ECL7202 – DENDROECOLOGY

2.2 – Post-processing and statistics of dendrochronological series

Post-processing and statistics of dendrochronological series

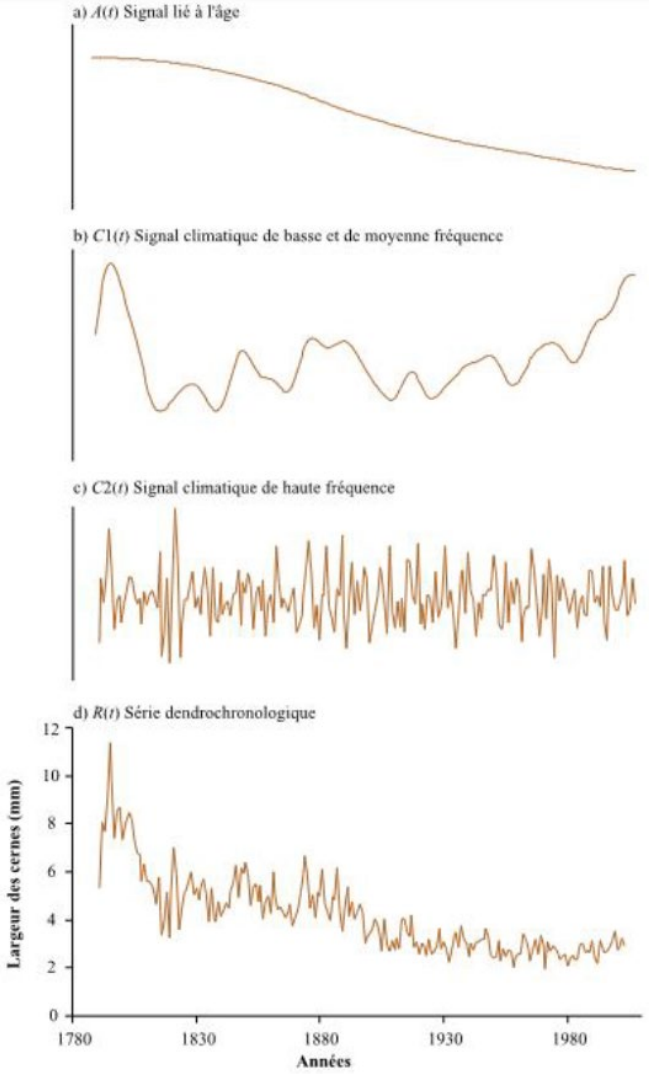
1. Standardization/Detrending
2. Some descriptive statistics : $\bar{r}$; EPS; SSS

Standardization/Detrending

Required to increase the SNR (signal-to-noise ratio)

Limits the influence of the age of the trees (A_t)

Amplifies the climate signal (C_t)



The Principle of Aggregate Tree Growth

$$R_t = A_t + C_t + \delta D1_t + \delta D2_t + E_t$$

Nicault et al. (2010)

