[] Dendrochronology Program Library Run PIST Program COF 10:45 Fri 04 Sep 2020 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 31295

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

File of DATED series: SCBI\_pist.rwl

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 N

8 Parts printed 1234567

9 Absent rings are omitted from master series and segment correlations (Y)

Time span of Master dating series is 1931 to 2016 86 years

Continuous time span is 1931 to 2016 86 years

Portion with two or more series is 1935 to 2010 76 years

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

\*C\* Number of dated series 36 \*C\*

\*O\* Master series 1931 2016 86 yrs \*O\*

\*F\* Total rings in all series 2271 \*F\*

\*E\* Total dated rings checked 2261 \*E\*

\*C\* Series intercorrelation .472 \*C\*

\*H\* Average mean sensitivity .279 \*H\*

\*A\* Segments, possible problems 23 \*A\*

\*\*\* Mean length of series 63.1 \*\*\*

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

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

No ring measurements of zero value

PART 2: TIME PLOT OF TREE-RING SERIES: 10:45 Fri 04 Sep 2020 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

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

. . . . . . . . . . . . . . . . . . <======> . 112258 1 1931 2009 79

. . . . . . . . . . . . . . . . . . <======> . 112136 2 1935 2009 75

. . . . . . . . . . . . . . . . . . <======> . 122150 3 1935 2009 75

. . . . . . . . . . . . . . . . . . <======> . 112215 4 1936 2009 74

. . . . . . . . . . . . . . . . . . <======> . 142046 5 1936 2009 74

. . . . . . . . . . . . . . . . . . <======> . 122164 6 1937 2003 67

. . . . . . . . . . . . . . . . . . <======> . 182058 7 1937 2009 73

. . . . . . . . . . . . . . . . . . <======> . 132233 8 1938 2009 72

. . . . . . . . . . . . . . . . . . <======> . 142484 9 1938 2009 72

. . . . . . . . . . . . . . . . . . <======> . 132236 10 1939 2009 71

. . . . . . . . . . . . . . . . . . <=====> . 122128 11 1940 2009 70

. . . . . . . . . . . . . . . . . . <=====> . 122165 12 1940 2009 70

. . . . . . . . . . . . . . . . . . <=====> . 122180 13 1940 2009 70

. . . . . . . . . . . . . . . . . . <=====> . 132194 14 1940 2007 68

. . . . . . . . . . . . . . . . . . <=====> . 122166 15 1943 2009 67

. . . . . . . . . . . . . . . . . . <=====> . 122184 16 1944 2009 66

. . . . . . . . . . . . . . . . . . <=====> . 112145 17 1945 2005 61

. . . . . . . . . . . . . . . . . . <=====> . 122229 18 1945 2009 65

. . . . . . . . . . . . . . . . . . <=====> . 132241 19 1945 2009 65

. . . . . . . . . . . . . . . . . . <=====> . 72458 20 1946 2009 64

. . . . . . . . . . . . . . . . . . <=====> . 102273 21 1946 2006 61

. . . . . . . . . . . . . . . . . . <=====> . 122149 22 1946 2004 59

. . . . . . . . . . . . . . . . . . <======> . 122256 23 1947 2016 70

. . . . . . . . . . . . . . . . . . <=====> . 192213 24 1948 2009 62

. . . . . . . . . . . . . . . . . . <====> . 102279 25 1950 2009 60

. . . . . . . . . . . . . . . . . . <====> . 112170 26 1950 2009 60

. . . . . . . . . . . . . . . . . . <====> . 122187 27 1950 2009 60

. . . . . . . . . . . . . . . . . . <====> . 122157 28 1952 2009 58

. . . . . . . . . . . . . . . . . . <====> . 142521 29 1953 2009 57

. . . . . . . . . . . . . . . . . . <====> . 122275 30 1954 2009 56

. . . . . . . . . . . . . . . . . . <====> . 122146 31 1955 2009 55

. . . . . . . . . . . . . . . . . . <=====> . 112180 32 1958 2010 53

. . . . . . . . . . . . . . . . . . .<===> . 162432 33 1962 2005 44

. . . . . . . . . . . . . . . . . . .<===> . 122302 34 1963 2009 47

. . . . . . . . . . . . . . . . . . .<===> . 122131 35 1969 2009 41

. . . . . . . . . . . . . . . . . . . <=> . 122278 36 1980 2009 30

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

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

PART 3: Master Dating Series: 10:45 Fri 04 Sep 2020 Page 3

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Year Value No Ab Year Value No Ab Year Value No Ab Year Value No Ab Year Value No Ab Year Value No Ab

