

The dry season in French Guiana is not enough to impact *Parkia nitida* Miq. (Fabaceae) secondary growth

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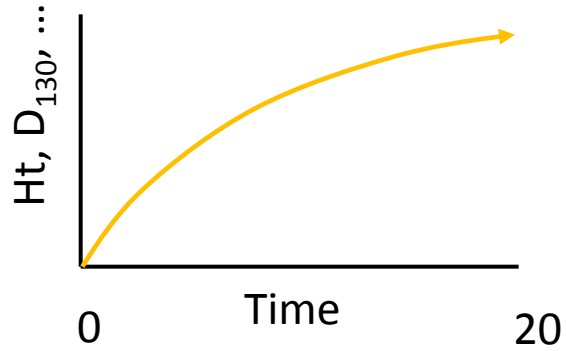


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What methods to study tree growth ?

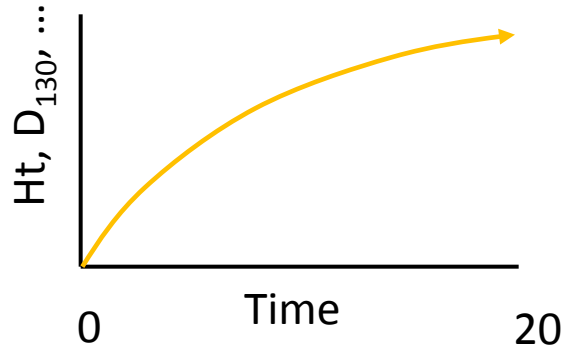


20 years

Growth monitoring

Permanent plot

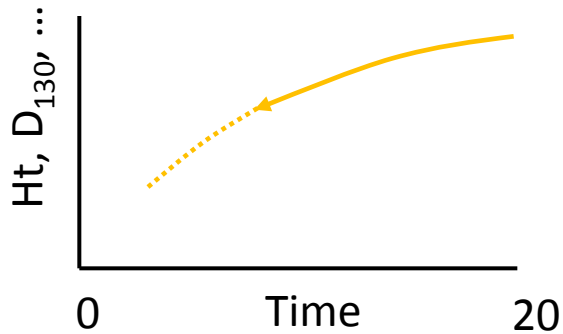
What methods to study tree growth ?



