[] Dendrochronology Program Library Run PIRE Program COF 12:33 Sat 26 Feb 2016 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 29644

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

Title of run: PIRE\_CORE6RP\_Original-50

File of DATED series: PIRE\_CORE6RP

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 1871 to 2015 145 years

Continuous time span is 1871 to 2015 145 years

Portion with two or more series is 1872 to 2015 144 years

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

\*C\* Number of dated series 32 \*C\*

\*O\* Master series 1871 2015 145 yrs \*O\*

\*F\* Total rings in all series 2859 \*F\*

\*E\* Total dated rings checked 2858 \*E\*

\*C\* Series intercorrelation .585 \*C\*

\*H\* Average mean sensitivity .238 \*H\*

\*A\* Segments, possible problems 10 \*A\*

\*\*\* Mean length of series 89.3 \*\*\*

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

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

No ring measurements of zero value

1900 -.423 6 1950 -.425 28 2000 -.264 32

1901 -.155 6 1951 .401 28 2001 .697 32

1902 -.113 6 1952 1.383 28 2002 1.738 32

1903 -1.093 7 1953 .764 29 2003 .408 32

1904 .859 7 1954 .822 29 2004 1.213 32

1905 .507 7 1955 .443 29 2005 .514 32

1906 -.257 7 1956 -1.994 29 2006 .272 32

1907 .464 7 1957 -1.501 29 2007 -.515 32

1908 .473 8 1958 .044 29 2008 -2.578 32

1909 .531 8 1959 .340 31 2009 -2.160 32

1910 1.128 8 1960 -1.088 31 2010 -.799 32

1911 -1.213 9 1961 .616 31 2011 .757 32

1912 -.471 9 1962 1.053 31 2012 .887 32

1913 1.222 9 1963 -.031 31 2013 1.211 32

1914 -.006 11 1964 -1.035 31 2014 .208 32

1915 1.294 11 1965 -1.376 31 2015 .161 32

1916 1.776 11 1966 -1.338 31

1917 1.079 11 1967 -.976 31

1918 -1.605 11 1968 .853 31

1919 -.667 11 1969 .360 31

1920 -.259 11 1970 .119 31

1871 .325 1 1921 -1.161 11 1971 -.366 31

1872 1.522 2 1922 -.548 11 1972 .756 31

1873 -.702 3 1923 -.189 11 1973 1.409 31

1874 .211 3 1924 -.574 11 1974 .467 31

1875 1.457 3 1925 -.440 11 1975 .550 31

1876 -4.286 3 1926 -.327 11 1976 .759 31

1877 -.926 3 1927 .773 12 1977 -.332 31

1878 -.376 3 1928 -.034 12 1978 -.698 32

1879 -.294 3 1929 -1.824 12 1979 -1.469 32

1880 .390 3 1930 -.893 13 1980 .758 32

1881 -.182 3 1931 -.925 13 1981 .196 32

1882 .581 3 1932 .529 13 1982 .163 32

1883 .817 3 1933 .041 13 1983 .326 32

1884 -.715 3 1934 .897 13 1984 -2.176 32

1885 .500 3 1935 1.332 13 1985 -1.718 32

1886 1.280 3 1936 -.276 16 1986 -.891 32

1887 1.364 3 1937 1.005 18 1987 .719 32

1888 1.262 3 1938 1.735 20 1988 .421 32

1889 .825 3 1939 1.034 20 1989 1.210 32

1890 .452 4 1940 -.799 23 1990 1.608 32

1891 -.246 4 1941 .723 24 1991 1.147 32

1892 -1.007 4 1942 .299 26 1992 .315 32

1893 -1.085 4 1943 -1.690 26 1993 -.186 32

1894 .681 4 1944 -.960 26 1994 .601 32

1895 -.823 4 1945 -.439 26 1995 .067 32

1896 -1.180 4 1946 .290 27 1996 -.038 32

1897 .550 6 1947 .678 27 1997 -1.552 32

1898 .281 6 1948 -.625 28 1998 -.253 32

1899 -1.519 6 1949 .338 28 1999 -1.172 32

PART 5: CORRELATION OF SERIES BY SEGMENTS: PIRE\_CORE6RP\_Original-50 12:33 Sat 26 Feb 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 1850 1875 1900 1925 1950 1975

