



# ECL7202 – DENDROECOLOGY

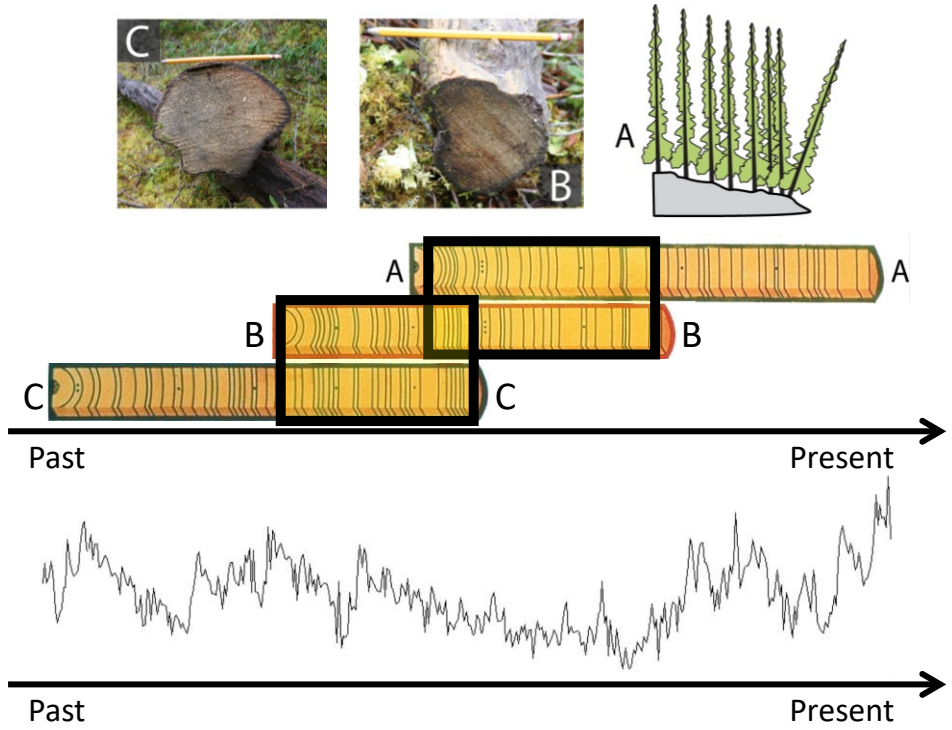
## 2.1 – Crossdating

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# 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.



Sampling  
↓  
Crossdating  
↓  
Development of long tree-ring chronology

# 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> = Measurements

<cana461.txt> = COFECHA Validation



**NOAA**  
NATIONAL CENTERS FOR  
ENVIRONMENTAL INFORMATION  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION



Formerly the National Climatic Data Center (NCDC)... [more about NCEI »](#)

HomeClimate InformationData AccessCustomer SupportContactAbout

Home > Data Access > Paleoclimatology > Datasets > Tree Ring

Quick Links

Land-Based Station

Satellite

Radar

Model

Weather Balloon

Marine / Ocean

Paleoclimatology

Datasets

Borehole

Climate Forcing

Climate Reconstruction

Coral and Sclerosponge

Fauna

Fire History



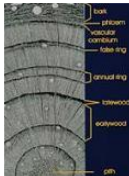
Historical

Ice Core

Insect

Isotope

## Tree Ring



The International Tree-Ring Data Bank (ITRDB) is the world's largest public archive of tree ring data, managed by NCEI's Paleoclimatology Team and the World Data System for Paleoclimatology. Oversight is provided by the ITRDB Advisory Committee, chaired by [Peter Brewer](#) and including Kathy Allen, Ulf Buntgen, Ed Cook, M. Eugenia Ferrero, Xiaohua Gou, Esther Jansma, Alexander Kirdyanov, and Jonathan Palmer. The ITRDB includes raw ring width, wood density, and isotope measurements, plus site growth index chronologies. Over 4,000 sites on six continents are included. Reconstructed climate parameters are also available for some areas.