20 years

Growth monitoring

Permanent plot



1 month

Retrospective analyses

Anatomical markers

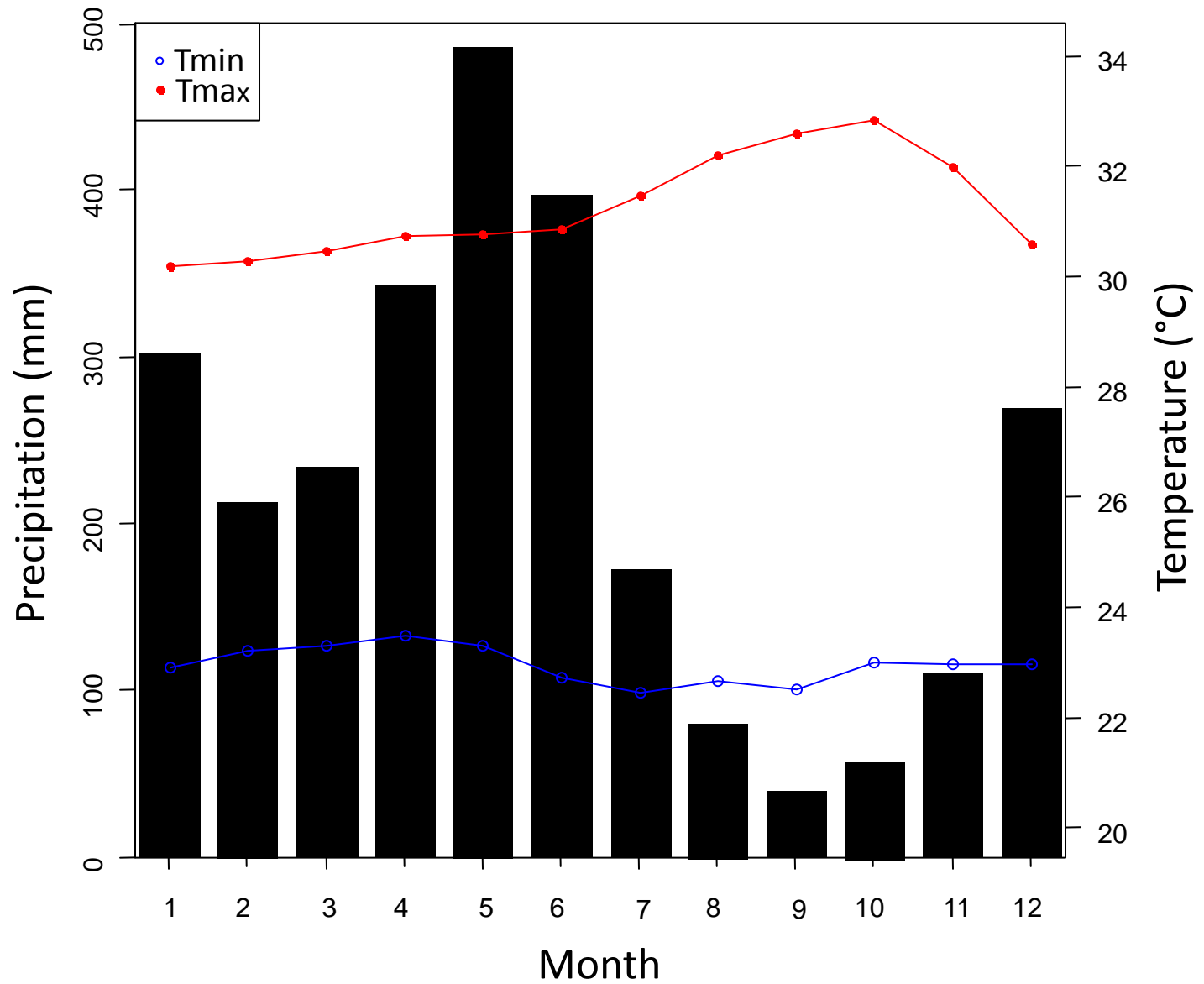
Retrospective analyses



- ☀️
- ☀️☁️
- ☁️🌧️
- ☁️🌧️
- ☁️🌧️
- ☀️



French Guiana climate



Dendrochronology in tropical rain forest

- Hard, because many species do not show clear annual growth ring ...
 - **...but not impossible** (Jacoby, 1989, Sass et al., 1995, Lisi et al., 2008, Zuidema et al. 2012, ...)

OBJECTIVES

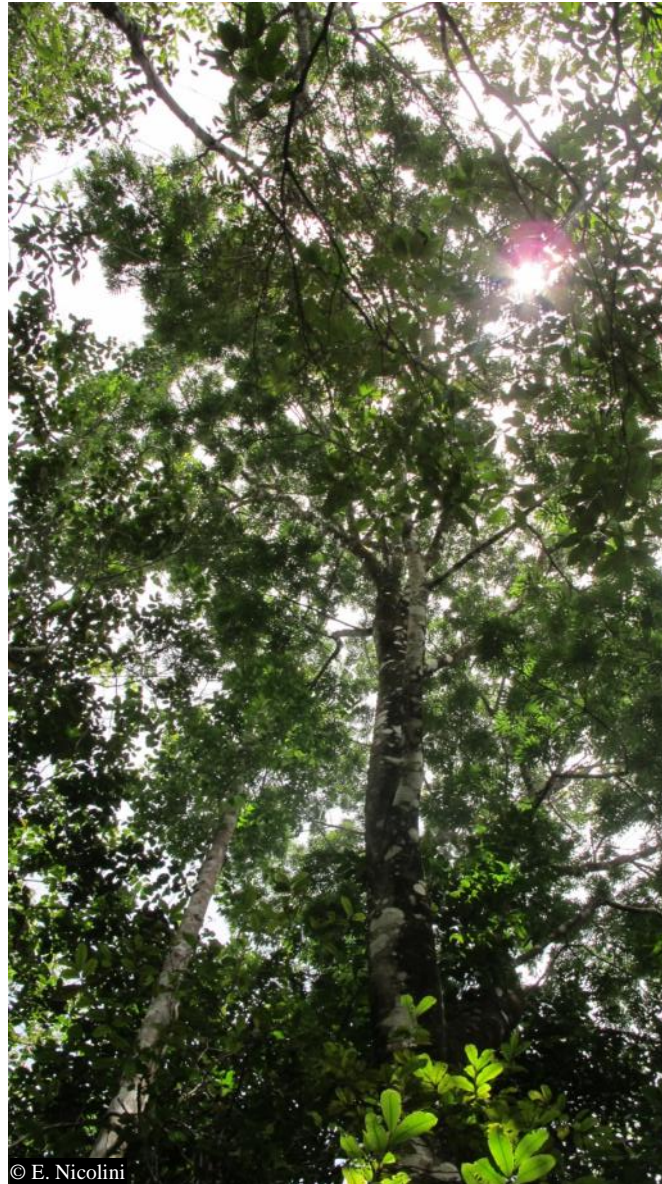
(1) Identify annual growth rings.

