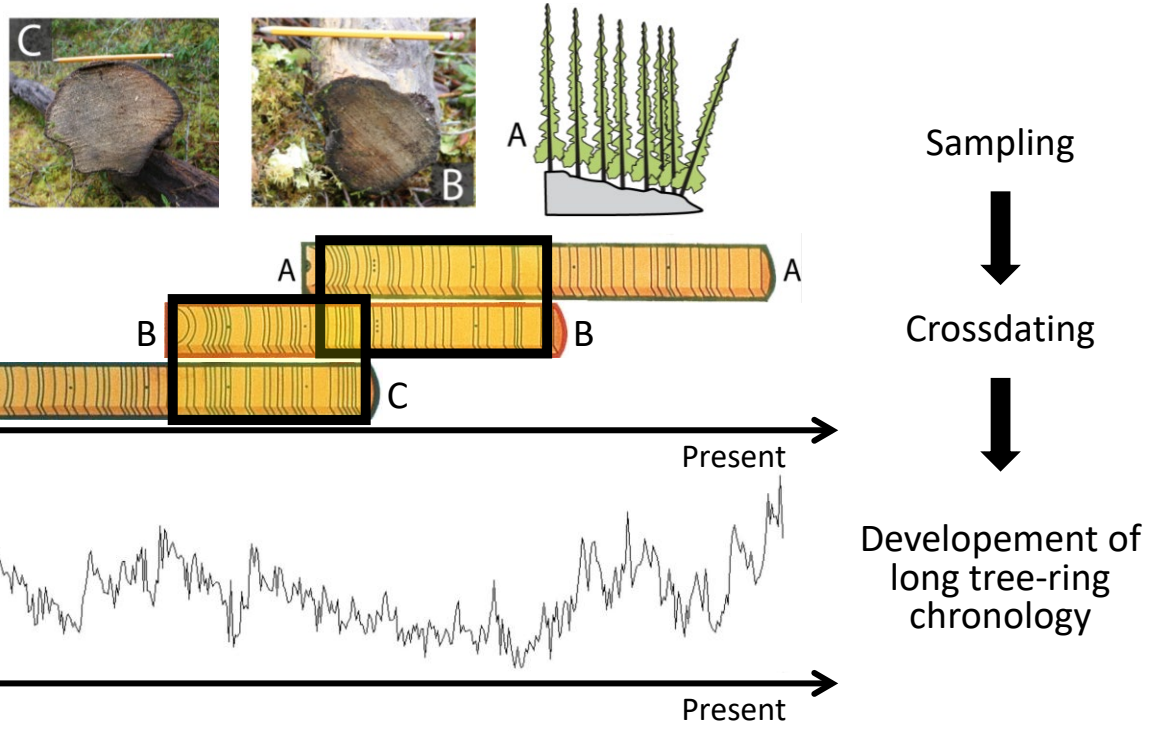
ECL7202 – DENDROECOLOGY

2.1 – Crossdating

The Principle of Crossdating

states that matching patterns in ring widths or other ring characteristics (such as ring density patterns) among several tree-ring series allow the identification of the exact year in which each tree-ring was formed. For example, one can date the construction of a building, such as a barn or Indian pueblo, by matching the tree-ring patterns of wood taken from the buildings with tree-ring patterns from living trees.



