[] Dendrochronology Program Library Run ACRU Program COF 08:50 Thu 31 Aug 2017 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 30195

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

Title of run: ACRU\_LB1400B\_CORR1-50

File of DATED series: ACRU\_LB1400B\_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 1878 to 2015 138 years

Continuous time span is 1878 to 2015 138 years

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

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

\*C\* Number of dated series 28 \*C\*

\*O\* Master series 1878 2015 138 yrs \*O\*

\*F\* Total rings in all series 1777 \*F\*

\*E\* Total dated rings checked 1750 \*E\*

\*C\* Series intercorrelation .542 \*C\*

\*H\* Average mean sensitivity .228 \*H\*

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

\*\*\* Mean length of series 63.5 \*\*\*

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

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

No ring measurements of zero value

1900 -.842 1 1950 -1.556 3 2000 .834 28

1901 1.539 1 1951 -.184 3 2001 .485 28

1902 2.219 1 1952 .272 5 2002 .419 28

1903 1.393 1 1953 -.372 9 2003 -.054 28

1904 1.571 1 1954 .325 10 2004 -.250 28

1905 .734 2 1955 .445 13 2005 .178 28

1906 .679 2 1956 .370 14 2006 -.143 28

1907 1.263 2 1957 .205 16 2007 -.533 28

1908 .486 2 1958 .819 17 2008 .103 28

1909 -.232 2 1959 .100 18 2009 .885 28

1910 -.353 3 1960 .913 20 2010 -.164 28

1911 -.010 3 1961 .735 21 2011 .355 28

1912 -1.449 3 1962 .628 22 2012 -.693 28

1913 -1.136 3 1963 -.533 23 2013 .093 28

1914 -.781 3 1964 -.977 23 2014 1.020 28

1915 .988 3 1965 -2.261 23 2015 -.170 28

1916 .985 3 1966 -1.632 23

1917 .827 3 1967 -.251 23

1918 .495 3 1968 -.627 24

1919 -1.158 3 1969 .282 27

1920 1.299 3 1970 -.203 27

1921 .369 3 1971 .343 27

1922 1.044 3 1972 -.010 27

1923 -1.262 3 1973 -.441 27

1924 -1.596 3 1974 1.214 27

1925 -.357 3 1975 1.272 28

1926 -.077 3 1976 .823 28

1927 .216 3 1977 .944 28

1878 2.772 1 1928 .161 3 1978 .043 28

1879 -.107 1 1929 -.196 3 1979 .113 28

1880 .294 1 1930 1.610 3 1980 1.162 28

1881 -.741 1 1931 1.968 3 1981 .668 28

1882 -.376 1 1932 1.162 3 1982 -.136 28

1883 -1.034 1 1933 -.629 3 1983 -1.611 28

1884 -.039 1 1934 .181 3 1984 -.671 28

1885 .030 1 1935 .622 3 1985 -.226 28

1886 -1.056 1 1936 -1.026 3 1986 .488 28

1887 -2.525 1 1937 .184 3 1987 .215 28

1888 .637 1 1938 -.944 3 1988 -2.075 28

1889 .242 1 1939 -1.092 3 1989 .744 28

1890 -.848 1 1940 -.904 3 1990 .033 28

1891 1.802 1 1941 .377 3 1991 .406 28

1892 .037 1 1942 .528 3 1992 .614 28

1893 -1.870 1 1943 .031 3 1993 -.580 28

1894 .987 1 1944 .476 3 1994 .289 28

1895 -2.961 1 1945 1.152 3 1995 -.654 28

1896 .451 1 1946 -.990 3 1996 .282 28

1897 -.266 1 1947 .969 3 1997 -1.019 28

1898 -.742 1 1948 -.164 3 1998 .884 28

1899 -2.536 1 1949 -2.964 3 1999 -1.496 28

PART 5: CORRELATION OF SERIES BY SEGMENTS: ACRU\_LB1400B\_CORR1-50 08:50 Thu 31 Aug 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 1900 1925 1950 1975