(2) Know if the secondary growth is synchronous and homogeneous intra-tree and intra-species.

(3) Identify the influence (or not) of climate on secondary growth in French Guiana.

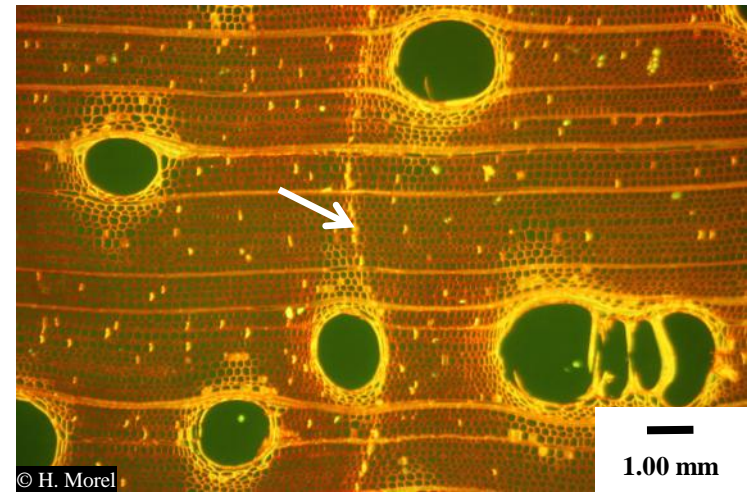
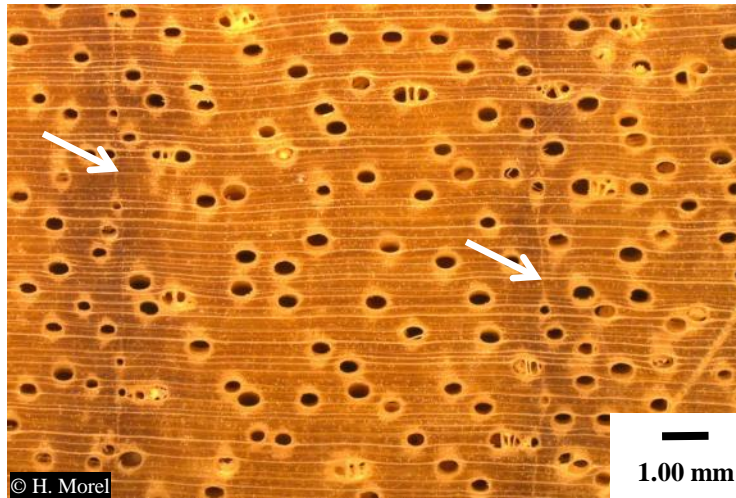
Parkia nitida