Step by step guide to crossdating

1. Retrieve data

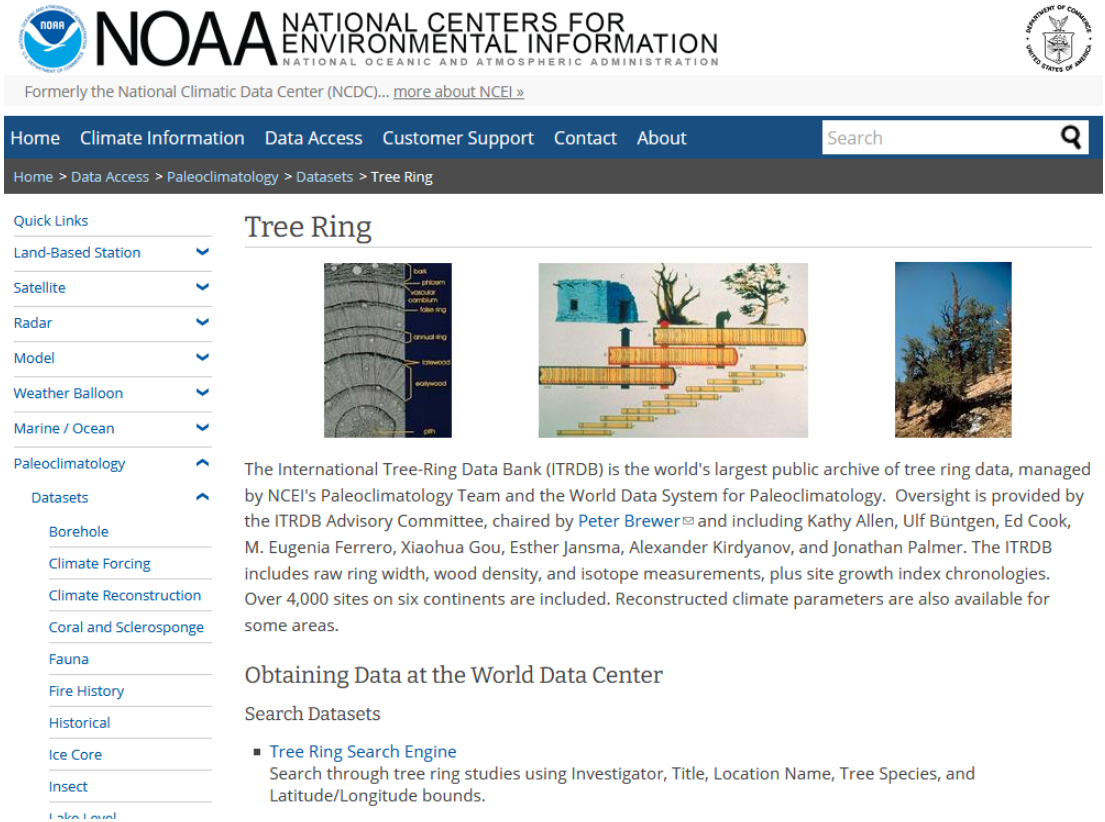
The International Tree-Ring Data Bank (ITRDB)
https://www.ncdc.noaa.gov/data-access/paleoclimatology-data/datasets/tree-ring

Investigator: Gennaretti

Lake L18 (CANA461)

