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[] P R O G R A M C O F E C H A Version 6.06P 30327

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 QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

 Title of run: PIRU\_SNYDER\_CORR1-50

 File of DATED series: PIRU\_SNYDER\_CORR1

 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 1880 to 2017 138 years

 Continuous time span is 1880 to 2017 138 years

 Portion with two or more series is 1880 to 2017 138 years

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

 \*C\* Number of dated series 38 \*C\*

 \*O\* Master series 1880 2017 138 yrs \*O\*

 \*F\* Total rings in all series 3674 \*F\*

 \*E\* Total dated rings checked 3674 \*E\*

 \*C\* Series intercorrelation .548 \*C\*

 \*H\* Average mean sensitivity .247 \*H\*

 \*A\* Segments, possible problems 7 \*A\*

 \*\*\* Mean length of series 96.7 \*\*\*

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

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

 7B 1 absent rings: 2004

 1 absent rings .027%

 1900 1.338 11 1950 .264 35 2000 -.322 38

 1901 .776 12 1951 -.080 35 2001 .235 38

 1902 .641 12 1952 -.040 35 2002 -.299 38

 1903 .694 12 1953 -.134 35 2003 -2.131 38

 1904 -.278 12 1954 .070 35 2004 -1.892 38 1

 1905 1.276 12 1955 1.011 35 2005 -.849 38

 1906 .053 12 1956 -.420 36 2006 -1.244 38

 1907 .000 12 1957 .374 36 2007 -.186 38

 1908 -.265 12 1958 .826 36 2008 .141 38

 1909 -.715 12 1959 -.341 36 2009 1.383 38

 1910 .580 12 1960 -.648 36 2010 2.043 38

 1911 -1.082 12 1961 .138 38 2011 1.287 38

 1912 1.187 12 1962 -2.343 38 2012 1.036 38

 1913 1.356 12 1963 -.244 38 2013 -.457 38

 1914 -.655 13 1964 .124 38 2014 .279 38

 1915 1.433 13 1965 .489 38 2015 -.500 38

 1916 .664 13 1966 -.079 38 2016 -.709 38

 1917 -.098 13 1967 .529 38 2017 -.049 38

 1918 -.183 14 1968 .425 38

 1919 -.930 14 1969 .546 38

 1920 -.362 14 1970 .767 38

 1921 -.317 14 1971 .636 38

 1922 -.736 17 1972 -.410 38

 1923 -1.016 18 1973 -.223 38

 1924 -.563 18 1974 -1.652 38

 1925 .000 18 1975 -1.201 38

 1926 .043 19 1976 .027 38

 1927 .689 19 1977 -.769 38

 1928 .271 21 1978 -.441 38

 1929 .526 22 1979 -1.290 38

 1880 .079 2 1930 .293 23 1980 .254 38

 1881 -3.203 2 1931 .878 24 1981 -.397 38

 1882 .565 2 1932 1.219 24 1982 -1.176 38

 1883 2.464 2 1933 -.217 27 1983 .201 38

 1884 .342 2 1934 .143 27 1984 -.996 38

 1885 .913 2 1935 -.773 28 1985 .079 38

 1886 1.312 2 1936 -.786 29 1986 .541 38

 1887 .481 4 1937 -.444 30 1987 1.023 38

 1888 .366 4 1938 .521 30 1988 .579 38

 1889 1.090 6 1939 -.054 30 1989 -.113 38

 1890 .702 6 1940 .339 30 1990 .929 38

 1891 .850 6 1941 1.073 30 1991 .300 38

 1892 .071 6 1942 .986 31 1992 1.571 38

 1893 -3.638 6 1943 -1.139 31 1993 1.593 38

 1894 -1.257 6 1944 .191 31 1994 .338 38

 1895 -3.856 6 1945 1.245 32 1995 -.807 38

 1896 -.457 7 1946 -.828 34 1996 -.622 38

 1897 -.284 8 1947 .222 34 1997 -.553 38

 1898 1.176 9 1948 -2.616 34 1998 .506 38

 1899 -.080 10 1949 -.130 34 1999 .989 38

PART 5: CORRELATION OF SERIES BY SEGMENTS: PIRU\_SNYDER\_CORR1-50 11:05 Wed 10 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 1875 1900 1925 1950 1975

 1924 1949 1974 1999 2024

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

 1 1A 1937 2017 .41 .32B .54

 2 1B 1933 2017 .33 .27B .61

 3 2A 1935 2017 .57 .56 .60

 4 2B 1933 2017 .48 .56 .47

 5 3A 1923 2017 .60 .58 .69 .56

 6 3B 1942 2017 .61 .70 .68

 7 4A 1946 2017 .55 .42 .44

 8 4B 1946 2017 .63 .50 .39

 9 5A 1961 2017 .38 .34

 10 5B 1950 2017 .57 .48

 11 6A 1897 2017 .39 .47 .45 .55 .57

 12 6B 1896 2017 .54 .59 .68 .68 .61

 13 7A 1945 2017 .42 .32B .32A

 14 7B 1929 2017 .55 .41 .34

 15 8A 1889 2017 .60 .63 .64 .49 .44

 16 8B 1889 2017 .60 .55 .72 .71 .59

 17 9A 1880 2017 .70 .67 .50 .34 .51

 18 9B 1880 2017 .70 .71 .68 .45 .48

 19 10A 1928 2017 .62 .70 .75

 20 10B 1922 2017 .36 .40 .67 .68

 21 11A 1936 2017 .71 .60 .60

 22 11B 1931 2017 .39 .53 .36

 23 12A 1887 2017 .50 .65 .53 .32B .53

 24 12B 1887 2017 .56 .46 .42 .45 .58

 25 13A 1899 2017 .67 .66 .58 .44 .55

 26 13B 1900 2017 .67 .57 .49 .54

 27 14A 1898 2017 .58 .72 .58 .42 .57

 28 14B 1901 2017 .64 .80 .56 .58

 29 15A 1933 2017 .54 .66 .59

 30 15B 1930 2017 .57 .68 .55

 31 16A 1922 2017 .37 .45 .31A .61

 32 16B 1918 2017 .35 .40 .39 .52

 33 17A 1922 2017 .39 .48 .37 .54

 34 17B 1914 2017 .32A .41 .38 .57

 35 18A 1928 2017 .36 .57 .63

 36 18B 1926 2017 .38 .47 .59

 37 19A 1956 2017 .57 .68

 38 19B 1961 2017 .67 .71

 Av segment correlation .58 .54 .53 .50 .55

PART 6: POTENTIAL PROBLEMS: PIRU\_SNYDER\_CORR1-50 11:05 Wed 10 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