### Obtaining Data at the World Data Center

#### Search Datasets

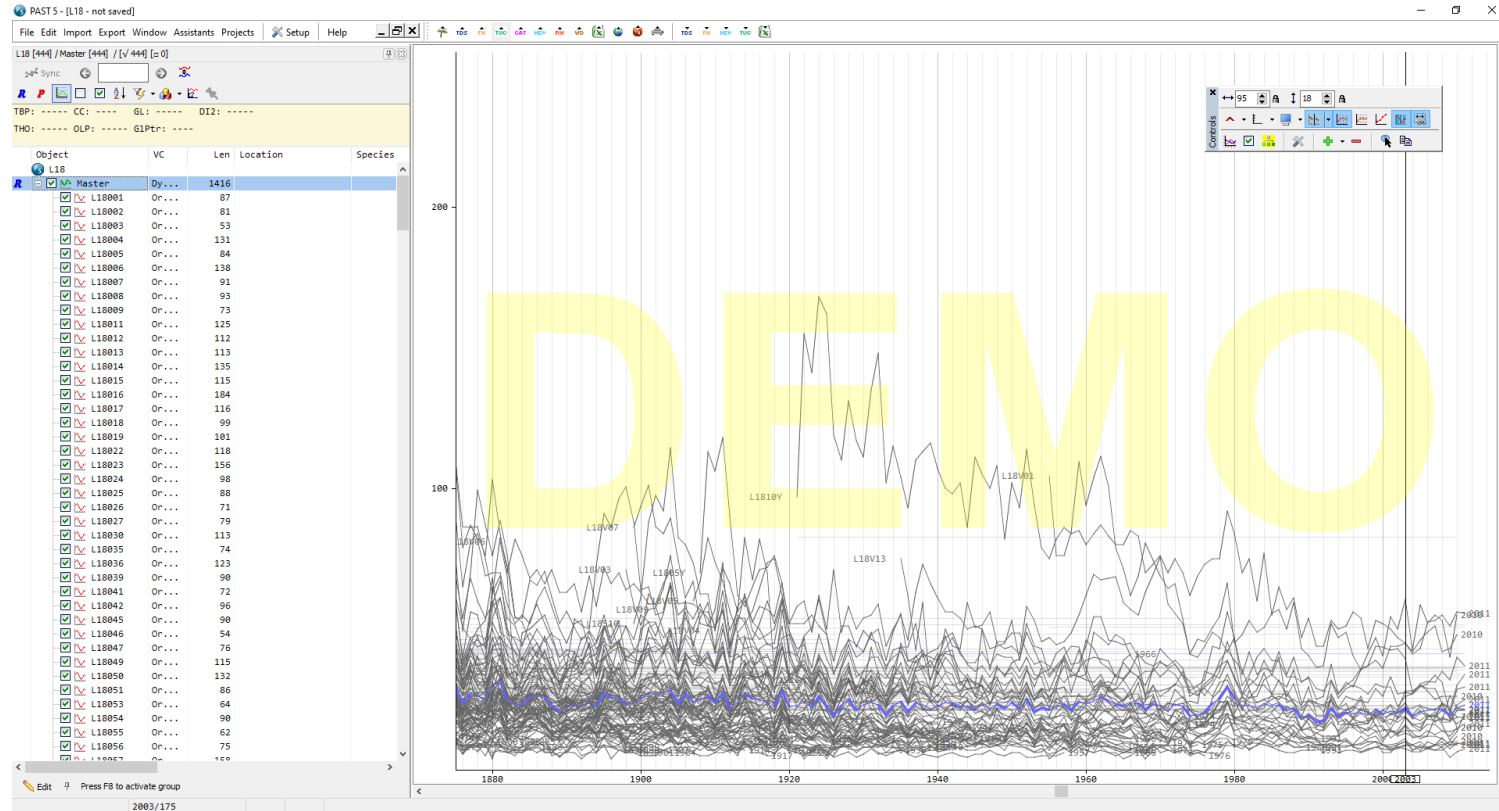
- Tree Ring Search Engine**  
Search through tree ring studies using Investigator, Title, Location Name, Tree Species, and Latitude/Longitude bounds.

