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[] P R O G R A M C O F E C H A Version 6.06P 29831

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

Title of run: VMC245\_ACSA\_Corr3-50 FINAL

File of DATED series: VMC245\_ACSA\_Corr3

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 1910 to 2015 106 years

Continuous time span is 1910 to 2015 106 years

Portion with two or more series is 1911 to 2015 105 years

>> 106A 1993 absent in 2 of 39 series, but is not usually narrow: master index is .096

>> 137A 1977 absent in 2 of 39 series, but is not usually narrow: master index is .424

>> 1172A 1955 absent in 1 of 39 series, but is not usually narrow: master index is .441

>> 1174B 2007 absent in 1 of 39 series, but is not usually narrow: master index is -.358

>> 1183A 1987 absent in 1 of 39 series, but is not usually narrow: master index is -.181

>> 1183A 2012 absent in 1 of 39 series, but is not usually narrow: master index is .590

>> 1035A 1977 absent in 2 of 39 series, but is not usually narrow: master index is .424

>> 1035A 1993 absent in 2 of 39 series, but is not usually narrow: master index is .096

>> 1035A 1999 absent in 1 of 39 series, but is not usually narrow: master index is -.106

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

\*C\* Number of dated series 39 \*C\*

\*O\* Master series 1910 2015 106 yrs \*O\*

\*F\* Total rings in all series 3606 \*F\*

\*E\* Total dated rings checked 3605 \*E\*

\*C\* Series intercorrelation .605 \*C\*

\*H\* Average mean sensitivity .322 \*H\*

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

\*\*\* Mean length of series 92.5 \*\*\*

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

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

106A 1 absent rings: 1993

137A 1 absent rings: 1977

137B 1 absent rings: 1983

1035B 4 absent rings: 1982 1983 2001 2002

1036A 1 absent rings: 1945

1037A 1 absent rings: 2000

1038B 1 absent rings: 1945

1040A 1 absent rings: 1945

1042A 1 absent rings: 2010

1043B 1 absent rings: 1983

1172A 3 absent rings: 1955 1982 1983

1174B 2 absent rings: 1983 2007

1183A 4 absent rings: 1987 2000 2002 2012

1183B 2 absent rings: 2002 2015

1035A 5 absent rings: 1977 1982 1983 1993 1999

29 absent rings .804%

1950 .687 39 2000 -.825 39 2

1951 1.519 39 2001 -1.529 39 1

1952 .368 39 2002 -1.629 39 3

1953 -1.777 39 2003 -.796 39

1954 -1.386 39 2004 .492 39

1955 .441 39 1<< 2005 1.251 39

1956 .288 39 2006 .389 39

1957 .564 39 2007 -.358 39 1<<

1958 .505 39 2008 1.331 39

1959 -.189 39 2009 1.064 39

1910 1.082 1 1960 -1.455 39 2010 -2.109 39 1

1911 -.211 6 1961 1.344 39 2011 .303 39

1912 -1.019 8 1962 .700 39 2012 .590 39 1<<

1913 .052 10 1963 .012 39 2013 .784 39

1914 .171 10 1964 -.480 39 2014 .413 39

1915 -.773 11 1965 .389 39 2015 -1.130 39 1

1916 -.409 11 1966 -.585 39

1917 .928 12 1967 .487 39

1918 .302 12 1968 -1.706 39

1919 .358 15 1969 -.295 39

1920 .716 16 1970 -.006 39

1921 1.532 19 1971 1.046 39

1922 -.497 21 1972 1.304 39

1923 -1.227 21 1973 1.198 39

1924 .884 23 1974 -.120 39

1925 -2.447 26 1975 -.966 39

1926 -1.207 26 1976 -.337 39

1927 .104 29 1977 .424 39 2<<

1928 1.090 30 1978 1.220 39

1929 .495 31 1979 .056 39

1930 .080 31 1980 .015 39

1931 .671 31 1981 .055 39

1932 -.314 31 1982 -1.497 39 3

1933 .122 31 1983 -2.828 39 6

1934 -.218 33 1984 .146 39

1935 1.040 33 1985 .675 39

1936 -2.713 33 1986 -.357 39

1937 1.592 33 1987 -.181 39 1<<

1938 .438 34 1988 -1.445 39

1939 .053 34 1989 -.275 39

1940 .402 34 1990 1.187 39

1941 .455 36 1991 1.130 39

1942 .499 36 1992 .763 39

1943 .690 36 1993 .096 39 2<<

1944 -.772 36 1994 1.248 39

1945 -3.492 36 3 1995 -.086 39

1946 -.306 39 1996 .370 39

1947 -.402 39 1997 .221 39

1948 .151 39 1998 .736 39

1949 .744 39 1999 -.106 39 1<<

PART 5: CORRELATION OF SERIES BY SEGMENTS: VMC245\_ACSA\_Corr3-50 13:55 Thu 01 Sep 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 1900 1925 1950 1975

