

1900 319 230 380 247 253 396 269 190 159 188

1910 239 171 177 171 132 208 249 225 273 122

1920 202 116 167 109 180 245 180 190 230 178

1930 182 166 164 99 127 133 119 164 210 143

1940 131 141 196 305 180 315 200 312 240 132

1950 128 217 200 115 103 141 169 163 213 184

1960 140 138 123 102 139 93 92 136 146 139

1970 142 115 144 157 97 91 90 93 113 84

1980 69 84 60 47 57 76 63 87 70 86

1990 130 80 70 81 83 76 102 95 127 88

2000 79 83 90 62 93 94 104 84 112 87

2010 90 88 91 97 115 130 81

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1748B 1894 to 2016 123 years Series 25

[B] Entire series, effect on correlation ( .748) is:

Lower 1982< -.013 1988> -.010 1917< -.010 1953> -.008 1932> -.006 1985< -.006 Higher 2003 .016 1983 .010

1748B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1894 285 216 249 279 301 338

1900 329 237 408 260 245 398 297 231 190 193

1910 238 163 194 189 161 195 200 146 199 104

1920 158 100 139 108 114 168 131 137 167 144

1930 163 138 159 76 114 130 98 151 175 180

1940 156 157 201 316 185 287 172 323 266 199

1950 175 310 277 154 144 174 252 216 269 259

1960 161 172 150 151 185 148 120 177 158 174

1970 136 157 172 159 106 97 119 119 109 86

1980 75 97 72 65 73 84 99 105 114 130

1990 147 112 123 106 121 105 139 141 173 131

2000 129 138 147 112 145 148 171 157 175 138

2010 146 118 137 143 180 184 103

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1750A 1918 to 2016 99 years Series 26

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

Lower 1919> -.028 1957< -.009 1933> -.007 1930< -.005 1970< -.004 1928< -.004 Higher 1953 .018 2003 .010

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

1919 +3.3 SD

1750A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1918 61 62

1920 97 48 58 42 52 59 76 67 64 82

1930 66 97 73 51 66 62 56 47 154 354

1940 318 251 266 253 193 241 223 397 317 236

1950 191 301 242 105 129 163 209 147 201 195

1960 145 165 154 143 171 139 129 154 137 153

1970 128 155 160 194 173 132 137 123 144 100

1980 84 90 120 72 105 104 95 129 101 125

1990 137 116 134 107 108 74 155 133 196 144

2000 104 103 119 78 103 107 114 115 132 147

2010 140 109 111 127 137 145 85

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1750B 1895 to 2016 122 years Series 27

[B] Entire series, effect on correlation ( .760) is:

Lower 1965< -.019 1899< -.011 1901< -.009 1925< -.009 1986< -.008 1933> -.008 Higher 1953 .025 1995 .011

1750B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1895 214 240 244 244 141

1900 141 77 159 98 77 104 102 89 69 68

1910 67 59 52 51 36 37 51 64 48 33

1920 66 45 45 32 37 36 55 61 53 65

1930 71 102 50 48 63 54 64 59 160 310

1940 279 199 254 274 219 331 229 321 262 201

1950 184 314 222 101 131 188 241 227 236 273

1960 207 209 171 165 196 125 135 178 175 185

1970 165 216 223 242 211 198 172 138 210 136

1980 108 137 144 97 126 157 115 165 123 146

1990 165 151 174 145 154 104 177 159 216 185

2000 138 143 126 103 142 137 136 140 159 184

2010 157 130 143 163 176 188 118

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1751A 1903 to 2016 114 years Series 28

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

Lower 1921> -.018 1919> -.018 1925< -.009 2009< -.006 1931< -.005 1918< -.005 Higher 1953 .016 2016 .013

1751A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1903 114 111 183 162 115 87 83

1910 90 79 65 71 59 50 56 54 41 42

1920 53 46 44 34 37 29 36 48 40 40

1930 37 34 29 23 37 34 36 31 121 293

1940 262 218 262 286 245 382 251 400 265 198

1950 196 312 247 130 148 188 230 224 257 255

1960 179 212 201 183 233 166 165 215 184 219

1970 165 188 205 235 209 136 188 145 163 102

1980 89 124 132 85 115 156 132 167 128 121

1990 170 124 110 108 137 96 120 111 140 112

2000 111 104 115 87 102 108 109 119 109 99

2010 106 101 95 98 107 109 79

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1751B 1893 to 2016 124 years Series 29

[\*] Early part of series cannot be checked from 1893 to 1893 -- not matched by another series

[B] Entire series, effect on correlation ( .805) is:

Lower 1915< -.013 1926> -.010 1895> -.010 1921> -.008 1923> -.007 1992< -.006 Higher 1953 .019 2003 .011

1751B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1893 138 180 171 152 220 153 145

