[] Dendrochronology Program Library Run M2F2 Program COF 13:18 Tue 24 Jan 2012 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 28149

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 QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

 Title of run: MIC002\_FAGR\_Corr2-40

 File of DATED series: MIC002\_FAGR\_Compact\_Corr2

 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 40 years lagged successively by 20 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 .3665

 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 1939 to 2011 73 years

 Continuous time span is 1939 to 2011 73 years

 Portion with two or more series is 1939 to 2011 73 years

 >> 13b 1946 absent in 1 of 6 series, but is not usually narrow: master index is -.168

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

 \*C\* Number of dated series 8 \*C\*

 \*O\* Master series 1939 2011 73 yrs \*O\*

 \*F\* Total rings in all series 556 \*F\*

 \*E\* Total dated rings checked 556 \*E\*

 \*C\* Series intercorrelation .528 \*C\*

 \*H\* Average mean sensitivity .241 \*H\*

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

 \*\*\* Mean length of series 69.5 \*\*\*

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

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

 13b 2 absent rings: 1945 1946

 2 absent rings .360%

PART 2: TIME PLOT OF TREE-RING SERIES: MIC002\_FAGR\_Corr2-40 13:18 Tue 24 Jan 2012 Page 2

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 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000 2050 Ident Seq Time-span Yrs

 : : : : : : : : : : : : : : : : : : : : : -------- --- ---- ---- ----

 . . . . . . . . . . . . . . . . . . <======> . 11a 1 1941 2011 71

 . . . . . . . . . . . . . . . . . . <=======> . 11b 2 1939 2011 73

 . . . . . . . . . . . . . . . . . . <======> . 12a 3 1940 2011 72

 . . . . . . . . . . . . . . . . . . <=======> . 12b 4 1939 2011 73

 . . . . . . . . . . . . . . . . . . <=======> . 13a 5 1939 2011 73

 . . . . . . . . . . . . . . . . . . <=======> . 13b 6 1939 2011 73

 . . . . . . . . . . . . . . . . . . <=====> . 14a 7 1951 2011 61

 . . . . . . . . . . . . . . . . . . <=====> . 14b 8 1952 2011 60

 : : : : : : : : : : : : : : : : : : : : :

 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000 2050

 1950 .661 6 2000 -.427 8

 1951 .635 7 2001 .462 8

 1952 .857 8 2002 1.241 8

 1953 1.267 8 2003 -1.176 8

 1954 .695 8 2004 .987 8

 1955 .799 8 2005 .329 8

 1956 .089 8 2006 .694 8

 1957 -4.052 8 2007 .555 8

 1958 -1.389 8 2008 -.168 8

 1959 -.443 8 2009 .142 8

 1960 -.856 8 2010 -.460 8

 1961 .201 8 2011 -2.249 8

 1962 -1.103 8

 1963 -.446 8

 1964 .959 8

 1965 .655 8

 1966 .310 8

 1967 -.030 8

 1968 -1.107 8

 1969 .917 8

 1970 .759 8

 1971 .607 8

 1972 .488 8

 1973 .159 8

 1974 -.681 8

 1975 -.210 8

 1976 -.350 8

 1977 -.177 8

 1978 .941 8

 1979 -.076 8

 1980 .576 8

 1981 -1.020 8

 1982 -.241 8

 1983 -1.925 8

 1984 -.983 8

 1985 -.898 8

 1986 -1.030 8

 1987 -1.361 8

 1988 1.189 8

 1939 -1.670 4 1989 .602 8

 1940 -.571 5 1990 1.503 8

 1941 -.558 6 1991 .871 8

 1942 .959 6 1992 1.145 8

 1943 .521 6 1993 .579 8

 1944 -.323 6 1994 .904 8

 1945 -1.660 6 1 1995 -.897 8

 1946 -.168 6 1<< 1996 -.428 8

 1947 1.750 6 1997 .051 8

 1948 .971 6 1998 .540 8

 1949 .986 6 1999 .578 8

PART 5: CORRELATION OF SERIES BY SEGMENTS: MIC002\_FAGR\_Corr2-40 13:18 Tue 24 Jan 2012 Page 5

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 Correlations of 40-year dated segments, lagged 20 years

 Flags: A = correlation under .3665 but highest as dated; B = correlation higher at other than dated position

 Seq Series Time\_span 1920 1940 1960 1980

 1959 1979 1999 2019

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

 1 11a 1941 2011 .33A .47 .56

 2 11b 1939 2011 .49 .46 .54 .50

 3 12a 1940 2011 .66 .41 .41

 4 12b 1939 2011 .63 .75 .47 .61

 5 13a 1939 2011 .72 .70 .42 .47

 6 13b 1939 2011 .68 .67 .29B .36B

 7 14a 1951 2011 .54 .03B-.01B

 8 14b 1952 2011 .65 .25B .37

 Av segment correlation .63 .60 .36 .41

PART 6: POTENTIAL PROBLEMS: MIC002\_FAGR\_Corr2-40 13:18 Tue 24 Jan 2012 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 40-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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 11a 1941 to 2011 71 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