1949 1974 1999 2024

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

1 106A 1929 2015 .79 .56 .20B I believe that this is right

2 106B 1928 2015 .81 .61 .36

3 137A 1913 2015 .69 .73 .49 .63

4 137B 1911 2015 .54 .59 .54 .68

5 160A 1946 2015 .73 .77 .73

6 160B 1946 2015 .64 .67 .69

7 415A 1925 2015 .71 .63 .67

8 415B 1934 2015 .72 .67 .79

9 429A 1924 2015 .66 .66 .72 .76

10 429B 1924 2015 .59 .58 .35 .53

11 1035B 1911 2015 .76 .78 .54 .53

12 1036A 1912 2015 .86 .87 .76 .75

13 1036B 1919 2015 .87 .82 .54 .61

14 1037A 1915 2015 .64 .60 .38 .39

15 1037B 1927 2015 .58 .51 .63

16 1038A 1919 2015 .71 .69 .49 .55

17 1038B 1912 2015 .75 .79 .57 .48

18 1039A 1946 2015 .44 .49 .67

19 1039B 1927 2015 .61 .48 .56

20 1040A 1919 2015 .68 .68 .47 .56

21 1040B 1921 2015 .72 .70 .58 .63

22 1041A 1922 2015 .47 .52 .62 .61

23 1041B 1927 2015 .67 .62 .54

24 1042A 1934 2015 .65 .54 .63

25 1042B 1921 2015 .82 .81 .75 .68

26 1043A 1913 2015 .65 .73 .71 .60

27 1043B 1911 2015 .61 .69 .53 .42

28 1172A 1938 2015 .39 .42 .60

29 1172B 1917 2015 .51 .53 .35 .58

30 1174B 1920 2015 .57 .53 .37 .31A

31 1176A 1911 2015 .23A .32A .42 .43

32 1176B 1911 2015 .32A .34 .46 .52

33 1179A 1925 2015 .44 .74 .72

34 1179B 1925 2015 .39 .74 .77

35 1181A 1922 2015 .85 .86 .67 .74

36 1181B 1921 2015 .66 .66 .66 .74

37 1183A 1941 2015 .41 .46 .30B As good as I can get

38 1183B 1941 2015 .55 .61 .37

39 1035A 1910 2015 .81 .79 .73 .78

Av segment correlation .65 .64 .57 .58

PART 6: POTENTIAL PROBLEMS: VMC245\_ACSA\_Corr3-50 13:55 Thu 01 Sep 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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106A 1929 to 2015 87 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

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

1966 2015 -6 -.22 -.15 .14 .09 .22\* .17 .16 -.03 -.07 .13 .20| - - - - - - - - - -

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

Lower 1993< -.075 2010> -.044 2007< -.022 2002> -.013 2015> -.011 2000> -.009 Higher 1936 .111 1945 .058

1966 to 2015 segment:

Lower 2010> -.059 1993< -.052 2002> -.018 2015> -.015 2000> -.013 1967< -.011 Higher 1968 .045 1978 .028

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

1993 .096 39 2 >> WARNING: Ring is not usually narrow

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

1993 -6.5 SD; 2010 +3.1 SD

106A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1929 156

1930 140 182 180 196 184 240 91 193 214 217

1940 207 207 209 202 169 63 143 184 222 305

1950 264 322 289 191 188 251 283 300 300 196

1960 135 255 225 182 120 281 257 167 121 189

1970 202 194 176 180 170 220 210 287 350 263

1980 243 220 98 81 83 101 88 108 51 44

1990 80 55 71 0 57 68 50 56 64 33

2000 61 55 62 55 43 82 62 6 42 105

2010 88 65 71 63 56 75

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106B 1928 to 2015 88 years Series 2

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

Lower 2010> -.028 2014< -.021 2002> -.013 1983> -.013 2003> -.013 1967< -.010 Higher 1936 .073 1945 .052

106B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1928 231 174

1930 145 196 203 266 235 301 114 312 284 275

1940 268 214 187 160 152 60 160 123 174 253

1950 190 283 181 126 149 223 225 217 221 233

1960 139 286 337 284 163 144 190 142 122 192

1970 230 218 258 262 135 133 123 195 193 112

1980 74 84 38 48 35 44 38 59 25 63

1990 105 84 77 37 47 49 56 93 61 37

2000 33 52 64 92 110 77 51 39 55 78

2010 60 46 45 61 37 42

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137A 1913 to 2015 103 years Series 3

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

Lower 1977< -.021 1987< -.014 1920< -.011 1954> -.009 1935< -.009 1974> -.009 Higher 1945 .041 1936 .039

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

1977 .424 39 2 >> WARNING: Ring is not usually narrow

137A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1913 32 24 52 35 67 117 79

1920 69 227 194 197 334 177 218 342 374 316

1930 338 302 296 438 311 303 162 557 463 393

1940 395 375 501 378 292 87 283 198 303 290

1950 226 233 172 141 215 231 221 206 123 102

1960 86 117 134 158 124 139 85 90 28 34

1970 48 69 117 96 119 98 51 0 44 30

1980 68 92 28 24 107 65 70 20 65 94

1990 131 117 141 77 143 117 143 166 194 70

2000 131 92 46 93 156 135 166 205 196 161

2010 68 176 195 169 178 103

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137B 1911 to 2015 105 years Series 4

[B] Entire series, effect on correlation ( .604) is:

Lower 1947< -.029 1911> -.019 1954> -.014 1936> -.009 1940< -.008 1966< -.008 Higher 1925 .046 1968 .021

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

1983 -2.828 39 6

137B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1911 160 122 118 114 106 147 170 154 183

1920 209 214 169 157 178 118 184 229 265 199

1930 229 257 214 317 272 318 174 335 203 166

1940 119 158 150 137 109 79 205 65 201 127

1950 105 177 109 104 160 146 178 150 137 114

1960 117 148 116 128 134 128 89 128 77 121

1970 169 150 170 176 189 167 125 122 192 169

1980 149 209 54 0 51 41 56 19 44 83

1990 172 209 176 92 160 161 136 115 133 89

2000 100 74 64 87 173 172 187 186 198 159

2010 114 181 161 156 140 113

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160A 1946 to 2015 70 years Series 5

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

Lower 2005< -.028 2010> -.025 1964> -.018 1947> -.014 1960> -.007 1946< -.007 Higher 1968 .023 1983 .021

160A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1946 200 283 288 238

1950 231 280 272 143 212 332 274 316 280 223

1960 245 375 412 291 356 335 202 279 195 270

1970 270 303 315 328 212 142 219 265 207 167

1980 231 214 99 68 172 148 121 160 89 121

1990 167 127 105 86 104 57 91 69 125 80

2000 55 68 56 56 105 96 109 84 169 245

2010 165 261 352 280 332 193

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160B 1946 to 2015 70 years Series 6

[B] Entire series, effect on correlation ( .627) is:

Lower 1964> -.018 1947> -.017 1950< -.016 1954> -.015 1986> -.013 2003< -.012 Higher 1983 .037 1968 .023