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

1950 -1.125 27 2000 .461 36

1951 -1.287 27 2001 .115 36

1952 -1.098 28 2002 .906 36

1953 -.816 29 2003 .042 36

1954 .647 30 2004 .495 35

1955 .976 31 2005 .844 34

1956 1.153 31 2006 -.023 32

1957 .651 31 2007 -.320 31

1958 .312 32 2008 -.637 30

1959 .642 32 2009 1.039 30

1960 .697 32 2010 .279 2

1961 .486 32 2011 -1.192 1

1962 .821 33 2012 -.907 1

1963 .261 34 2013 -1.117 1

1964 -.365 34 2014 1.264 1

1965 -.548 34 2015 1.488 1

1966 -3.355 34 2016 1.671 1

1967 -.021 34

1968 1.150 34

1969 .674 35

1970 .306 35

1971 -.474 35

1972 -.236 35

1973 -.109 35

1974 -.342 35

1975 -1.089 35

1976 .208 35

1977 -.270 35

1978 -.042 35

1979 -2.070 35

1980 -.244 36

1931 .143 1 1981 .224 36

1932 -2.144 1 1982 .967 36

1933 -.737 1 1983 1.310 36

1934 -1.928 1 1984 .316 36

1935 -1.260 3 1985 .790 36

1936 -.361 5 1986 -.410 36

1937 .548 7 1987 -.686 36

1938 .534 9 1988 .890 36

1939 1.758 10 1989 .551 36

1940 1.128 14 1990 1.134 36

1941 .037 14 1991 .483 36

1942 .692 14 1992 -.951 36

1943 -.216 15 1993 -1.447 36

1944 -.297 16 1994 -1.850 36

1945 .642 19 1995 .476 36

1946 .269 22 1996 1.003 36

1947 .508 23 1997 1.596 36

1948 -.084 24 1998 .257 36

1949 -.973 24 1999 -2.815 36

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PART 4: Master Bar Plot: 10:45 Fri 04 Sep 2020 Page 4

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Year Rel value Year Rel value Year Rel value Year Rel value Year Rel value Year Rel value Year Rel value Year Rel value

1950-e 2000------B

1951-e 2001-----@

1952-d 2002---------D

1953--c 2003----@

1954--------C 2004------B

1955---------D 2005--------C

1956---------E 2006----@

1957--------C 2007---a

1958-----A 2008--c

1959--------C 2009---------D

1960--------C 2010-----A

1961------B 2011-e

1962--------C 2012-d

1963-----A 2013-d

1964---a 2014----------E

1965--b 2015----------F

1966m 2016----------G

1967----@

1968---------E

1969--------C

1970-----A

1971---b

1972---a

1973----@

1974---a

1975-d

1976-----A

1977---a

1978----@

1979h

1980---a

1931-----A 1981-----A

1932i 1982---------D

1933--c 1983----------E

1934h 1984-----A

1935-e 1985--------C

1936---a 1986---b

1937-------B 1987--c

1938-------B 1988---------D

1939----------G 1989-------B

1940---------E 1990---------E

1941----@ 1991------B

1942--------C 1992-d

1943---a 1993-f

1944---a 1994g

1945--------C 1995------B

1946-----A 1996---------D

1947-------B 1997----------F

1948----@ 1998-----A

1949-d 1999k

PART 5: CORRELATION OF SERIES BY SEGMENTS: 10:45 Fri 04 Sep 2020 Page 5

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Correlations of 50-year dated segments, lagged 25 years

Flags: A = correlation under .3281 but highest as dated; B = correlation higher at other than dated position