Download

<cana461.rwl> = Mesurements
<cana461.txt> = COFECHA Validation

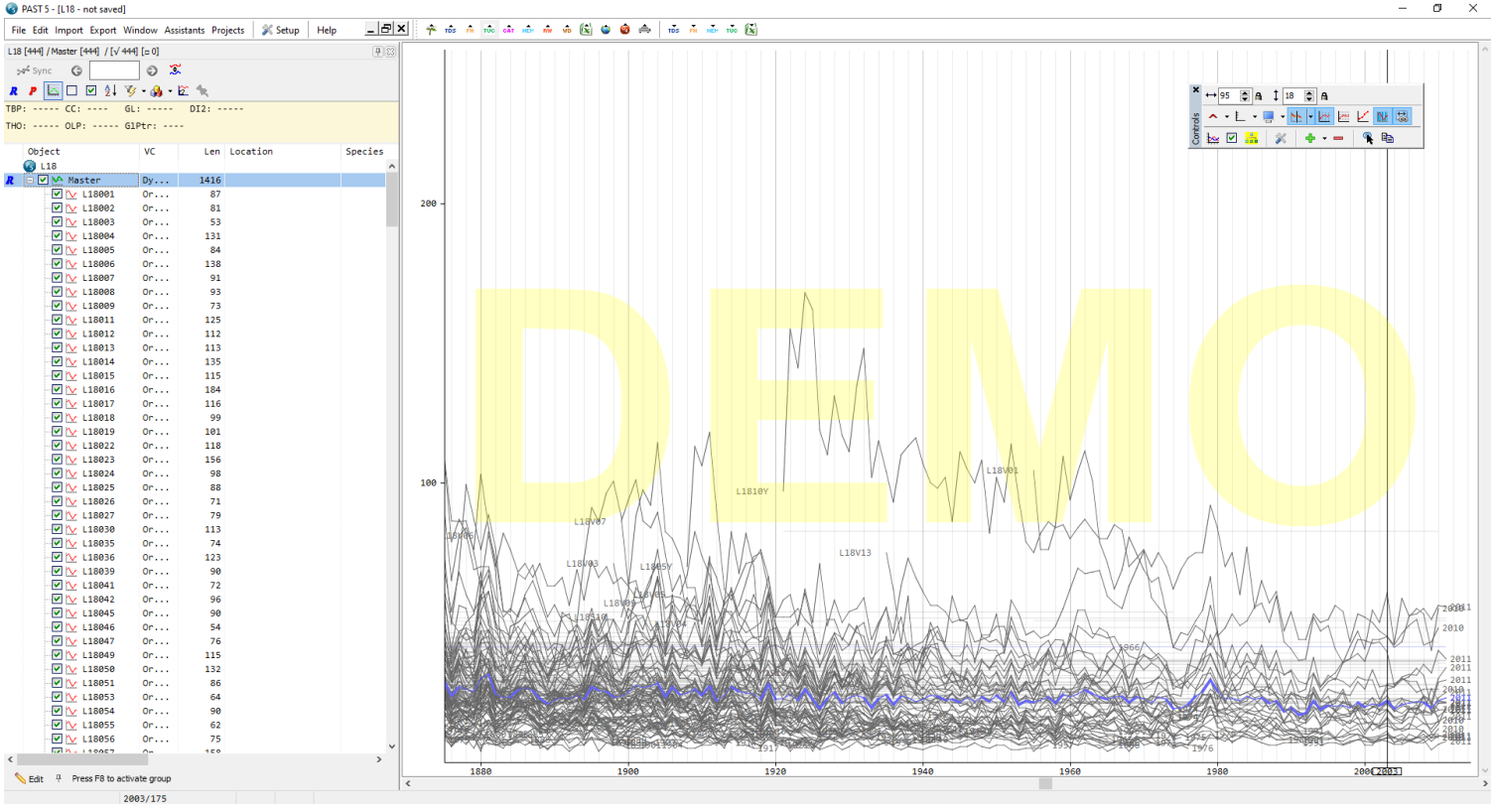


Step by step guide to crossdating

1. Retrieve data
2. Develop a master chronology in PAST5

Import <cana461.rwl>

Create a dynamic group

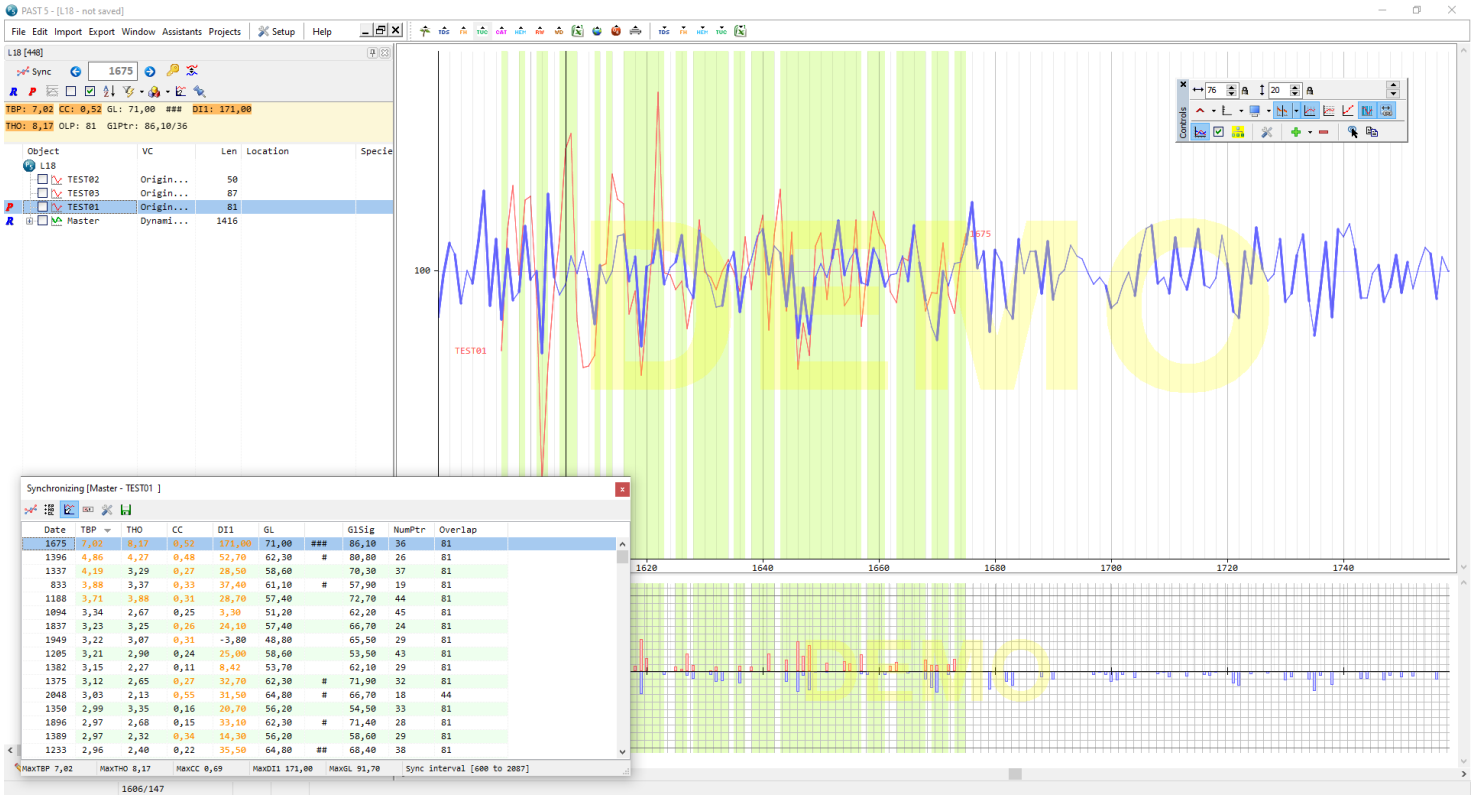


Step by step guide to crossdating

1. Retrieve data
2. Develop a master chronology in PAST5
3. Import a new sample and synchronize it in PAST5

Import <L18_TEST01.rwl>

Sync



COFECHA

Open <cana461.txt>
The COFECHA validation of the dating of the lake L18 samples

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                    P R O G R A M    C O F E C H A

                 Version 6.02P 21:30  Tue 02 Feb 2010
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Program COFECHA does data quality control on a set of tree-ring measurements,
verifying crossdating among measurement series and indicating possible dating
or measurement problems.  It identifies portions of tree-ring series that may
have dating errors or important errors in measurement.  You may also check
crossdating among chronologies.

Before problems are identified each time series is transformed to enhance
characteristics related to crossdating.  Low-frequency variance is removed
by cubic smoothing spline.  Autoregressive modeling removes persistence.
To weigh proportional differences equally the series is log-transformed.
Each transformed series is then tested against the master dating series
