[] Dendrochronology Program Library Run PIRU Program COF 09:19 Thu 21 Sep 2017 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 30216

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 QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

 Title of run: PIRU\_WOLCOTT\_ORIGINAL-50

 File of DATED series: PIRU\_WOLCOTT

 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 1930 to 2017 88 years

 Continuous time span is 1930 to 2017 88 years

 Portion with two or more series is 1930 to 2017 88 years

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

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

 \*O\* Master series 1930 2017 88 yrs \*O\*

 \*F\* Total rings in all series 1981 \*F\*

 \*E\* Total dated rings checked 1981 \*E\*

 \*C\* Series intercorrelation .553 \*C\*

 \*H\* Average mean sensitivity .231 \*H\*

 \*A\* Segments, possible problems 2 \*A\*

 \*\*\* Mean length of series 66.0 \*\*\*

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

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

 No ring measurements of zero value

 1950 -.964 11 2000 -.327 30

 1951 .032 13 2001 .008 30

 1952 -.139 13 2002 .561 30

 1953 -1.483 14 2003 -1.659 30

 1954 .484 15 2004 -.359 30

 1955 -.891 16 2005 .094 30

 1956 -1.397 20 2006 -1.623 30

 1957 .897 21 2007 -.748 30

 1958 1.491 21 2008 -.199 30

 1959 .092 23 2009 1.889 30

 1960 -.433 25 2010 2.418 30

 1961 1.320 25 2011 .711 30

 1962 .517 25 2012 1.643 30

 1963 -.338 27 2013 -1.035 30

 1964 .255 27 2014 .220 30

 1965 .686 27 2015 -.783 30

 1966 -1.129 28 2016 .584 30

 1967 -.919 28 2017 -2.145 30

 1968 .536 28

 1969 1.081 28

 1970 .103 28

 1971 -.065 28

 1972 -.546 28

 1973 -.404 28

 1974 -.767 28

 1975 -1.480 28

 1976 -.020 28

 1977 -.220 30

 1978 .776 30

 1979 .543 30

 1930 1.106 2 1980 .959 30

 1931 1.719 2 1981 -.477 30

 1932 1.612 2 1982 -1.999 30

 1933 -.840 4 1983 -1.203 30

 1934 -.056 4 1984 -.639 30

 1935 -.810 4 1985 -.040 30

 1936 -2.385 4 1986 .885 30

 1937 .613 4 1987 1.561 30

 1938 -.070 4 1988 .165 30

 1939 .310 4 1989 .080 30

 1940 .628 6 1990 -.017 30

 1941 1.031 6 1991 -1.060 30

 1942 .310 8 1992 .724 30

 1943 -.683 8 1993 1.403 30

 1944 -.499 9 1994 -.006 30

 1945 1.539 9 1995 -.052 30

 1946 1.079 10 1996 -1.280 30

 1947 .159 10 1997 -.931 30

 1948 1.106 10 1998 .001 30

 1949 -1.873 10 1999 1.064 30

PART 5: CORRELATION OF SERIES BY SEGMENTS: PIRU\_WOLCOTT\_ORIGINAL-50 09:19 Thu 21 Sep 2017 Page 5

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 Correlations of 50-year dated segments, lagged 25 years

 Flags: A = correlation under .3281 but highest as dated; B = correlation higher at other than dated position

