[] Dendrochronology Program Library Run ACRU Program COF 11:24 Wed 09 Mar 2016 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 29655

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

Title of run: ACRU\_CORE1WPRM\_Corr1-50

File of DATED series: ACRU\_CORE1WPRM\_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 1941 to 2015 75 years

Continuous time span is 1941 to 2015 75 years

Portion with two or more series is 1942 to 2015 74 years

>> 1951A 2006 absent in 1 of 26 series, but is not usually narrow: master index is -.143

>> 1951A 2009 absent in 1 of 26 series, but is not usually narrow: master index is .438

>> 1951A 2010 absent in 1 of 26 series, but is not usually narrow: master index is 1.106

>> 1951A 2011 absent in 1 of 26 series, but is not usually narrow: master index is .842

>> 1951A 2012 absent in 1 of 26 series, but is not usually narrow: master index is .187

>> 1951A 2014 absent in 1 of 26 series, but is not usually narrow: master index is -.038

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

\*C\* Number of dated series 26 \*C\*

\*O\* Master series 1941 2015 75 yrs \*O\*

\*F\* Total rings in all series 1719 \*F\*

\*E\* Total dated rings checked 1718 \*E\*

\*C\* Series intercorrelation .498 \*C\*

\*H\* Average mean sensitivity .239 \*H\*

\*A\* Segments, possible problems 6 \*A\*

\*\*\* Mean length of series 66.1 \*\*\*

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

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

1951A 8 absent rings: 2006 2009 2010 2011 2012 2013 2014 2015

8 absent rings .465%

1950 .221 14 2000 -.242 26

1951 1.633 16 2001 -.698 26

1952 -.085 19 2002 .622 26

1953 .719 19 2003 -1.381 26

1954 -.404 21 2004 .627 26

1955 .595 21 2005 .697 26

1956 -.471 22 2006 -.143 26 1<<

1957 .778 24 2007 1.202 26

1958 .480 25 2008 .179 26

1959 -1.385 25 2009 .438 26 1<<

1960 .855 25 2010 1.106 26 1<<

1961 1.248 25 2011 .842 26 1<<

1962 .443 25 2012 .187 26 1<<

1963 .367 25 2013 -1.324 26 1

1964 -1.197 25 2014 -.038 26 1<<

1965 -1.410 25 2015 -.517 26 1

1966 -2.441 25

1967 -.882 25

1968 -.132 25

1969 1.203 25

1970 -.418 25

1971 1.061 26

1972 -.686 26

1973 -.901 26

1974 1.059 26

1975 1.439 26

1976 .456 26

1977 .126 26

1978 -.279 26

1979 1.405 26

1980 1.785 26

1981 .288 26

1982 .684 26

1983 -.582 26

1984 -.337 26

1985 .201 26

1986 .565 26

1987 -.781 26

1988 -2.357 26

1989 -.380 26

1990 -.861 26

1941 -2.951 1 1991 -.027 26

1942 1.369 2 1992 1.131 26

1943 .032 5 1993 -.531 26

1944 -.418 7 1994 -.003 26

1945 .350 7 1995 -.408 26

1946 .938 9 1996 .447 26

1947 1.315 10 1997 -1.408 26

1948 -1.627 13 1998 .941 26

1949 -1.982 14 1999 -.345 26

PART 5: CORRELATION OF SERIES BY SEGMENTS: ACRU\_CORE1WPRM\_Corr1-50 11:24 Wed 09 Mar 2016 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 1946A 1948 2015 .52 .49 .57