1949 1974 1999 2024

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

1 1264A 1969 2015 .51

2 1264B 1957 2015 .69 .64

3 1281A 1952 2015 .57 .56

4 1281B 1953 2015 .55 .60

5 1283A 1963 2015 .59 .55

6 1283B 1969 2015 .20B

7 1354A 1910 2015 .28A .48 .66 .65

8 1354B 1955 2015 .64 .60

9 1355A 1953 2015 .77 .67

10 1355B 1968 2015 .39

11 1357A 1975 2015 .42

12 1357B 1954 2015 .43 .36

13 1358A 1952 2015 .51 .51

14 1358B 1969 2015 .61

15 1362A 1905 2015 .53 .56 .69 .64

16 1362B 1878 2015 .63 .57 .61 .64

17 1364A 1962 2015 .71 .69

18 1364B 1953 2015 .60 .49

19 1376A 1956 2015 .67 .61

20 1376B 1961 2015 .62 .59

21 1377A 1959 2015 .50 .40

22 1377B 1960 2015 .59 .61

23 1382A 1955 2015 .66 .63

24 1382B 1958 2015 .53 .52

25 1391A 1960 2015 .39 .40

26 1391B 1955 2015 .59 .61

27 1393A 1953 2015 .65 .55

28 1393B 1957 2015 .62 .58

Av segment correlation .48 .54 .58 .56

PART 6: POTENTIAL PROBLEMS: ACRU\_LB1400B\_CORR1-50 08:50 Thu 31 Aug 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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1264A 1969 to 2015 47 years Series 1

[B] Entire series, effect on correlation ( .510) is:

Lower 1999> -.090 2012< -.029 1991< -.021 1969< -.019 2015> -.018 1997> -.017 Higher 1988 .098 1983 .052

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

1999 +3.7 SD

1264A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1969 380

1970 444 416 346 337 477 476 432 433 367 329

1980 394 355 280 194 280 246 271 267 140 185

1990 143 130 213 123 219 153 280 212 263 238

2000 285 223 171 160 157 128 137 163 162 154

2010 112 143 81 91 87 96

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

1264B 1957 to 2015 59 years Series 2

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

Lower 1997> -.031 1999> -.025 2010< -.018 2008> -.015 2007> -.011 1962< -.010 Higher 1988 .096 1966 .011

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

2008 +3.5 SD

1264B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1957 433 356 246

1960 419 318 227 237 159 118 69 98 178 228

1970 221 182 183 184 312 340 334 361 320 300

1980 384 342 247 210 260 228 231 210 129 265

1990 185 195 236 159 201 145 219 204 218 182

2000 211 194 174 165 174 149 177 176 231 196

2010 126 160 109 114 116 108

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

1281A 1952 to 2015 64 years Series 3

[B] Entire series, effect on correlation ( .536) is:

Lower 1956< -.047 1997> -.037 1953> -.030 1991< -.022 1954< -.017 1984> -.014 Higher 1988 .078 1965 .066

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

1953 +3.1 SD; 1985 +3.2 SD; 1997 +3.4 SD

1281A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1952 343 478 315 446 257 268 290 246

1960 325 325 281 217 189 133 171 172 181 170

1970 144 173 199 172 210 248 195 157 178 146

1980 158 172 126 100 148 179 148 135 72 95

1990 87 60 94 63 56 61 91 100 110 45

2000 58 79 87 59 58 31 24 29 27 31

2010 27 19 22 43 44 39

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

1281B 1953 to 2015 63 years Series 4

[B] Entire series, effect on correlation ( .524) is:

Lower 1966> -.027 2015> -.024 1953> -.017 1958< -.014 1986< -.014 1997> -.013 Higher 1999 .077 1983 .064

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

1966 +3.4 SD

1281B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1953 446 394 368 176 165 183 124

1960 239 267 202 195 208 179 242 252 228 260

1970 184 190 227 239 252 265 204 182 136 152

1980 237 189 131 71 164 158 117 154 105 138

1990 176 128 129 109 99 82 100 94 147 49

2000 72 80 94 74 61 44 36 35 39 52

2010 37 31 22 35 29 37

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1283A 1963 to 2015 53 years Series 5

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

Lower 2003< -.033 1983> -.024 2001< -.023 1995> -.019 1988> -.018 2004< -.010 Higher 1999 .061 1965 .057