 Seq Series Time\_span 1925 1950 1975

 1974 1999 2024

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

 1 1A 1930 2017 .51 .55 .65

 2 1B 1930 2017 .60 .67 .78

 3 2A 1955 2017 .41 .66

 4 2B 1959 2017 .60 .74

 5 3A 1954 2017 .40 .67

 6 3B 1960 2017 .54 .55

 7 4A 1956 2017 .36 .61

 8 4B 1951 2017 .36 .69

 9 5A 1959 2017 .37 .52

 10 5B 1956 2017 .44 .51

 11 6A 1957 2017 .60 .66

 12 6B 1956 2017 .46 .58

 13 7A 1977 2017 .65

 14 7B 1977 2017 .54

 15 8A 1956 2017 .51 .65

 16 8B 1963 2017 .62 .68

 17 9A 1950 2017 .59 .65

 18 9B 1951 2017 .51 .60

 19 10A 1963 2017 .62 .64

 20 10B 1966 2017 .58 .65

 21 11A 1953 2017 .46 .52

 22 11B 1960 2017 .40 .52

 23 12A 1942 2017 .55 .44 .36

 24 12B 1942 2017 .18B .40 .52

 25 13A 1946 2017 .58 .54 .59

 26 13B 1944 2017 .59 .62 .63

 27 14A 1940 2017 .66 .58 .54

 28 14B 1940 2017 .48 .33 .47

 29 15A 1933 2017 .36 .28A .51

 30 15B 1933 2017 .40 .34 .50

 Av segment correlation .49 .49 .60

PART 6: POTENTIAL PROBLEMS: PIRU\_WOLCOTT\_ORIGINAL-50 09:19 Thu 21 Sep 2017 Page 5

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 For each series with potential problems the following diagnostics may appear:

 [A] Correlations with master dating series of flagged 50-year segments of series filtered with 32-year spline,

 at every point from ten years earlier (-10) to ten years later (+10) than dated

 [B] Effect of those data values which most lower or raise correlation with master series

 Symbol following year indicates value in series is greater (>) or lesser (<) than master series value

 [C] Year-to-year changes very different from the mean change in other series

 [D] Absent rings (zero values)

 [E] Values which are statistical outliers from mean for the year

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 1A 1930 to 2017 88 years Series 1

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

 Lower 1991> -.018 1936> -.017 1935> -.013 1947> -.013 1934< -.011 1946< -.011 Higher 1949 .016 2006 .015

 1A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1930 338 387 342 181 170 207 194 264 186 178

 1940 266 282 233 211 202 214 154 233 238 141

 1950 93 110 110 95 107 85 80 127 222 170

 1960 115 172 139 119 88 136 91 92 86 75

 1970 59 55 36 22 12 8 17 15 22 21

 1980 23 35 19 39 47 55 109 130 126 101

 1990 99 109 102 79 63 58 58 59 54 97

 2000 74 70 75 73 84 81 49 73 92 168

 2010 219 123 197 68 176 106 123 65

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 1B 1930 to 2017 88 years Series 2

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

 Lower 1953> -.020 2011< -.018 1934< -.016 1949> -.015 1964< -.011 1945> -.005 Higher 2017 .018 2003 .014

 1B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1930 339 359 367 193 158 160 144 219 181 242

 1940 258 256 208 233 204 588 372 299 259 202

 1950 182 220 189 212 265 173 148 188 228 149

 1960 128 188 138 117 84 129 85 98 166 150

 1970 95 53 43 36 27 25 38 33 35 40

 1980 35 32 19 30 30 46 65 85 72 49

 1990 40 37 59 73 56 56 64 84 111 157

 2000 109 119 112 71 98 111 70 110 110 156

 2010 206 104 132 58 130 122 172 88

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

 2A 1955 to 2017 63 years Series 3

 [B] Entire series, effect on correlation ( .554) is:

 Lower 1964< -.029 1956> -.021 1978< -.021 1975> -.018 1959> -.017 1957< -.015 Higher 1982 .035 2003 .031

 2A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1955 97 162 151 186 275

 1960 183 236 259 204 131 216 219 175 313 406

 1970 389 234 228 202 182 194 143 209 121 113

 1980 95 140 50 30 38 87 109 119 95 115

 1990 109 108 176 193 172 197 142 165 168 213

 2000 174 174 188 117 131 156 96 158 154 199

 2010 236 193 192 111 145 136 172 113

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

 2B 1959 to 2017 59 years Series 4

 [B] Entire series, effect on correlation ( .652) is:

 Lower 1963< -.065 1975> -.017 1974> -.011 1960> -.011 1972> -.010 1965< -.009 Higher 1982 .028 2006 .023

 2B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1959 187

 1960 233 246 199 134 227 190 177 190 202 303

 1970 201 199 240 232 224 206 254 203 250 190

 1980 171 111 55 77 89 134 195 175 120 160

 1990 129 118 148 145 99 116 93 134 139 163

 2000 150 153 177 139 153 157 111 157 149 217

 2010 227 194 216 144 175 161 224 124

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 3A 1954 to 2017 64 years Series 5

 [B] Entire series, effect on correlation ( .529) is:

 Lower 1954< -.116 1975> -.029 1969< -.028 1955> -.013 1974> -.012 1956> -.011 Higher 2003 .052 2017 .048

 3A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1954 32 144 197 275 315 258