160B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1946 237 272 213 246

1950 223 277 278 157 266 297 258 280 249 209

1960 187 321 384 256 327 330 194 260 173 302

1970 233 205 273 246 211 127 156 215 200 149

1980 209 252 100 61 180 204 215 258 129 133

1990 213 187 192 169 197 117 237 215 188 155

2000 121 103 140 104 161 202 143 138 217 181

2010 112 157 152 177 234 153

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415A 1925 to 2015 91 years Series 7

[B] Entire series, effect on correlation ( .680) is:

Lower 1960> -.026 2015> -.013 2003> -.011 1954> -.011 1965< -.011 1994< -.008 Higher 1945 .039 1983 .016

415A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1925 214 242 273 422 382

1930 414 447 277 287 282 519 269 540 454 346

1940 441 397 333 380 226 108 274 276 254 226

1950 224 293 212 148 254 326 209 260 258 230

1960 253 268 206 159 183 170 174 245 155 212

1970 187 184 183 197 137 94 185 207 236 160

1980 154 129 70 33 83 71 72 55 18 40

1990 83 75 50 39 34 21 36 36 54 27

2000 20 23 21 44 42 33 12 14 44 37

2010 12 22 24 50 28 29

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415B 1934 to 2015 82 years Series 8

[B] Entire series, effect on correlation ( .744) is:

Lower 1954> -.015 1965< -.012 1960> -.012 1938> -.011 1940< -.011 1976> -.009 Higher 1936 .033 2010 .019

415B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1934 451 731 187 400 598 286

1940 164 229 260 214 77 29 149 147 145 193

1950 229 303 328 210 264 304 272 312 269 238

1960 213 253 230 164 170 134 102 154 108 138

1970 132 168 144 133 99 81 139 148 133 99

1980 82 72 63 22 47 75 56 81 56 87

1990 131 92 96 75 83 52 81 57 94 90

2000 58 42 35 40 42 57 37 37 101 92

2010 32 70 53 85 53 36

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429A 1924 to 2015 92 years Series 9

[B] Entire series, effect on correlation ( .674) is:

Lower 1936> -.041 1939< -.012 1944> -.010 1947> -.007 1941< -.006 1954> -.005 Higher 1925 .041 1968 .018

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

1983 -4.8 SD

429A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1924 169 77 158 209 271 259

1930 214 255 261 348 318 340 278 394 346 216

1940 242 260 389 347 360 258 325 412 397 422

1950 412 413 325 218 270 277 225 244 284 202

1960 184 247 173 166 118 159 113 192 80 113

1970 106 188 155 186 130 107 139 121 107 104

1980 103 100 64 20 73 117 72 70 46 60

1990 65 62 52 47 55 56 78 54 51 63

2000 43 24 4 37 94 96 119 101 175 161

2010 61 187 204 177 148 133

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429B 1924 to 2015 92 years Series 10

[B] Entire series, effect on correlation ( .556) is:

Lower 1945> -.055 1983> -.036 1944> -.025 1960> -.024 1949< -.016 1952< -.012 Higher 1936 .092 1925 .053

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

1945 +4.2 SD; 1983 +3.2 SD

429B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1924 175 72 149 189 220 190

1930 160 199 220 253 275 304 150 286 264 245

1940 254 255 374 381 379 318 291 247 222 182

1950 247 250 162 147 191 231 206 211 224 139

1960 195 223 191 138 120 128 106 209 135 186

1970 186 182 134 191 126 104 231 216 137 97

1980 198 150 112 144 197 161 87 73 49 82

1990 103 78 71 77 74 81 78 63 66 68

2000 59 40 50 68 95 138 126 168 223 161

2010 49 160 186 156 112 97

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1035B 1911 to 2015 105 years Series 11

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

Lower 2011< -.021 1960> -.019 1948< -.018 2008< -.017 1911> -.010 1977< -.009 Higher 1936 .045 1945 .033

[D] 4 Absent rings: Year Master N series Absent

1982 -1.497 39 3

1983 -2.828 39 6

2001 -1.529 39 1

2002 -1.629 39 3

1035B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1911 121 84 131 102 86 130 204 207 202

1920 261 309 243 226 320 190 173 259 308 278

1930 343 361 309 235 300 442 155 422 245 288

1940 288 269 239 254 177 55 123 128 73 197

1950 142 159 117 92 132 142 204 204 178 151

1960 190 225 199 188 208 196 156 141 26 119

1970 121 159 142 170 114 79 30 14 133 105

1980 65 27 0 0 37 21 39 66 36 37

1990 88 117 108 89 131 118 88 127 201 177

2000 84 0 0 105 105 143 113 91 57 88

2010 49 30 86 118 93 69

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1036A 1912 to 2015 104 years Series 12

[B] Entire series, effect on correlation ( .792) is:

Lower 2010< -.016 2015> -.014 1964< -.013 1983> -.008 1916> -.008 1990< -.005 Higher 1936 .022 1945 .015

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

1945 -3.492 36 3

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

2010 -5.1 SD

1036A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1912 224 220 194 177 283 393 320 335

1920 241 287 162 113 211 110 129 226 296 245

1930 185 275 222 239 224 325 50 363 258 179

1940 175 338 309 303 107 0 198 161 183 267

1950 250 232 232 118 111 185 169 190 161 160

1960 117 192 183 159 109 170 155 187 122 172

1970 137 223 234 232 187 155 190 209 311 238

1980 154 144 108 98 150 162 111 77 44 81

1990 98 134 134 102 144 112 115 98 73 71

2000 68 41 40 48 60 101 65 51 73 65

2010 9 61 78 78 59 68

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1036B 1919 to 2015 97 years Series 13

[B] Entire series, effect on correlation ( .771) is:

Lower 1970< -.025 1983> -.020 1982> -.018 1990< -.011 1944< -.010 2015> -.007 Higher 1936 .040 1925 .025