Seq Series Time\_span 1925 1950 1975

1974 1999 2024

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

1 112258 1931 2009 .15B .19A .30A

2 112136 1935 2009 .29A .47 .50

3 122150 1935 2009 .77 .86 .84

4 112215 1936 2009 .28A .56 .54

5 142046 1936 2009 .33A .37B .36B

6 122164 1937 2003 .64 .45 .44

7 182058 1937 2009 .53 .64 .62

8 132233 1938 2009 .26B .38 .45

9 142484 1938 2009 .51 .65 .63

10 132236 1939 2009 .48 .52 .46

11 122128 1940 2009 .78 .78 .73

12 122165 1940 2009 .34 .43 .49

13 122180 1940 2009 .68 .70 .66

14 132194 1940 2007 .30A .34B .34B

15 122166 1943 2009 .60 .66 .65

16 122184 1944 2009 .41 .57 .49

17 112145 1945 2005 .46 .37 .37

18 122229 1945 2009 .42B .41B .36

19 132241 1945 2009 .65 .66 .66

20 72458 1946 2009 .48 .52 .58

21 102273 1946 2006 .31B .34B .31B

22 122149 1946 2004 .53 .44 .44

23 122256 1947 2016 .36 .38 .34

24 192213 1948 2009 .36 .44 .49

25 102279 1950 2009 .45 .58

26 112170 1950 2009 .33 .46

27 122187 1950 2009 .34B .27A

28 122157 1952 2009 .73 .67

29 142521 1953 2009 .76 .75

30 122275 1954 2009 .35 .31A

31 122146 1955 2009 .52 .53

32 112180 1958 2010 .32A .26A

33 162432 1962 2005 .44

34 122302 1963 2009 .25B

35 122131 1969 2009 .44

36 122278 1980 2009 .62

Av segment correlation .45 .49 .50

PART 6: POTENTIAL PROBLEMS: 10:45 Fri 04 Sep 2020 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

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

112258 1931 to 2009 79 years Series 1

[\*] Early part of series cannot be checked from 1931 to 1934 -- not matched by another series

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

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

1935 1984 1 - - - - - - -.23 -.03 -.01 .05 .15| .21\* .16 -.07 .00 -.15 -.02 .06 -.06 -.04 -.19

1950 1999 0 .01 -.25 .13 .06 .12 .05 -.04 -.03 .01 .18 .19\* .12 .06 -.21 -.08 -.01 -.01 .13 -.10 -.01 -.30

1960 2009 0 -.22 .01 .00 .19 .04 .15 .04 -.23 -.10 .01 .30\* .11 .07 -.12 -.09 .15 -.07 .16 - - -

[B] Entire series, effect on correlation ( .304) is:

Lower 1966> -.119 1954< -.023 1950> -.021 1985< -.018 1996< -.012 1984> -.011 Higher 1999 .038 2009 .020

1935 to 1984 segment:

Lower 1966> -.174 1954< -.034 1950> -.028 1936> -.014 1984> -.012 1968< -.011 Higher 1949 .056 1951 .039

1950 to 1999 segment:

Lower 1966> -.171 1954< -.036 1950> -.031 1985< -.028 1996< -.018 1984> -.015 Higher 1999 .085 1988 .033

1960 to 2009 segment:

Lower 1966> -.184 1985< -.033 1996< -.022 1984> -.019 1990< -.019 1968< -.013 Higher 1999 .078 2009 .032

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

1966 +4.6 SD

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

112136 1935 to 2009 75 years Series 2

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

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

1935 1984 0 - - - - - - .12 .18 -.04 .26 .29\* .06 -.14 -.15 -.41 .01 -.22 .02 .14 .08 -.08

[B] Entire series, effect on correlation ( .473) is:

Lower 1954< -.041 1966> -.022 1978< -.018 1975> -.016 1967< -.016 1973> -.013 Higher 1999 .063 1994 .018

1935 to 1984 segment:

Lower 1954< -.074 1978< -.031 1967< -.029 1975> -.024 1973> -.019 1970< -.017 Higher 1939 .043 1979 .030

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122150 1935 to 2009 75 years Series 3

[B] Entire series, effect on correlation ( .760) is:

Lower 1940< -.027 1944> -.014 2002< -.011 1941> -.011 1938< -.008 1994> -.008 Higher 1966 .065 1999 .046