2 1946B 1952 2015 .45 .54

3 1949A 1951 2015 .35 .40

4 1949B 1944 2015 .47 .36 .42

5 1953A 1958 2015 .44 .44

6 1953A\* 1944 2015 .56 .64 .48

7 1954A 1947 2015 .63 .68 .64

8 1954B 1941 2015 .43 .46 .64

9 1948A 1957 2015 .62 .61

10 1948B 1942 2015 .66 .62 .61

11 1940A 1946 2015 .47 .46 .52

12 1940B 1946 2015 .47 .43 .37

13 1945A 1952 2015 .58 .45

14 1945B 1948 2015 .68 .70 .61

15 1950A 1952 2015 .53 .52

16 1950BRE 1943 2015 .17B .22B .29A

17 1947A 1943 2015 .69 .65 .51

18 1947B 1956 2015 .64 .55

19 1944A 1954 2015 .62 .49

20 1944B 1971 2015 .46

21 1952ARE 1954 2015 .25A .22B

22 1952B 1949 2015 .34 .34 .31A

23 1943A 1943 2015 .55 .59 .37

24 1943B 1957 2015 .64 .65

25 1951A 1948 2015 .74 .71 .68

26 1951B 1951 2015 .55 .60

Av segment correlation .53 .52 .50

PART 6: POTENTIAL PROBLEMS: ACRU\_CORE1WPRM\_Corr1-50 11:24 Wed 09 Mar 2016 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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1946A 1948 to 2015 68 years Series 1

[B] Entire series, effect on correlation ( .508) is:

Lower 1965> -.028 1961< -.027 2011< -.021 1950< -.013 1999> -.013 1959> -.013 Higher 1948 .018 2003 .016

1946A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1948 210 246

1950 231 385 278 362 324 334 311 367 332 266

1960 295 206 202 226 130 250 166 179 179 217

1970 141 222 106 102 167 216 116 100 110 242

1980 279 265 312 232 254 278 227 113 100 226

1990 141 124 165 110 149 115 243 205 264 298

2000 169 215 283 192 328 321 244 301 380 430

2010 530 253 261 245 290 192

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1946B 1952 to 2015 64 years Series 2

[B] Entire series, effect on correlation ( .537) is:

Lower 1966> -.036 1971< -.032 1965> -.029 1974< -.026 1954> -.015 1983> -.009 Higher 2003 .040 2013 .018

1946B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1952 294 356 339 299 253 307 332 229

1960 266 241 266 249 165 231 196 184 160 191

1970 122 108 106 76 105 165 144 110 117 294

1980 315 213 267 242 246 399 351 192 112 247

1990 112 140 176 188 159 143 210 174 286 251

2000 173 121 297 128 246 247 213 241 235 355

2010 462 247 250 168 271 182

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

1949A 1951 to 2015 65 years Series 3

[B] Entire series, effect on correlation ( .406) is:

Lower 1988> -.086 1952< -.044 1997> -.027 2009< -.025 1987> -.014 1986< -.011 Higher 1966 .044 2003 .036

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

1988 +3.3 SD

1949A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1951 250 142 241 239 309 259 221 234 191

1960 246 278 282 192 153 133 115 222 207 291

1970 219 271 217 210 283 284 292 241 298 314

1980 325 286 242 217 169 184 174 238 286 278

1990 208 252 237 177 142 108 134 167 167 93

2000 148 143 213 97 163 156 97 104 80 54

2010 66 67 67 43 53 42

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

1949B 1944 to 2015 72 years Series 4

[B] Entire series, effect on correlation ( .496) is:

Lower 1975< -.080 1988> -.026 1996< -.019 2009< -.012 1998< -.012 1993> -.011 Higher 1948 .056 2003 .035

1949B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1944 219 239 232 221 101 142

1950 210 222 135 190 176 293 257 295 258 225

1960 248 324 349 221 207 197 170 183 255 282

1970 229 242 171 174 315 153 218 159 294 268

1980 447 268 299 220 253 234 210 192 194 238

1990 193 255 273 219 183 141 98 86 104 106

2000 125 94 106 61 145 143 135 149 147 112

2010 161 191 162 145 176 156

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1953A 1958 to 2015 58 years Series 5

[B] Entire series, effect on correlation ( .432) is:

Lower 2003> -.054 1998< -.033 1982< -.031 1972> -.023 1960< -.021 1965> -.020 Higher 1959 .041 1988 .035

1953A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1958 261 93

1960 120 189 253 287 234 278 173 207 215 261

1970 213 232 320 258 361 416 348 370 270 338

1980 309 277 161 152 137 134 181 118 92 183

1990 146 174 186 101 130 101 128 83 74 75

2000 89 103 93 103 109 74 98 91 59 63

2010 51 62 71 24 22 34

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1953A\* 1944 to 2015 72 years Series 6