1283A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1963 164 147 81 164 298 203 430

1970 283 398 317 251 383 456 406 413 374 353

1980 370 373 304 322 279 398 413 291 259 329

1990 376 275 246 209 263 256 238 182 181 86

2000 216 109 147 69 79 186 130 165 216 236

2010 125 130 112 131 233 87

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1283B 1969 to 2015 47 years Series 6

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

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

1969 2015 -1 -.17 -.15 -.23 -.20 .03 -.07 -.05 -.37 .07 .25\* .20| - - - - - - - - - -

[B] Entire series, effect on correlation ( .202) is:

Lower 1984< -.063 1988> -.038 1993> -.028 1980< -.011 1998< -.011 2009< -.009 Higher 2014 .027 1974 .021

1969 to 2015 segment:

Lower 1984< -.063 1988> -.038 1993> -.028 1980< -.011 1998< -.011 2009< -.009 Higher 2014 .027 1974 .021

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

1984 -4.9 SD; 1990 +3.4 SD

1283B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1969 498

1970 366 501 420 358 461 424 405 367 370 329

1980 361 417 321 337 240 356 425 361 347 370

1990 482 404 338 415 346 313 408 305 262 259

2000 353 226 313 198 182 239 241 171 140 151

2010 151 134 88 99 142 89

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

1354A 1910 to 2015 106 years Series 7

[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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1910 1959 0 .27 -.05 -.16 -.25 .05 .10 -.18 -.06 -.04 .15 .28\*-.07 .03 -.01 -.04 .07 -.26 -.09 -.31 .15 .00

[B] Entire series, effect on correlation ( .448) is:

Lower 1913> -.039 1933> -.030 1936> -.028 1983> -.016 1914< -.015 1951< -.012 Higher 1988 .059 1949 .058

1910 to 1959 segment:

Lower 1913> -.062 1933> -.042 1936> -.041 1914< -.021 1951< -.018 1912> -.011 Higher 1949 .149 1930 .027

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

1913 1914 -4.0 SD

[E] Outliers 4 3.0 SD above or -4.5 SD below mean for year

1912 +3.2 SD; 1913 +6.1 SD; 1933 +3.1 SD; 1936 +4.0 SD

1354A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1910 21 47 37 62 22 51 42 30 25 23

1920 35 25 29 22 9 27 32 34 29 28

1930 70 52 43 42 54 43 47 43 22 20

1940 36 61 54 54 55 118 36 99 116 27

1950 51 87 208 252 273 256 320 367 398 368

1960 396 414 376 314 287 220 280 353 354 650

1970 553 462 432 507 621 559 586 356 326 303

1980 461 413 230 315 248 262 259 308 146 291

1990 278 239 226 164 177 148 149 127 170 118

2000 121 110 101 92 93 106 106 93 94 103

2010 84 72 61 69 76 71

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1354B 1955 to 2015 61 years Series 8

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

Lower 1979< -.032 1982< -.026 1996< -.015 1983> -.015 1977< -.015 2002< -.013 Higher 1988 .092 1965 .023

1354B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1955 334 355 397 407 303

1960 337 380 315 224 244 182 188 280 262 501

1970 373 457 390 395 463 432 427 316 352 218

1980 349 366 212 208 249 224 200 224 133 276

1990 233 210 212 165 154 128 101 81 117 83

2000 97 80 66 58 71 91 92 91 96 101

2010 86 69 59 55 72 58

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1355A 1953 to 2015 63 years Series 9

[B] Entire series, effect on correlation ( .691) is:

Lower 2014< -.036 2006> -.018 1999> -.017 1985< -.015 2003< -.013 1954> -.011 Higher 1988 .078 1965 .022

1355A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1953 190 346 246 258 242 248 196

1960 323 241 340 195 174 127 147 183 154 309

1970 282 418 350 312 461 497 360 325 250 292

1980 411 359 327 214 222 173 249 216 124 292

1990 180 216 209 150 231 163 174 147 173 139

2000 159 152 127 110 122 149 160 123 128 168

2010 119 123 102 100 85 80

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1355B 1968 to 2015 48 years Series 10

[B] Entire series, effect on correlation ( .395) is:

Lower 2008< -.083 1988> -.067 2007< -.037 1999> -.010 2003> -.009 1995> -.009 Higher 1983 .059 1997 .035

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

2008 -4.8 SD

1355B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1968 222 340

1970 268 424 253 243 378 361 260 393 278 268

1980 390 384 324 185 243 226 303 285 248 319

1990 220 263 208 180 199 205 200 149 215 164

2000 189 171 167 174 159 132 143 95 92 121

2010 123 147 113 120 126 108

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1357A 1975 to 2015 41 years Series 11

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

Lower 1999> -.110 1981< -.100 2008< -.032 1990< -.022 2005< -.019 1995> -.018 Higher 1988 .136 1983 .035

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

1999 +4.1 SD

1357A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1975 306 286 329 287 280

1980 292 234 274 235 230 258 317 307 210 251

1990 199 243 290 235 229 256 247 190 280 294

2000 346 275 263 197 168 143 174 149 122 147

2010 131 155 132 120 123 99

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1357B 1954 to 2015 62 years Series 12

[B] Entire series, effect on correlation ( .401) is:

Lower 1999> -.053 2008< -.051 1983> -.050 1995< -.028 1967< -.020 1954< -.007 Higher 1988 .053 2014 .017

[E] Outliers 4 3.0 SD above or -4.5 SD below mean for year

1983 +3.7 SD; 1995 -5.0 SD; 1999 +3.3 SD; 2008 -5.0 SD

1357B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1954 146 229 221 177 214 162

1960 218 174 176 98 96 103 93 77 147 191

1970 164 184 180 176 240 280 283 308 304 307

1980 346 349 340 346 292 328 379 350 248 306

1990 266 266 261 229 235 142 199 206 242 236

2000 277 204 209 186 137 152 153 137 98 142

2010 132 124 103 98 109 83

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1358A 1952 to 2015 64 years Series 13

[B] Entire series, effect on correlation ( .510) is:

Lower 1983> -.052 1972< -.046 1987< -.029 1958< -.020 2006> -.009 1971< -.008 Higher 1999 .069 1988 .037

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

1972 -4.6 SD

1358A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1952 395 286 275 263 282 273 213 290

1960 303 350 303 188 156 131 153 226 166 188

1970 146 137 78 117 196 212 226 278 245 341

1980 272 268 195 234 154 317 246 86 71 235

1990 152 187 235 138 128 90 169 145 192 73

2000 224 257 165 208 124 172 203 132 190 178

2010 130 161 141 155 183 123

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1358B 1969 to 2015 47 years Series 14

[B] Entire series, effect on correlation ( .613) is:

Lower 1983> -.056 1969< -.049 1987< -.037 1997> -.018 2012> -.015 1978> -.011 Higher 1988 .152 1999 .054

1358B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1969 229

1970 360 321 265 368 456 465 431 422 436 402

1980 448 408 257 328 301 387 306 101 46 350

1990 224 258 262 154 178 124 205 153 206 55

2000 187 129 120 165 114 145 153 79 162 139

2010 117 207 154 159 208 149

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1362A 1905 to 2015 111 years Series 15

[B] Entire series, effect on correlation ( .567) is:

Lower 2015< -.030 1924> -.017 1913< -.013 2007< -.012 1946> -.011 1950> -.008 Higher 1999 .025 1949 .020

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

1950 +3.2 SD; 1951 +3.5 SD

1362A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1905 110 109 127 105 89

1910 97 86 54 51 78 99 110 135 136 83

1920 162 99 143 80 103 116 118 116 117 98

1930 119 150 132 75 98 124 81 92 101 86

1940 99 145 141 116 157 157 111 183 141 62

1950 104 150 87 69 61 72 90 82 139 86

1960 64 63 52 36 20 20 7 28 19 24

1970 35 33 50 65 86 77 87 97 66 88

1980 94 80 78 64 51 78 74 77 58 108

1990 95 101 96 80 98 70 96 69 98 65

2000 93 104 97 108 109 120 106 75 97 99

2010 88 96 90 93 95 78

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1362B 1878 to 2015 138 years Series 16

[\*] Early part of series cannot be checked from 1878 to 1904 -- not matched by another series