 1960 350 404 403 315 360 366 286 304 301 250

 1970 232 279 248 276 291 315 265 233 281 279

 1980 223 131 70 54 89 110 145 247 211 244

 1990 131 111 158 171 151 130 106 96 102 134

 2000 107 110 127 71 103 85 71 92 123 137

 2010 152 104 131 99 102 84 97 69

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 3B 1960 to 2017 58 years Series 6

 [B] Entire series, effect on correlation ( .573) is:

 Lower 1969< -.047 1975> -.025 1974> -.021 2013> -.017 1994> -.014 1983< -.013 Higher 2003 .051 1982 .034

 3B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1960 343 379 344 326 368 353 267 276 314 222

 1970 306 291 248 213 279 254 194 182 244 241

 1980 184 130 59 68 132 114 149 188 165 235

 1990 149 154 238 221 231 185 163 156 238 212

 2000 204 167 199 130 189 197 175 183 204 239

 2010 220 139 213 153 177 123 128 78

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 4A 1956 to 2017 62 years Series 7

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

 Lower 1962< -.038 1965< -.032 1968< -.027 1958< -.021 1975> -.018 2017> -.013 Higher 1982 .045 2006 .038

 4A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1956 293 364 292 311

 1960 304 275 216 289 336 229 242 221 199 261

 1970 319 278 286 350 305 288 244 229 285 355

 1980 315 199 77 89 115 160 192 242 169 108

 1990 123 137 156 226 164 174 86 161 165 174

 2000 112 178 165 98 132 193 52 61 85 141

 2010 190 132 160 59 75 51 97 59

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 4B 1951 to 2017 67 years Series 8

 [B] Entire series, effect on correlation ( .519) is:

 Lower 1951< -.085 1953> -.027 1956> -.021 1955> -.015 1975> -.007 1974> -.007 Higher 1982 .035 2013 .034

 4B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1951 20 168 230 347 326 343 301 324 258

 1960 263 337 245 206 272 279 226 132 206 283

 1970 375 431 423 476 412 334 365 301 333 346

 1980 291 179 48 54 99 136 122 145 94 83

 1990 86 56 78 111 106 142 58 73 71 88

 2000 73 112 128 71 101 78 36 43 49 73

 2010 107 96 93 38 53 45 61 36

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

 5A 1959 to 2017 59 years Series 9

 [B] Entire series, effect on correlation ( .462) is:

 Lower 1982> -.057 1967< -.035 1985< -.023 1998< -.022 1994> -.017 1961< -.016 Higher 2010 .029 2003 .025

 5A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1959 494

 1960 386 416 655 481 452 596 400 259 438 775

 1970 555 544 475 501 496 387 554 481 679 528

 1980 495 340 493 467 418 284 314 363 292 293

 1990 220 190 254 245 267 229 159 180 130 159

 2000 106 136 133 94 126 145 80 126 117 138

 2010 198 123 150 68 114 64 78 48

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 5B 1956 to 2017 62 years Series 10

 [B] Entire series, effect on correlation ( .489) is:

 Lower 1982> -.070 1967< -.021 2017> -.016 1994< -.013 1997> -.013 1983> -.013 Higher 2003 .024 2010 .024

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

 1982 +3.6 SD

 5B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1956 487 549 573 654

 1960 556 885 624 413 364 399 320 178 294 446

 1970 466 447 480 349 246 183 268 181 320 277

 1980 303 229 367 337 294 292 287 262 175 204

 1990 171 123 186 166 115 117 97 147 100 160

 2000 77 111 109 83 82 113 74 94 106 109

 2010 168 126 149 73 109 72 97 68

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 6A 1957 to 2017 61 years Series 11

 [B] Entire series, effect on correlation ( .638) is:

 Lower 1982> -.026 1979< -.021 1965< -.018 1991> -.014 1967< -.013 1977< -.007 Higher 2006 .024 2013 .022

 6A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1957 405 373 332

 1960 324 430 357 299 263 210 184 150 216 226

 1970 209 177 141 165 118 92 165 113 121 104

 1980 152 116 120 122 129 135 132 144 117 143

 1990 128 129 156 169 120 120 111 105 137 163

 2000 125 125 107 86 95 107 72 82 119 117

 2010 137 132 121 67 88 80 101 61

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

 6B 1956 to 2017 62 years Series 12

 [B] Entire series, effect on correlation ( .513) is:

 Lower 1965< -.056 1956> -.014 2004< -.012 1984< -.012 1991> -.011 1982> -.009 Higher 2010 .025 1961 .018

 6B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1956 392 382 435 347

 1960 308 413 313 251 292 222 226 185 277 323

 1970 313 233 176 233 241 152 214 214 223 263

 1980 252 193 173 151 128 181 302 319 197 186

 1990 245 236 235 283 236 204 183 193 251 221

 2000 173 185 185 163 147 175 185 186 227 231

 2010 355 291 312 192 210 126 156 117

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

 7A 1977 to 2017 41 years Series 13

 [B] Entire series, effect on correlation ( .645) is:

 Lower 1981< -.036 2017> -.029 2000> -.027 2013> -.018 1984> -.009 1990> -.007 Higher 1982 .035 2006 .030

 7A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1977 396 450 407

 1980 516 320 290 372 423 385 435 420 305 373

 1990 397 298 349 331 276 242 188 242 265 258

 2000 314 253 297 171 265 195 109 121 155 223

 2010 315 261 295 168 158 127 269 139

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 7B 1977 to 2017 41 years Series 14

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

 Lower 1996< -.039 2013> -.031 1999< -.029 1977< -.018 2003> -.014 1984> -.012 Higher 2006 .036 1987 .018

 7B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1977 383 597 571

 1980 673 482 417 550 675 548 591 707 425 596

 1990 599 438 452 502 409 348 161 248 332 252

 2000 318 235 359 257 365 300 136 202 243 323

 2010 421 403 432 294 357 138 339 132

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 8A 1956 to 2017 62 years Series 15

 [B] Entire series, effect on correlation ( .573) is:

 Lower 1967> -.024 1994> -.023 1957< -.019 1986< -.010 2012< -.009 1978< -.008 Higher 2017 .036 2009 .027

 8A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1956 347 391 434 420

 1960 420 462 458 334 348 396 258 327 361 328

 1970 250 296 291 277 191 165 220 233 160 119

 1980 126 90 53 52 84 83 79 111 109 128

 1990 141 131 204 226 241 213 153 124 139 183

 2000 161 150 186 137 170 192 152 135 154 359

 2010 309 135 125 92 94 138 220 78

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 8B 1963 to 2017 55 years Series 16

 [B] Entire series, effect on correlation ( .661) is:

 Lower 1990< -.036 1996> -.020 1999< -.019 2001< -.018 1967> -.015 1982> -.014 Higher 2017 .052 2003 .034

 8B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1963 410 439 421 304 383 455 468

 1970 314 329 363 399 313 252 407 377 341 412

 1980 411 329 253 248 325 285 323 353 220 224

 1990 165 152 225 323 273 257 221 184 218 194

 2000 186 152 200 150 207 268 170 184 228 369

 2010 376 282 243 178 213 231 253 137

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 9A 1950 to 2017 68 years Series 17

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

 Lower 1998< -.030 1991< -.020 1951< -.015 1997< -.014 1982> -.013 1950> -.010 Higher 2017 .031 2010 .016

 9A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1950 626 507 571 463 608 453 465 503 545 428

 1960 446 504 405 334 354 385 263 317 318 363

 1970 239 245 197 164 159 162 219 147 271 258

 1980 345 265 197 207 223 232 199 225 187 163

 1990 159 106 149 171 126 123 109 83 77 114

 2000 93 102 111 88 81 96 69 85 96 141

 2010 178 120 130 89 104 100 115 62

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

 9B 1951 to 2017 67 years Series 18

 [B] Entire series, effect on correlation ( .581) is:

 Lower 1991< -.047 1955> -.017 1960< -.017 1967> -.014 1986< -.011 2000> -.008 Higher 2010 .018 2006 .015

 9B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1951 620 621 411 562 540 463 538 510 434

 1960 319 441 409 322 374 399 300 360 306 301

 1970 254 229 190 189 183 184 256 147 299 327

 1980 314 241 159 181 182 170 141 150 143 128

 1990 121 66 145 163 113 105 107 98 105 126

 2000 137 132 169 114 108 109 76 125 143 218

 2010 267 157 212 122 145 95 145 77

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

 10A 1963 to 2017 55 years Series 19

 [B] Entire series, effect on correlation ( .633) is:

 Lower 1996> -.032 1975< -.027 1967> -.024 1972> -.009 1978< -.007 1995< -.007 Higher 2003 .042 2017 .027