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

 1A 1937 to 2017 81 years Series 1

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

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

 1950 1999 -5 .34 -.21 -.12 .19 .00 .40\*-.12 -.01 .04 .02 .32|-.32 -.14 -.30 -.31 .17 .03 .01 -.01 .00 .01

 [B] Entire series, effect on correlation ( .481) is:

 Lower 1974> -.031 1962> -.024 1989< -.018 1959> -.017 1960> -.016 1954< -.008 Higher 1946 .033 2003 .021

 1950 to 1999 segment:

 Lower 1974> -.052 1962> -.029 1959> -.029 1960> -.026 1964< -.014 1954< -.013 Higher 1984 .047 1993 .020

 1A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1937 385 395 303

 1940 297 280 290 213 261 269 145 248 190 222

 1950 294 226 225 167 171 269 256 260 267 329

 1960 373 292 262 241 234 277 263 272 299 298

 1970 351 377 290 307 320 296 320 270 268 227

 1980 325 275 244 247 127 225 207 245 258 98

 1990 244 182 227 243 170 126 129 126 132 167

 2000 96 121 133 66 106 91 57 102 92 136

 2010 228 203 169 119 161 126 150 93

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

 1B 1933 to 2017 85 years Series 2

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

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

 1950 1999 -5 .12 -.15 -.02 .11 -.13 .37\* .03 -.01 .12 .10 .27|-.16 -.09 -.25 -.38 .04 -.18 -.12 -.05 -.07 .07

 [B] Entire series, effect on correlation ( .458) is:

 Lower 1963< -.034 1964< -.025 1962> -.021 1974> -.018 1983< -.014 1989< -.013 Higher 2003 .035 1946 .028

 1950 to 1999 segment:

 Lower 1963< -.051 1964< -.037 1974> -.028 1962> -.025 1983< -.022 1959> -.019 Higher 1984 .040 1992 .030

 1B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1933 242 243 292 247 317 349 327

 1940 275 238 197 165 260 289 174 236 170 200

 1950 174 141 171 203 242 305 266 247 260 293

 1960 338 291 263 205 189 274 299 258 316 385

 1970 395 342 288 332 306 301 363 273 303 216

 1980 253 200 201 157 108 169 162 223 262 112

 1990 258 205 313 324 212 111 169 229 306 234

 2000 114 187 202 83 108 124 64 95 110 176

 2010 172 166 151 83 145 117 150 107

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

 2A 1935 to 2017 83 years Series 3

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

 Lower 1948> -.050 1953< -.014 1964< -.011 2000> -.010 1939> -.010 1986< -.009 Higher 1943 .026 1946 .022

 2A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1935 205 308 364 407 476

 1940 399 409 358 206 354 409 203 227 247 302

 1950 240 208 321 199 182 283 196 221 335 249

 1960 197 220 163 194 150 141 158 202 175 209

 1970 208 138 120 108 80 74 89 80 115 92

 1980 114 97 63 72 78 69 67 84 148 151

 1990 176 150 206 199 152 87 88 83 128 126

 2000 146 112 120 95 108 133 111 169 248 231

 2010 265 233 159 79 113 116 107 108

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 2B 1933 to 2017 85 years Series 4

 [B] Entire series, effect on correlation ( .476) is:

 Lower 1948> -.055 2000> -.020 1936< -.013 1938< -.012 1985< -.011 1986< -.011 Higher 1962 .068 1943 .019

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

 1948 +3.2 SD

 2B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1933 325 359 371 311 363 340 367

 1940 421 391 420 321 518 460 377 430 386 372

 1950 373 260 306 259 254 261 156 230 216 186

 1960 152 138 91 184 162 203 194 181 209 225

 1970 269 188 165 148 114 141 121 123 132 120

 1980 192 150 145 141 135 97 88 92 148 86

 1990 120 117 132 167 133 75 78 68 89 95

 2000 128 102 111 68 88 75 47 50 74 134

 2010 128 107 85 58 96 72 70 66

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

 3A 1923 to 2017 95 years Series 5

 [B] Entire series, effect on correlation ( .590) is:

 Lower 1974> -.022 1982< -.017 1948> -.016 1946> -.012 1938< -.009 1943> -.008 Higher 1962 .060 1992 .013

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

 1982 -4.8 SD

 3A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1923 60 76 91 84 73 78 71

 1930 55 66 85 50 56 42 45 61 78 164

 1940 202 247 260 214 236 266 248 325 266 262

 1950 348 304 294 282 281 313 289 327 371 292

 1960 302 341 250 374 383 432 399 386 368 455

 1970 397 308 225 308 301 297 274 221 297 208

 1980 254 179 92 149 125 181 190 212 142 143

 1990 171 128 270 284 145 136 140 143 177 173

 2000 71 64 52 38 43 75 79 167 198 237

 2010 296 250 204 168 163 102 94 84

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 3B 1942 to 2017 76 years Series 6

 [B] Entire series, effect on correlation ( .649) is:

 Lower 1948> -.065 1982< -.021 1988< -.013 2006> -.009 1978> -.009 1972> -.008 Higher 1974 .021 1943 .018

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

 1948 +3.1 SD

 3B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1942 268 224 262 363 294 346 322 307