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

Lower 1921> -.016 1914> -.015 1995< -.012 1948< -.012 1962< -.010 1991< -.006 Higher 1949 .023 1983 .019

1362B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1878 206 105

1880 107 83 83 70 78 74 58 44 71 64

1890 50 86 58 38 74 29 69 59 54 34

1900 57 111 136 113 121 96 97 104 95 85

1910 91 80 62 55 88 121 126 117 105 57

1920 111 130 116 56 64 53 54 65 69 70

1930 93 105 83 59 58 65 45 70 53 61

1940 51 57 72 71 78 82 67 92 54 41

1950 54 86 82 92 146 123 181 201 234 131

1960 120 121 61 70 39 47 46 81 76 109

1970 101 89 143 131 136 154 156 187 112 139

1980 122 114 114 81 98 99 109 121 90 147

1990 116 101 107 105 120 80 105 72 97 77

2000 92 110 102 96 102 123 120 120 113 123

2010 100 117 99 112 117 98

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1364A 1962 to 2015 54 years Series 17

[B] Entire series, effect on correlation ( .697) is:

Lower 1986< -.049 2006> -.020 1964> -.013 1992< -.011 2014< -.009 2007> -.009 Higher 1988 .042 1983 .033

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

2006 +3.4 SD

1364A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1962 205 129 187 135 159 237 219 383

1970 361 333 361 276 382 352 451 452 272 277

1980 507 489 334 168 221 205 134 242 136 205

1990 200 189 150 113 145 123 126 83 135 100

2000 175 166 186 142 138 170 209 172 165 160

2010 111 106 93 92 89 61

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1364B 1953 to 2015 63 years Series 18

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

Lower 1999> -.054 2015> -.033 1978< -.031 1989< -.022 1986< -.011 2014< -.010 Higher 1983 .062 1965 .029

1364B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1953 110 322 187 329 218 291 233

1960 314 275 314 190 214 130 135 222 242 331

1970 356 299 354 240 370 329 409 372 210 239

1980 274 235 211 131 153 163 137 185 114 139

1990 143 161 142 123 121 101 126 78 123 81

2000 98 85 89 83 79 91 79 73 54 68

2010 66 56 57 38 44 687

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1376A 1956 to 2015 60 years Series 19

[B] Entire series, effect on correlation ( .596) is:

Lower 2009< -.026 1965> -.021 1988> -.017 2006> -.016 2011< -.014 1956< -.014 Higher 1999 .048 1983 .046

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

1967 +3.0 SD

1376A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1956 181 211 241 209

1960 243 247 274 216 202 221 212 312 195 223

1970 240 294 293 252 287 321 296 294 262 246

1980 265 266 227 166 261 236 302 241 191 267

1990 179 213 223 156 199 185 179 130 211 104

2000 144 154 147 176 123 139 157 114 93 80

2010 66 68 75 78 100 79

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1376B 1961 to 2015 55 years Series 20

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

Lower 1966> -.025 1999> -.021 1977< -.018 2010> -.018 2003> -.014 1996< -.012 Higher 1983 .044 1965 .022

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

1965 -4.5 SD

1376B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1961 233 193 173 159 19 230 300 225 254

1970 270 364 313 282 316 308 269 240 265 266

1980 320 256 251 176 274 237 306 240 188 273

1990 224 248 225 181 217 175 181 182 219 191

2000 227 198 248 252 208 203 184 178 186 208

2010 220 211 179 176 185 155

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1377A 1959 to 2015 57 years Series 21

[B] Entire series, effect on correlation ( .503) is:

Lower 1988> -.146 1996< -.038 1975< -.029 1995> -.024 2015> -.019 2003< -.019 Higher 1965 .075 1983 .048

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

1988 +5.3 SD

1377A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1959 376

1960 405 395 361 309 267 207 252 261 251 282

1970 238 291 217 180 328 220 269 294 188 240

1980 330 263 201 139 196 148 197 245 281 229

1990 194 225 242 184 192 220 129 131 200 112

2000 186 195 152 90 99 99 104 87 95 116

2010 92 83 74 84 97 94

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1377B 1960 to 2015 56 years Series 22