An emergent annual deciduous tree of Amazonian basin



© E. Nicolini

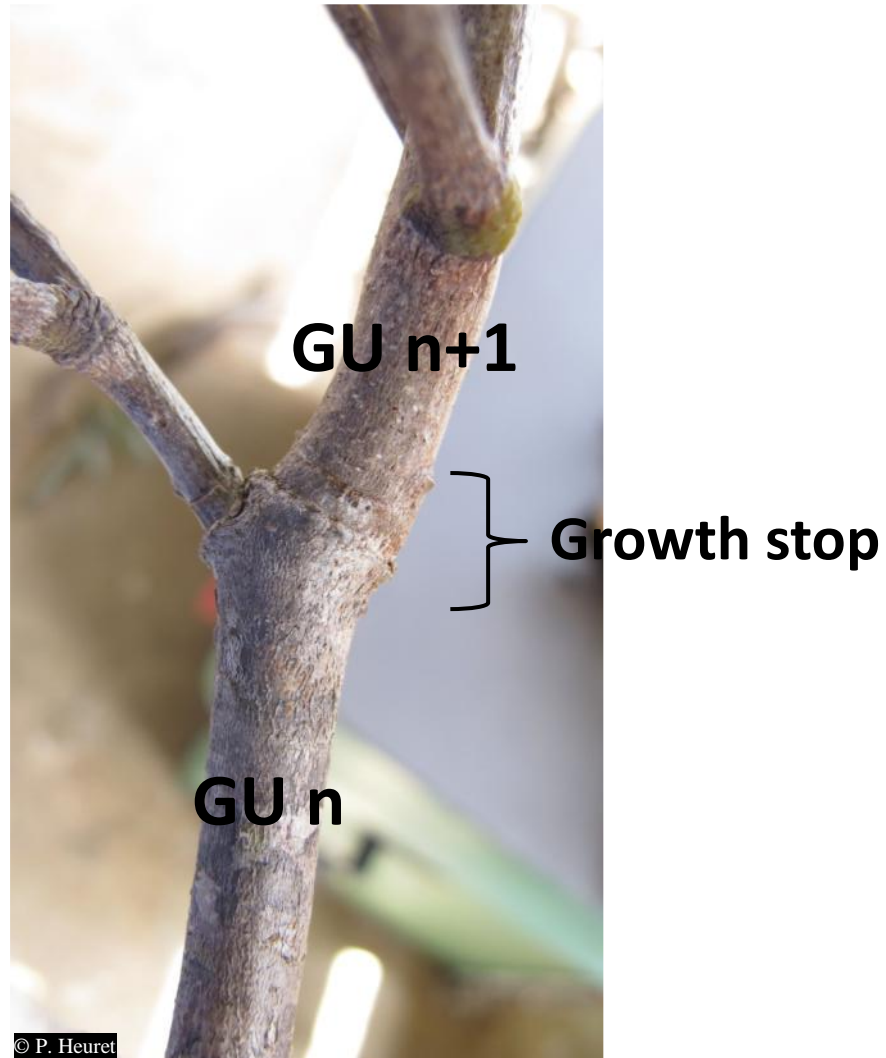
Parkia nitida: Visibility of growth rings?



- ▶ Visibility of growth rings
- ▶ Availability and accessibility of the resource
 - ▶ High growth rates

Parkia nitida: Annual growth rings?