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

Lower 2003> -.037 2010< -.025 1949> -.021 1972> -.021 2015> -.016 1995> -.013 Higher 1966 .042 1997 .029

1953A\* Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1944 200 179 182 268 220 254

1950 337 442 350 291 315 265 188 202 228 141

1960 240 277 242 260 203 202 130 159 262 364

1970 289 345 405 357 337 500 406 281 398 349

1980 348 278 265 219 167 146 193 143 116 198

1990 209 238 239 143 178 229 200 124 156 150

2000 122 158 140 167 197 153 161 195 160 163

2010 110 212 188 86 96 218

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

1954A 1947 to 2015 69 years Series 7

[B] Entire series, effect on correlation ( .600) is:

Lower 2014< -.031 1948> -.027 1960< -.017 1964> -.015 2003> -.015 2015> -.011 Higher 1966 .026 1959 .020

1954A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1947 368 251 193

1950 266 304 227 391 153 204 186 200 185 103

1960 159 279 231 226 198 196 86 125 157 218

1970 189 258 188 214 252 268 249 227 156 250

1980 247 210 229 155 142 186 234 125 127 167

1990 160 179 218 136 184 182 159 108 211 117

2000 104 126 149 135 158 135 122 171 137 178

2010 157 139 136 114 100 145

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1954B 1941 to 2015 75 years Series 8

[\*] Early part of series cannot be checked from 1941 to 1941 -- not matched by another series

[B] Entire series, effect on correlation ( .488) is:

Lower 1954< -.096 1960< -.024 1948> -.019 1996< -.015 1988> -.010 1990> -.010 Higher 1959 .026 1997 .021

1954B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1941 95 367 219 231 232 292 339 240 229

1950 299 389 273 269 78 206 187 201 162 107

1960 131 197 175 231 198 201 144 171 228 255

1970 227 235 207 133 200 242 193 161 153 266

1980 300 301 298 191 182 194 280 188 185 220

1990 241 217 233 200 253 206 165 143 201 153

2000 158 177 198 165 228 197 174 237 206 205

2010 222 207 208 166 156 161

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1948A 1957 to 2015 59 years Series 9

[B] Entire series, effect on correlation ( .571) is:

Lower 1964> -.026 2010< -.018 2013> -.017 2006> -.015 2009< -.012 1958< -.012 Higher 1988 .058 1966 .018

1948A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1957 215 138 154

1960 182 215 158 217 204 185 163 171 241 267

1970 177 297 179 216 228 261 197 286 272 300

1980 347 264 277 193 204 241 282 212 184 276

1990 222 216 254 174 234 253 272 197 231 230

2000 288 189 284 169 255 301 289 333 140 159

2010 163 238 229 173 198 91

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

1948B 1942 to 2015 74 years Series 10

[B] Entire series, effect on correlation ( .623) is:

Lower 1989< -.039 1954> -.024 2000> -.015 2009< -.014 2008< -.014 1973> -.014 Higher 1988 .047 1948 .022

1948B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1942 148 127 111 174 167 173 65 69

1950 175 184 78 245 249 211 121 156 130 95

1960 168 150 139 173 162 140 134 149 168 178

1970 162 275 187 217 235 229 202 225 260 259

1980 328 189 223 177 185 190 197 175 93 105

1990 162 168 258 163 215 181 233 149 184 174

2000 251 148 166 109 183 192 133 216 86 86

2010 112 122 114 95 111 63

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1940A 1946 to 2015 70 years Series 11

[B] Entire series, effect on correlation ( .461) is:

Lower 1957< -.034 1948> -.016 1975< -.014 1952> -.013 2006> -.013 1959< -.011 Higher 1949 .018 1979 .015

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

1959 -5.0 SD

1940A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1946 382 366 306 220

1950 223 278 297 251 254 216 187 123 141 49

1960 133 181 174 171 138 126 107 96 135 161

1970 123 126 105 71 145 113 79 74 130 190

1980 183 174 195 124 154 130 106 91 78 112

1990 96 138 127 104 95 116 139 126 143 141

2000 138 114 193 187 249 224 309 373 349 335

2010 277 339 256 214 194 244

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1940B 1946 to 2015 70 years Series 12