1899 1924 1949 1974 1999 2024

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

1 1544A 1890 2015 .34 .49 .57 .61 .56

2 1544B 1871 2015 .49 .50 .69 .74 .73 .74

3 1562A 1936 2015 .48 .58 .65

4 1562B 1930 2015 .50 .51 .67

5 1543A 1937 2015 .73 .72 .70

6 1543B 1927 2015 .74 .73 .75

7 1561A 1914 2015 .55 .44 .43 .34

8 1561B 1940 2015 .69 .72 .68

9 1545A 1936 2015 .43 .52 .63

10 1545B 1978 2015 .15B

11 1554A 1903 2015 .52 .51 .76 .76

12 1554B 1914 2015 .56 .55 .71 .84

13 1550A 1948 2015 .23A .27A .50

14 1550B 1942 2015 .21B .22B .39

15 1553A 1911 2015 .64 .75 .80 .74

16 1553B 1908 2015 .73 .69 .77 .76

17 1547A 1953 2015 .28A .19B

18 1547B 1936 2015 .46 .53 .65

19 1552A 1872 2015 .74 .75 .60 .69 .78 .77

20 1552B 1873 2015 .72 .72 .71 .72 .65 .62

21 1563A 1959 2015 .47 .45

22 1563B 1942 2015 .36 .30A .57

23 1551A 1940 2015 .47 .63 .57

24 1551B 1938 2015 .67 .71 .66

25 1549A 1940 2015 .65 .66 .66

26 1549B 1959 2015 .18B .24B

27 1548A 1938 2015 .58 .62 .81

28 1548B 1937 2015 .71 .77 .77

29 1546A 1946 2015 .54 .56 .62

30 1546B 1941 2015 .54 .60 .66

31 1555A 1897 2015 .49 .51 .64 .66 .56

32 1555B 1897 2015 .67 .67 .75 .75 .78

Av segment correlation .65 .58 .61 .57 .59 .61

PART 6: POTENTIAL PROBLEMS: PIRE\_CORE6RP\_Original-50 12:33 Sat 26 Feb 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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1544A 1890 to 2015 126 years Series 1

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

Lower 2003< -.026 1892> -.021 1903> -.018 1891< -.011 1929> -.010 1999> -.010 Higher 1956 .043 2008 .016

1544A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1890 196 157 200 189 314 191 205 169 221 118

1900 126 105 127 210 346 243 171 130 104 84

1910 89 78 128 185 154 137 152 158 76 91

1920 76 51 64 72 78 95 88 127 146 119

1930 72 70 112 98 92 142 153 162 173 190

1940 127 156 143 99 99 74 105 118 83 131

1950 98 69 97 99 93 78 37 45 47 49

1960 31 33 39 25 27 29 25 28 29 35

1970 22 27 26 30 37 35 24 18 11 15

1980 31 27 26 28 20 21 32 35 34 45

1990 63 62 45 47 51 47 34 29 28 37

2000 32 32 55 23 32 28 23 22 13 11

2010 19 31 28 31 24 20

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1544B 1871 to 2015 145 years Series 2

[\*] Early part of series cannot be checked from 1871 to 1871 -- not matched by another series

[B] Entire series, effect on correlation ( .597) is:

Lower 1876> -.035 1873> -.025 1922> -.010 1998< -.008 1905> -.008 1877< -.008 Higher 1956 .018 1918 .014

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

1873 +3.2 SD; 1876 +3.0 SD; 1894 +3.5 SD

1544B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1871 180 231 222 159 201 112 113 114 137

1880 139 122 163 218 168 206 191 189 207 204

1890 167 170 167 157 352 188 165 263 184 111

1900 166 164 176 148 256 306 199 158 148 148

1910 173 120 155 193 113 133 160 120 67 92

1920 128 74 173 103 109 102 119 133 96 105

1930 111 94 174 154 148 188 115 160 190 131

1940 111 156 127 68 79 88 81 104 57 88

1950 79 85 95 84 65 54 27 35 42 49

1960 31 41 44 39 44 43 50 50 72 52

1970 39 39 40 58 64 55 44 30 23 20

1980 46 37 39 49 26 24 29 42 34 39

1990 41 48 44 37 49 42 40 27 22 31

2000 36 35 70 38 56 53 34 33 22 22

2010 33 38 32 37 35 34

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1562A 1936 to 2015 80 years Series 3

[B] Entire series, effect on correlation ( .541) is:

Lower 1943> -.024 1944< -.022 1962< -.019 1940> -.017 1965> -.015 2010< -.013 Higher 1938 .014 2002 .014

1562A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1936 227 281 458 328

1940 286 283 224 223 167 207 201 196 174 211

1950 164 145 154 158 169 144 102 88 105 117

1960 68 83 72 74 64 83 59 66 83 100

1970 76 57 95 90 81 98 96 87 83 64

1980 104 100 98 77 69 69 93 102 104 103

1990 114 125 102 87 82 109 100 81 101 72

2000 102 134 169 132 123 113 111 94 71 75

2010 63 112 111 111 98 83

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1562B 1930 to 2015 86 years Series 4

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

Lower 1950< -.049 1956> -.029 1976< -.016 1967> -.016 1948> -.011 1997> -.010 Higher 1984 .037 2008 .021

1562B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1930 247 224 266 253 370 331 235 309 455 326

1940 223 276 258 202 227 223 251 212 199 184

1950 113 185 247 184 149 128 113 99 80 95

1960 66 88 92 74 54 58 89 156 205 139

1970 107 93 149 136 116 98 70 71 106 87

1980 125 104 85 159 98 88 113 134 130 159

1990 169 102 70 60 78 72 79 92 131 101

2000 110 123 149 111 120 108 88 76 52 61

2010 61 125 145 124 99 111

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1543A 1937 to 2015 79 years Series 5