[B] Entire series, effect on correlation ( .608) is:

Lower 1988> -.087 1963> -.023 1962< -.014 1985< -.014 1996< -.011 2008> -.009 Higher 1999 .060 1983 .041

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

1988 +3.6 SD

1377B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1960 370 392 303 369 271 239 248 295 302 425

1970 328 349 289 270 374 353 319 260 183 237

1980 291 202 211 126 162 133 240 302 221 207

1990 155 230 267 195 204 162 133 124 142 85

2000 155 166 131 105 118 140 101 107 145 128

2010 95 120 88 91 99 82

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1382A 1955 to 2015 61 years Series 23

[B] Entire series, effect on correlation ( .608) is:

Lower 1999> -.033 2012> -.023 1961< -.019 1965> -.018 1993> -.017 2001< -.015 Higher 1988 .103 1983 .022

1382A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1955 253 216 211 228 152

1960 176 119 123 81 86 98 89 202 234 222

1970 215 282 323 269 397 443 351 362 386 305

1980 317 306 335 249 242 266 280 285 168 218

1990 315 333 347 351 395 270 310 174 255 225

2000 359 237 219 167 133 145 101 172 190 194

2010 185 174 231 268 311 231

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1382B 1958 to 2015 58 years Series 24

[B] Entire series, effect on correlation ( .501) is:

Lower 2006< -.081 1999> -.036 2011< -.023 1961< -.018 1978> -.015 1964> -.013 Higher 1988 .071 1983 .057

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

2006 -5.2 SD

1382B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1958 252 198

1960 217 116 110 50 143 111 102 175 250 223

1970 236 315 287 258 393 449 435 442 531 451

1980 500 434 414 248 276 314 368 307 197 232

1990 212 195 218 194 232 220 214 130 225 209

2000 272 281 234 245 220 161 84 138 150 158

2010 159 114 112 153 163 161

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1391A 1960 to 2015 56 years Series 25

[B] Entire series, effect on correlation ( .398) is:

Lower 1988> -.118 1992< -.019 1966< -.018 2006> -.012 1964> -.010 1970> -.010 Higher 1983 .040 1999 .038

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

1988 +5.4 SD

1391A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1960 227 188 298 228 222 171 95 179 164 196

1970 238 220 191 176 225 228 191 195 164 189

1980 204 194 202 143 150 160 249 236 237 219

1990 170 202 140 120 132 134 129 116 143 107

2000 123 120 126 123 147 136 170 128 163 186

2010 173 178 118 147 148 129

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1391B 1955 to 2015 61 years Series 26

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

Lower 1957< -.033 1986< -.028 1983> -.021 1997> -.015 2003> -.014 1971< -.013 Higher 1988 .107 1999 .053

1391B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1955 303 327 231 263 243

1960 243 248 327 243 168 125 103 129 109 95

1970 97 82 116 108 139 119 89 149 94 100

1980 130 87 89 83 87 100 77 74 60 97

1990 98 122 129 108 125 115 155 146 165 123

2000 145 145 162 200 187 200 205 190 199 208

2010 179 164 151 144 165 127

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1393A 1953 to 2015 63 years Series 27

[B] Entire series, effect on correlation ( .542) is:

Lower 2006< -.111 1966> -.029 1995> -.026 1998< -.013 1984> -.008 1959> -.008 Higher 1988 .107 1999 .051

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

1966 +3.2 SD; 2006 -7.1 SD

1393A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1953 130 218 290 266 269 348 405

1960 421 392 350 291 293 260 383 392 343 297

1970 253 275 335 242 411 501 446 445 373 444

1980 410 367 365 234 329 258 381 236 84 277

1990 196 236 215 187 238 245 179 135 117 45

2000 111 137 106 89 95 80 5 32 96 122

2010 69 86 85 107 151 122

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1393B 1957 to 2015 59 years Series 28

[B] Entire series, effect on correlation ( .607) is:

Lower 2006< -.047 1966> -.026 1995> -.019 1997> -.017 1987< -.014 2015> -.012 Higher 1999 .058 1988 .043