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

112215 1936 to 2009 74 years Series 4

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

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

1936 1985 0 - - - - - .10 .03 .05 .12 .18 .28\* .01 .13 -.05 -.14 .04 -.08 -.01 .05 -.08 -.09

[B] Entire series, effect on correlation ( .502) is:

Lower 1984< -.060 1966> -.037 1936< -.035 1968< -.016 2008> -.014 1954< -.013 Higher 1999 .124 1992 .019

1936 to 1985 segment:

Lower 1984< -.076 1936< -.053 1968< -.025 1954< -.020 1966> -.017 1943> -.015 Higher 1979 .028 1956 .024

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

142046 1936 to 2009 74 years Series 5

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

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

1936 1985 0 - - - - - -.34 -.19 -.07 .30 .10 .33\* .09 .06 .08 -.15 .26 .11 -.22 -.09 -.13 -.20

1950 1999 5 -.14 -.05 .22 .06 -.13 -.28 -.29 -.19 .35 .18 .37| .08 -.21 -.09 -.19 .42\* .15 -.10 -.16 -.16 -.15

1960 2009 5 -.24 .01 .22 .14 -.08 -.20 -.23 -.22 .30 .11 .36| .03 -.28 -.13 -.23 .47\* .16 -.03 - - -

[B] Entire series, effect on correlation ( .441) is:

Lower 1979> -.119 1981< -.076 1999> -.030 1974< -.008 1986> -.006 1968< -.006 Higher 1966 .048 1994 .026

1936 to 1985 segment:

Lower 1979> -.193 1981< -.107 1968< -.009 1975> -.007 1974< -.005 1970> -.004 Higher 1966 .117 1939 .041

1950 to 1999 segment:

Lower 1979> -.137 1981< -.091 1999> -.029 1974< -.010 1986> -.007 1968< -.006 Higher 1966 .068 1994 .034

1960 to 2009 segment:

Lower 1979> -.141 1981< -.089 1999> -.029 1974< -.008 1986> -.007 1975> -.006 Higher 1966 .071 1994 .037

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

1979 +4.4 SD

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

122164 1937 to 2003 67 years Series 6

[B] Entire series, effect on correlation ( .460) is:

Lower 1999> -.124 1970< -.027 1995< -.024 1994> -.021 2003> -.013 1998> -.012 Higher 1979 .057 1966 .053

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

1999 +4.1 SD

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

182058 1937 to 2009 73 years Series 7

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

Lower 1946< -.023 1986> -.022 1944> -.022 1940< -.020 1988< -.017 1945< -.011 Higher 1966 .143 1999 .029

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132233 1938 to 2009 72 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

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

1938 1987 7 - - - .05 -.01 -.05 -.27 -.21 -.01 .09 .26| .02 -.04 -.17 -.02 .00 .10 .35\* .08 -.28 -.30

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

Lower 1966> -.078 1959< -.061 2004< -.017 1990< -.015 1952> -.015 1989> -.014 Higher 1999 .113 1979 .057

1938 to 1987 segment:

Lower 1966> -.120 1959< -.091 1952> -.022 1946< -.019 1964> -.019 1960< -.012 Higher 1979 .120 1939 .024

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

1966 +3.4 SD; 1989 +3.4 SD

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142484 1938 to 2009 72 years Series 9

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

Lower 1983< -.034 1979> -.030 1945< -.028 1976< -.024 1944> -.016 1970> -.010 Higher 1966 .117 1999 .087

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132236 1939 to 2009 71 years Series 10

[B] Entire series, effect on correlation ( .455) is:

Lower 1979> -.071 1992> -.041 1990< -.028 1988< -.019 2009< -.013 1977> -.012 Higher 1966 .180 1999 .085

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

1966 -4.8 SD; 1979 +3.3 SD

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

122128 1940 to 2009 70 years Series 11

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

Lower 1999> -.043 2003< -.015 1944> -.015 2009< -.013 1940< -.013 1998> -.009 Higher 1966 .087 1979 .021

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

1966 -5.5 SD

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

122165 1940 to 2009 70 years Series 12

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

Lower 1963< -.077 1952> -.032 1975> -.014 1985< -.012 1968< -.011 1947< -.008 Higher 1966 .068 1999 .039