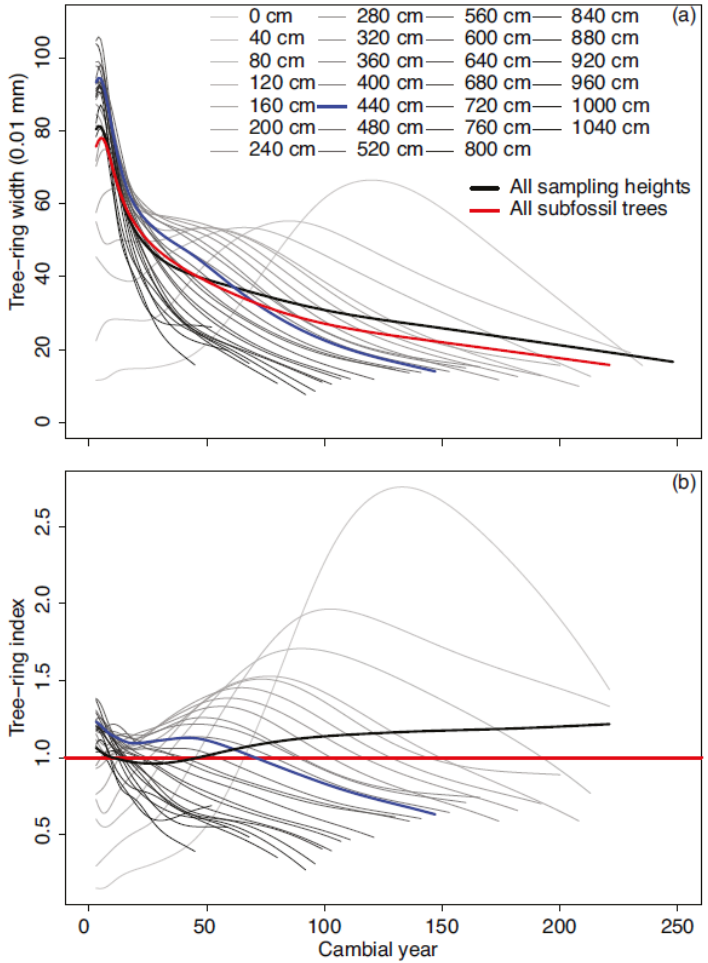
Standardization/Detrending

Required to increase the SNR (signal-to-noise ratio)

Limits the influence of the age of the trees (A_t)

Amplifies the climate signal (C_t)

The age signal can be extremely variable



Autin, J., Gennaretti, F., Arseneault, D., & Bégin, Y. (2015). Biases in RCS tree ring chronologies due to sampling heights of trees. *Dendrochronologia*, *36*(November 2015), 13–22. doi: 10.1016/j.dendro.2015.08.002

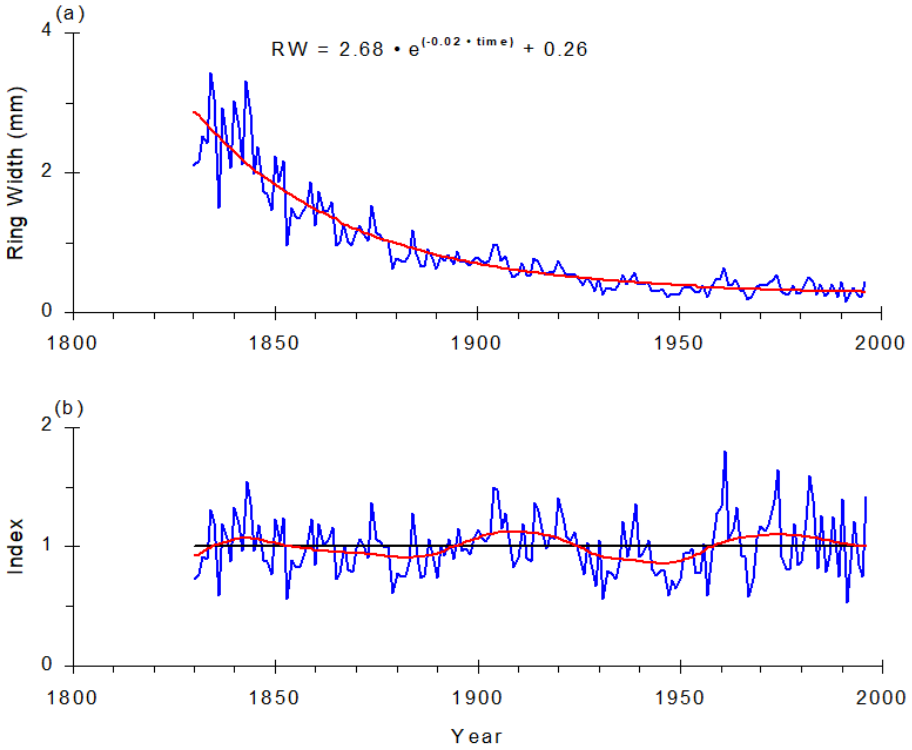
Standardization/Detrending

Required to increase the SNR (signal-to-noise ratio)

Limits the influence of the age of the trees (A_t)