[B] Entire series, effect on correlation ( .754) is:

Lower 1984> -.036 1980< -.012 2013< -.011 1950> -.008 1960< -.008 1964> -.006 Higher 2008 .028 1956 .026

1543A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1937 231 167 167

1940 87 107 136 92 115 118 169 184 96 97

1950 115 171 221 176 134 121 42 78 118 118

1960 55 140 159 115 90 67 77 76 139 130

1970 98 98 112 158 101 94 75 62 63 51

1980 62 62 60 113 94 60 63 130 137 154

1990 134 94 90 82 93 88 79 46 65 46

2000 88 101 111 100 110 97 105 96 46 46

2010 74 106 143 109 94 84

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1543B 1927 to 2015 89 years Series 6

[B] Entire series, effect on correlation ( .749) is:

Lower 1954< -.018 1966> -.007 1950> -.007 1958< -.006 1938< -.006 1940> -.005 Higher 2008 .026 1956 .024

1543B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1927 248 126 72

1930 138 173 224 178 234 238 177 226 202 191

1940 166 190 188 122 113 98 130 232 123 118

1950 132 157 178 155 103 119 71 96 86 116

1960 84 106 141 97 61 62 88 97 110 115

1970 101 100 141 149 124 106 96 41 40 25

1980 44 51 38 57 25 31 49 67 66 76

1990 81 104 80 88 106 74 50 36 38 46

2000 58 76 112 56 98 118 89 83 35 38

2010 69 73 87 83 72 99

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1561A 1914 to 2015 102 years Series 7

[B] Entire series, effect on correlation ( .429) is:

Lower 1991< -.034 2008> -.026 2015< -.018 1943> -.016 1978> -.015 1965> -.015 Higher 1918 .028 1956 .023

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

1919 +3.4 SD

1561A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1914 65 94 104 125 64 207

1920 155 120 118 139 88 104 128 129 217 171

1930 203 217 524 502 360 362 279 383 404 307

1940 232 262 246 248 209 220 196 240 116 178

1950 115 276 275 160 146 175 110 116 116 141

1960 115 172 176 147 138 153 104 140 144 135

1970 94 80 92 88 90 84 94 79 109 85

1980 100 95 71 66 55 51 61 76 67 75

1990 80 50 60 46 70 52 67 56 65 61

2000 82 84 89 72 99 109 96 95 94 82

2010 100 101 117 109 87 67

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1561B 1940 to 2015 76 years Series 8

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

Lower 2012< -.040 1943> -.027 1976< -.020 1960> -.014 1962< -.010 1949< -.009 Higher 1984 .058 2008 .017

1561B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1940 180 259 183 181 147 185 205 244 129 126

1950 104 153 168 133 194 159 82 81 121 147

1960 111 136 85 90 78 49 40 50 82 81

1970 70 61 70 73 69 64 44 53 49 39

1980 60 47 48 54 30 32 37 52 45 56

1990 83 55 61 69 81 64 47 52 72 50

2000 50 62 84 59 82 62 92 63 50 61

2010 84 77 58 86 84 92

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1545A 1936 to 2015 80 years Series 9

[B] Entire series, effect on correlation ( .517) is:

Lower 1952< -.031 1940> -.024 1950> -.019 1971> -.015 1965> -.012 1953< -.011 Higher 1997 .021 2008 .016

1545A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1936 182 239 382 389

1940 448 579 432 267 218 268 230 210 197 221

1950 278 248 184 151 194 167 145 176 196 167

1960 133 224 186 173 117 143 143 109 166 131

1970 116 171 144 148 108 131 160 130 107 82

1980 114 98 87 81 68 63 69 103 101 108

1990 137 133 104 108 108 102 82 46 76 58

2000 81 103 82 82 73 64 60 27 19 22

2010 23 26 26 30 24 21

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1545B 1978 to 2015 38 years Series 10

[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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1978 2015 -10 .34\* .21 .16 -.11 -.24 .05 -.21 .08 .07 .08 .15| - - - - - - - - - -

[B] Entire series, effect on correlation ( .154) is:

Lower 1997> -.092 1989< -.043 1978> -.033 1987< -.032 1999> -.027 2002< -.023 Higher 1979 .146 1984 .069

1978 to 2015 segment:

Lower 1997> -.092 1989< -.043 1978> -.033 1987< -.032 1999> -.027 2002< -.023 Higher 1979 .146 1984 .069

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

1997 +3.7 SD; 1999 +3.3 SD

1545B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1978 160 111

1980 121 127 148 162 121 114 121 90 95 66

1990 97 88 124 81 77 83 96 235 247 231

2000 160 119 83 85 100 92 61 36 19 23

2010 29 35 48 60 75 73

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1554A 1903 to 2015 113 years Series 11