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

1952 +3.2 SD

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

122180 1940 to 2009 70 years Series 13

[B] Entire series, effect on correlation ( .635) is:

Lower 1955< -.020 2002< -.015 1989< -.015 1941> -.015 1982< -.013 1963> -.010 Higher 1966 .107 1979 .031

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132194 1940 to 2007 68 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

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

1940 1989 0 - -.09 -.02 -.02 -.01 .03 .24 -.01 .08 .19 .30\*-.04 -.05 -.29 -.11 -.17 -.04 .04 .12 -.05 -.02

1950 1999 7 -.22 -.25 -.04 -.08 .01 .19 -.03 .03 -.11 .06 .34| .05 .24 -.38 -.16 -.13 .01 .37\*-.20 -.02 -.11

1958 2007 7 -.30 -.27 .02 .05 .05 .15 -.07 -.03 -.19 -.03 .34| .07 .28 -.37 -.15 -.10 .05 .40\*-.18 .07 -

[B] Entire series, effect on correlation ( .298) is:

Lower 1997< -.071 1967< -.018 1940< -.017 1993> -.016 1966> -.014 1943> -.013 Higher 1979 .058 1992 .026

1940 to 1989 segment:

Lower 1967< -.038 1940< -.035 1943> -.026 1974> -.021 1954< -.021 1945< -.019 Higher 1979 .128 1951 .029

1950 to 1999 segment:

Lower 1997< -.084 1966> -.028 1967< -.021 1993> -.020 1974> -.012 1954< -.011 Higher 1979 .060 1951 .014

1958 to 2007 segment:

Lower 1997< -.089 1967< -.022 1966> -.022 1993> -.019 2003> -.013 1974> -.012 Higher 1979 .066 1992 .013

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

1966 1967 -4.0 SD

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122166 1943 to 2009 67 years Series 15

[B] Entire series, effect on correlation ( .644) is:

Lower 1954< -.016 1966> -.015 1975> -.015 2008> -.012 1967< -.011 1970> -.011 Higher 1979 .039 1999 .020

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

122184 1944 to 2009 66 years Series 16

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

Lower 1966> -.044 2008> -.030 1994> -.024 2009< -.018 2004< -.015 1944< -.015 Higher 1999 .153 1979 .020

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112145 1945 to 2005 61 years Series 17

[B] Entire series, effect on correlation ( .413) is:

Lower 1966> -.062 1999> -.062 1973> -.014 1962< -.013 1995< -.009 1985< -.009 Higher 1979 .061 1968 .016

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

1965 1966 4.5 SD

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

122229 1945 to 2009 65 years Series 18

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

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

1945 1994 -1 -.05 -.04 -.03 .02 .04 -.10 -.12 -.33 -.04 .56\* .42| .16 .01 -.07 -.04 .15 -.08 -.06 -.05 -.09 -.21

1950 1999 -1 .07 -.03 -.13 .12 -.02 -.03 -.06 -.33 -.02 .41\* .41| .01 -.01 .04 -.14 .16 -.10 .03 -.03 -.09 -.21

[B] Entire series, effect on correlation ( .407) is:

Lower 1996< -.056 2003< -.046 1992> -.044 1966> -.024 1986> -.015 1976< -.014 Higher 1999 .067 1994 .026

1945 to 1994 segment:

Lower 1992> -.075 1966> -.032 1980< -.029 1976< -.027 1986> -.025 1967< -.025 Higher 1994 .041 1968 .029

1950 to 1999 segment:

Lower 1996< -.086 1992> -.060 1966> -.024 1980< -.021 1986> -.021 1976< -.020 Higher 1999 .097 1994 .031

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

132241 1945 to 2009 65 years Series 19

[B] Entire series, effect on correlation ( .609) is:

Lower 1992> -.035 1994> -.030 2006> -.013 1947< -.013 2009< -.013 1955< -.010 Higher 1966 .128 1979 .028

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

72458 1946 to 2009 64 years Series 20

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

Lower 1996< -.041 1960< -.040 1955< -.022 1995< -.019 1951> -.017 2000< -.016 Higher 1966 .158 1999 .055