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

 1941 1980 0 - - - - - - - - -.17 -.14 .33\*-.07 -.01 .20 .11 -.03 .01 -.04 -.08 -.14 -.28

 [B] Entire series, effect on correlation ( .424) is:

 Lower 1957> -.102 1986> -.021 1953< -.015 1954< -.010 1970> -.010 2007> -.009 Higher 2011 .039 1995 .023

 1941 to 1980 segment:

 Lower 1957> -.103 1953< -.030 1970> -.025 1954< -.022 1942< -.014 1959> -.011 Higher 1945 .049 1947 .046

 11a Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1941 162 169 190 194 141 191 290 251 277

 1950 241 264 248 181 138 158 162 144 197 219

 1960 163 141 114 144 135 131 118 90 58 143

 1970 220 149 155 128 123 136 96 87 105 88

 1980 108 105 95 55 75 110 152 142 149 129

 1990 182 147 140 124 156 117 134 171 171 204

 2000 146 176 255 185 264 233 248 277 245 195

 2010 185 60

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 11b 1939 to 2011 73 years Series 2

 [B] Entire series, effect on correlation ( .492) is:

 Lower 1957> -.022 1941> -.014 2003> -.012 1978< -.012 2000< -.012 2007> -.011 Higher 2011 .029 1983 .023

 11b Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1939 84

 1940 118 208 251 229 234 190 228 251 195 184

 1950 206 176 243 345 276 263 159 105 154 130

 1960 132 124 79 88 134 171 136 99 62 106

 1970 169 152 160 127 103 75 53 54 50 42

 1980 61 66 81 42 47 94 106 127 162 205

 1990 248 262 229 198 231 131 186 203 205 227

 2000 148 222 304 243 285 186 179 232 169 184

 2010 107 42

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 12a 1940 to 2011 72 years Series 3

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

 Lower 1983> -.030 2000> -.022 1944< -.017 1973> -.015 1963< -.013 1955< -.013 Higher 1957 .184 1947 .017

 12a Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1940 218 188 246 185 105 140 204 282 195 175

 1950 139 122 121 103 85 74 68 33 101 85

 1960 81 78 56 62 110 88 94 102 114 143

 1970 136 136 136 180 141 152 191 193 214 199

 1980 249 188 229 230 249 227 258 213 285 265

 1990 300 293 269 213 250 175 233 200 251 274

 2000 284 210 197 161 259 226 200 215 143 119

 2010 45 14

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 12b 1939 to 2011 73 years Series 4

 [B] Entire series, effect on correlation ( .628) is:

 Lower 1939> -.079 1986> -.015 1966< -.013 1941< -.011 2001< -.009 1984> -.008 Higher 1957 .161 2011 .019

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

 1939 +3.1 SD

 12b Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1939 76

 1940 53 45 72 92 71 62 90 150 145 131

 1950 120 136 117 157 153 143 127 43 110 93

 1960 98 174 111 92 138 116 96 107 129 189

 1970 170 156 179 195 146 136 144 202 237 197

 1980 218 135 167 152 212 189 212 157 184 168

 1990 196 169 190 199 207 149 137 160 174 157

 2000 136 132 156 95 226 166 148 160 135 147

 2010 90 35

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

 13a 1939 to 2011 73 years Series 5

 [B] Entire series, effect on correlation ( .642) is:

 Lower 2006< -.016 1958< -.013 1968< -.010 1984< -.008 1969< -.008 2000> -.008 Higher 1957 .131 1939 .015

 13a Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1939 50

 1940 93 84 146 117 119 73 79 126 133 138

 1950 135 141 142 168 163 170 148 51 42 87

 1960 94 128 101 114 113 104 111 78 37 55

 1970 54 77 67 47 63 97 76 107 115 100

 1980 108 86 88 61 46 55 50 48 105 122

 1990 113 121 121 146 143 114 103 140 141 124

 2000 117 108 144 56 78 50 37 73 84 82

 2010 33 18

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

 13b 1939 to 2011 73 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

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

 1960 1999 -2 .08 -.26 .16 -.27 .01 .05 -.03 .16 .39\*-.10 .29|-.19 -.07 -.15 -.09 -.26 .12 -.24 .09 .09 .01

 1972 2011 -2 .00 -.21 .13 -.17 .16 .01 -.02 .16 .41\*-.10 .36| - - - - - - - - - -

 [B] Entire series, effect on correlation ( .584) is:

 Lower 1970< -.082 1995> -.030 2011> -.023 2009< -.018 2007> -.014 1973< -.010 Higher 1957 .174 1945 .020