[B] Entire series, effect on correlation ( .421) is:

Lower 2004< -.033 1987> -.026 1996< -.024 1970> -.017 1947< -.016 1973< -.014 Higher 1959 .030 2003 .027

1940B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1946 460 319 260 234

1950 229 276 286 245 267 259 182 221 198 131

1960 205 208 233 171 148 115 87 111 178 237

1970 246 236 175 65 200 171 143 122 133 172

1980 145 106 169 126 130 156 146 166 127 119

1990 102 164 143 142 152 155 115 116 148 144

2000 139 156 216 139 120 159 216 229 368 383

2010 448 432 294 301 269 262

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1945A 1952 to 2015 64 years Series 13

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

Lower 2008< -.072 1992< -.038 1997> -.030 2013> -.020 2015> -.017 1952> -.016 Higher 1988 .088 1966 .032

1945A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1952 380 285 338 281 272 359 268 213

1960 392 383 257 265 184 180 149 234 236 265

1970 265 333 236 228 331 341 335 356 326 387

1980 478 330 325 304 300 278 271 239 167 264

1990 241 181 156 189 224 175 208 186 207 148

2000 99 86 122 107 104 131 88 116 58 84

2010 109 120 119 107 94 123

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1945B 1948 to 2015 68 years Series 14

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

Lower 2015> -.018 1974< -.017 2002< -.014 2000< -.014 2014< -.010 1993> -.010 Higher 1988 .048 1966 .019

1945B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1948 221 238

1950 232 324 289 251 278 236 198 315 301 175

1960 339 307 228 272 200 180 157 236 198 255

1970 180 276 227 225 243 281 338 361 268 339

1980 400 352 353 282 324 353 385 271 140 306

1990 227 267 285 261 269 191 330 192 246 131

2000 80 66 98 87 123 159 134 156 99 134

2010 161 152 118 101 82 136

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1950A 1952 to 2015 64 years Series 15

[B] Entire series, effect on correlation ( .514) is:

Lower 2009< -.055 1959> -.039 1973> -.023 1980< -.022 1977< -.017 1954< -.014 Higher 1988 .079 2013 .020

1950A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1952 384 454 351 430 392 452 451 445

1960 437 451 418 340 297 269 278 403 408 469

1970 308 395 240 371 398 446 358 195 252 261

1980 208 296 231 173 146 155 173 143 79 98

1990 107 157 144 98 90 97 89 99 182 120

2000 140 147 104 83 142 171 126 152 144 72

2010 111 138 96 75 104 91

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

1950BRE 1943 to 2015 73 years Series 16

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

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1943 1992 10 - - - - - - - - -.14 -.08 .17| .02 -.22 -.17 -.04 .04 .15 -.19 .03 .02 .25\*

1950 1999 6 - .12 -.05 .11 .18 .15 .16 -.32 -.11 -.15 .22|-.08 -.05 -.15 .00 -.11 .24\*-.17 .01 .06 .19

1966 2015 0 -.11 .19 -.21 .09 .16 .08 .17 -.17 -.05 -.30 .29\* - - - - - - - - - -

[B] Entire series, effect on correlation ( .314) is:

Lower 1977< -.056 1988> -.037 1966> -.030 1959> -.028 1980< -.023 1982< -.020 Higher 1997 .041 1948 .032

1943 to 1992 segment:

Lower 1977< -.064 1988> -.037 1959> -.032 1966> -.032 1980< -.031 1982< -.026 Higher 1948 .064 1951 .036

1950 to 1999 segment:

Lower 1977< -.062 1988> -.048 1966> -.039 1959> -.038 1980< -.030 1982< -.025 Higher 1997 .071 1951 .035

1966 to 2015 segment:

Lower 1977< -.071 1988> -.057 1966> -.045 1980< -.032 1982< -.027 1973> -.019 Higher 1997 .063 1975 .025