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

102273 1946 to 2006 61 years Series 21

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

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

1946 1995 8 -.21 .11 .14 .30 .07 -.08 -.15 -.05 .04 .04 .31| .05 -.11 -.13 -.30 .18 .25 .05 .36\*-.26 -.28

1950 1999 8 -.23 .08 .13 .32 .09 -.07 -.19 -.10 .00 .05 .34| .05 -.13 -.14 -.26 .20 .25 .05 .36\*-.26 -.31

1957 2006 -7 -.25 -.03 .16 .45\* .01 -.02 -.16 .04 -.02 -.11 .31| .02 -.13 -.24 -.30 .24 .24 .08 .22 -.25 -.18

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

Lower 1958< -.098 1966> -.063 1969< -.029 1987> -.010 2006< -.009 1968< -.007 Higher 1979 .040 1954 .019

1946 to 1995 segment:

Lower 1958< -.124 1966> -.089 1969< -.037 1987> -.012 1968< -.009 1955< -.009 Higher 1979 .056 1954 .030

1950 to 1999 segment:

Lower 1958< -.123 1966> -.070 1969< -.035 1987> -.011 1968< -.007 1964> -.007 Higher 1979 .046 1954 .023

1957 to 2006 segment:

Lower 1958< -.104 1966> -.071 1969< -.030 1987> -.012 1964> -.008 1975> -.008 Higher 1979 .047 2000 .022

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

1958 -5.6 SD; 1966 +3.0 SD

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

122149 1946 to 2004 59 years Series 22

[B] Entire series, effect on correlation ( .451) is:

Lower 1999> -.061 1961< -.055 1966> -.047 1980< -.018 1996< -.008 1969< -.005 Higher 1979 .077 1988 .017

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

1979 -5.2 SD

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

122256 1947 to 2016 70 years Series 23

[\*] Later part of series cannot be checked from 2011 to 2016 -- not matched by another series

[B] Entire series, effect on correlation ( .320) is:

Lower 1954< -.038 1966> -.031 2004< -.030 2010< -.024 1973< -.023 1979> -.022 Higher 1994 .026 1992 .025

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

192213 1948 to 2009 62 years Series 24

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

Lower 1983< -.061 1992> -.049 1959< -.026 1975> -.026 1956< -.021 1962< -.020 Higher 1966 .094 1999 .044

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

102279 1950 to 2009 60 years Series 25

[B] Entire series, effect on correlation ( .470) is:

Lower 1966> -.044 1955< -.043 1950> -.032 1989< -.022 1956< -.012 1964> -.012 Higher 1999 .180 2000 .013

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

112170 1950 to 2009 60 years Series 26

[B] Entire series, effect on correlation ( .370) is:

Lower 1957< -.093 1966> -.040 1990< -.015 1995< -.013 1987> -.013 1993> -.012 Higher 1999 .100 1997 .023

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

122187 1950 to 2009 60 years Series 27

[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 -7 .00 -.08 .00 .36\*-.03 .01 -.33 .07 -.11 .04 .34| .00 .02 -.21 -.08 .08 -.06 .08 -.08 -.08 -.07

1960 2009 0 -.03 .24 -.09 .26 -.06 .05 -.22 -.01 -.06 -.03 .27\*-.12 -.06 -.17 -.05 .13 -.19 .00 - - -

[B] Entire series, effect on correlation ( .301) is:

Lower 1982< -.141 1979> -.064 2008< -.048 1971> -.008 1994> -.007 1993> -.007 Higher 1999 .107 1966 .030

1950 to 1999 segment:

Lower 1982< -.263 1979> -.081 1976< -.010 1971> -.010 1985< -.008 1993> -.007 Higher 1999 .145 1966 .046

1960 to 2009 segment:

Lower 1982< -.146 1979> -.068 2008< -.044 1971> -.008 1994> -.008 1993> -.007 Higher 1999 .119 1966 .035

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

1979 +3.3 SD; 1982 -6.2 SD; 2008 -5.8 SD

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

122157 1952 to 2009 58 years Series 28

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

Lower 1982< -.031 2006> -.027 1975> -.025 1992> -.021 2003> -.015 1979> -.010 Higher 1966 .113 1999 .061