 1950 379 331 282 271 288 343 248 330 349 264

 1960 217 229 186 249 311 454 383 388 417 436

 1970 398 328 343 379 231 296 285 279 352 203

 1980 259 218 127 152 123 199 236 256 160 140

 1990 183 152 216 276 184 142 166 144 167 187

 2000 118 148 95 34 48 114 178 260 358 426

 2010 353 303 227 134 144 82 81 78

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 4A 1946 to 2017 72 years Series 7

 [B] Entire series, effect on correlation ( .498) is:

 Lower 1946> -.024 2003> -.021 1987< -.018 1950< -.017 1999< -.014 1962> -.014 Higher 1948 .110 1992 .016

 4A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1946 213 252 143 197

 1950 144 191 182 210 239 221 199 278 251 97

 1960 73 109 99 92 97 104 111 186 244 209

 1970 189 244 146 186 159 150 236 148 216 218

 1980 306 272 257 278 247 275 291 240 222 258

 1990 289 240 319 271 207 170 253 220 280 224

 2000 269 324 329 257 212 183 135 170 205 244

 2010 280 296 266 230 251 231 245 273

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 4B 1946 to 2017 72 years Series 8

 [B] Entire series, effect on correlation ( .504) is:

 Lower 2003> -.059 2004> -.026 1946> -.018 1999< -.015 1965< -.014 1964< -.012 Higher 1948 .117 1974 .032

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

 2004 +3.8 SD

 4B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1946 215 273 133 199

 1950 179 218 196 172 172 194 131 188 194 118

 1960 109 155 106 95 90 89 96 115 159 128

 1970 158 191 137 150 113 140 166 169 213 189

 1980 185 190 207 250 208 210 219 250 218 242

 1990 335 225 286 237 228 185 217 206 259 211

 2000 147 177 228 308 367 313 252 254 305 337

 2010 292 306 249 197 200 175 208 183

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 5A 1961 to 2017 57 years Series 9

 [B] Entire series, effect on correlation ( .369) is:

 Lower 1974> -.084 1968< -.026 1994> -.017 1985< -.016 2004> -.016 1969< -.014 Higher 1962 .035 2010 .035

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

 1974 +3.6 SD

 5A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1961 230 130 178 137 145 160 164 120 129

 1970 220 255 249 244 339 322 335 287 228 220

 1980 340 248 265 241 255 225 265 259 230 248

 1990 265 252 276 329 322 185 202 187 255 243

 2000 156 223 248 177 256 197 181 216 297 470

 2010 531 296 256 209 217 208 221 286

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 5B 1950 to 2017 68 years Series 10

 [B] Entire series, effect on correlation ( .577) is:

 Lower 1974> -.061 1984> -.025 1982> -.021 2012< -.017 1985< -.015 1956> -.013 Higher 1962 .098 2003 .046

 5B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1950 370 315 320 306 268 310 269 283 254 165

 1960 157 163 91 129 118 119 108 118 113 124

 1970 188 206 135 121 155 120 141 122 146 138

 1980 139 139 173 238 222 175 211 213 189 188

 1990 214 212 243 230 179 132 142 142 199 191

 2000 145 197 216 120 143 156 109 259 240 186

 2010 192 188 133 118 115 116 121 112

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 6A 1897 to 2017 121 years Series 11

 [B] Entire series, effect on correlation ( .486) is:

 Lower 1897< -.040 1974> -.024 1981< -.016 1955< -.011 1919> -.010 1913< -.010 Higher 1962 .042 2003 .025

 6A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1897 106 275 226

 1900 246 172 167 177 134 238 196 224 221 136

 1910 177 64 88 76 46 101 91 47 108 134

 1920 186 175 136 90 112 142 142 138 80 68

 1930 39 36 42 18 36 30 19 16 214 237

 1940 270 258 269 186 168 227 179 168 135 170

 1950 263 233 199 217 154 129 131 150 167 125

 1960 140 177 91 113 114 179 288 301 359 357

 1970 360 349 261 347 349 262 278 201 278 212

 1980 227 135 143 199 177 260 288 312 264 210

 1990 333 261 347 327 217 213 218 240 290 277

 2000 183 279 217 102 64 68 175 365 206 312

 2010 237 185 194 140 229 168 145 257

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 6B 1896 to 2017 122 years Series 12

 [B] Entire series, effect on correlation ( .586) is:

 Lower 2009< -.027 1896< -.021 1943> -.014 2015> -.010 1918> -.007 1919> -.007 Higher 1948 .018 1962 .015

 6B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1896 106 156 243 170

 1900 178 134 116 131 75 150 132 167 150 114

 1910 180 75 111 113 63 94 79 47 94 89

 1920 111 103 70 44 64 65 77 62 47 57

 1930 42 52 40 22 23 15 15 29 33 34

 1940 54 67 94 85 113 146 101 120 71 99

 1950 104 128 132 168 158 188 165 148 167 110

 1960 107 115 87 152 221 202 207 248 267 285

 1970 305 290 216 219 157 154 187 135 220 221

 1980 304 233 223 241 153 231 257 274 226 116

 1990 147 165 232 226 122 122 57 102 125 136

 2000 58 53 38 18 16 40 51 58 70 45

 2010 84 88 89 76 112 129 96 135

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 7A 1945 to 2017 73 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

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

 1950 1999 -8 -.04 -.04 .32\*-.03 .14 -.01 -.16 .08 -.32 -.12 .32|-.21 .19 .02 -.15 -.01 .30 .04 .09 .05 -.10

 1968 2017 0 -.02 .14 .24 .17 -.13 -.07 -.11 -.03 -.16 .21 .32\* - - - - - - - - - -

 [B] Entire series, effect on correlation ( .486) is:

 Lower 1974> -.081 1969< -.039 1970< -.020 1984> -.020 2006> -.013 2000> -.012 Higher 2003 .054 1946 .037

 1950 to 1999 segment:

 Lower 1974> -.141 1969< -.063 1970< -.033 1984> -.032 1981> -.014 1968< -.013 Higher 1962 .070 1982 .040

 1968 to 2017 segment:

 Lower 1974> -.127 1969< -.049 1984> -.031 1970< -.026 2006> -.020 2000> -.019 Higher 2003 .128 1982 .033

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

 1974 +4.1 SD

 7A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1945 374 211 309 225 256

 1950 299 264 278 301 220 292 189 242 275 200

 1960 185 200 137 275 249 177 168 173 112 66

 1970 72 88 150 141 296 154 164 123 123 82

 1980 171 181 74 128 155 140 130 102 91 94

 1990 142 177 147 117 87 43 56 57 90 163

 2000 126 88 94 16 6 44 139 142 114 267

 2010 213 230 136 176 196 145 185 388

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 7B 1929 to 2017 89 years Series 14

 [B] Entire series, effect on correlation ( .451) is:

 Lower 1982< -.069 1943> -.016 1968< -.014 2013> -.012 1972> -.009 1956> -.009 Higher 1962 .056 1948 .023

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

 1981 1982 -4.4 SD

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

 2004 -1.892 38 1

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

 1982 -6.0 SD

 7B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1929 59

 1930 100 120 119 77 139 147 126 222 293 183

 1940 333 394 424 333 387 416 291 277 181 223

 1950 263 281 202 244 218 268 233 210 228 198

 1960 168 171 100 113 112 106 81 91 62 65

 1970 60 77 69 52 38 33 43 34 41 29

 1980 38 39 13 32 29 27 31 31 47 37

 1990 31 27 33 34 34 26 52 46 52 80

 2000 47 51 26 12 0 26 19 28 26 73

 2010 92 99 69 74 44 46 52 66

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 8A 1889 to 2017 129 years Series 15

 [B] Entire series, effect on correlation ( .586) is:

 Lower 1973< -.038 1914> -.014 1989< -.013 1986< -.010 1915< -.009 1911> -.009 Higher 1893 .018 1948 .016

 8A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1889 159

 1890 117 125 88 30 28 22 56 42 63 37

 1900 83 56 31 24 29 45 25 29 11 7

 1910 21 16 29 41 33 24 31 28 27 12

 1920 8 9 8 7 10 147 133 126 139 196

 1930 205 199 218 165 148 133 161 192 267 171

 1940 218 283 214 128 178 216 132 145 118 205

 1950 209 208 206 209 200 232 147 159 194 138

 1960 140 164 124 167 159 138 120 103 94 87

 1970 79 94 80 56 55 52 54 46 43 46

 1980 49 44 42 58 44 42 38 58 60 37

 1990 66 64 97 114 98 61 49 64 67 123

 2000 92 147 181 96 126 88 122 196 190 447

 2010 284 178 104 82 158 89 73 104

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 8B 1889 to 2017 129 years Series 16

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

 Lower 1915< -.016 1911> -.015 1902< -.012 1939> -.011 1916> -.008 1914> -.006 Higher 1893 .024 1962 .021

 8B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1889 158

 1890 109 122 76 19 26 15 29 42 49 34

 1900 56 42 20 28 17 28 17 12 11 5

 1910 17 13 31 27 18 10 31 28 32 14

 1920 10 8 8 7 8 20 36 74 98 90

 1930 131 120 140 130 162 117 131 188 193 309

 1940 335 367 316 233 317 400 299 357 297 283

 1950 318 275 290 262 287 311 268 242 236 196

 1960 179 206 123 180 199 209 176 213 215 218

 1970 174 165 130 106 87 63 74 70 78 92

 1980 130 122 138 149 144 182 206 281 208 162

 1990 183 220 200 202 185 140 133 97 172 204

 2000 127 112 119 98 153 215 199 252 232 339

 2010 325 205 205 127 123 104 86 133

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 9A 1880 to 2017 138 years Series 17

 [B] Entire series, effect on correlation ( .605) is:

 Lower 1899< -.028 1962> -.016 1930< -.011 1967< -.010 2000> -.009 1984> -.007 Higher 1893 .041 1881 .027

 9A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1880 85 54 109 115 78 90 91 76 66 75

 1890 88 96 90 49 73 45 61 62 84 38

 1900 76 71 60 48 47 65 61 63 41 23

 1910 33 23 66 73 40 110 62 44 40 34

 1920 47 43 40 28 31 98 97 118 118 182

 1930 93 139 195 138 156 122 158 152 146 139

 1940 137 187 236 152 176 200 158 177 147 278

 1950 260 277 266 192 175 208 190 171 245 177

 1960 171 161 145 166 157 142 98 79 73 69

 1970 81 59 49 46 39 36 43 43 36 35

 1980 34 34 39 51 50 49 59 67 79 40

 1990 41 50 73 61 59 54 55 44 109 134

 2000 123 109 48 27 33 67 71 60 77 125

 2010 144 119 136 103 104 84 79 78

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 9B 1880 to 2017 138 years Series 18

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

 Lower 1989< -.015 1891< -.012 1956> -.009 1904> -.008 1882< -.008 2000> -.007 Higher 1893 .047 1948 .024

 9B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1880 88 56 72 124 90 85 91 68 59 62

 1890 72 50 55 27 36 28 43 49 58 38

 1900 54 44 52 53 55 78 62 49 25 28

 1910 29 23 47 66 42 98 55 44 36 36

 1920 43 35 27 23 24 25 84 232 180 180

 1930 190 178 220 156 200 142 146 122 164 133

 1940 129 189 182 152 150 163 120 157 119 158

 1950 161 155 181 167 140 188 178 160 216 156

 1960 138 153 100 138 139 102 78 67 59 48

 1970 45 44 32 32 25 21 35 29 27 31

 1980 37 47 46 66 55 90 82 85 73 34

 1990 49 56 75 71 85 78 70 57 104 118

 2000 116 91 62 30 65 58 41 39 59 109

 2010 172 122 130 103 102 110 109 98

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

 10A 1928 to 2017 90 years Series 19

 [B] Entire series, effect on correlation ( .656) is:

 Lower 1929< -.061 1953< -.019 1938< -.016 1982> -.011 1935> -.009 1937> -.007 Higher 1948 .049 1962 .024

 10A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1928 396 283

 1930 303 418 540 454 448 441 451 491 370 404

 1940 445 528 391 280 314 346 271 247 165 244

 1950 319 231 231 136 167 183 112 126 142 109

 1960 77 106 63 152 138 129 121 109 102 88

 1970 97 104 75 65 46 61 70 63 61 58

 1980 100 91 90 122 69 95 86 92 76 75

 1990 111 88 113 129 105 87 69 96 93 100

 2000 61 105 59 34 37 52 29 37 45 93

 2010 92 77 54 34 54 24 15 19

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

 10B 1922 to 2017 96 years Series 20

 [B] Entire series, effect on correlation ( .504) is:

 Lower 1953< -.039 1948> -.029 1926< -.020 1929< -.019 1946> -.018 1933> -.018 Higher 1962 .034 1974 .021

 10B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1922 105 97 117 217 123 222 288 177

 1930 154 252 282 324 288 257 212 169 228 292

 1940 319 423 338 281 326 330 304 312 266 309

 1950 314 270 236 146 194 203 136 127 112 101

 1960 91 97 70 103 109 97 87 101 90 88

 1970 78 89 69 73 59 71 72 76 82 67

 1980 97 98 86 108 80 111 160 231 153 146

 1990 164 172 178 177 140 119 101 97 115 105

 2000 92 125 64 53 32 62 17 31 30 65

 2010 86 52 40 30 32 20 14 18

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 11A 1936 to 2017 82 years Series 21

 [B] Entire series, effect on correlation ( .707) is:

 Lower 1974> -.026 1983< -.017 1946> -.013 1954< -.009 1955< -.009 1936< -.009 Higher 1948 .045 1962 .043

 11A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1936 362 501 533 477

 1940 478 482 424 288 350 405 328 361 234 252

 1950 242 199 224 173 145 141 134 138 128 104

 1960 82 110 63 96 93 86 71 84 81 98

 1970 88 65 54 48 50 39 60 54 37 37

 1980 55 39 34 27 32 41 41 66 72 78

 1990 103 132 135 124 108 77 66 70 90 122

 2000 53 46 36 11 17 31 36 74 68 89

 2010 93 80 104 63 62 50 29 47

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 11B 1931 to 2017 87 years Series 22

 [B] Entire series, effect on correlation ( .422) is:

 Lower 1948> -.058 2006> -.027 1932< -.026 1974> -.014 1937> -.011 1931< -.011 Higher 1962 .104 2003 .020

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

 1948 +3.1 SD; 1962 -4.8 SD; 2006 +3.1 SD

 11B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1931 261 212 305 386 434 305 568 587 544

 1940 524 548 517 432 444 513 417 468 466 435

 1950 463 396 403 334 311 361 254 255 226 176

 1960 111 143 62 109 168 113 101 125 78 102

 1970 70 61 67 59 56 41 62 61 47 49

 1980 50 55 38 45 59 49 62 83 81 85

 1990 115 107 124 124 104 61 86 68 66 63

 2000 55 72 69 35 63 102 190 107 82 154

 2010 170 119 152 71 55 45 30 49

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

 12A 1887 to 2017 131 years Series 23

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

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

 1950 1999 1 .01 -.04 -.26 .03 -.09 -.12 .06 -.13 .11 -.06 .32| .38\* .01 .16 -.07 -.33 .18 .07 -.12 -.01 .00

 [B] Entire series, effect on correlation ( .549) is:

 Lower 1925< -.027 1950< -.025 1900< -.017 1971< -.014 1893> -.014 1904> -.012 Higher 1948 .043 1895 .022

 1950 to 1999 segment:

 Lower 1950< -.073 1971< -.038 1991> -.017 1982> -.014 1988< -.013 1989> -.013 Higher 1962 .035 1992 .034

 12A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1887 143 145 144

 1890 85 95 54 40 52 29 62 72 75 63

 1900 47 51 55 64 67 66 53 37 34 49

 1910 72 38 65 71 52 96 86 69 54 40

 1920 58 54 55 32 75 14 36 98 104 157

 1930 150 263 319 260 234 220 176 136 196 138

 1940 229 219 211 141 140 153 97 103 57 146

 1950 87 100 100 91 94 81 64 84 73 67

 1960 39 43 27 28 109 127 153 239 309 364

 1970 267 81 123 131 120 102 93 99 117 97

 1980 185 147 204 317 230 304 447 475 258 316

 1990 260 465 492 389 175 160 140 189 225 193

 2000 152 140 107 75 51 105 66 117 114 121

 2010 151 95 99 62 55 46 46 47

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

 12B 1887 to 2017 131 years Series 24

 [B] Entire series, effect on correlation ( .588) is:

 Lower 1925< -.069 1935> -.014 1903< -.014 2000> -.008 1982> -.008 1971< -.008 Higher 1893 .058 1948 .033

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

 1924 1925 -4.0 SD

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

 1925 -4.8 SD

 12B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1887 152 168 145

 1890 106 104 81 45 74 37 72 61 74 60

 1900 55 55 52 35 38 51 33 28 37 34

 1910 59 40 73 91 71 148 91 72 93 69

 1920 85 71 63 56 102 13 28 101 118 182

 1930 205 207 222 170 223 294 185 261 367 223

 1940 285 218 217 152 157 173 127 106 57 168

 1950 130 103 82 104 86 79 45 67 77 64

 1960 22 30 12 16 31 56 79 125 142 136

 1970 137 52 68 57 52 45 62 54 47 60

 1980 127 98 172 321 246 262 317 230 177 172

 1990 135 119 181 138 95 85 68 79 103 127

 2000 124 112 84 38 39 56 30 38 57 61

 2010 104 86 75 38 47 41 16 29

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 13A 1899 to 2017 119 years Series 25

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

 Lower 1946> -.031 1982> -.011 1991> -.007 1950< -.007 2014< -.007 1962> -.006 Higher 1948 .029 1943 .012