[B] Entire series, effect on correlation ( .606) is:

Lower 1928< -.021 1939< -.015 1948< -.011 1921> -.009 1943> -.009 1904< -.009 Higher 1984 .029 2008 .025

1554A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1903 99 123 122 139 227 318 336

1910 287 194 193 229 170 264 227 171 109 143

1920 177 176 131 161 125 103 121 156 102 99

1930 170 193 193 214 205 208 170 250 262 179

1940 164 231 174 170 188 193 190 246 158 193

1950 153 155 198 186 213 166 141 122 147 132

1960 120 120 154 119 110 99 96 95 97 94

1970 85 97 123 131 103 111 109 85 73 63

1980 77 60 79 97 51 54 69 104 83 111

1990 150 128 126 92 105 79 78 44 45 37

2000 31 39 72 81 73 68 78 70 39 44

2010 67 64 71 63 51 47

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1554B 1914 to 2015 102 years Series 12

[B] Entire series, effect on correlation ( .696) is:

Lower 1948> -.019 1958< -.017 1955< -.015 1942< -.008 1956> -.007 1931> -.007 Higher 2008 .027 1984 .023

1554B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1914 196 309 279 189 88 92

1920 110 126 151 220 193 195 165 211 162 109

1930 202 239 316 217 270 275 203 210 269 330

1940 205 258 190 177 187 212 193 220 226 250

1950 178 156 163 186 166 115 101 124 91 113

1960 90 117 113 72 73 53 57 61 84 94

1970 82 86 92 99 71 77 99 81 78 54

1980 110 83 85 93 46 47 59 77 71 113

1990 148 117 91 75 87 61 68 45 55 32

2000 38 49 67 55 61 64 50 54 30 35

2010 39 45 49 46 46 42

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1550A 1948 to 2015 68 years Series 13

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

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1948 1997 0 -.12 .04 .02 .14 -.12 -.18 -.17 .02 .04 .09 .23\* .18 .13 .03 -.06 .16 .10 -.25 -.18 .00 -.14

1950 1999 0 -.19 .04 .00 .13 -.06 -.18 -.14 .01 .06 .09 .27\* .18 .09 -.05 -.05 .09 .09 -.19 -.12 .07 -.15

[B] Entire series, effect on correlation ( .352) is:

Lower 1951< -.089 1960> -.029 1979> -.017 1948> -.016 2005< -.016 1959< -.014 Higher 2008 .034 2002 .016

1948 to 1997 segment:

Lower 1951< -.107 1960> -.036 1948> -.020 1979> -.020 1959< -.018 1961< -.012 Higher 1987 .029 1952 .027

1950 to 1999 segment:

Lower 1951< -.110 1960> -.040 1979> -.023 1959< -.017 1961< -.011 1981< -.010 Higher 1987 .028 1952 .028

1550A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1948 177 210

1950 159 84 152 128 113 79 70 56 67 40

1960 70 47 57 45 33 25 21 35 75 66

1970 94 123 166 132 141 127 171 134 94 135

1980 180 104 137 115 113 144 120 268 196 225

1990 192 159 226 162 153 113 196 135 184 105

2000 152 211 225 197 199 107 124 90 72 66

2010 139 142 138 214 177 170

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1550B 1942 to 2015 74 years Series 14

[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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1942 1991 3 .26 -.02 -.09 .24 -.19 -.15 -.10 -.01 -.02 -.22 .21| .20 -.12 .38\* .05 -.09 .01 .24 -.09 -.16 .11

1950 1999 7 .07 -.12 -.10 .20 -.13 -.03 .03 -.01 -.03 -.14 .22| .18 -.09 .24 .01 -.19 -.04 .30\* .04 -.13 .19

[B] Entire series, effect on correlation ( .319) is:

Lower 1984> -.052 1953< -.045 1948> -.025 1979> -.018 1960> -.018 1962< -.014 Higher 2008 .065 1943 .021

1942 to 1991 segment:

Lower 1984> -.064 1953< -.052 1948> -.033 1979> -.024 1960> -.023 1962< -.018 Higher 1943 .036 1990 .030

1950 to 1999 segment:

Lower 1984> -.072 1953< -.053 1979> -.026 1960> -.025 1962< -.017 1989< -.015 Higher 1990 .031 1980 .028

1550B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1942 134 109 222 150 186 136 191 193

1950 71 113 71 27 100 38 47 16 63 24

1960 53 44 32 25 17 23 33 21 70 74

1970 107 91 105 101 91 64 94 60 72 104

1980 164 111 140 103 140 129 167 172 133 127

1990 181 155 136 163 220 147 160 91 94 98

2000 136 100 137 126 95 72 64 53 25 27

2010 62 75 115 123 125 106

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1553A 1911 to 2015 105 years Series 15

[B] Entire series, effect on correlation ( .682) is:

Lower 1911> -.051 2001< -.014 2015< -.013 1950> -.008 1913< -.006 1954< -.006 Higher 1984 .035 1956 .022