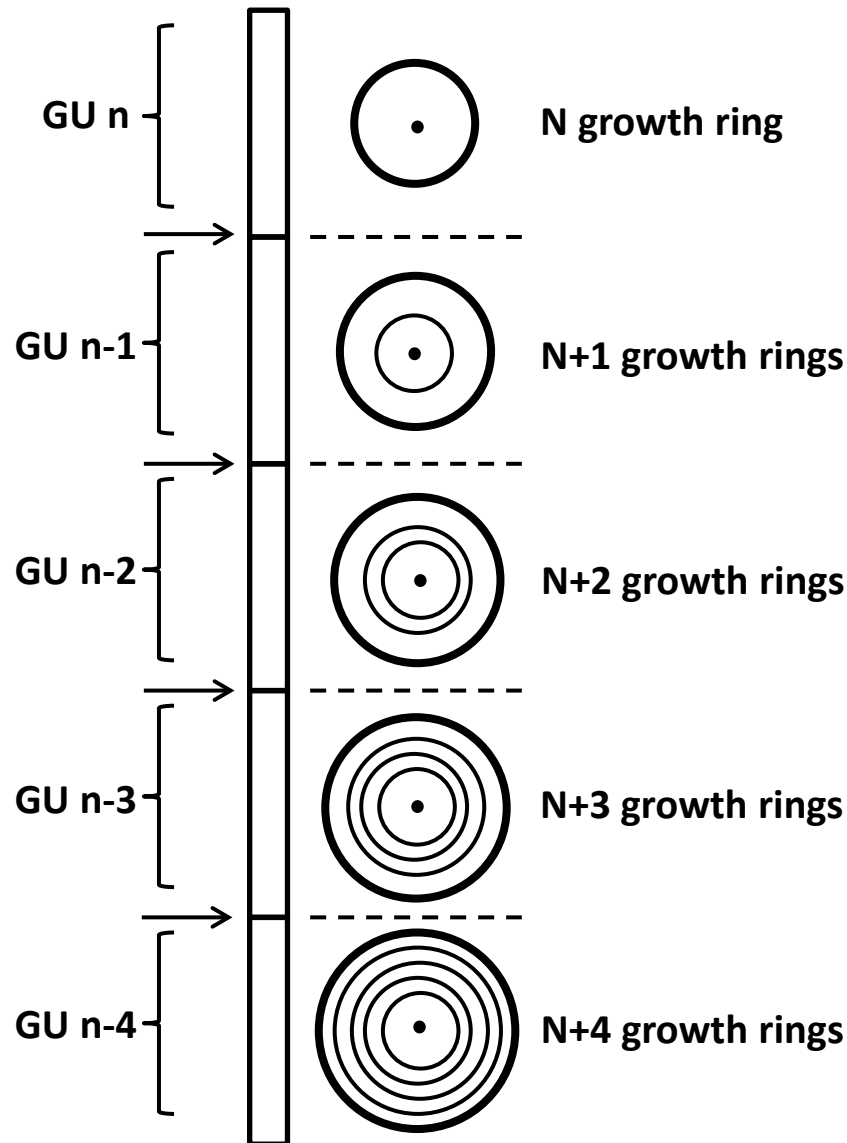
In branches: Relationship between primary and secondary growth
(Heuret et al. 2002; Zalamea et al. 2008; Nicolini et al. 2012)



Parkia nitida: Annual growth rings?