1036B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1919 369

1920 405 425 286 284 406 235 281 293 323 350

1930 304 394 308 326 327 390 133 314 298 238

1940 275 286 247 275 104 83 209 183 206 246

1950 251 222 199 130 122 218 219 287 263 236

1960 169 244 220 206 148 211 190 173 113 146

1970 107 171 174 191 160 139 118 130 204 167

1980 149 107 132 122 174 197 104 73 63 91

1990 100 116 115 114 117 97 103 91 115 89

2000 77 56 74 88 122 156 119 67 149 148

2010 56 123 133 127 83 97

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1037A 1915 to 2015 101 years Series 14

[B] Entire series, effect on correlation ( .545) is:

Lower 1968> -.044 1925> -.021 1944> -.020 2010> -.016 1915< -.016 1938< -.012 Higher 1936 .091 1945 .017

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

2000 -.825 39 2

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

1936 -4.8 SD; 1968 +3.2 SD

1037A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1915 122 219 243 222 218

1920 310 280 230 242 367 286 257 293 335 299

1930 283 332 295 290 326 348 146 343 226 256

1940 322 337 294 268 324 164 187 183 191 256

1950 248 288 190 133 108 182 146 122 133 146

1960 122 200 183 140 175 121 107 122 184 145

1970 94 129 176 124 81 86 124 144 66 49

1980 30 57 57 33 30 46 23 12 9 10

1990 35 38 32 25 60 32 31 42 47 44

2000 0 6 10 22 38 73 18 16 45 32

2010 21 25 31 20 20 17

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1037B 1927 to 2015 89 years Series 15

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

Lower 1983> -.022 1982> -.018 1929< -.017 1951< -.010 1930< -.010 1987< -.009 Higher 2010 .035 1968 .019

1037B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1927 414 550 332

1930 246 364 331 321 323 351 191 500 391 396

1940 461 579 408 286 188 80 169 126 104 93

1950 105 111 94 75 113 207 174 194 201 198

1960 142 212 215 154 89 151 127 134 64 86

1970 59 90 129 100 51 69 63 94 97 52

1980 39 58 63 56 49 68 34 16 3 33

1990 71 87 85 56 106 80 70 97 70 85

2000 37 30 3 32 29 71 56 41 47 53

2010 8 35 43 65 45 42

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1038A 1919 to 2015 97 years Series 16

[B] Entire series, effect on correlation ( .593) is:

Lower 1983< -.019 1992< -.013 1988> -.011 2007< -.008 2006< -.008 1957< -.008 Higher 1936 .025 1925 .009

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

1983 -6.3 SD

1038A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1919 192

1920 228 221 170 159 210 137 145 234 326 256

1930 265 249 242 174 117 157 40 259 188 176

1940 248 284 303 325 141 49 162 128 197 207

1950 102 96 55 42 39 52 57 43 53 54

1960 62 114 121 110 95 112 99 106 85 113

1970 99 101 95 95 85 77 86 72 101 96

1980 75 93 70 18 63 67 90 107 93 81

1990 110 97 58 65 105 57 112 87 91 74

2000 63 57 76 67 97 138 65 33 94 98

2010 63 73 79 67 80 51

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1038B 1912 to 2015 104 years Series 17

[B] Entire series, effect on correlation ( .651) is:

Lower 1977< -.026 1913< -.017 2002> -.016 1973< -.014 1919< -.013 2010> -.013 Higher 1936 .061 1983 .021

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

1945 -3.492 36 3

1038B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1912 114 113 139 159 147 166 170 140

1920 189 225 161 156 206 132 155 219 280 235

1930 220 241 221 171 130 187 42 253 181 146

1940 149 193 154 145 46 0 87 61 79 172

1950 188 178 101 82 54 90 108 86 74 73

1960 93 159 149 136 96 98 75 78 46 53

1970 78 124 85 48 43 39 42 19 50 48

1980 39 44 34 10 64 70 75 141 79 80

1990 112 99 100 89 101 63 77 69 74 70

2000 72 84 116 105 104 179 170 137 124 84

2010 75 78 69 66 111 67

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1039A 1946 to 2015 70 years Series 18

[B] Entire series, effect on correlation ( .535) is:

Lower 1959< -.032 1953> -.030 1949< -.028 1978< -.019 2008< -.018 1981< -.014 Higher 2010 .079 1983 .035

1039A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1946 202 202 189 102

1950 109 122 78 111 97 113 137 95 109 48

1960 52 162 111 131 82 174 162 203 135 135

1970 120 173 182 128 120 123 128 133 95 80

1980 88 56 41 35 118 132 147 127 93 147

1990 178 160 199 148 195 162 128 131 183 127

2000 121 118 96 136 161 169 103 98 86 104

2010 33 107 142 147 102 58

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1039B 1927 to 2015 89 years Series 19

[B] Entire series, effect on correlation ( .591) is:

Lower 1927< -.056 1953> -.026 1978< -.023 1984< -.019 1968> -.015 2010> -.010 Higher 1945 .053 1936 .031

1039B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1927 391 428 440

1930 403 431 343 366 350 361 195 410 363 275

1940 168 233 274 266 98 68 210 160 206 138

1950 175 173 132 158 98 133 169 141 150 129

1960 94 180 147 157 123 245 168 187 149 148

1970 172 217 187 171 125 136 170 179 100 89

1980 124 137 89 87 98 131 175 197 135 160

1990 173 166 163 136 165 163 159 137 156 142

2000 170 135 118 139 186 175 147 133 239 185

2010 129 199 199 187 165 118

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1040A 1919 to 2015 97 years Series 20

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

Lower 1968> -.031 1957< -.020 1988> -.019 2002> -.016 1981< -.012 1966> -.008 Higher 1936 .045 1945 .028

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

1945 -3.492 36 3

1040A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1919 175

1920 137 187 97 110 192 99 203 166 229 229

1930 219 241 228 272 339 421 73 310 200 246

1940 155 276 251 261 86 0 128 239 161 291

1950 293 354 312 221 211 359 285 179 253 286

1960 233 389 357 334 295 262 329 412 343 317

1970 288 264 288 274 221 171 150 152 212 132

1980 193 87 60 67 163 223 105 89 199 217

1990 214 229 282 255 280 177 219 227 265 212

2000 184 198 286 330 365 328 279 222 278 245

2010 84 247 275 311 357 193

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1040B 1921 to 2015 95 years Series 21