# Step by step guide to crossdating

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

Import <cana461.rwl>

Create a dynamic group



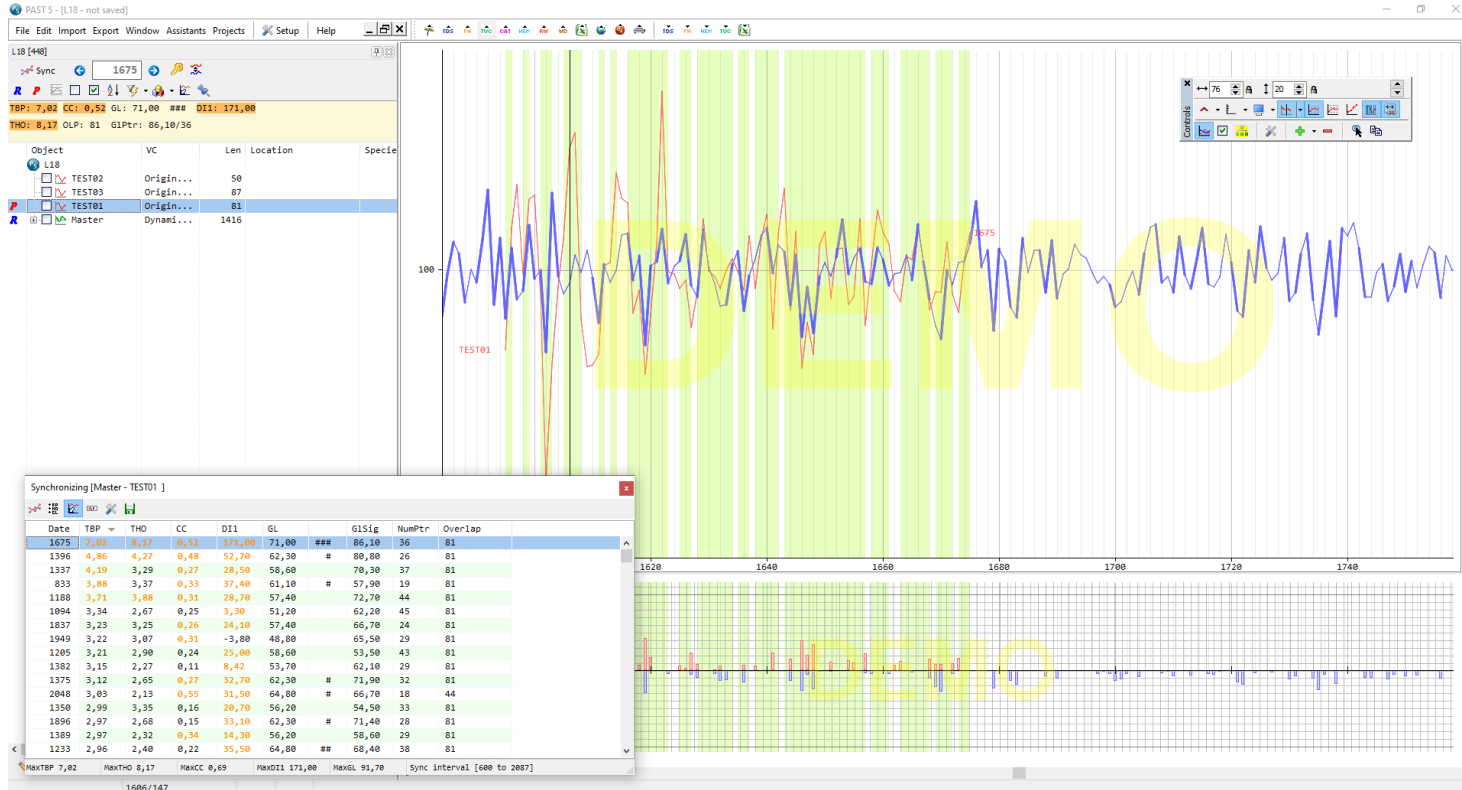


# Step by step guide to crossdating

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

```

      PROGRAM COFECHA
      Version 6.02P 21:30 Tue 02 Feb 2010
      ~~~~~
      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) -> _
  