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

 1948 -6.3 SD

 13A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1899 185

 1900 200 174 216 206 162 160 119 103 123 120

 1910 150 90 169 143 68 155 132 90 51 39

 1920 57 45 43 29 38 29 87 169 226 237

 1930 289 275 260 200 181 173 215 213 233 170

 1940 227 218 240 158 151 169 178 147 60 131

 1950 104 108 119 127 103 103 103 133 120 78

 1960 41 51 36 131 245 333 333 301 333 329

 1970 280 256 158 147 108 122 117 86 92 103

 1980 128 100 152 141 104 116 176 260 185 201

 1990 181 271 227 185 126 94 99 82 170 154

 2000 130 90 32 19 8 63 50 87 53 119

 2010 209 157 214 128 78 97 68 109

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

 13B 1900 to 2017 118 years Series 26

 [B] Entire series, effect on correlation ( .598) is:

 Lower 1946> -.018 1980< -.015 1942< -.010 1936> -.009 2007< -.007 2011< -.007 Higher 1948 .039 2010 .013

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

 1948 -6.1 SD

 13B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1900 207 185 185 173 141 129 75 73 71 64

 1910 80 48 101 134 66 123 104 84 58 53

 1920 61 68 54 53 83 113 244 237 255 269

 1930 258 338 325 227 191 160 237 220 209 166

 1940 143 166 128 104 100 124 119 104 46 106

 1950 109 99 96 91 83 73 46 88 78 64

 1960 36 50 28 44 129 243 295 230 253 227

 1970 179 153 90 64 59 59 80 56 65 68

 1980 33 42 41 51 47 74 111 164 150 82

 1990 81 73 93 112 108 75 52 70 64 98

 2000 94 146 70 29 23 53 50 20 58 116

 2010 276 138 118 63 274 128 109 75

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

 14A 1898 to 2017 120 years Series 27

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

 Lower 1898< -.035 1958< -.021 1899> -.020 1955< -.011 1936> -.010 1942< -.008 Higher 1948 .023 1943 .017

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

 1943 -5.4 SD

 14A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1898 64 95

 1900 110 100 90 83 70 74 52 55 61 63

 1910 57 47 79 72 43 94 74 70 49 47

 1920 53 56 38 48 66 111 119 193 181 204

 1930 217 190 233 150 150 135 183 109 148 106

 1940 106 128 97 59 99 136 86 99 68 84

 1950 80 93 70 91 93 75 73 87 54 88

 1960 62 85 44 88 156 276 314 243 351 461

 1970 375 278 174 190 196 214 301 210 269 188

 1980 324 392 321 486 394 378 539 604 455 210

 1990 183 133 252 258 253 111 143 104 120 142

 2000 122 176 194 127 86 107 159 232 338 331

 2010 417 268 181 117 90 54 62 62

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 14B 1901 to 2017 117 years Series 28

 [B] Entire series, effect on correlation ( .621) is:

 Lower 1904< -.055 1911> -.016 1989> -.013 1992< -.012 1991< -.011 1993< -.010 Higher 1948 .049 1962 .040

 14B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1901 99 92 105 64 82 75 68 67 61

 1910 60 57 90 83 49 88 69 59 38 36

 1920 39 28 26 22 36 117 120 179 219 212

 1930 189 175 206 112 133 86 78 72 106 65

 1940 87 86 103 79 100 107 68 83 45 61

 1950 69 69 67 71 80 77 80 79 75 68

 1960 98 85 45 80 96 185 116 179 219 276

 1970 289 313 267 268 168 210 318 303 335 221

 1980 448 333 405 440 320 392 545 428 318 461

 1990 267 140 156 116 129 80 83 72 94 96

 2000 60 78 51 17 19 23 19 23 33 38

 2010 57 53 63 47 47 34 34 30

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 15A 1933 to 2017 85 years Series 29

 [B] Entire series, effect on correlation ( .586) is:

 Lower 1949< -.032 1933> -.026 2016> -.015 1966< -.015 2010< -.014 1989> -.009 Higher 1962 .065 2003 .039

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

 1948 1949 -4.1 SD

 15A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1933 395 291 219 205 274 272 266

 1940 333 432 397 314 321 401 302 330 249 180

 1950 272 244 233 279 354 347 226 272 233 193

 1960 197 232 115 132 139 120 73 94 91 72

 1970 56 41 36 34 30 35 45 28 27 25

 1980 26 23 27 45 44 49 57 74 89 106

 1990 111 97 164 156 124 86 121 114 124 124

 2000 119 121 110 62 71 124 129 158 176 224

 2010 196 213 186 171 223 181 260 277

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

 15B 1930 to 2017 88 years Series 30

 [B] Entire series, effect on correlation ( .582) is:

 Lower 1933< -.045 1948> -.027 2006> -.014 1969< -.012 1960> -.012 1943> -.012 Higher 1962 .060 2003 .020

 15B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1930 224 239 383 187 248 229 245 346 320 305

 1940 418 424 446 390 450 460 337 445 388 394

 1950 447 437 407 378 399 422 318 365 380 281

 1960 346 376 167 203 223 166 118 145 110 72

 1970 60 66 54 35 31 28 54 45 37 26

 1980 25 18 20 37 31 47 54 71 86 76

 1990 141 141 220 200 178 106 135 150 172 194

 2000 146 120 147 99 118 131 180 201 203 200

 2010 218 176 189 142 140 175 203 230

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 16A 1922 to 2017 96 years Series 31

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

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

 1950 1999 0 .07 .07 -.04 .02 -.04 .03 .18 .16 .04 .02 .31\* .00 -.02 .12 -.16 .00 -.12 .06 -.01 -.05 .15

 [B] Entire series, effect on correlation ( .490) is:

 Lower 1962> -.059 2016< -.014 1989> -.014 1950< -.013 1952< -.012 1960> -.011 Higher 2003 .046 1974 .029

 1950 to 1999 segment:

 Lower 1962> -.121 1989> -.030 1950< -.028 1952< -.023 1960> -.023 1995> -.018 Higher 1974 .114 1982 .039

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

 1962 +3.5 SD

 16A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1922 268 283 277 303 261 232 192 174

 1930 217 234 205 166 166 113 128 98 142 121

 1940 133 158 174 104 91 128 96 98 69 111

 1950 77 65 45 95 203 261 275 299 378 341

 1960 463 442 462 386 477 464 344 368 362 340

 1970 324 238 161 289 148 126 137 103 92 86

 1980 111 75 30 32 32 58 48 45 73 98

 1990 77 72 78 101 65 63 54 63 48 66

 2000 44 44 49 25 18 32 20 21 21 30

 2010 40 29 31 27 31 25 15 21

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 16B 1918 to 2017 100 years Series 32

 [B] Entire series, effect on correlation ( .426) is:

 Lower 1962> -.036 2017< -.018 1969< -.014 1930< -.010 2016> -.010 1989> -.010 Higher 1974 .036 2010 .022

 16B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1918 243 170

 1920 232 317 309 290 286 293 273 243 209 316

 1930 221 281 284 212 221 191 189 149 191 164

 1940 139 168 162 98 102 121 92 73 54 60

 1950 61 67 50 189 258 453 409 377 358 353

 1960 441 380 376 370 411 472 358 366 316 224

 1970 254 226 186 227 110 139 143 111 107 112

 1980 102 80 28 38 24 59 46 48 66 72

 1990 47 36 55 75 56 41 43 33 39 44

 2000 26 27 13 8 12 13 10 16 15 24

 2010 43 28 26 19 21 19 25 15

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 17A 1922 to 2017 96 years Series 33

 [B] Entire series, effect on correlation ( .457) is:

 Lower 1995> -.017 1982> -.015 1980< -.014 1977> -.014 1923> -.012 1962> -.012 Higher 2003 .025 1974 .021

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

 1974 -5.3 SD

 17A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1922 347 349 281 306 233 198 159 161

 1930 149 168 177 122 136 111 112 69 88 90

 1940 54 65 59 34 36 51 38 33 10 29

 1950 23 28 19 49 74 129 152 215 337 312

 1960 382 432 301 314 322 348 260 266 250 239

 1970 284 238 210 205 118 162 188 206 169 126

 1980 108 86 124 113 110 126 104 91 106 132

 1990 176 136 148 145 95 126 83 86 108 152

 2000 65 101 86 32 23 48 32 60 57 70

 2010 114 164 144 73 94 65 52 96

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 17B 1914 to 2017 104 years Series 34

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

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

 1914 1963 0 -.04 .01 .03 -.05 -.10 .16 -.04 .07 .08 -.27 .32\*-.12 -.15 .02 .01 .03 .06 -.02 .00 .14 .22

 [B] Entire series, effect on correlation ( .447) is:

 Lower 1982> -.021 1956> -.017 1917> -.014 1995> -.013 1962> -.012 1923> -.010 Higher 1974 .028 2003 .023

 1914 to 1963 segment:

 Lower 1956> -.036 1917> -.030 1923> -.022 1921> -.021 1947< -.016 1916< -.015 Higher 1914 .055 1948 .052

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

 1974 -4.8 SD

 17B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1914 174 233 196 263 236 224

 1920 224 310 278 287 280 245 189 177 144 147

 1930 134 171 168 117 126 104 99 63 61 60

 1940 64 65 47 29 26 29 27 20 9 23

 1950 17 24 12 65 113 163 238 256 239 214

 1960 258 241 200 262 304 308 292 330 230 233

 1970 179 208 177 167 80 87 130 139 122 110

 1980 102 106 144 132 110 140 154 144 131 133

 1990 159 115 106 147 102 121 114 117 126 148

 2000 48 77 75 29 26 57 22 38 45 77

 2010 113 73 63 35 38 29 36 31

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 18A 1928 to 2017 90 years Series 35

 [B] Entire series, effect on correlation ( .480) is:

 Lower 1948> -.049 1949< -.021 1947< -.019 1940< -.018 1969< -.016 1943> -.014 Higher 2003 .052 1962 .027

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

 1947 1948 4.2 SD

 18A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1928 182 225

 1930 221 232 191 182 157 117 149 114 181 120

 1940 91 172 220 202 170 238 171 115 195 128

 1950 189 289 308 541 583 613 396 414 427 339

 1960 329 391 256 376 300 235 225 240 259 177

 1970 209 179 128 152 92 89 95 82 87 71

 1980 106 134 165 167 170 229 267 236 166 149

 1990 221 146 168 250 145 145 152 165 197 173

 2000 123 146 135 68 65 84 80 85 111 144

 2010 129 84 84 66 58 62 45 53

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 18B 1926 to 2017 92 years Series 36

 [B] Entire series, effect on correlation ( .464) is:

 Lower 1940< -.034 1941< -.026 1962> -.016 1982> -.016 1963< -.014 1959> -.014 Higher 1946 .022 1948 .021

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

 1941 -4.9 SD

 18B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1926 179 188 175 219

 1930 203 172 184 193 187 141 159 129 200 162

 1940 123 124 219 225 270 291 220 279 226 292

 1950 333 401 399 410 559 643 357 382 413 449

 1960 366 395 307 216 217 189 172 214 154 196

 1970 146 138 109 104 67 76 75 68 74 58

 1980 134 122 154 175 121 126 206 208 121 152

 1990 218 191 227 200 105 89 74 74 86 92

 2000 74 66 62 59 52 61 57 79 63 77

 2010 92 112 126 60 87 56 40 71

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 19A 1956 to 2017 62 years Series 37

 [B] Entire series, effect on correlation ( .592) is:

 Lower 1962> -.051 1995> -.024 1959> -.015 1967< -.015 1957< -.013 1978< -.010 Higher 1974 .034 2003 .031