1900 161 97 250 149 134 218 150 131 82 93

1910 115 75 66 64 57 43 56 54 45 38

1920 45 38 42 39 34 38 57 36 51 43

1930 44 38 26 27 42 37 30 41 105 208

1940 233 165 211 198 178 333 250 386 269 197

1950 198 277 224 122 169 182 232 258 290 250

1960 178 201 191 185 234 163 191 243 227 311

1970 252 277 275 320 254 195 209 162 187 141

1980 101 158 163 109 148 204 177 225 156 138

1990 213 148 147 174 222 142 205 154 259 184

2000 182 150 181 127 176 175 158 183 171 173

2010 170 133 136 149 150 173 97

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1752A 1942 to 2016 75 years Series 30

[B] Entire series, effect on correlation ( .904) is:

Lower 1962> -.009 1959< -.007 1965> -.007 1955< -.004 1942< -.003 1963> -.003 Higher 1953 .015 1983 .006

1752A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1942 250 283 220 272 278 452 323 222

1950 192 323 208 116 146 158 224 211 263 210

1960 197 277 300 271 288 286 212 323 291 338

1970 273 284 297 315 267 213 252 190 218 153

1980 141 189 218 136 183 208 244 286 190 218

1990 341 197 201 168 222 152 295 203 370 246

2000 199 179 212 145 227 247 214 272 323 247

2010 186 145 168 159 198 225 127

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1752B 1948 to 2016 69 years Series 31

[B] Entire series, effect on correlation ( .818) is:

Lower 1954> -.015 1975< -.015 2003> -.012 1965> -.010 1995> -.009 1966> -.006 Higher 1953 .028 1983 .012

1752B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1948 354 250

1950 214 319 239 124 204 187 203 180 238 212

1960 160 176 183 160 235 225 181 255 204 237

1970 164 206 201 202 177 109 150 117 130 98

1980 89 124 142 91 121 144 172 209 133 165

1990 242 178 184 128 206 145 314 178 271 189

2000 139 113 165 136 195 176 183 213 247 229

2010 163 118 145 148 168 200 125

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1753A 1950 to 2016 67 years Series 32

[B] Entire series, effect on correlation ( .673) is:

Lower 1986< -.111 1972< -.026 1976< -.010 1960> -.007 1964< -.005 1966> -.004 Higher 1983 .029 1995 .028

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

1986 -4.7 SD

1753A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1950 169 264 210 124 110 185 210 247 314 285

1960 237 229 178 227 192 192 197 210 238 252

1970 232 255 174 186 173 173 149 161 184 148

1980 138 158 148 112 136 171 108 213 169 176

1990 217 173 203 185 195 129 222 211 264 229

2000 172 174 201 151 256 229 217 213 212 192

2010 190 159 184 198 252 278 154

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1753B 1949 to 2016 68 years Series 33

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

Lower 1976< -.027 1953> -.019 1964< -.018 1954> -.012 1962< -.012 1989< -.011 Higher 1983 .027 2003 .024

1753B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1949 170

1950 162 283 224 151 178 253 279 226 257 229

1960 191 193 136 160 143 131 142 197 182 174

1970 166 227 223 250 210 199 141 187 217 155

1980 142 174 199 148 204 201 195 241 208 154

1990 194 188 181 238 200 117 207 215 350 236

2000 154 184 177 135 198 227 228 230 223 198

2010 189 160 160 175 237 303 190

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1754A 1903 to 2016 114 years Series 34

[B] Entire series, effect on correlation ( .684) is:

Lower 1918< -.019 1908< -.015 1903> -.013 1919< -.013 2016> -.012 2014< -.012 Higher 1933 .021 1983 .013

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

1919 -4.8 SD

1754A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1903 135 99 133 111 85 51 84

1910 104 81 87 81 95 85 85 108 65 39

1920 84 62 93 71 87 130 78 80 101 97

1930 102 106 84 43 51 73 59 84 77 107

1940 117 83 102 122 88 109 81 150 122 74

1950 84 160 142 48 40 75 106 68 115 109

1960 138 121 85 123 226 177 193 353 257 437

1970 382 391 383 417 356 247 313 272 325 178

1980 134 170 198 109 112 200 249 233 223 217

1990 226 185 227 163 131 100 197 143 328 202

2000 172 144 184 141 151 173 165 164 200 198

2010 149 109 148 126 108 191 135

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1754B 1920 to 2016 97 years Series 35

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

Lower 1927< -.030 1926< -.011 1965> -.011 1994< -.009 1985< -.008 1957< -.007 Higher 1933 .022 1953 .019

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

1965 +3.0 SD

1754B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1920 140 91 139 112 116 144 89 61 104 104

1930 114 108 99 55 51 73 69 81 74 93

1940 67 52 97 86 84 127 83 127 107 71

1950 69 114 75 30 29 45 96 60 85 108

1960 122 113 113 210 291 326 201 252 166 261

1970 283 297 326 436 366 264 357 301 291 152

1980 126 195 200 118 137 140 210 286 209 226

1990 260 203 259 195 148 113 164 154 273 195

2000 181 177 199 157 211 210 174 247 283 308

2010 222 151 198 205 172 273 147

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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 ()