1553A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1911 206 187 169 104 154 202 223 108 93

1920 93 96 94 135 133 155 146 282 196 115

1930 142 130 148 146 170 200 153 148 174 149

1940 79 98 119 67 75 71 79 72 76 91

1950 95 96 107 115 74 82 43 48 56 61

1960 47 71 74 64 48 50 40 51 65 53

1970 41 35 61 68 54 53 51 39 44 28

1980 60 54 50 77 34 44 64 70 62 75

1990 96 78 83 68 81 77 60 41 36 29

2000 29 28 69 47 62 54 58 55 37 31

2010 61 72 65 68 62 39

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1553B 1908 to 2015 108 years Series 16

[B] Entire series, effect on correlation ( .745) is:

Lower 1979< -.029 1927< -.014 1928> -.013 1943> -.010 1969< -.008 1998< -.008 Higher 2008 .018 1984 .018

1553B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1908 243 219

1910 274 156 166 258 201 274 334 335 185 167

1920 165 197 177 184 176 197 210 175 247 164

1930 163 199 256 196 231 226 187 378 351 258

1940 155 161 97 98 109 103 95 119 96 118

1950 100 120 185 166 140 102 50 47 84 88

1960 48 94 88 67 59 63 57 75 84 60

1970 73 64 79 105 88 94 91 72 84 40

1980 93 84 85 98 51 44 58 83 90 115

1990 110 96 87 77 100 91 87 63 52 57

2000 62 67 119 71 94 97 95 110 60 56

2010 83 136 126 136 120 111

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1547A 1953 to 2015 63 years Series 17

[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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1953 2002 0 -.10 .16 .18 .23 -.25 -.27 -.04 -.23 .07 .11 .28\* .15 .04 -.08 -.16 -.06 -.16 -.02 -.19 .02 .22

1966 2015 -7 -.02 .19 .20 .21\*-.11 -.22 -.18 -.31 .16 .02 .19| - - - - - - - - - -

[B] Entire series, effect on correlation ( .222) is:

Lower 1986< -.033 1984> -.031 1979> -.030 2005< -.029 2008> -.017 1974< -.015 Higher 2002 .023 1989 .022

1953 to 2002 segment:

Lower 1986< -.057 1984> -.045 1979> -.038 1974< -.023 1955< -.019 1990< -.016 Higher 2002 .025 1989 .025

1966 to 2015 segment:

Lower 1984> -.042 1979> -.039 2005< -.028 1986< -.025 2008> -.023 1974< -.012 Higher 2002 .029 1989 .027

1547A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1953 283 254 143 156 158 295 273

1960 245 257 317 240 144 146 155 122 174 166

1970 190 220 223 190 103 132 167 115 94 155

1980 161 169 140 124 130 125 84 142 133 170

1990 133 164 125 113 100 110 129 98 119 102

2000 96 145 154 128 90 39 50 64 68 71

2010 58 98 87 62 51 43

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1547B 1936 to 2015 80 years Series 18

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

Lower 1956> -.028 1965< -.024 1949< -.023 1972< -.014 1950> -.014 1947< -.010 Higher 1997 .019 2002 .011

1547B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1936 243 355 335 297

1940 195 278 260 218 236 234 282 234 224 193

1950 261 241 326 313 295 264 235 219 272 331

1960 249 238 240 229 162 85 112 105 146 119

1970 132 111 98 154 116 112 103 97 76 85

1980 97 100 96 89 83 85 95 112 123 130

1990 152 136 111 108 132 107 119 71 105 70

2000 129 135 152 88 97 56 60 56 42 42

2010 55 75 72 63 36 53

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1552A 1872 to 2015 144 years Series 19

[B] Entire series, effect on correlation ( .727) is:

Lower 1903> -.016 1918> -.015 1945< -.013 1894< -.011 1880> -.008 1963< -.006 Higher 1876 .059 1984 .017

1552A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1872 169 106 129 188 73 111 131 123

1880 234 181 190 157 95 134 180 270 215 162

1890 147 124 19 17 21 21 10 25 33 11

1900 20 20 17 30 33 27 26 27 25 29

1910 39 18 24 41 32 34 49 33 27 26

1920 24 14 22 22 20 24 28 42 40 22

1930 30 22 28 31 78 73 51 54 78 73

1940 47 82 88 59 75 42 66 58 58 57

1950 45 62 77 81 106 122 45 43 43 45

1960 38 53 76 36 46 52 50 54 99 100

1970 91 84 73 102 83 70 122 77 52 34

1980 71 63 47 78 30 52 70 89 101 134

1990 155 183 162 106 119 104 95 86 98 86

2000 112 110 123 103 102 95 65 52 38 42

2010 64 100 81 95 68 49

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1552B 1873 to 2015 143 years Series 20

[B] Entire series, effect on correlation ( .692) is:

Lower 1894< -.023 1877> -.008 1991< -.006 1878> -.006 1948> -.006 1937< -.006 Higher 1876 .076 1943 .011