 10A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1963 193 225 236 184 259 267 234

 1970 212 214 227 214 143 100 198 195 172 200

 1980 189 160 144 131 149 179 185 196 184 184

 1990 198 158 167 192 165 153 183 149 180 198

 2000 188 195 201 129 162 173 153 173 192 249

 2010 211 193 219 146 141 137 137 81

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 10B 1966 to 2017 52 years Series 20

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

 Lower 1974< -.051 2005< -.027 1967> -.022 2000> -.020 1989< -.016 1991> -.014 Higher 2017 .052 2003 .035

 10B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1966 220 299 324 262

 1970 232 245 227 237 148 132 160 168 176 167

 1980 198 175 139 137 142 162 233 206 167 138

 1990 159 179 230 246 176 218 167 200 204 278

 2000 277 206 239 138 218 143 131 149 199 291

 2010 240 212 206 160 160 168 196 121

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

 11A 1953 to 2017 65 years Series 21

 [B] Entire series, effect on correlation ( .560) is:

 Lower 1971< -.092 2013> -.020 1983> -.017 1982> -.016 1996> -.010 2001< -.010 Higher 2003 .030 2009 .024

 11A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1953 212 342 238 216 273 264 219

 1960 255 291 236 231 192 171 143 138 157 200

 1970 144 91 102 135 138 142 180 172 197 206

 1980 185 140 155 212 187 190 217 232 180 191

 1990 197 142 170 192 182 183 164 145 170 143

 2000 102 86 105 63 97 162 109 142 134 286

 2010 287 166 209 167 143 110 130 82

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 11B 1960 to 2017 58 years Series 22

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

 Lower 2013> -.038 1971< -.036 1994< -.030 1960> -.021 1974> -.016 2003> -.013 Higher 2017 .055 2006 .040

 11B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1960 264 222 198 220 192 175 175 207 237 206

 1970 163 99 107 158 220 180 230 250 287 204

 1980 173 129 122 145 152 153 226 242 178 178

 1990 159 182 198 182 134 231 165 175 211 201

 2000 150 195 220 184 179 214 142 169 159 237

 2010 215 188 263 214 205 140 165 92

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 12A 1942 to 2017 76 years Series 23

 [B] Entire series, effect on correlation ( .467) is:

 Lower 1992< -.039 2006> -.026 2010< -.023 1976< -.022 2008< -.021 2003> -.020 Higher 2017 .067 2009 .032

 12A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1942 397 330 396 525 369 294 341 257

 1950 303 278 222 218 243 173 157 262 264 180

 1960 174 260 197 163 197 242 153 132 167 148

 1970 184 126 71 71 46 23 18 23 40 47

 1980 78 68 40 53 76 113 73 62 93 120

 1990 102 44 25 40 51 45 39 46 63 79

 2000 69 62 62 62 54 50 68 73 46 138

 2010 73 59 74 61 85 59 60 33

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 12B 1942 to 2017 76 years Series 24

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

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

 1942 1991 4 .13 .24 -.20 .25 -.02 -.07 -.11 .05 -.18 .00 .18|-.10 -.09 -.15 .31\*-.02 .08 .08 .20 -.18 .01

 [B] Entire series, effect on correlation ( .290) is:

 Lower 1945< -.204 2002< -.017 1996> -.016 2006> -.013 1950> -.011 1981> -.009 Higher 2017 .063 1949 .037

 1942 to 1991 segment:

 Lower 1945< -.314 1950> -.015 1981> -.013 1953> -.012 1963> -.011 1976< -.010 Higher 1949 .071 1982 .060

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

 1944 1945 -5.4 SD

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

 1945 -5.9 SD

 12B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1942 403 372 339 213 319 266 304 234

 1950 341 349 367 313 303 284 192 319 284 186

 1960 204 228 198 235 217 248 170 176 198 203

 1970 123 85 75 93 53 47 39 46 61 49

 1980 47 68 29 48 64 76 56 95 93 56

 1990 43 25 30 58 61 43 69 61 118 112

 2000 84 79 42 27 41 71 79 76 74 160

 2010 145 95 78 67 75 69 56 28

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 13A 1946 to 2017 72 years Series 25

 [B] Entire series, effect on correlation ( .617) is:

 Lower 1970< -.064 1996> -.015 1991> -.013 1966> -.011 1978< -.009 2006> -.009 Higher 2003 .031 1949 .017