 1960 to 1999 segment:

 Lower 1970< -.201 1995> -.074 1973< -.014 1999< -.011 1979> -.011 1998< -.010 Higher 1983 .072 1988 .040

 1972 to 2011 segment:

 Lower 1995> -.060 2009< -.052 2007> -.030 2011> -.030 1973< -.026 2002< -.021 Higher 2003 .073 1983 .062

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

 1945 -1.660 6 1

 1946 -.168 6 1 >> WARNING: Ring is not usually narrow

 13b Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1939 43

 1940 84 130 184 134 122 0 0 142 137 184

 1950 176 127 137 180 173 180 154 37 46 102

 1960 94 117 103 103 121 105 106 90 75 89

 1970 70 84 102 83 79 93 91 93 106 104

 1980 100 83 94 71 60 60 59 48 100 101

 1990 110 109 113 127 130 117 101 79 70 65

 2000 78 87 72 37 83 65 65 87 55 13

 2010 8 15

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

 14a 1951 to 2011 61 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

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

 1960 1999 1 -.13 -.12 -.30 -.16 -.31 .08 -.12 .31 -.05 .15 .03| .40\*-.01 .06 -.07 -.20 .01 .15 -.26 .36 -.02

 1972 2011 -4 -.18 -.13 -.07 .06 -.26 -.06 .20\*-.04 .03 .04 -.01| - - - - - - - - - -

 [B] Entire series, effect on correlation ( .268) is:

 Lower 2007< -.163 1995> -.032 2010> -.019 1987> -.019 1968> -.017 1994< -.017 Higher 1957 .230 2003 .023

 1960 to 1999 segment:

 Lower 1995> -.068 1987> -.045 1994< -.043 1968> -.038 1980< -.031 1972< -.018 Higher 1990 .039 1983 .038

 1972 to 2011 segment:

 Lower 2007< -.146 1995> -.044 1987> -.028 2010> -.027 1994< -.020 1980< -.013 Higher 2011 .055 2003 .055

 14a Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1951 281 246 285 236 228 186 41 68 130

 1960 77 118 126 197 224 211 223 237 242 223

 1970 212 179 122 96 90 135 123 127 182 146

 1980 132 159 158 166 189 220 138 266 294 325

 1990 386 453 521 492 339 384 290 271 317 262

 2000 244 295 231 134 126 207 302 54 41 98

 2010 170 71

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 14b 1952 to 2011 60 years Series 8

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

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

 1960 1999 2 -.05 -.03 -.12 -.13 .05 -.09 .09 .05 .11 -.27 .25|-.06 .38\*-.26 .14 -.21 .27 -.22 .03 .09 .29

 [B] Entire series, effect on correlation ( .574) is:

 Lower 1995> -.042 1977< -.024 1967> -.021 1968> -.020 2010> -.016 1991< -.016 Higher 1957 .213 2003 .019

 1960 to 1999 segment:

 Lower 1995> -.079 1977< -.040 1967> -.040 1968> -.038 1991< -.031 1984> -.021 Higher 1988 .068 1983 .055

 14b Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1952 308 266 250 256 201 52 116 109

 1960 99 155 141 180 209 250 209 270 226 253

 1970 227 177 138 150 142 128 144 118 159 145

 1980 151 129 147 138 182 145 138 157 242 187

 1990 195 169 208 187 182 211 219 220 231 233

 2000 172 258 270 140 146 139 206 92 56 103

 2010 144 65

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PART 7: DESCRIPTIVE STATISTICS: MIC002\_FAGR\_Corr2-40 13:18 Tue 24 Jan 2012 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 11a 1941 2011 71 3 1 .424 1.62 2.90 .567 .733 .212 2.67 .438 .052 1

 2 11b 1939 2011 73 4 0 .492 1.61 3.45 .726 .792 .251 2.66 .480 .014 1

 3 12a 1940 2011 72 3 0 .578 1.72 3.00 .721 .832 .219 2.60 .427 -.003 1

 4 12b 1939 2011 73 4 0 .628 1.42 2.37 .461 .635 .232 2.58 .406 -.004 1

 5 13a 1939 2011 73 4 0 .642 .97 1.70 .368 .696 .244 2.53 .468 .049 1

 6 13b 1939 2011 73 4 2 .584 .94 1.84 .421 .654 .274 2.41 .416 .002 2

 7 14a 1951 2011 61 3 2 .268 2.09 5.21 1.050 .810 .273 2.41 .392 -.025 1

 8 14b 1952 2011 60 3 1 .574 1.76 3.08 .572 .637 .225 2.77 .453 .001 1

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

 Total or mean: 556 28 6 .528 1.50 5.21 .602 .724 .241 2.77 .436 .012

 - = [ COFECHA M2F2 COF ] = -