1552B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1873 126 174 184 88 151 169 151

1880 137 141 143 126 93 115 184 142 126 103

1890 134 111 37 38 20 20 13 22 21 15

1900 22 24 19 22 37 26 30 40 63 39

1910 52 18 26 56 32 49 59 38 14 21

1920 35 26 36 26 24 19 27 46 29 16

1930 26 41 70 95 168 164 114 112 150 205

1940 113 228 197 86 198 204 245 210 208 169

1950 170 208 221 248 230 261 122 145 117 142

1960 51 126 121 70 48 53 51 68 86 54

1970 50 44 60 114 77 90 114 83 53 32

1980 44 49 38 61 34 52 96 158 129 123

1990 101 76 87 150 139 126 86 74 115 117

2000 140 173 224 139 228 184 143 74 49 59

2010 99 146 132 87 44 67

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1563A 1959 to 2015 57 years Series 21

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

Lower 1996< -.056 1971< -.034 1990< -.023 1978> -.019 1999> -.018 2010< -.017 Higher 2008 .047 1997 .013

1563A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1959 216

1960 179 229 194 192 173 139 132 109 129 146

1970 134 86 112 146 116 138 174 122 137 93

1980 120 87 85 90 70 58 64 98 85 103

1990 79 85 62 84 99 109 56 56 99 107

2000 120 152 133 138 136 97 105 88 59 65

2010 52 96 85 80 85 72

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1563B 1942 to 2015 74 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

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

1950 1999 0 .12 -.02 -.01 .20 .07 -.18 -.13 -.07 .12 -.05 .30\*-.10 -.09 .01 -.23 -.16 .11 .16 -.14 -.05 .16

[B] Entire series, effect on correlation ( .433) is:

Lower 1950< -.077 1956> -.028 1969< -.023 1960> -.013 1968< -.011 1954< -.009 Higher 2008 .041 1984 .027

1950 to 1999 segment:

Lower 1950< -.056 1956> -.035 1969< -.024 1960> -.017 1968< -.013 1978> -.012 Higher 1984 .049 1973 .027

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

1950 -5.6 SD

1563B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1942 467 342 357 286 397 450 297 380

1950 143 263 357 347 274 403 327 273 385 314

1960 305 424 305 305 229 243 224 157 181 120

1970 191 220 195 294 241 193 162 140 206 178

1980 218 153 226 237 113 101 124 178 202 255

1990 191 200 114 90 94 82 95 108 148 152

2000 128 186 241 168 325 202 132 137 67 107

2010 148 221 189 178 153 152

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1551A 1940 to 2015 76 years Series 23

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

Lower 1973< -.025 1941< -.025 1948> -.023 1969< -.021 1979> -.020 1947< -.014 Higher 1984 .081 1956 .063

1551A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1940 250 243 220 247 336 412 497 366 391 438

1950 423 386 459 376 427 430 239 234 400 312

1960 260 339 331 295 195 119 169 210 294 179

1970 169 151 130 112 101 130 143 170 146 154

1980 185 203 180 128 49 125 184 190 162 200

1990 270 209 136 105 167 153 167 99 134 108

2000 146 210 195 199 216 142 93 73 55 56

2010 88 86 111 104 68 81

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1551B 1938 to 2015 78 years Series 24

[B] Entire series, effect on correlation ( .660) is:

Lower 2014< -.025 1942< -.015 1979> -.013 1960> -.012 1968< -.012 1943> -.011 Higher 1984 .057 1956 .018

1551B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1938 365 319

1940 166 291 166 169 266 393 423 451 246 268

1950 240 370 456 371 320 315 166 151 190 192

1960 189 190 306 203 175 113 129 86 85 67

1970 63 71 75 88 83 106 106 95 84 85

1980 117 120 112 111 56 71 72 101 105 131

1990 119 105 88 85 113 107 86 48 96 72

2000 107 141 130 118 144 141 103 94 60 64

2010 105 118 108 94 41 60

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1549A 1940 to 2015 76 years Series 25

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

Lower 2010< -.025 2012< -.018 1940> -.017 1950> -.014 1965> -.009 1963< -.008 Higher 1943 .029 2008 .021

1549A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1940 260 256 304 138 161 235 283 224 185 191

1950 256 240 270 194 242 243 149 119 226 240

1960 145 186 227 111 118 186 192 111 264 192

1970 202 139 173 188 159 176 239 152 104 115

1980 199 152 186 174 124 128 124 227 228 218

1990 176 209 171 126 155 183 197 106 161 133

2000 153 177 207 126 108 86 102 101 53 53

2010 39 66 43 60 47 43

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1549B 1959 to 2015 57 years Series 26

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

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

1959 2008 -1 -.02 .11 .01 -.16 -.04 .06 -.27 -.05 .04 .73\* .18| .15 -.15 -.13 -.04 -.20 .00 -.23 - - -