 13A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1946 458 379 358 269

 1950 297 401 338 211 418 318 250 376 405 282

 1960 261 310 311 250 233 290 227 215 205 249

 1970 123 158 132 126 125 122 157 111 122 141

 1980 177 143 113 128 136 168 294 318 231 157

 1990 237 216 250 229 159 168 190 198 187 255

 2000 155 137 133 92 129 132 125 122 128 153

 2010 170 106 147 91 107 77 120 68

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 13B 1944 to 2017 74 years Series 26

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

 Lower 2006> -.033 1964< -.028 1944< -.016 1955> -.013 2003> -.011 1973< -.010 Higher 2013 .026 2017 .020

 13B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1944 400 522 527 599 554 395

 1950 437 455 360 273 455 387 257 422 435 313

 1960 239 289 263 257 182 253 168 202 217 234

 1970 169 235 163 108 89 101 134 117 177 131

 1980 189 134 104 131 103 164 224 316 221 169

 1990 241 202 295 254 197 206 178 192 186 201

 2000 174 177 207 195 209 239 243 251 261 247

 2010 270 181 273 129 179 148 214 107

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 14A 1940 to 2017 78 years Series 27

 [B] Entire series, effect on correlation ( .637) is:

 Lower 2007< -.061 2006> -.027 1975> -.027 2003> -.018 1977> -.017 1961< -.012 Higher 1949 .038 2017 .034

 14A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1940 420 515 454 323 301 441 362 303 358 198

 1950 188 250 224 181 214 146 142 199 215 154

 1960 128 122 136 116 143 130 90 68 85 87

 1970 88 125 97 85 106 143 158 227 132 88

 1980 94 64 17 53 67 121 141 155 151 77

 1990 70 81 103 216 138 103 79 99 144 182

 2000 140 189 179 150 157 163 170 111 172 182

 2010 220 171 208 120 177 143 158 98

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 14B 1940 to 2017 78 years Series 28

 [B] Entire series, effect on correlation ( .527) is:

 Lower 1987< -.027 1986< -.023 1991> -.016 1955> -.010 1976< -.009 1984< -.009 Higher 1949 .035 2017 .016

14B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1940 503 507 463 349 411 406 380 285 320 157

 1950 186 324 277 197 212 200 160 174 168 126

 1960 104 121 135 97 111 105 73 62 76 73

 1970 65 70 66 53 56 50 38 60 63 53

 1980 89 62 25 33 26 44 38 38 53 59

 1990 86 86 89 76 77 85 72 52 103 148

 2000 76 112 118 90 100 103 96 90 95 138

 2010 152 117 132 75 82 59 74 51

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 15A 1933 to 2017 85 years Series 29

 [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 -.14 -.17 -.29 .25 .24 .07 .02 -.01 -.40 .10 .28\* .12 .04 .15 -.12 -.28 .18 -.07 -.08 .11 .11

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

 Lower 1974> -.023 1954< -.019 1995< -.019 1966> -.018 1983> -.013 1973< -.012 Higher 2017 .038 2009 .018

 1950 to 1999 segment:

 Lower 1974> -.049 1966> -.040 1954< -.032 1983> -.026 1995< -.025 1991> -.021 Higher 1986 .024 1999 .023

 15A Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1933 396 478 366 258 479 441 433

 1940 404 391 346 308 312 410 293 222 323 231

 1950 204 221 158 152 127 121 112 139 146 119

 1960 81 109 83 107 119 155 124 87 102 96

 1970 85 58 49 40 151 91 80 147 133 119

 1980 145 110 100 184 160 118 191 163 117 98

 1990 117 141 159 169 106 85 117 106 141 210

 2000 197 200 226 169 200 202 163 163 187 287

 2010 277 224 260 173 170 164 201 120

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 15B 1933 to 2017 85 years Series 30

 [B] Entire series, effect on correlation ( .466) is:

 Lower 1999< -.042 2008< -.028 1933> -.022 2006> -.018 1982> -.016 1934> -.015 Higher 2017 .037 2013 .027

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

 1934 +3.2 SD

15B Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1933 525 584 493 410 444 464 453