1393B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1957 241 266 307

1960 305 317 388 327 276 230 331 364 325 345

1970 273 352 372 355 411 498 516 585 545 546

1980 565 504 400 268 316 239 422 272 185 344

1990 289 335 321 288 243 259 250 222 224 101

2000 189 165 162 149 137 120 8 31 37 58

2010 10 46 54 80 112 96

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PART 7: DESCRIPTIVE STATISTICS: ACRU\_LB1400B\_CORR1-50 08:50 Thu 31 Aug 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 ()

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1 1264A 1969 2015 47 1 0 .510 2.42 4.77 1.148 .869 .210 2.50 .519 -.092 1

2 1264B 1957 2015 59 2 0 .638 2.18 4.33 .820 .726 .214 2.65 .467 -.065 2

3 1281A 1952 2015 64 2 0 .536 1.47 4.78 1.042 .885 .229 2.66 .560 -.051 1

4 1281B 1953 2015 63 2 0 .524 1.51 4.46 .921 .864 .240 2.65 .445 -.022 1

5 1283A 1963 2015 53 2 0 .600 2.48 4.56 1.088 .721 .299 2.58 .559 .017 1

6 1283B 1969 2015 47 1 1 .202 3.08 5.01 1.140 .799 .197 2.45 .382 .041 2

7 1354A 1910 2015 106 4 1 .448 1.78 6.50 1.613 .927 .269 2.71 .437 -.053 1

8 1354B 1955 2015 61 2 0 .619 2.25 5.01 1.296 .875 .193 2.72 .512 -.094 1

9 1355A 1953 2015 63 2 0 .691 2.20 4.97 .969 .727 .232 2.74 .473 .006 1

10 1355B 1968 2015 48 1 0 .395 2.25 4.24 .886 .699 .202 2.47 .517 .188 1

11 1357A 1975 2015 41 1 0 .422 2.27 3.46 .674 .807 .152 2.73 .633 -.111 1

12 1357B 1954 2015 62 2 0 .401 2.07 3.79 .808 .881 .157 2.48 .413 -.042 1

13 1358A 1952 2015 64 2 0 .510 1.99 3.95 .721 .534 .298 2.56 .574 -.014 1

14 1358B 1969 2015 47 1 0 .613 2.40 4.65 1.205 .736 .343 2.40 .450 .057 1

15 1362A 1905 2015 111 4 0 .567 .91 1.83 .328 .644 .245 2.62 .484 -.052 1

16 1362B 1878 2015 138 4 0 .600 .94 2.34 .354 .706 .223 2.77 .521 -.066 2

17 1364A 1962 2015 54 2 0 .697 2.11 5.07 1.110 .786 .242 2.74 .674 -.145 1

18 1364B 1953 2015 63 2 0 .538 1.89 6.87 1.188 .563 .261 2.61 .513 .105 2

19 1376A 1956 2015 60 2 0 .596 1.99 3.21 .699 .788 .181 2.47 .435 .008 1

20 1376B 1961 2015 55 2 0 .623 2.27 3.64 .554 .516 .200 2.37 .379 -.017 1

21 1377A 1959 2015 57 2 0 .503 2.04 4.05 .866 .812 .207 2.60 .555 .017 1

22 1377B 1960 2015 56 2 0 .608 2.11 4.25 .943 .834 .214 2.57 .492 -.006 1

23 1382A 1955 2015 61 2 0 .608 2.42 4.43 .865 .768 .195 2.65 .466 -.098 1

24 1382B 1958 2015 58 2 0 .501 2.39 5.30 1.113 .871 .213 2.44 .483 -.014 1

25 1391A 1960 2015 56 2 0 .398 1.73 2.98 .433 .620 .164 2.50 .406 -.026 1

26 1391B 1955 2015 61 2 0 .571 1.51 3.27 .631 .869 .165 2.69 .492 -.025 1

27 1393A 1953 2015 63 2 0 .542 2.43 5.01 1.263 .849 .305 2.35 .430 .040 1

28 1393B 1957 2015 59 2 0 .607 2.71 5.85 1.472 .903 .276 2.46 .449 -.045 1

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Total or mean: 1777 57 2 .542 1.95 6.87 .908 .768 .228 2.77 .489 -.024

- = [ COFECHA ACRU COF ] = -