1950BRE Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1943 203 209 244 347 453 247 309

1950 358 598 614 406 249 311 251 240 370 443

1960 554 501 368 350 351 292 363 303 243 343

1970 264 326 206 321 452 553 401 122 138 240

1980 170 201 139 216 220 192 246 201 185 184

1990 160 139 148 100 97 80 104 55 141 91

2000 145 110 99 74 162 188 86 114 74 84

2010 129 142 100 94 140 91

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1947A 1943 to 2015 73 years Series 17

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

Lower 2011< -.046 2001> -.025 1951< -.015 2006> -.012 2000> -.012 2013> -.012 Higher 1948 .046 1988 .040

1947A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1943 262 243 272 263 283 136 173

1950 434 272 177 194 161 228 243 342 276 214

1960 292 249 223 182 170 146 128 199 219 360

1970 200 207 191 242 347 344 303 358 332 262

1980 349 239 279 157 190 191 212 174 72 77

1990 69 88 181 72 99 97 78 77 134 114

2000 221 275 193 121 191 179 225 192 149 184

2010 188 147 172 186 226 200

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1947B 1956 to 2015 60 years Series 18

[B] Entire series, effect on correlation ( .578) is:

Lower 1989< -.031 1973> -.029 2007< -.025 1972> -.020 1959> -.017 2013> -.015 Higher 1988 .048 2003 .036

1947B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1956 206 305 206 208

1960 328 416 267 302 159 119 86 139 220 291

1970 307 310 375 447 466 507 374 424 307 334

1980 470 287 354 186 127 174 236 206 96 69

1990 91 121 238 151 171 185 210 167 282 183

2000 276 260 236 148 252 210 218 222 302 292

2010 505 344 360 340 347 304

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1944A 1954 to 2015 62 years Series 19

[B] Entire series, effect on correlation ( .546) is:

Lower 2013> -.031 1986< -.027 2011< -.022 1999> -.020 1972> -.020 2008> -.014 Higher 1966 .039 2003 .036

1944A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1954 117 133 112 164 143 111

1960 143 193 136 143 69 90 56 115 123 139

1970 131 194 216 202 247 226 184 215 234 327

1980 291 210 199 157 119 161 112 125 115 226

1990 164 133 244 186 189 247 238 169 203 278

2000 251 236 282 163 212 243 189 266 345 347

2010 295 232 251 293 311 253

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1944B 1971 to 2015 45 years Series 20

[B] Entire series, effect on correlation ( .463) is:

Lower 1991< -.057 2010< -.025 1988> -.024 2013> -.012 1995< -.012 1986< -.011 Higher 1997 .063 1979 .025

1944B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1971 284 214 121 190 197 201 203 140 215

1980 181 143 123 110 156 168 118 110 107 135

1990 105 82 157 156 140 113 209 128 256 287

2000 331 292 406 293 465 479 453 502 415 485

2010 353 340 358 377 444 374

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

1952ARE 1954 to 2015 62 years Series 21

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

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

1954 2003 0 -.05 -.03 .24 -.15 .23 .00 -.04 -.25 .13 -.22 .25\*-.02 .17 -.08 -.12 -.04 -.05 -.14 -.06 .07 .18

1966 2015 -6 -.02 -.04 .18 -.16 .24\*-.06 .00 -.16 .16 -.26 .22| - - - - - - - - - -

[B] Entire series, effect on correlation ( .296) is:

Lower 1988> -.115 1978< -.037 1986< -.036 1966> -.020 1959> -.018 2003> -.012 Higher 1964 .024 1969 .021

1954 to 2003 segment:

Lower 1988> -.126 1986< -.040 1978< -.038 1966> -.021 1959> -.020 2003> -.013 Higher 1964 .027 1969 .027

1966 to 2015 segment:

Lower 1988> -.131 1986< -.041 1978< -.033 1966> -.019 2003> -.011 1991< -.008 Higher 1972 .030 1969 .027

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

1988 +4.3 SD

1952ARE Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1954 125 256 139 202 254 264