segment by segment, and successive segments are lagged with a 50% overlap.

Maximum time span  4096 years                    For more information type:  ?

Identify job (up to 5 characters) -> _
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PART 5: CORRELATION OF SERIES BY SEGMENTS: Lake L18 — 10:04 Thu 19 Jun 2014 Page 5

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	725 774	750 799	775 824	800 849	825 874	850 899	875 924	900 949	925 974	950 999	975 1024	1000 1049	1025 1074	1050 1099	1075 1124	1100 1149	1125 1174	1150 1199	1175 1224	1200 1249
3	L18003	917 969								.59	.64											
4	L18004	1129 1259																	.51	.67	.63	.42

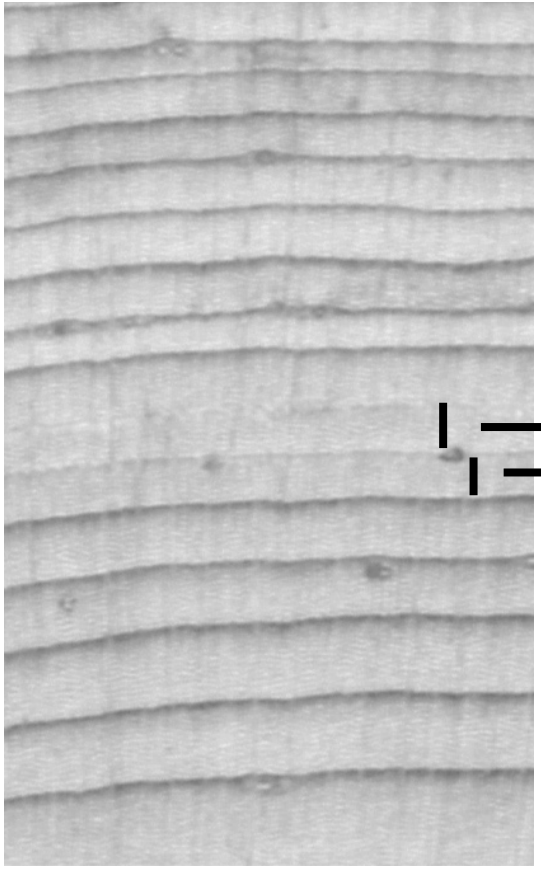
PART 7: DESCRIPTIVE STATISTICS: Lake L18 — 10:04 Thu 19 Jun 2014 Page 23

Seq	Series	Interval	No. Years	No. Segmt	No. Flags	Corr with Master	Unfiltered Mean msmt	Unfiltered Max msmt	Unfiltered Std dev	Unfiltered Auto corr	Unfiltered Mean sens	Filtered Max value	Filtered Std dev	Filtered Auto corr	AR ()
1	L18001	1673 1759	87	4	0	.525	.53	.93	.154	.812	.129	2.64	.471	.029	1
2	L18002	1595 1675	81	4	0	.700	.49	1.00	.147	.687	.187	2.81	.480	.016	1

Other dating tools: Diagnostic tree-rings

1. Light rings
2. Narrow rings
3. Rings with narrow late wood
4. Cracks

Light rings
(e.g. the two years following the Tambora eruption in 1815)



Other dating tools: "skeleton pots" and "pointer years"

We can train with skeleton plots on the website:

https://www.ltrr.arizona.edu/skeletonplot/SkeletonPlot19.htm