[B] Entire series, effect on correlation ( .683) is:

Lower 1962< -.016 1983> -.013 2003> -.011 1948< -.009 1991< -.009 1964< -.008 Higher 1925 .030 1945 .013

1040B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1921 239 148 136 187 75 191 187 289 226

1930 228 294 272 370 417 546 247 745 566 570

1940 503 471 538 516 192 110 366 401 301 440

1950 361 447 334 219 161 233 267 264 281 222

1960 166 230 168 187 142 194 215 328 214 175

1970 217 269 294 213 242 177 142 207 327 243

1980 243 103 84 151 318 294 176 163 139 226

1990 294 202 219 209 264 171 204 251 265 173

2000 127 141 133 255 232 204 157 141 182 153

2010 50 116 169 151 181 120

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1041A 1922 to 2015 94 years Series 22

[B] Entire series, effect on correlation ( .566) is:

Lower 1932< -.040 1945> -.034 1922> -.022 1934< -.013 1968> -.011 1971< -.010 Higher 1925 .019 1937 .016

1041A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1922 103 82 104 66 87 106 187 161

1930 168 173 83 153 107 224 159 404 269 224

1940 326 348 279 346 253 279 282 339 304 393

1950 343 418 299 185 135 208 175 196 172 216

1960 134 229 218 178 143 172 189 174 154 110

1970 107 119 219 274 197 133 170 166 172 114

1980 101 160 97 87 153 157 126 205 98 119

1990 130 142 100 123 129 82 82 62 69 53

2000 57 38 39 38 68 125 101 74 131 112

2010 58 89 76 81 52 56

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1041B 1927 to 2015 89 years Series 23

[B] Entire series, effect on correlation ( .595) is:

Lower 1945> -.058 1983> -.032 1992< -.027 2010> -.018 1944> -.014 1986> -.008 Higher 1936 .065 1953 .020

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

1945 +3.8 SD

1041B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1927 153 176 213

1930 265 289 191 238 178 347 172 342 274 224

1940 351 263 287 378 356 339 296 272 326 344

1950 376 410 307 176 170 277 291 366 332 285

1960 151 237 217 214 185 205 195 178 147 226

1970 245 286 287 248 186 144 168 193 191 136

1980 114 186 101 122 114 126 115 81 61 67

1990 70 93 46 42 65 36 51 43 67 56

2000 48 37 30 44 54 69 64 42 118 184

2010 85 99 106 83 59 45

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1042A 1934 to 2015 82 years Series 24

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

Lower 1985< -.025 1983> -.015 1965< -.014 1942< -.012 1960> -.011 1998< -.008 Higher 2010 .020 1936 .018

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

2010 -2.109 39 1

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

2010 -4.6 SD

1042A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1934 156 196 91 250 252 210

1940 230 244 126 150 120 86 133 92 260 237

1950 377 389 345 197 172 237 205 230 238 204

1960 187 176 139 115 130 102 119 120 78 120

1970 108 144 154 135 85 84 77 93 157 99

1980 93 128 79 72 98 53 57 59 45 70

1990 69 101 80 77 90 60 62 61 41 49

2000 28 23 10 12 22 41 32 32 33 36

2010 0 28 30 52 40 34

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1042B 1921 to 2015 95 years Series 25

[B] Entire series, effect on correlation ( .746) is:

Lower 2015> -.012 1945> -.009 2002< -.009 1990< -.008 1944> -.007 1934< -.007 Higher 1936 .044 1983 .011

1042B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1921 271 167 117 157 80 109 145 153 129

1930 131 139 124 110 83 147 61 193 160 130

1940 151 212 185 173 177 124 118 130 199 278

1950 232 271 260 138 172 233 193 202 227 217

1960 142 236 162 152 108 132 153 153 88 113

1970 104 129 129 119 75 71 79 87 115 104

1980 78 72 49 29 55 48 41 39 39 52

1990 43 60 55 55 59 53 49 42 39 41

2000 45 44 27 39 48 59 56 53 58 52

2010 21 57 59 105 88 91

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

1043A 1913 to 2015 103 years Series 26

[B] Entire series, effect on correlation ( .612) is:

Lower 2010> -.038 1999> -.015 1918< -.014 1966> -.010 1989< -.009 2013< -.008 Higher 1925 .036 1983 .024

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

1999 +3.3 SD

1043A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1913 186 235 202 105 164 110 166

1920 181 219 165 164 204 127 166 232 333 298

1930 314 300 256 243 204 326 206 421 315 305

1940 302 240 219 257 228 161 156 158 132 175

1950 192 201 198 114 86 127 133 130 166 160

1960 121 204 162 188 135 121 149 120 66 90

1970 86 109 115 110 67 55 63 71 122 89

1980 65 82 56 29 70 53 57 89 43 39

1990 80 83 83 80 115 63 86 89 100 163

2000 94 57 85 83 92 123 99 106 159 118

2010 115 95 98 81 109 64

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1043B 1911 to 2015 105 years Series 27

[B] Entire series, effect on correlation ( .565) is:

Lower 2010> -.039 1977< -.019 1915> -.015 1960> -.015 1938< -.013 1918< -.010 Higher 1945 .042 1983 .031

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

1983 -2.828 39 6

1043B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1911 138 99 188 219 240 103 131 77 144

1920 151 180 110 107 134 68 74 112 143 182

1930 211 187 165 131 121 181 114 208 102 153

1940 199 181 156 192 184 80 95 157 146 264

1950 190 180 184 109 93 151 134 129 111 134

1960 147 223 149 137 79 74 98 100 45 64

1970 88 124 84 94 70 61 40 19 68 56

1980 27 28 45 0 48 72 62 107 66 65

1990 153 149 75 76 136 116 146 143 133 116

2000 11 30 68 57 64 69 101 93 174 135

2010 162 177 179 153 179 127

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1172A 1938 to 2015 78 years Series 28