1960 388 408 355 252 157 160 285 309 331 467

1970 317 388 175 310 326 405 330 355 212 309

1980 349 316 323 319 344 306 240 269 408 349

1990 311 259 282 273 342 272 303 258 349 255

2000 292 254 417 324 377 318 315 318 367 364

2010 504 410 300 234 377 236

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1952B 1949 to 2015 67 years Series 22

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

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

1966 2015 0 -.20 -.11 -.14 .05 .10 -.06 .05 -.38 -.06 -.21 .31\* - - - - - - - - - -

[B] Entire series, effect on correlation ( .348) is:

Lower 2010< -.051 1988> -.031 1966> -.025 1985< -.024 1981< -.023 1973> -.016 Higher 1951 .021 2013 .018

1966 to 2015 segment:

Lower 2010< -.065 1988> -.037 1985< -.030 1966> -.030 1981< -.026 1973> -.019 Higher 2013 .026 1975 .024

1952B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1949 187

1950 344 573 499 263 111 174 154 198 160 154

1960 272 291 156 230 182 171 236 361 313 398

1970 276 251 168 300 379 506 365 318 190 252

1980 275 168 232 210 232 172 243 179 198 168

1990 220 220 231 182 204 161 241 190 224 167

2000 149 141 179 156 188 193 198 235 225 213

2010 149 200 159 145 202 181

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1943A 1943 to 2015 73 years Series 23

[B] Entire series, effect on correlation ( .428) is:

Lower 2006< -.057 2003> -.053 2004< -.021 1961< -.015 1973> -.014 1948> -.011 Higher 1988 .036 1997 .023

1943A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1943 252 203 235 210 234 183 110

1950 150 254 163 173 158 205 129 155 210 145

1960 191 124 108 122 114 75 85 116 179 210

1970 214 343 197 241 351 253 197 233 122 225

1980 236 139 198 218 301 411 423 334 178 183

1990 224 431 560 467 402 467 471 337 588 589

2000 577 547 623 722 529 650 443 588 613 689

2010 778 656 653 604 621 651

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1943B 1957 to 2015 59 years Series 24

[B] Entire series, effect on correlation ( .636) is:

Lower 2003> -.045 1961< -.036 1994< -.035 2012< -.017 1993> -.016 1980< -.011 Higher 1988 .064 1998 .012

1943B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1957 217 228 144

1960 180 114 126 162 107 97 108 131 164 230

1970 162 255 172 143 314 334 275 362 305 399

1980 336 286 339 270 370 500 461 343 153 205

1990 219 373 476 476 297 365 489 382 682 581

2000 543 467 554 576 618 542 449 625 548 602

2010 740 691 351 265 254 354

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1951A 1948 to 2015 68 years Series 25

[B] Entire series, effect on correlation ( .636) is:

Lower 2013> -.028 2003> -.026 1959> -.015 2002< -.013 1956> -.012 2004< -.011 Higher 1988 .045 1948 .039

[D] 8 Absent rings: Year Master N series Absent

2006 -.143 26 1 >> WARNING: Ring is not usually narrow

2009 .438 26 1 >> WARNING: Ring is not usually narrow

2010 1.106 26 1 >> WARNING: Ring is not usually narrow

2011 .842 26 1 >> WARNING: Ring is not usually narrow

2012 .187 26 1 >> WARNING: Ring is not usually narrow

2013 -1.324 26 1

2014 -.038 26 1 >> WARNING: Ring is not usually narrow

2015 -.517 26 1

>> WARNING: Last ring in series is ABSENT

1951A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1948 146 123

1950 216 250 245 258 255 278 349 332 273 268

1960 465 494 410 283 237 142 120 281 389 464

1970 455 571 527 368 504 536 462 484 504 588

1980 585 456 468 390 382 372 380 262 179 222

1990 184 208 233 200 215 194 193 115 116 87

2000 69 55 37 35 21 11 0 12 12 0

2010 0 0 0 0 0 0

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

1951B 1951 to 2015 65 years Series 26

[B] Entire series, effect on correlation ( .538) is:

Lower 1951< -.030 1956> -.018 2004< -.018 1972> -.012 1959> -.012 1995> -.009 Higher 1988 .028 2003 .025