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142521 1953 to 2009 57 years Series 29

[B] Entire series, effect on correlation ( .736) is:

Lower 1956< -.024 1975> -.017 1999> -.015 2003> -.014 1974> -.013 1978< -.011 Higher 1966 .078 1979 .026

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

122275 1954 to 2009 56 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

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

1960 2009 0 -.20 .18 -.08 .23 .21 -.08 .12 -.33 .14 -.12 .31\* .07 -.05 -.03 -.13 -.06 .25 .18 - - -

[B] Entire series, effect on correlation ( .298) is:

Lower 2005< -.045 1968< -.028 1994> -.027 1988< -.022 2008> -.017 1984> -.016 Higher 1999 .058 1975 .019

1960 to 2009 segment:

Lower 2005< -.051 1968< -.032 1994> -.027 1988< -.025 2008> -.016 2000< -.015 Higher 1999 .059 1997 .015

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122146 1955 to 2009 55 years Series 31

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

Lower 1966> -.043 1955< -.029 2005< -.021 1971> -.016 1973> -.013 1983< -.012 Higher 1999 .125 1997 .017

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

112180 1958 to 2010 53 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

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

1958 2007 0 -.08 -.10 .03 -.11 .00 .04 .18 -.17 -.12 .01 .32\* .07 .00 .10 -.13 .05 -.20 .13 .03 -.11 -

1961 2010 0 .08 -.03 .06 -.11 .03 .05 .10 -.22 -.15 .06 .26\* .03 .00 .07 -.08 .03 -.25 - - - -

[B] Entire series, effect on correlation ( .258) is:

Lower 2009< -.048 2000< -.046 1994> -.043 1993> -.033 2010> -.018 2002< -.017 Higher 1979 .154 1966 .034

1958 to 2007 segment:

Lower 2000< -.053 1994> -.047 1993> -.036 2002< -.020 1970< -.009 1990< -.008 Higher 1979 .143 1966 .029

1961 to 2010 segment:

Lower 2009< -.049 2000< -.047 1994> -.045 1993> -.035 2010> -.019 2002< -.017 Higher 1979 .157 1966 .033

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

2009 2010 4.4 SD

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

1993 +3.1 SD; 1994 +3.6 SD

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

162432 1962 to 2005 44 years Series 33

[B] Entire series, effect on correlation ( .437) is:

Lower 1999> -.100 1970< -.082 2004< -.034 1995< -.014 1973< -.013 1975> -.012 Higher 1966 .050 1979 .034

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

122302 1963 to 2009 47 years Series 34

[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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1963 2009 -1 .03 .15 -.04 .09 -.12 .10 -.17 -.02 .14 .27\* .25|-.20 -.18 -.22 .03 .22 .18 .07 - - -

[B] Entire series, effect on correlation ( .248) is:

Lower 1980< -.077 1969< -.039 1968< -.032 1979> -.026 1966> -.020 1967< -.015 Higher 1997 .030 1999 .030

1963 to 2009 segment:

Lower 1980< -.077 1969< -.039 1968< -.032 1979> -.026 1966> -.020 1967< -.015 Higher 1997 .030 1999 .030

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

122131 1969 to 2009 41 years Series 35

[B] Entire series, effect on correlation ( .437) is:

Lower 1972< -.147 1986> -.025 1973> -.025 2007> -.011 2006> -.009 1974> -.009 Higher 1994 .040 1979 .037

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122278 1980 to 2009 30 years Series 36

[B] Entire series, effect on correlation ( .615) is:

Lower 1993> -.056 1992> -.046 1988< -.032 1995< -.027 2003> -.024 1983< -.012 Higher 1999 .362 2009 .016

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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 112258 1931 2009 79 3 3 .304 .87 2.68 .547 .857 .234 2.70 .464 -.089 2