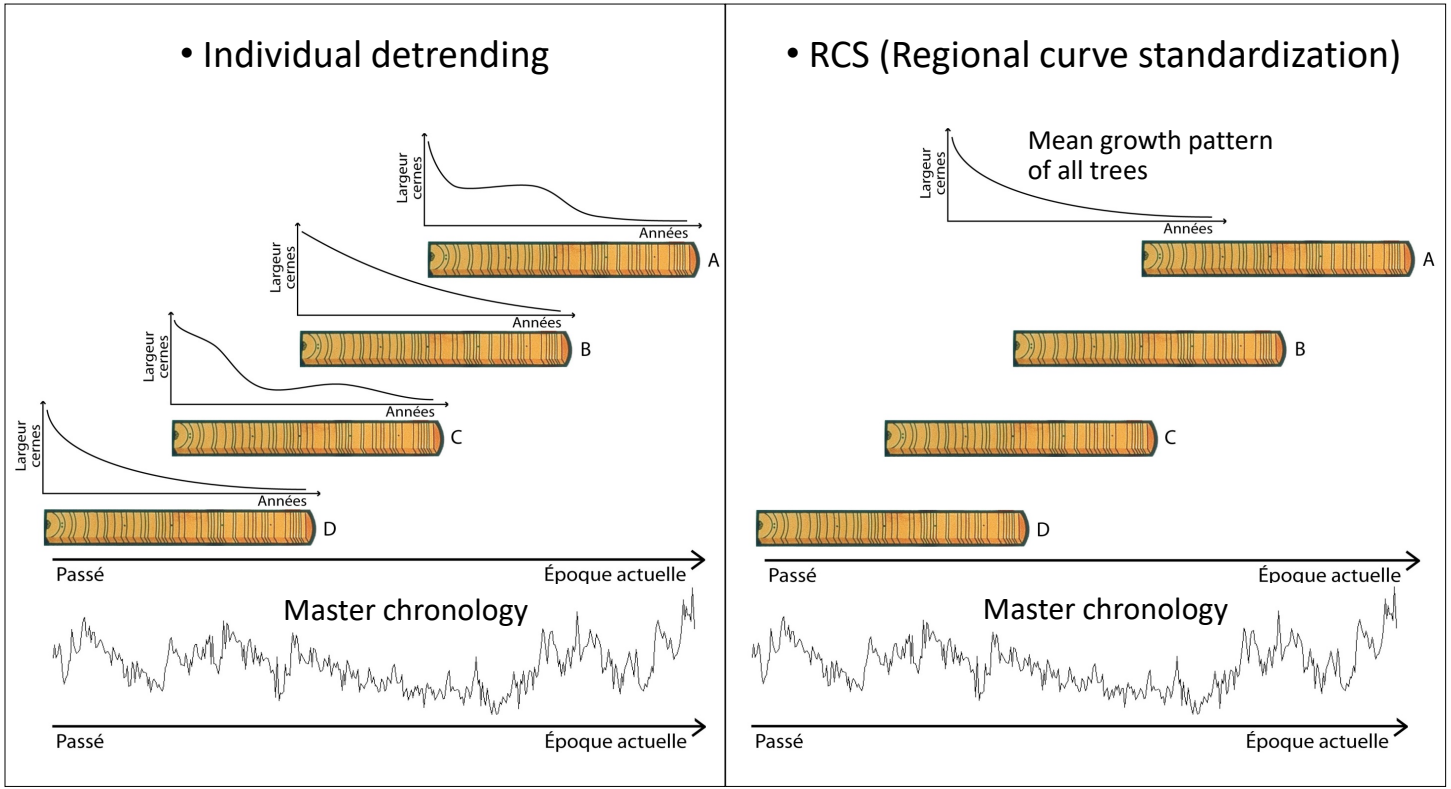
Amplifies the climate signal (C_t)

For the standardization of ring widths we often use divisions



Standardization/Detrending

Several methods that derive from 2 standardization approaches



Strength: The risk of introducing bias is low
Weakness: Low climatic frequencies are lost