1966 2015 -1 .04 .01 -.08 -.20 -.03 -.18 -.25 .08 .11 .71\* .24| - - - - - - - - - -

[B] Entire series, effect on correlation ( .205) is:

Lower 1980< -.040 1961< -.036 1960> -.028 2000< -.025 1979> -.020 1997> -.018 Higher 2008 .086 1965 .029

1959 to 2008 segment:

Lower 1980< -.043 1961< -.038 1960> -.029 2000< -.027 1979> -.021 1997> -.018 Higher 2008 .094 1965 .031

1966 to 2015 segment:

Lower 1980< -.047 2000< -.031 1979> -.025 1997> -.022 2004< -.016 1975< -.015 Higher 2008 .099 1985 .027

1549B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1959 328

1960 336 284 309 312 293 229 185 265 268 363

1970 302 246 295 273 324 222 197 194 173 203

1980 139 209 176 162 136 81 100 138 223 215

1990 203 278 223 157 168 157 187 171 129 139

2000 87 133 125 149 103 133 118 94 34 9

2010 9 9 19 24 20 14

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1548A 1938 to 2015 78 years Series 27

[B] Entire series, effect on correlation ( .664) is:

Lower 1954< -.028 1956> -.020 1957< -.017 1948> -.014 1966> -.012 1977> -.009 Higher 1984 .054 2008 .035

1548A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1938 424 371

1940 347 390 490 242 236 376 353 339 311 316

1950 282 295 243 245 167 195 168 120 214 174

1960 148 139 182 128 97 105 123 89 96 97

1970 90 71 104 100 99 106 118 108 64 49

1980 88 83 99 84 37 62 102 116 105 146

1990 137 140 102 124 113 112 107 69 114 66

2000 83 100 125 80 109 98 125 91 44 71

2010 60 94 101 153 91 123

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1548B 1937 to 2015 79 years Series 28

[B] Entire series, effect on correlation ( .732) is:

Lower 1948> -.019 1969> -.010 2003> -.010 1937< -.009 1945> -.009 1968< -.009 Higher 1956 .035 1984 .027

1548B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1937 353 395 346

1940 292 434 429 177 225 350 270 302 292 280

1950 224 229 216 194 237 195 107 127 140 136

1960 81 139 117 115 103 83 104 98 96 152

1970 149 92 138 113 84 82 105 74 94 79

1980 148 112 116 113 50 72 91 119 113 143

1990 135 124 88 83 100 89 86 62 118 90

2000 98 143 181 178 159 160 137 108 49 69

2010 81 106 114 173 110 99

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1546A 1946 to 2015 70 years Series 29

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

Lower 1953< -.097 1950> -.027 2007< -.020 1960> -.018 1979> -.010 1973< -.008 Higher 1956 .049 1997 .016

1546A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1946 321 307 239 256

1950 312 289 306 183 239 215 138 160 184 184

1960 172 179 205 141 93 69 70 75 112 98

1970 139 126 154 127 109 100 109 111 98 108

1980 158 140 191 162 112 94 67 151 168 246

1990 238 223 133 85 121 99 137 61 96 44

2000 72 153 143 117 115 105 118 31 20 25

2010 35 39 57 51 40 29

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1546B 1941 to 2015 75 years Series 30

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

Lower 1985> -.027 1960> -.024 1945< -.020 1979> -.015 1989< -.013 1950> -.011 Higher 1984 .074 1997 .016

1546B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1941 339 357 265 241 164 199 224 166 202

1950 223 204 225 179 194 202 130 173 214 159

1960 166 205 137 114 69 67 47 35 75 58

1970 67 74 105 111 85 82 81 89 82 89

1980 98 96 119 105 56 112 94 99 94 93

1990 121 132 140 136 158 109 102 53 118 56

2000 114 130 112 113 110 96 101 35 24 30

2010 47 57 54 56 40 39

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1555A 1897 to 2015 119 years Series 31

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

Lower 2003< -.028 1980< -.014 1924> -.012 1916< -.012 1901> -.010 1932< -.010 Higher 1984 .028 1956 .027

1555A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1897 555 441 371

1900 395 516 362 183 271 287 235 266 292 284

1910 286 129 107 217 311 429 288 203 160 189

1920 179 177 195 205 318 270 240 306 329 249

1930 202 168 156 183 218 231 214 346 301 242

1940 148 164 199 87 97 120 104 138 108 131

1950 99 138 156 147 106 102 51 63 63 79

1960 55 70 130 112 84 76 68 93 105 96

1970 76 52 62 87 78 73 61 51 44 47

1980 49 75 68 87 53 49 65 103 96 123

1990 173 151 114 134 117 125 104 89 73 77

2000 64 96 120 57 107 89 75 57 45 48

2010 70 104 97 97 61 71

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1555B 1897 to 2015 119 years Series 32

[B] Entire series, effect on correlation ( .733) is:

Lower 1997> -.014 1908< -.011 1936> -.009 1902> -.009 1950> -.007 1934< -.007 Higher 1956 .022 2008 .018