[B] Entire series, effect on correlation ( .379) is:

Lower 1955< -.168 1968> -.023 1954> -.012 1973< -.011 1953> -.011 1991< -.005 Higher 2010 .029 1982 .020

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

1954 1955 -6.1 SD

[D] 3 Absent rings: Year Master N series Absent

1955 .441 39 1 >> WARNING: Ring is not usually narrow

1982 -1.497 39 3

1983 -2.828 39 6

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

1955 -5.8 SD

1172A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1938 471 509

1940 388 265 232 338 78 68 158 129 163 166

1950 154 166 151 117 127 0 56 108 109 94

1960 68 82 67 37 24 30 20 118 128 228

1970 227 311 235 128 131 105 62 84 133 108

1980 77 32 0 0 87 135 88 78 52 73

1990 126 90 105 86 163 104 73 53 65 44

2000 43 33 42 48 89 110 151 131 195 188

2010 69 76 57 59 35 15

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

1172B 1917 to 2015 99 years Series 29

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

Lower 1955< -.070 1925> -.028 1975< -.016 1979< -.014 1982> -.012 1954> -.009 Higher 1945 .043 1936 .019

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

1954 1955 -4.1 SD

1172B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1917 363 290 254

1920 234 344 212 196 360 315 300 362 445 443

1930 378 473 458 321 305 379 223 410 347 355

1940 389 362 356 307 118 84 273 223 224 323

1950 270 347 263 192 252 95 198 246 223 179

1960 172 239 150 134 128 223 168 206 118 153

1970 124 150 133 138 104 62 109 103 101 61

1980 77 90 100 82 119 165 79 121 91 106

1990 139 122 111 85 117 75 105 82 91 68

2000 58 11 51 32 94 135 171 145 193 194

2010 47 67 117 106 103 46

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

1174B 1920 to 2015 96 years Series 30

[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 .02 .02 .05 -.10 .10 -.12 .06 -.26 .06 .31\* - - - - - - - - - -

[B] Entire series, effect on correlation ( .521) is:

Lower 1925> -.021 1944> -.012 2002> -.011 1996< -.011 2006< -.010 1974> -.010 Higher 1945 .065 1936 .032

1966 to 2015 segment:

Lower 2002> -.026 1974> -.023 1996< -.023 2006< -.021 1978< -.019 1969< -.019 Higher 1983 .104 1982 .042

[D] 2 Absent rings: Year Master N series Absent

1983 -2.828 39 6

2007 -.358 39 1 >> WARNING: Ring is not usually narrow

1174B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1920 185 257 188 169 230 212 203 246 216 253

1930 252 261 240 271 306 289 146 256 253 235

1940 150 251 205 245 231 31 212 157 130 120

1950 146 201 167 107 113 178 110 119 100 73

1960 82 103 112 181 118 165 123 67 41 33

1970 85 92 64 83 123 78 74 112 56 64

1980 70 33 15 0 67 84 57 93 46 64

1990 79 85 89 119 138 86 34 51 51 113

2000 56 85 103 104 115 160 21 0 67 65

2010 48 65 126 59 93 29

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

1176A 1911 to 2015 105 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

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

1911 1960 0 - - - - - - - - - -.13 .23\*-.16 -.07 -.06 .19 .01 .08 -.13 .04 -.16 -.07

1925 1974 0 -.13 .11 -.19 .08 .10 .00 -.08 -.01 .02 -.08 .32\*-.22 .00 -.19 .09 -.03 .22 -.10 .11 -.14 -.09

[B] Entire series, effect on correlation ( .326) is:

Lower 1936> -.035 1911< -.027 1996< -.026 1945> -.024 1931< -.017 1953> -.016 Higher 1925 .046 2010 .031

1911 to 1960 segment:

Lower 1936> -.055 1911< -.049 1945> -.036 1931< -.031 1953> -.026 1944> -.019 Higher 1925 .102 1960 .056

1925 to 1974 segment:

Lower 1936> -.072 1945> -.048 1953> -.032 1931< -.031 1944> -.023 1969< -.016 Higher 1925 .086 1968 .053

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

1945 +3.5 SD

1176A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1911 32 80 92 115 82 103 123 161 152

1920 146 139 100 89 107 41 77 99 73 79

1930 38 31 37 129 107 108 104 121 110 102

1940 89 97 98 103 154 149 166 117 186 158

1950 163 253 276 223 134 172 126 137 179 164

1960 55 197 188 164 199 202 116 143 66 57

1970 199 229 192 159 158 190 251 262 215 224

1980 307 206 94 137 177 197 136 88 168 163

1990 193 183 178 126 165 142 77 122 123 87

2000 95 86 129 129 147 105 152 90 124 173

2010 98 169 156 165 159 126

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1176B 1911 to 2015 105 years Series 32

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

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

1911 1960 0 - - - - - - - - - -.02 .32\*-.13 .27 -.16 .09 -.22 .21 -.16 -.18 .00 .12

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

Lower 1945> -.054 1943< -.051 1969< -.020 1988> -.017 1983> -.017 1930< -.016 Higher 1968 .038 1925 .034

1911 to 1960 segment:

Lower 1943< -.097 1945> -.093 1930< -.030 1944> -.027 1935< -.014 1931< -.008 Higher 1925 .077 1960 .037

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

1945 +4.7 SD

1176B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1911 76 68 73 106 93 74 116 110 100

1920 120 95 69 33 96 34 62 87 93 87

1930 34 58 59 122 86 85 82 145 135 149

1940 153 165 243 105 217 244 211 152 209 248

1950 205 232 198 172 99 199 194 217 263 250

1960 93 193 275 241 195 180 115 151 53 51

1970 202 221 188 211 172 179 217 282 295 241

1980 296 206 216 229 217 250 157 156 254 227

1990 289 239 225 174 242 252 235 222 197 144

2000 130 102 106 100 173 164 164 147 145 190

2010 115 198 163 144 137 117

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1179A 1925 to 2015 91 years Series 33