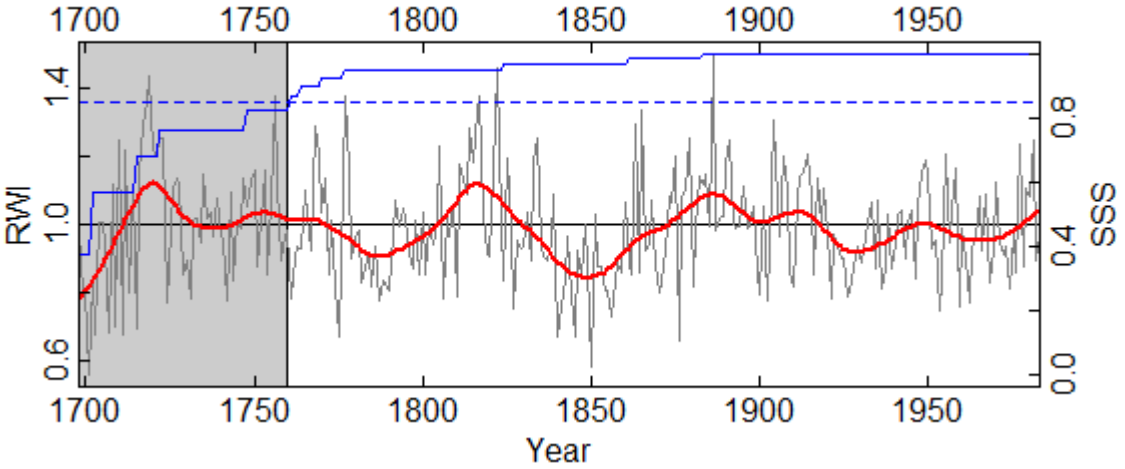
Strength: Low climatic frequencies are maintained
Weakness: The risk of introducing bias is higher

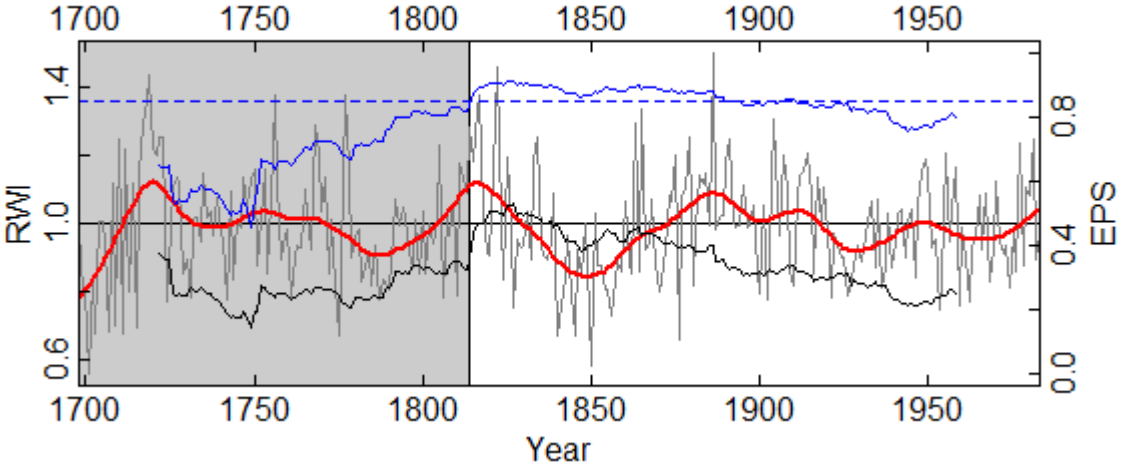
Practical excersise

We will standardize tree-ring series, develop a master-chronology and calculate descriptive statistics in R

Open : <dendroecology-standardisation-2020.R>

We will use the package <dplR>





Bunn, A. G. (2010). Statistical and visual crossdating in R using the dplR library. *Dendrochronologia*, *28*(4), 251–258. doi: 10.1016/j.dendro.2009.12.001

Bunn, A. G. (2008). A dendrochronology program library in R (dplR). *Dendrochronologia*, *26*(2), 115–124. doi: 10.1016/j.dendro.2008.01.002