```

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

## ▲ PART 7: DESCRIPTIVE STATISTICS: Lake L18

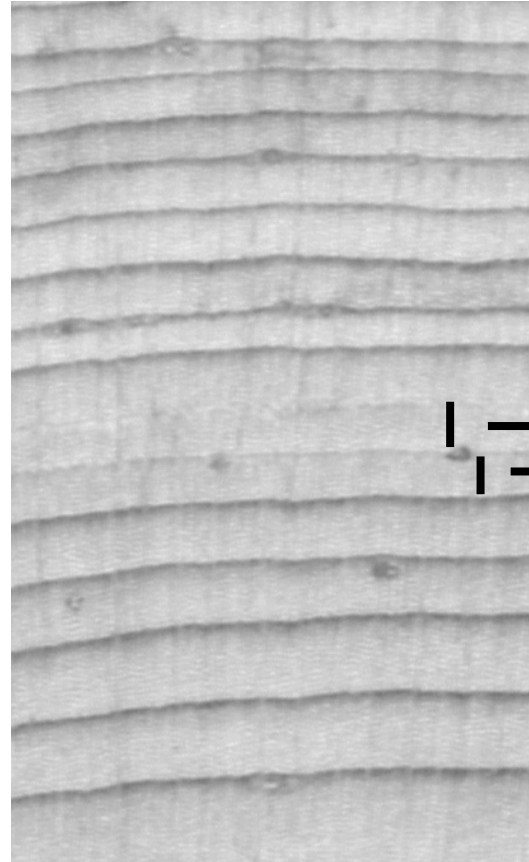
10:04 Thu 19 Jun 2014 Page 23

Seq Series	Interval	No. Years	No. Segmt	No. Flags	Corr with Master	//----- Unfiltered -----\\	Mean msmt	Max msmt	Std dev	Auto corr	Mean sens	//---- Filtered ----\\	Max value	Std dev	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)

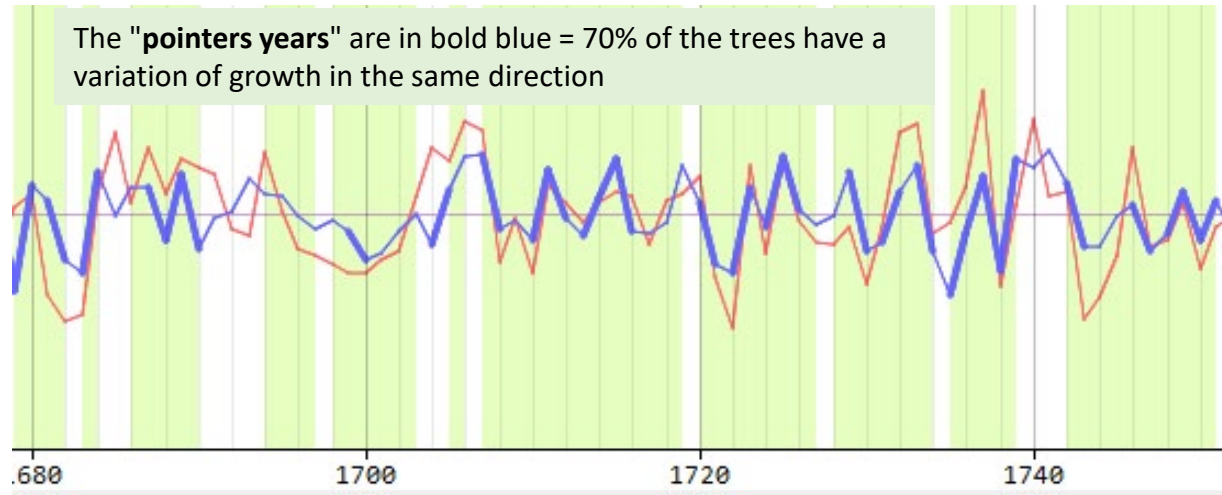


ID = L12\_136

1817

1816

## 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>