 1940 405 351 263 248 209 585 548 367 317 192

 1950 156 178 178 172 158 115 119 196 218 156

 1960 113 142 111 122 158 113 72 68 86 99

 1970 78 82 54 31 39 37 67 187 276 246

 1980 144 161 164 156 146 139 146 176 171 140

 1990 163 153 217 243 203 192 161 128 129 112

 2000 119 141 141 121 146 153 152 135 99 159

 2010 169 157 164 106 129 118 137 107

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PART 7: DESCRIPTIVE STATISTICS: PIRU\_WOLCOTT\_ORIGINAL-50 09:19 Thu 21 Sep 2017 Page 6

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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 1930 2017 88 3 0 .586 1.20 3.87 .800 .837 .274 2.70 .427 -.111 1

 2 1B 1930 2017 88 3 0 .689 1.38 5.88 .981 .787 .270 3.09 .466 -.055 1

 3 2A 1955 2017 63 2 0 .554 1.68 4.06 .689 .707 .255 2.60 .566 -.036 1

 4 2B 1959 2017 59 2 0 .652 1.71 3.03 .496 .606 .216 2.61 .529 .020 1

 5 3A 1954 2017 64 2 0 .529 1.86 4.04 .979 .889 .226 2.47 .479 -.068 1

 6 3B 1960 2017 58 2 0 .573 2.09 3.79 .736 .781 .212 2.47 .526 .080 1

 7 4A 1956 2017 62 2 0 .479 1.94 3.63 .883 .794 .283 2.66 .557 .058 1

 8 4B 1951 2017 67 2 0 .519 1.79 4.76 1.252 .908 .291 2.51 .526 -.022 1

 9 5A 1959 2017 59 2 0 .462 3.12 7.75 1.855 .841 .263 2.68 .518 .006 1

 10 5B 1956 2017 62 2 0 .489 2.57 8.85 1.767 .877 .265 2.75 .584 -.055 3

 11 6A 1957 2017 61 2 0 .638 1.58 4.30 .840 .915 .178 2.75 .557 .022 1

 12 6B 1956 2017 62 2 0 .513 2.36 4.35 .719 .691 .183 2.71 .533 -.036 2

 13 7A 1977 2017 41 1 0 .645 2.87 5.16 1.010 .708 .241 2.59 .661 .139 1

 14 7B 1977 2017 41 1 0 .544 3.95 7.07 1.556 .666 .311 2.43 .452 .032 1

 15 8A 1956 2017 62 2 0 .573 2.12 4.62 1.122 .861 .213 2.78 .470 -.025 3

 16 8B 1963 2017 55 2 0 .661 2.84 4.68 .906 .724 .197 2.63 .587 -.074 2

 17 9A 1950 2017 68 2 0 .658 2.39 6.26 1.531 .928 .191 2.70 .524 -.058 1

 18 9B 1951 2017 67 2 0 .581 2.39 6.21 1.450 .901 .215 2.51 .421 -.099 1

 19 10A 1963 2017 55 2 0 .633 1.82 2.67 .369 .556 .148 2.52 .494 .041 1

 20 10B 1966 2017 52 2 0 .639 1.96 3.23 .486 .558 .182 2.62 .546 .060 1

 21 11A 1953 2017 65 2 0 .560 1.76 3.42 .563 .672 .200 2.70 .482 .072 1

 22 11B 1960 2017 58 2 0 .451 1.87 2.87 .412 .422 .193 2.64 .566 -.009 1

 23 12A 1942 2017 76 3 0 .467 1.34 5.25 1.091 .909 .276 3.14 .541 .099 1

 24 12B 1942 2017 76 3 1 .290 1.41 4.03 1.072 .918 .263 2.71 .449 -.030 1

 25 13A 1946 2017 72 3 0 .617 2.05 4.58 .928 .778 .218 2.62 .528 -.052 1

 26 13B 1944 2017 74 3 0 .592 2.45 5.99 1.152 .824 .232 2.79 .658 -.059 1

 27 14A 1940 2017 78 3 0 .637 1.67 5.15 .954 .848 .261 2.69 .520 .000 1

 28 14B 1940 2017 78 3 0 .527 1.34 5.07 1.138 .939 .216 2.57 .360 .022 2

 29 15A 1933 2017 85 3 1 .469 1.87 4.79 1.038 .865 .223 2.67 .490 .069 1

 30 15B 1933 2017 85 3 0 .466 1.93 5.85 1.269 .881 .198 2.78 .448 -.096 2

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 Total or mean: 1981 68 2 .553 1.97 8.85 1.007 .799 .231 3.14 .510 -.010

 - = [ COFECHA PIRU COF ] = -