In branches: Relationship between primary and secondary growth

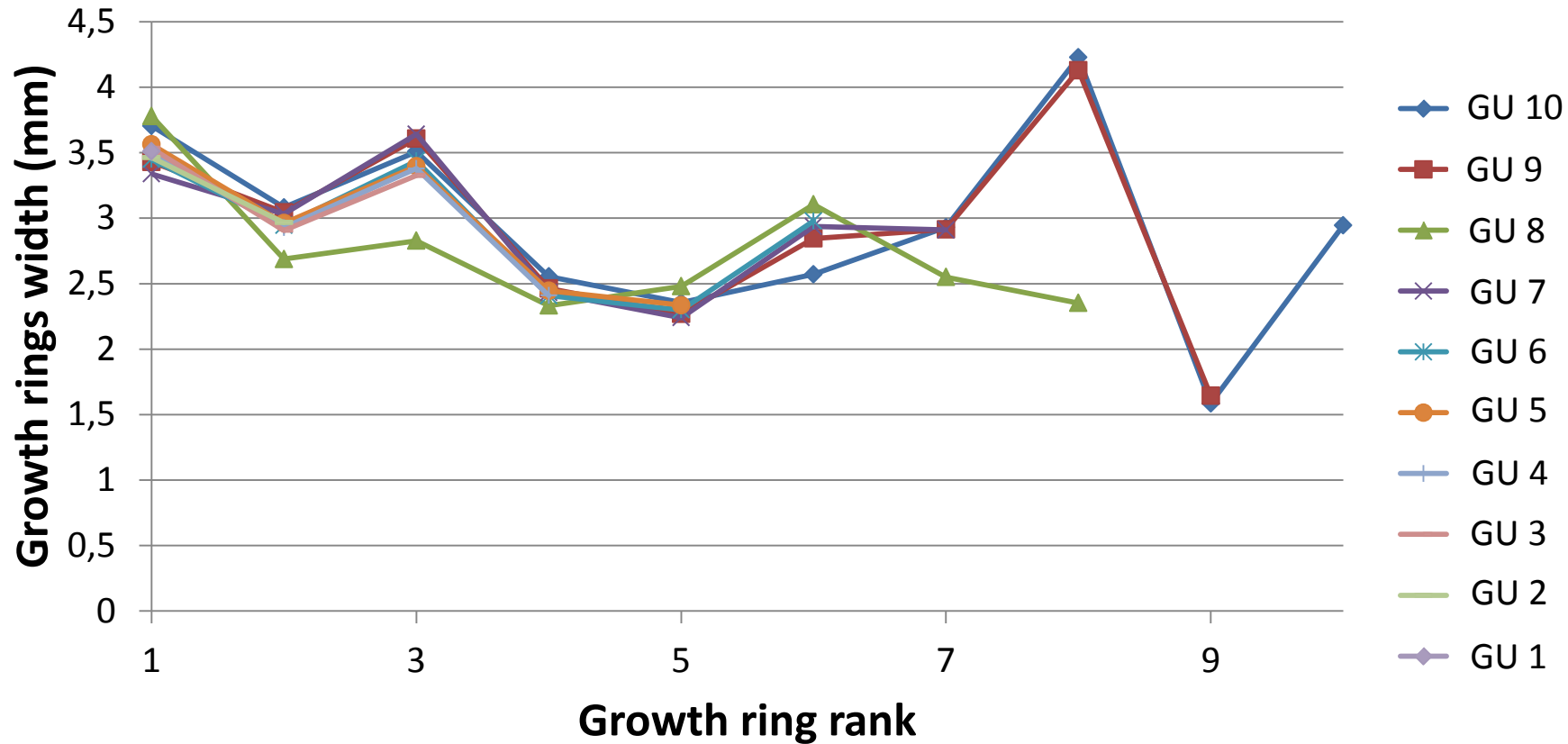
(Heuret et al. 2002; Zalamea et al. 2008; Nicolini et al. 2012)



Parkia nitida: Annual growth rings?