1951B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1951 235 221 244 281 266 388 378 362 293

1960 328 434 400 255 215 146 123 226 201 248

1970 225 311 316 220 295 381 311 343 362 386

1980 363 257 282 288 232 275 266 168 133 189

1990 209 252 274 230 192 240 232 191 226 184

2000 175 169 189 93 98 143 139 163 126 126

2010 127 109 87 44 73 64

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PART 7: DESCRIPTIVE STATISTICS: ACRU\_CORE1WPRM\_Corr1-50 11:24 Wed 09 Mar 2016 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 1946A 1948 2015 68 3 0 .508 2.35 5.30 .874 .606 .276 2.65 .490 -.090 1

2 1946B 1952 2015 64 2 0 .537 2.21 4.62 .811 .518 .281 2.81 .552 -.088 1

3 1949A 1951 2015 65 2 0 .406 1.93 3.25 .780 .798 .217 2.59 .472 -.037 1

4 1949B 1944 2015 72 3 0 .496 2.01 4.47 .698 .608 .225 2.74 .464 -.040 1

5 1953A 1958 2015 58 2 0 .432 1.69 4.16 .988 .857 .248 2.45 .496 -.022 1

6 1953A\* 1944 2015 72 3 0 .479 2.30 5.00 .886 .751 .232 2.67 .561 -.010 1

7 1954A 1947 2015 69 3 0 .600 1.86 3.91 .602 .432 .247 2.62 .473 .083 1

8 1954B 1941 2015 75 3 0 .488 2.10 3.89 .565 .336 .216 2.47 .383 -.014 1

9 1948A 1957 2015 59 2 0 .571 2.23 3.47 .526 .229 .231 2.71 .594 -.041 1

10 1948B 1942 2015 74 3 0 .623 1.68 3.28 .545 .434 .260 2.67 .446 .122 1

11 1940A 1946 2015 70 3 0 .461 1.78 3.82 .819 .866 .213 2.38 .354 -.025 1

12 1940B 1946 2015 70 3 0 .421 1.98 4.60 .847 .809 .207 2.62 .463 -.006 1

13 1945A 1952 2015 64 2 0 .464 2.28 4.78 .976 .827 .196 2.71 .495 -.004 1

14 1945B 1948 2015 68 3 0 .619 2.30 4.00 .848 .692 .244 2.51 .432 .007 1

15 1950A 1952 2015 64 2 0 .514 2.36 4.68 1.338 .896 .222 2.64 .549 -.022 1

16 1950BRE 1943 2015 73 3 3 .314 2.39 6.14 1.373 .801 .285 2.62 .469 -.046 1

17 1947A 1943 2015 73 3 0 .560 2.07 4.34 .795 .608 .254 2.83 .478 .052 1

18 1947B 1956 2015 60 2 0 .578 2.62 5.07 1.074 .694 .273 3.01 .571 .076 1

19 1944A 1954 2015 62 2 0 .546 1.95 3.47 .688 .732 .231 2.56 .488 -.030 1

20 1944B 1971 2015 45 1 0 .463 2.47 5.02 1.276 .873 .225 2.60 .589 -.060 1

21 1952ARE 1954 2015 62 2 2 .296 3.07 5.04 .752 .320 .234 2.63 .502 -.041 1

22 1952B 1949 2015 67 3 1 .348 2.31 5.72 .895 .608 .253 2.80 .613 -.122 1

23 1943A 1943 2015 73 3 0 .428 3.28 7.78 1.963 .901 .242 2.57 .458 .004 1

24 1943B 1957 2015 59 2 0 .636 3.48 7.40 1.722 .820 .249 2.61 .457 .083 1

25 1951A 1948 2015 68 3 0 .636 2.50 5.88 1.802 .937 .259 2.64 .574 .214 1

26 1951B 1951 2015 65 2 0 .538 2.31 4.34 .923 .835 .192 2.34 .423 .030 1

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Total or mean: 1719 65 6 .498 2.28 7.78 .970 .681 .239 3.01 .491 .000

- = [ COFECHA ACRU COF ] = -