[B] Entire series, effect on correlation ( .535) is:

Lower 1936> -.070 1925> -.025 1937< -.023 2012< -.015 1935< -.012 1941< -.008 Higher 1945 .027 1968 .020

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

1935 1936 4.1 SD

1179A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1925 60 67 133 101 100

1930 124 110 33 22 33 50 97 79 81 88

1940 148 102 125 176 176 93 90 132 213 273

1950 313 401 279 184 211 319 295 328 301 258

1960 224 361 375 268 300 293 181 339 232 296

1970 330 370 368 363 238 157 140 247 314 198

1980 160 218 90 77 166 187 153 155 125 113

1990 152 143 146 97 139 72 58 49 87 72

2000 66 37 45 47 85 107 114 90 162 114

2010 55 95 65 98 107 78

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1179B 1925 to 2015 91 years Series 34

[B] Entire series, effect on correlation ( .533) is:

Lower 1936> -.114 1937< -.021 1925> -.017 1935< -.008 2002> -.006 2009< -.006 Higher 2010 .038 1968 .027

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

1936 +4.2 SD

1179B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1925 43 68 122 86 82

1930 92 76 28 29 40 49 128 77 51 67

1940 111 80 113 136 114 75 96 144 226 244

1950 256 369 276 167 157 220 263 262 251 221

1960 182 287 276 175 241 221 133 225 98 150

1970 171 209 221 204 164 86 156 177 266 185

1980 270 282 128 109 215 224 185 154 71 81

1990 162 142 144 104 179 109 156 132 121 114

2000 108 86 116 102 135 192 191 143 184 123

2010 68 112 122 133 135 97

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1181A 1922 to 2015 94 years Series 35

[B] Entire series, effect on correlation ( .815) is:

Lower 1976< -.010 1964> -.009 1968> -.009 1994< -.009 1974< -.009 1958< -.006 Higher 1936 .030 1925 .021

1181A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1922 140 139 223 99 89 155 260 233

1930 248 273 253 220 263 369 137 336 303 276

1940 393 341 291 439 149 31 228 207 276 330

1950 385 390 249 127 190 226 230 253 191 201

1960 188 324 264 181 281 281 182 294 183 145

1970 156 235 252 267 88 85 66 95 143 134

1980 110 94 82 57 100 138 84 98 79 91

1990 119 113 105 82 84 87 139 153 156 108

2000 77 58 39 41 76 97 97 77 118 120

2010 32 108 87 103 58 24

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1181B 1921 to 2015 95 years Series 36

[B] Entire series, effect on correlation ( .722) is:

Lower 1936> -.027 1968> -.026 1938< -.026 1960> -.013 1994< -.010 1966< -.008 Higher 1925 .034 1945 .024

1181B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1921 223 148 130 241 104 121 220 288 306

1930 378 324 325 305 321 333 225 463 216 188

1940 311 351 288 385 197 76 268 223 392 323

1950 433 493 280 155 244 287 302 323 249 229

1960 260 322 242 179 210 254 175 208 235 256

1970 235 229 282 268 161 123 133 182 201 141

1980 134 129 79 50 97 142 101 121 67 105

1990 175 119 175 108 72 65 73 82 100 79

2000 87 73 52 53 139 113 107 99 136 129

2010 49 108 125 139 89 52

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

1183A 1941 to 2015 75 years Series 37

[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 -7 -.27 -.12 .10 .37\* .14 -.07 -.04 -.02 .23 .11 .30| - - - - - - - - - -

[B] Entire series, effect on correlation ( .340) is:

Lower 2012< -.070 1968> -.054 2010> -.030 2001> -.022 1990< -.017 1941< -.017 Higher 1960 .029 2002 .017

1966 to 2015 segment:

Lower 2012< -.121 1968> -.081 2010> -.036 2001> -.032 1990< -.028 1971< -.009 Higher 2002 .037 1983 .033

[D] 4 Absent rings: Year Master N series Absent

1987 -.181 39 1 >> WARNING: Ring is not usually narrow

2000 -.825 39 2

2002 -1.629 39 3

2012 .590 39 1 >> WARNING: Ring is not usually narrow

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

1960 -6.2 SD; 1968 +3.1 SD; 2012 -4.8 SD

1183A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1941 151 280 321 258 218 369 368 343 373

1950 390 404 306 206 195 318 251 255 241 182

1960 84 221 194 192 166 234 188 180 245 210

1970 122 132 201 203 127 98 67 118 187 102

1980 58 63 39 21 28 34 17 0 12 15

1990 5 23 13 33 34 10 17 18 34 21

2000 0 29 0 16 23 41 21 21 44 30

2010 36 53 0 51 55 44

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

1183B 1941 to 2015 75 years Series 38

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

Lower 2010> -.041 1968> -.033 2001> -.014 2007> -.014 2009< -.013 1962< -.012 Higher 1983 .026 2015 .017

[D] 2 Absent rings: Year Master N series Absent

2002 -1.629 39 3

2015 -1.130 39 1

>> WARNING: Last ring in series is ABSENT

1183B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1941 121 112 144 141 140 270 349 347 334

1950 340 373 285 194 190 377 283 320 327 277

1960 188 265 200 187 198 246 149 146 187 214

1970 162 186 227 189 118 79 41 80 115 64

1980 53 54 52 23 59 90 44 15 18 36

1990 71 101 54 77 101 65 39 43 60 34

2000 20 36 0 24 23 38 19 46 56 18

2010 17 10 5 21 31 0

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

1035A 1910 to 2015 106 years Series 39

[\*] Early part of series cannot be checked from 1910 to 1910 -- not matched by another series

[B] Entire series, effect on correlation ( .730) is:

Lower 1993< -.020 1977< -.019 1999< -.017 1944> -.017 1933< -.006 1947> -.006 Higher 1936 .030 1945 .030