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

1 1631A 1949 2016 68 3 0 .832 1.53 3.57 .542 .617 .231 2.68 .495 .073 1

2 1631B 1940 2016 77 3 0 .760 1.27 3.18 .610 .719 .231 2.63 .495 .039 1

3 1632A 1952 2016 65 2 0 .817 1.23 2.43 .422 .499 .267 2.77 .514 .044 1

4 1632B 1957 2016 60 2 0 .845 1.27 3.12 .434 .651 .220 2.54 .600 -.007 2

5 1633A 1943 2016 74 3 0 .886 1.94 4.92 .710 .578 .235 2.75 .590 -.024 1

6 1633B 1944 2016 73 3 0 .785 1.46 4.05 .578 .570 .234 2.69 .635 -.003 1

7 1634A 1953 2016 64 2 0 .672 2.28 3.07 .431 .482 .160 2.58 .488 .034 1

8 1634B 1968 2016 49 1 0 .725 2.41 3.30 .479 .639 .143 2.49 .499 .107 1

9 1651A 1895 2016 122 5 0 .830 1.33 3.04 .560 .747 .202 2.74 .423 .056 2

10 1651B 1905 2016 112 4 0 .872 1.40 3.14 .563 .761 .197 2.81 .490 .001 2

11 1652A 1942 2016 75 3 0 .921 2.40 4.25 .804 .584 .258 2.63 .592 .039 1

12 1652B 1942 2016 75 3 0 .857 1.49 2.58 .418 .437 .231 2.64 .566 .047 1

13 1653A 1940 2016 77 3 0 .856 2.10 5.97 1.162 .815 .229 2.79 .526 .035 1

14 1653B 1942 2016 75 3 0 .840 2.07 4.96 .845 .729 .208 2.51 .398 -.001 1

15 1744A 1942 2016 75 3 0 .456 1.88 2.89 .487 .681 .164 2.63 .472 -.006 1

16 1744B 1974 2016 43 1 0 .659 3.82 6.19 .831 .642 .140 2.66 .582 .007 1

17 1744C 1941 2016 76 3 0 .477 1.83 2.82 .463 .698 .164 2.59 .441 .072 1

18 1745A 1944 2016 73 3 0 .818 2.14 3.91 .621 .379 .249 2.62 .458 -.058 1

19 1745B 1951 2016 66 2 0 .800 1.63 4.27 .587 .581 .232 2.51 .418 -.092 1

20 1746A 1967 2016 50 1 0 .823 2.28 3.61 .650 .628 .214 2.74 .699 .043 1

21 1746B 1959 2016 58 2 0 .822 2.28 3.80 .688 .493 .221 2.65 .540 .079 1

22 1747A 1956 2016 61 2 0 .770 2.30 3.76 .522 .390 .209 2.59 .528 -.053 1

23 1747B 1953 2016 64 2 0 .822 2.60 4.36 .845 .689 .214 2.53 .507 -.075 1

24 1748A 1894 2016 123 5 0 .711 1.52 3.96 .723 .723 .235 2.72 .417 -.003 1

25 1748B 1894 2016 123 5 0 .748 1.71 4.08 .681 .693 .211 2.62 .430 -.017 1

26 1750A 1918 2016 99 4 0 .846 1.37 3.97 .691 .775 .224 2.71 .486 -.043 1

27 1750B 1895 2016 122 5 0 .760 1.46 3.31 .722 .809 .223 2.72 .472 .010 1

28 1751A 1903 2016 114 4 0 .781 1.35 4.00 .789 .834 .200 2.53 .390 .001 1

29 1751B 1893 2016 124 5 0 .805 1.56 3.86 .773 .789 .236 2.78 .511 .001 2

30 1752A 1942 2016 75 3 0 .904 2.33 4.52 .633 .390 .241 2.81 .574 .033 1

31 1752B 1948 2016 69 3 0 .818 1.82 3.54 .534 .388 .252 2.66 .441 -.003 1

32 1753A 1950 2016 67 2 0 .673 1.95 3.14 .437 .460 .184 2.55 .496 -.086 1

33 1753B 1949 2016 68 3 0 .694 1.97 3.50 .431 .341 .192 2.89 .513 -.012 2

34 1754A 1903 2016 114 4 0 .684 1.49 4.37 .867 .818 .275 2.83 .450 .078 1

35 1754B 1920 2016 97 4 0 .727 1.65 4.36 .866 .811 .266 2.73 .578 .058 1

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Total or mean: 2827 106 0 .775 1.77 6.19 .654 .649 .220 2.89 .496 .011

- = [ COFECHA QURU COF ] = -