1555B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1897 524 475 354

1900 369 324 380 226 292 232 182 264 186 236

1910 246 128 156 196 154 169 208 197 118 118

1920 154 118 110 137 112 145 136 131 116 78

1930 92 90 123 92 98 160 166 168 242 209

1940 122 111 105 59 63 97 99 102 76 100

1950 93 85 92 90 57 50 22 35 47 56

1960 27 47 44 44 37 33 32 41 73 50

1970 58 41 64 95 71 88 102 78 78 46

1980 97 84 64 59 40 52 64 67 68 107

1990 109 103 82 76 90 87 100 94 102 79

2000 85 93 113 81 119 94 83 87 60 70

2010 64 101 97 91 80 74

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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 1544A 1890 2015 126 5 0 .524 .84 3.46 .655 .866 .234 2.72 .439 -.022 1

2 1544B 1871 2015 145 6 0 .597 1.02 3.52 .675 .826 .236 2.81 .427 .050 1

3 1562A 1936 2015 80 3 0 .541 1.25 4.58 .693 .878 .172 2.62 .476 -.072 2

4 1562B 1930 2015 86 3 0 .593 1.46 4.55 .797 .846 .226 2.72 .423 -.035 2

5 1543A 1937 2015 79 3 0 .754 1.05 2.31 .397 .596 .257 2.61 .544 -.052 3

6 1543B 1927 2015 89 3 0 .749 1.06 2.48 .545 .787 .263 2.75 .513 .043 1

7 1561A 1914 2015 102 4 0 .429 1.42 5.24 .938 .838 .211 2.71 .491 -.097 1

8 1561B 1940 2015 76 3 0 .649 .90 2.59 .509 .827 .233 2.65 .501 .124 1

9 1545A 1936 2015 80 3 0 .517 1.45 5.79 1.026 .906 .199 2.82 .530 .031 1

10 1545B 1978 2015 38 1 1 .154 1.02 2.47 .544 .806 .231 2.53 .407 -.141 1

11 1554A 1903 2015 113 4 0 .606 1.32 3.36 .642 .856 .189 2.63 .476 .006 1

12 1554B 1914 2015 102 4 0 .696 1.26 3.30 .756 .872 .211 2.57 .452 .004 1

13 1550A 1948 2015 68 3 2 .352 1.29 2.68 .572 .696 .285 2.77 .499 .004 2

14 1550B 1942 2015 74 3 2 .319 1.00 2.22 .516 .714 .354 2.81 .557 -.040 3

15 1553A 1911 2015 105 4 0 .682 .87 2.82 .500 .820 .220 2.76 .425 -.002 1

16 1553B 1908 2015 108 4 0 .745 1.30 3.78 .732 .832 .221 2.68 .419 -.022 1

17 1547A 1953 2015 63 2 2 .222 1.43 3.17 .641 .794 .217 2.51 .457 .025 1

18 1547B 1936 2015 80 3 0 .554 1.56 3.55 .853 .906 .186 2.68 .459 -.011 1

19 1552A 1872 2015 144 6 0 .727 .73 2.70 .498 .825 .283 2.58 .404 -.052 1

20 1552B 1873 2015 143 6 0 .692 .97 2.61 .639 .817 .325 2.39 .307 -.050 1

21 1563A 1959 2015 57 2 0 .461 1.11 2.29 .411 .793 .201 2.66 .565 -.002 1

22 1563B 1942 2015 74 3 1 .433 2.21 4.67 .966 .704 .261 2.56 .358 -.022 1

23 1551A 1940 2015 76 3 0 .538 2.10 4.97 1.127 .868 .232 2.53 .471 -.016 2

24 1551B 1938 2015 78 3 0 .660 1.57 4.56 1.034 .850 .224 2.63 .451 .002 1

25 1549A 1940 2015 76 3 0 .638 1.66 3.04 .635 .620 .256 2.63 .476 -.025 2

26 1549B 1959 2015 57 2 2 .205 1.77 3.63 .954 .896 .236 2.68 .570 .100 1

27 1548A 1938 2015 78 3 0 .664 1.53 4.90 1.002 .887 .237 2.51 .504 .044 1

28 1548B 1937 2015 79 3 0 .732 1.53 4.34 .888 .842 .229 2.50 .433 -.007 1

29 1546A 1946 2015 70 3 0 .565 1.37 3.21 .748 .847 .255 2.49 .485 .007 1

30 1546B 1941 2015 75 3 0 .593 1.22 3.57 .685 .877 .225 2.35 .359 -.049 1

31 1555A 1897 2015 119 5 0 .556 1.56 5.55 1.062 .877 .231 2.65 .433 -.059 2

32 1555B 1897 2015 119 5 0 .733 1.19 5.24 .865 .910 .219 2.61 .444 -.032 1

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Total or mean: 2859 111 10 .585 1.27 5.79 .733 .826 .238 2.82 .453 -.013

- = [ COFECHA PIRE COF ] = -