2 112136 1935 2009 75 3 1 .473 1.27 3.38 .605 .805 .238 2.69 .500 .032 1

3 122150 1935 2009 75 3 0 .760 1.95 4.41 .853 .587 .296 2.52 .400 -.003 1

4 112215 1936 2009 74 3 1 .502 .78 2.69 .557 .880 .209 2.55 .444 -.060 1

5 142046 1936 2009 74 3 3 .441 1.45 5.15 .738 .457 .314 2.83 .482 .074 1

6 122164 1937 2003 67 3 0 .460 1.30 4.77 1.106 .861 .276 2.91 .641 -.030 1

7 182058 1937 2009 73 3 0 .535 1.66 4.99 1.066 .751 .372 2.52 .383 -.015 1

8 132233 1938 2009 72 3 1 .379 1.80 5.87 .998 .629 .251 3.13 .580 .070 1

9 142484 1938 2009 72 3 0 .590 3.58 6.65 1.480 .552 .314 2.51 .420 .039 1

10 132236 1939 2009 71 3 0 .455 1.48 2.72 .597 .508 .324 2.36 .369 -.012 1

11 122128 1940 2009 70 3 0 .684 1.33 4.28 .875 .759 .330 2.43 .331 -.067 1

12 122165 1940 2009 70 3 0 .422 1.28 6.02 1.103 .655 .325 2.66 .441 -.022 1

13 122180 1940 2009 70 3 0 .635 1.62 7.71 1.206 .558 .337 2.91 .421 -.004 2

14 132194 1940 2007 68 3 3 .298 1.26 3.85 .822 .808 .294 2.41 .379 -.112 1

15 122166 1943 2009 67 3 0 .644 1.85 4.14 .764 .639 .231 2.67 .497 -.019 1

16 122184 1944 2009 66 3 0 .488 1.44 5.12 .893 .877 .198 2.60 .410 -.085 1

17 112145 1945 2005 61 3 0 .413 1.67 4.68 1.160 .892 .255 2.62 .423 .059 1

18 122229 1945 2009 65 3 2 .407 1.10 4.05 .934 .905 .218 2.68 .468 -.111 1

19 132241 1945 2009 65 3 0 .609 1.46 3.28 .576 .663 .266 2.51 .390 -.028 1

20 72458 1946 2009 64 3 0 .488 1.16 3.30 .662 .600 .309 2.59 .432 -.082 1

21 102273 1946 2006 61 3 3 .352 1.66 3.76 .729 .507 .316 2.76 .455 -.025 1

22 122149 1946 2004 59 3 0 .451 .90 3.35 .742 .763 .375 2.55 .379 .071 1

23 122256 1947 2016 70 3 0 .320 .61 3.28 .588 .948 .268 2.94 .591 .094 1

24 192213 1948 2009 62 3 0 .428 3.25 7.30 1.665 .800 .210 2.97 .693 .049 4

25 102279 1950 2009 60 2 0 .470 1.29 2.61 .552 .828 .218 2.68 .392 -.070 1

26 112170 1950 2009 60 2 0 .370 1.52 4.95 .973 .584 .331 2.63 .494 -.079 1

27 122187 1950 2009 60 2 2 .301 1.70 2.93 .531 .584 .231 2.39 .409 -.022 1

28 122157 1952 2009 58 2 0 .680 3.20 5.61 .913 .293 .301 2.63 .394 .049 1

29 142521 1953 2009 57 2 0 .736 2.87 6.54 1.346 .658 .263 2.49 .359 -.002 1

30 122275 1954 2009 56 2 1 .298 1.09 4.12 .908 .886 .241 2.72 .512 -.095 2

31 122146 1955 2009 55 2 0 .510 2.89 4.42 .734 .534 .202 2.70 .550 .031 1

32 112180 1958 2010 53 2 2 .258 1.55 3.93 .664 .755 .223 2.50 .408 -.050 1

33 162432 1962 2005 44 1 0 .437 2.63 4.69 1.273 .515 .417 2.51 .584 .023 3

34 122302 1963 2009 47 1 1 .248 .76 5.83 .917 .878 .330 2.64 .545 .001 1

35 122131 1969 2009 41 1 0 .437 2.08 5.53 1.144 .514 .335 2.60 .489 -.083 2

36 122278 1980 2009 30 1 0 .615 3.34 4.44 .616 .226 .182 2.38 .440 -.055 3

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Total or mean: 2271 92 23 .472 1.66 7.71 .880 .691 .279 3.13 .459 -.016

- = [ COFECHA PIST COF ] = -