Growth unit n = n growth ring in *Parkia nitida*

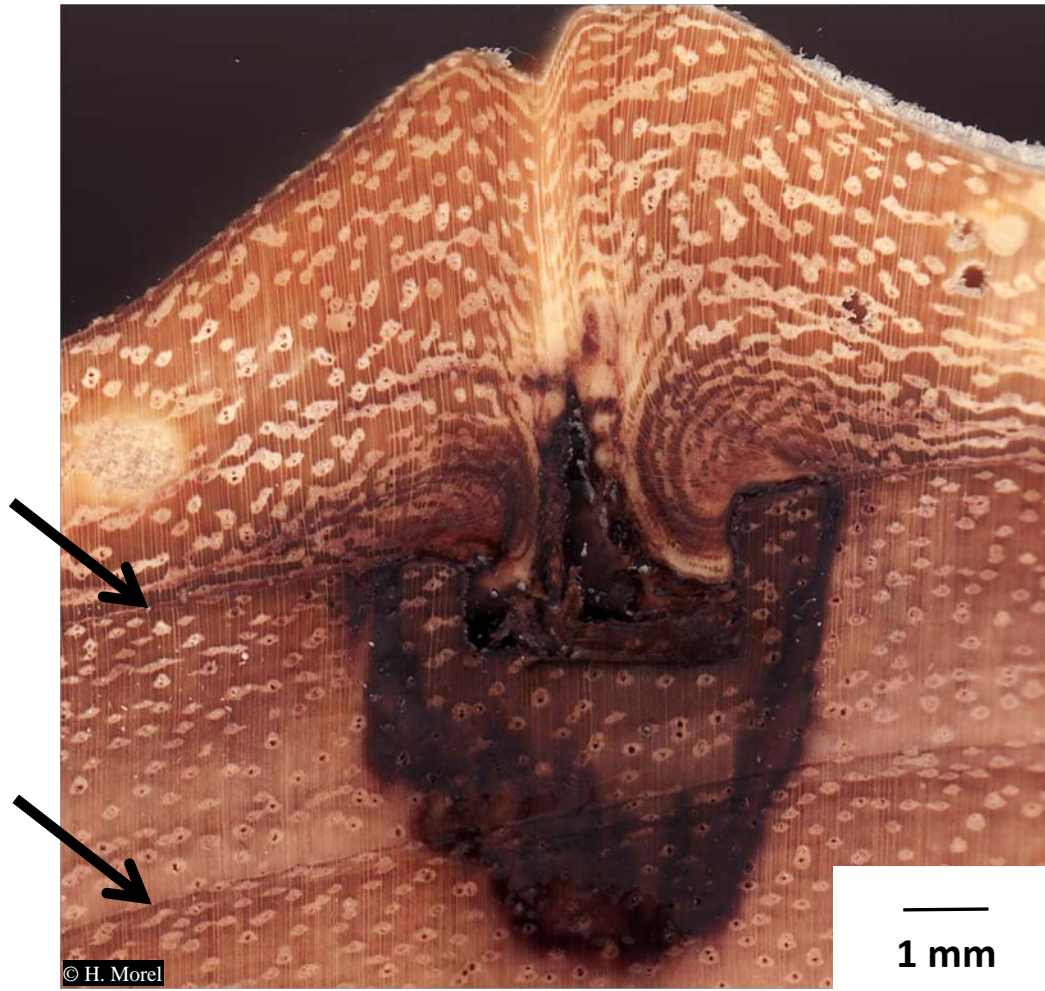
Parkia nitida 10



► The same for PN4, PN7, PN8 et PN9

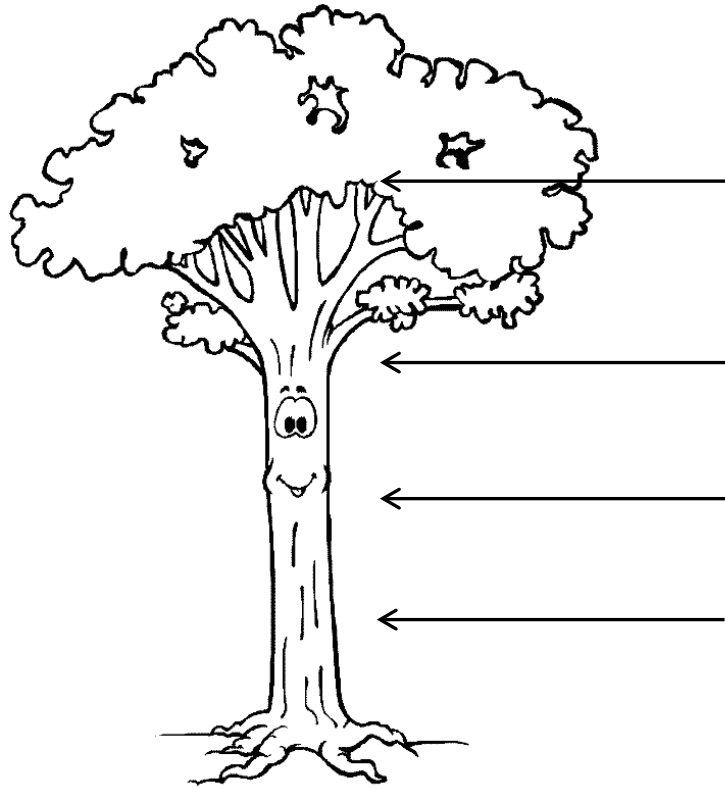
Parkia nitida: Annual growth rings?

In the trunk: Mariaux's wound (Mariaux, 1967)



Growth rings formation around July-August

Parkia nitida: Synchronous and homogeneous growth?