[D] 5 Absent rings: Year Master N series Absent

1977 .424 39 2 >> WARNING: Ring is not usually narrow

1982 -1.497 39 3

1983 -2.828 39 6

1993 .096 39 2 >> WARNING: Ring is not usually narrow

1999 -.106 39 1 >> WARNING: Ring is not usually narrow

1035A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1910 167 143 126 179 142 131 162 246 306 300

1920 334 348 215 176 282 152 159 223 261 235

1930 312 370 314 209 265 352 149 404 243 305

1940 363 330 299 354 357 144 270 306 273 253

1950 206 277 220 107 102 156 191 219 199 159

1960 95 126 124 108 133 130 124 94 38 50

1970 89 109 120 129 77 40 39 0 67 37

1980 16 10 0 0 26 19 4 23 11 20

1990 28 30 22 0 31 35 35 32 34 0

2000 48 17 24 43 64 149 136 86 131 138

2010 31 78 136 95 133 71

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PART 7: DESCRIPTIVE STATISTICS: VMC245\_ACSA\_Corr3-50 13:55 Thu 01 Sep 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 106A 1929 2015 87 3 1 .489 1.53 3.50 .861 .818 .331 2.46 .408 -.051 1

2 106B 1928 2015 88 3 0 .633 1.42 3.37 .855 .786 .304 2.56 .469 -.050 1

3 137A 1913 2015 103 4 0 .640 1.68 5.57 1.175 .786 .406 2.55 .382 -.007 1

4 137B 1911 2015 105 4 0 .604 1.49 3.35 .591 .599 .309 2.61 .500 -.051 1

5 160A 1946 2015 70 3 0 .673 2.00 4.12 .942 .767 .291 2.46 .433 .020 2

6 160B 1946 2015 70 3 0 .627 2.05 3.84 .633 .471 .273 2.46 .465 -.014 2

7 415A 1925 2015 91 3 0 .680 1.77 5.40 1.339 .855 .318 2.55 .428 .037 2

8 415B 1934 2015 82 3 0 .744 1.50 7.31 1.235 .706 .338 2.60 .470 -.001 1

9 429A 1924 2015 92 4 0 .674 1.78 4.22 1.115 .890 .297 2.48 .408 .011 2

10 429B 1924 2015 92 4 0 .556 1.67 3.81 .780 .777 .259 2.44 .394 -.084 2

11 1035B 1911 2015 105 4 0 .691 1.50 4.42 .937 .750 .413 2.60 .477 .011 1

12 1036A 1912 2015 104 4 0 .792 1.65 3.92 .849 .630 .336 2.51 .359 -.023 1

13 1036B 1919 2015 97 4 0 .771 1.88 4.25 .928 .781 .241 2.47 .419 -.040 3

14 1037A 1915 2015 101 4 0 .545 1.45 3.67 1.094 .889 .332 2.53 .367 -.026 2

15 1037B 1927 2015 89 3 0 .590 1.43 5.79 1.323 .872 .391 2.47 .371 .003 1

16 1038A 1919 2015 97 4 0 .593 1.19 3.26 .709 .759 .296 2.43 .312 .035 1

17 1038B 1912 2015 104 4 0 .651 1.13 2.80 .585 .722 .312 2.70 .420 -.029 1

18 1039A 1946 2015 70 3 0 .535 1.24 2.03 .416 .520 .274 2.54 .492 .032 1

19 1039B 1927 2015 89 3 0 .591 1.87 4.40 .868 .784 .229 2.75 .542 .064 2

20 1040A 1919 2015 97 4 0 .684 2.30 4.21 .847 .511 .334 2.46 .412 -.009 1

21 1040B 1921 2015 95 4 0 .683 2.48 7.44 1.240 .662 .303 2.60 .377 .004 3

22 1041A 1922 2015 94 4 0 .566 1.62 4.18 .893 .786 .271 2.75 .485 -.012 1

23 1041B 1927 2015 89 3 0 .595 1.81 4.10 1.050 .846 .252 2.82 .553 -.049 1

24 1042A 1934 2015 82 3 0 .640 1.19 3.89 .844 .848 .303 2.52 .348 -.070 1

25 1042B 1921 2015 95 4 0 .746 1.14 2.78 .649 .817 .235 2.50 .419 -.049 1

26 1043A 1913 2015 103 4 0 .612 1.46 4.21 .781 .816 .253 2.85 .611 .030 1

27 1043B 1911 2015 105 4 0 .565 1.20 2.64 .541 .642 .352 2.68 .472 -.003 1

28 1172A 1938 2015 78 3 0 .379 1.19 5.09 .965 .809 .415 2.49 .349 .004 1

29 1172B 1917 2015 99 4 0 .542 1.92 4.73 1.149 .827 .311 2.63 .521 .041 1

30 1174B 1920 2015 96 4 1 .521 1.26 3.06 .758 .752 .417 2.40 .351 .006 1

31 1176A 1911 2015 105 4 2 .326 1.39 3.07 .545 .625 .275 2.51 .465 -.025 1

32 1176B 1911 2015 105 4 1 .406 1.62 2.96 .678 .716 .266 2.60 .512 .019 1

33 1179A 1925 2015 91 3 0 .535 1.65 4.01 1.006 .836 .292 2.67 .430 .001 2

34 1179B 1925 2015 91 3 0 .533 1.51 3.69 .702 .701 .297 2.60 .460 .019 1

35 1181A 1922 2015 94 4 0 .815 1.73 4.39 .978 .693 .322 2.47 .479 -.012 2

36 1181B 1921 2015 95 4 0 .722 1.96 4.93 1.036 .729 .301 2.71 .492 .022 2

37 1183A 1941 2015 75 3 1 .340 1.29 4.03 1.183 .911 .531 2.45 .386 -.026 1

38 1183B 1941 2015 75 3 0 .461 1.28 3.77 1.091 .907 .429 2.47 .427 -.043 2

39 1035A 1910 2015 106 4 0 .730 1.46 4.04 1.102 .838 .467 2.52 .472 -.034 1

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Total or mean: 3606 140 6 .605 1.58 7.44 .901 .754 .322 2.85 .440 -.009

- = [ COFECHA V2453COF ] = -