 19A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1956 201 218 307 280

 1960 273 313 234 244 232 258 189 180 164 159

 1970 172 185 156 172 116 152 148 129 106 85

 1980 124 127 92 131 74 140 119 137 127 116

 1990 126 96 160 137 115 130 103 90 96 152

 2000 94 96 60 38 39 51 45 69 70 105

 2010 106 87 109 69 88 58 40 45

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 19B 1961 to 2017 57 years Series 38

 [B] Entire series, effect on correlation ( .679) is:

 Lower 1981> -.033 1989> -.030 1961< -.023 1962> -.009 1998< -.006 2000> -.005 Higher 1974 .025 1992 .017

 19B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1961 156 155 278 212 213 174 199 184 221

 1970 204 237 178 183 103 140 136 129 111 93

 1980 135 216 124 156 93 128 143 151 155 226

 1990 210 136 273 219 118 115 104 109 101 159

 2000 102 124 67 55 37 54 51 81 72 88

 2010 109 86 126 59 80 60 58 60

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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 1A 1937 2017 81 3 1 .481 2.23 3.95 .818 .766 .220 2.48 .437 -.101 1

 2 1B 1933 2017 85 3 1 .458 2.24 3.95 .785 .715 .247 2.53 .576 -.037 1

 3 2A 1935 2017 83 3 0 .572 1.83 4.76 .961 .824 .220 2.72 .463 -.038 1

 4 2B 1933 2017 85 3 0 .476 1.91 5.18 1.164 .922 .199 2.73 .481 -.084 1

 5 3A 1923 2017 95 4 0 .590 2.02 4.55 1.093 .894 .207 2.64 .438 -.033 1

 6 3B 1942 2017 76 3 0 .649 2.46 4.54 1.007 .812 .237 2.62 .515 -.035 1

 7 4A 1946 2017 72 3 0 .498 2.16 3.29 .615 .674 .199 2.52 .443 -.049 1

 8 4B 1946 2017 72 3 0 .504 2.00 3.67 .630 .747 .181 2.67 .403 -.033 1

 9 5A 1961 2017 57 2 0 .369 2.43 5.30 .739 .626 .187 2.62 .470 -.073 1

 10 5B 1950 2017 68 2 0 .577 1.79 3.70 .627 .790 .162 2.71 .468 -.045 1

 11 6A 1897 2017 121 5 0 .486 1.87 3.65 .876 .744 .283 2.70 .488 -.032 1

 12 6B 1896 2017 122 5 0 .586 1.26 3.05 .715 .849 .266 2.58 .423 -.083 1

 13 7A 1945 2017 73 3 2 .486 1.66 3.88 .818 .644 .340 2.87 .603 .062 1

 14 7B 1929 2017 89 3 0 .451 1.16 4.24 1.062 .931 .289 2.43 .315 -.100 1

 15 8A 1889 2017 129 5 0 .586 1.06 4.47 .752 .816 .289 2.91 .506 .006 1

 16 8B 1889 2017 129 5 0 .640 1.44 4.00 1.001 .926 .264 2.58 .362 -.067 1

 17 9A 1880 2017 138 5 0 .605 .97 2.78 .592 .865 .236 2.75 .477 -.074 1

 18 9B 1880 2017 138 5 0 .640 .89 2.32 .535 .859 .239 2.71 .421 -.035 2

 19 10A 1928 2017 90 3 0 .656 1.62 5.39 1.379 .942 .244 2.65 .546 -.021 1

 20 10B 1922 2017 96 4 0 .504 1.46 4.23 .946 .908 .228 2.77 .522 -.061 1

 21 11A 1936 2017 82 3 0 .707 1.34 5.33 1.304 .961 .223 2.52 .447 -.137 1

 22 11B 1931 2017 87 3 0 .422 1.88 5.87 1.660 .951 .239 2.46 .376 -.031 1

 23 12A 1887 2017 131 5 1 .549 1.31 4.92 .990 .845 .289 2.72 .415 -.109 1

 24 12B 1887 2017 131 5 0 .588 1.04 3.67 .725 .833 .322 2.72 .441 -.018 2

 25 13A 1899 2017 119 5 0 .587 1.45 3.33 .750 .826 .294 2.40 .262 -.057 1

 26 13B 1900 2017 118 4 0 .598 1.17 3.38 .724 .782 .302 2.49 .280 -.024 1

 27 14A 1898 2017 120 5 0 .548 1.62 6.04 1.180 .864 .267 2.65 .408 -.086 1

 28 14B 1901 2017 117 4 0 .621 1.30 5.45 1.136 .889 .246 2.46 .391 -.031 2

 29 15A 1933 2017 85 3 0 .586 1.67 4.32 1.071 .914 .187 2.57 .402 -.022 1

 30 15B 1930 2017 88 3 0 .582 2.07 4.60 1.341 .920 .204 2.58 .404 -.096 1

 31 16A 1922 2017 96 4 1 .490 1.50 4.77 1.257 .945 .232 2.57 .548 -.024 1

 32 16B 1918 2017 100 4 0 .426 1.56 4.72 1.297 .940 .237 2.60 .376 -.075 1

 33 17A 1922 2017 96 4 0 .457 1.43 4.32 .965 .918 .267 2.40 .334 -.049 1

 34 17B 1914 2017 104 4 1 .447 1.34 3.30 .845 .922 .245 2.52 .366 -.056 1

 35 18A 1928 2017 90 3 0 .480 1.89 6.13 1.124 .867 .221 2.61 .499 -.066 1

 36 18B 1926 2017 92 3 0 .464 1.81 6.43 1.185 .901 .204 2.59 .478 -.116 1

 37 19A 1956 2017 62 2 0 .592 1.34 3.13 .671 .881 .211 2.62 .545 .016 2

 38 19B 1961 2017 57 2 0 .679 1.36 2.78 .596 .687 .253 2.69 .507 .038 2

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 Total or mean: 3674 138 7 .548 1.56 6.43 .942 .851 .247 2.91 .437 -.051

 - = [ COFECHA PIRU COF ] = -