20 trees * 4 discs

Elementary dated
chronologies (by rays)



Chronologies by discs
(*average of n-rays*)



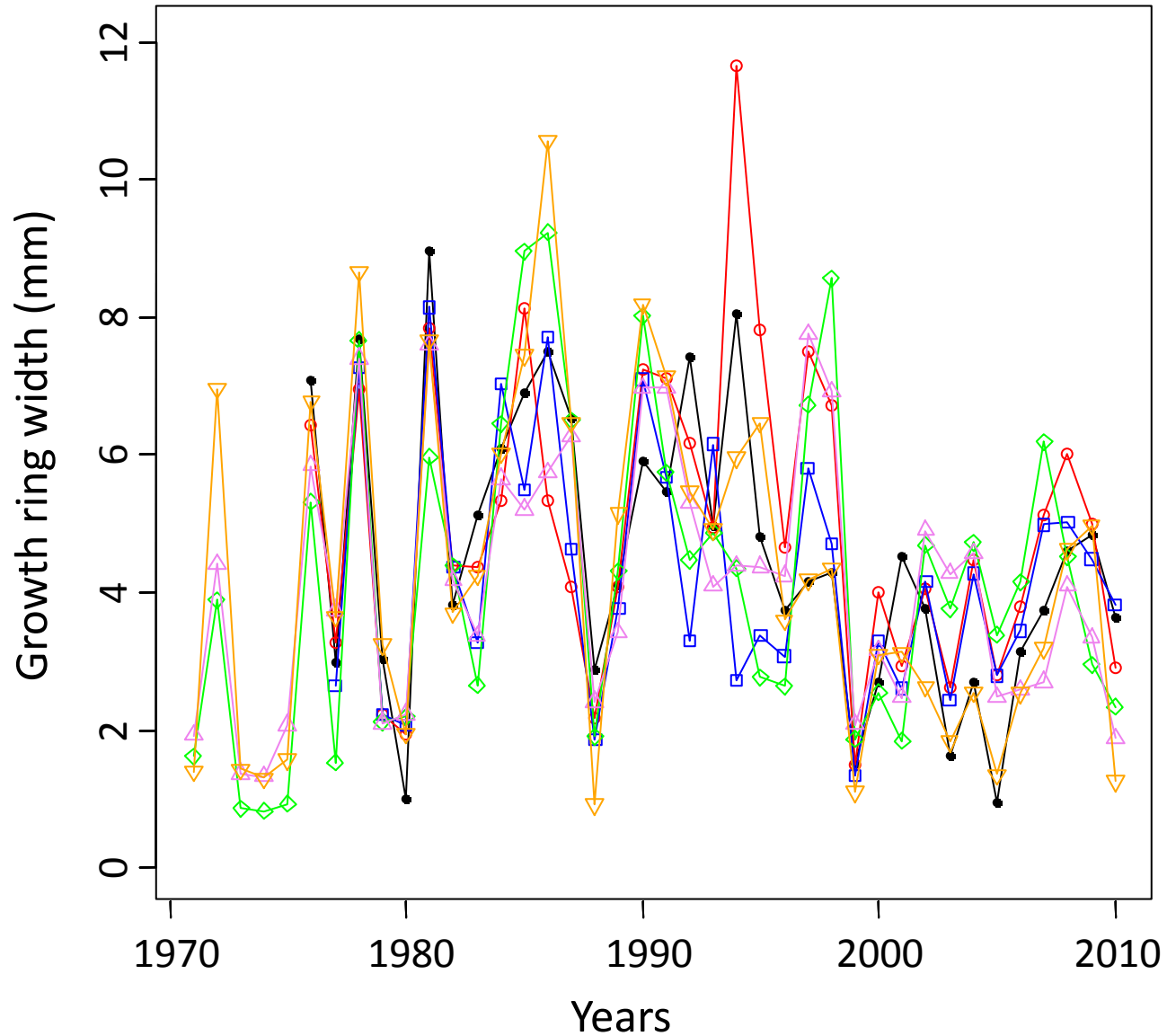
Individual chronologies



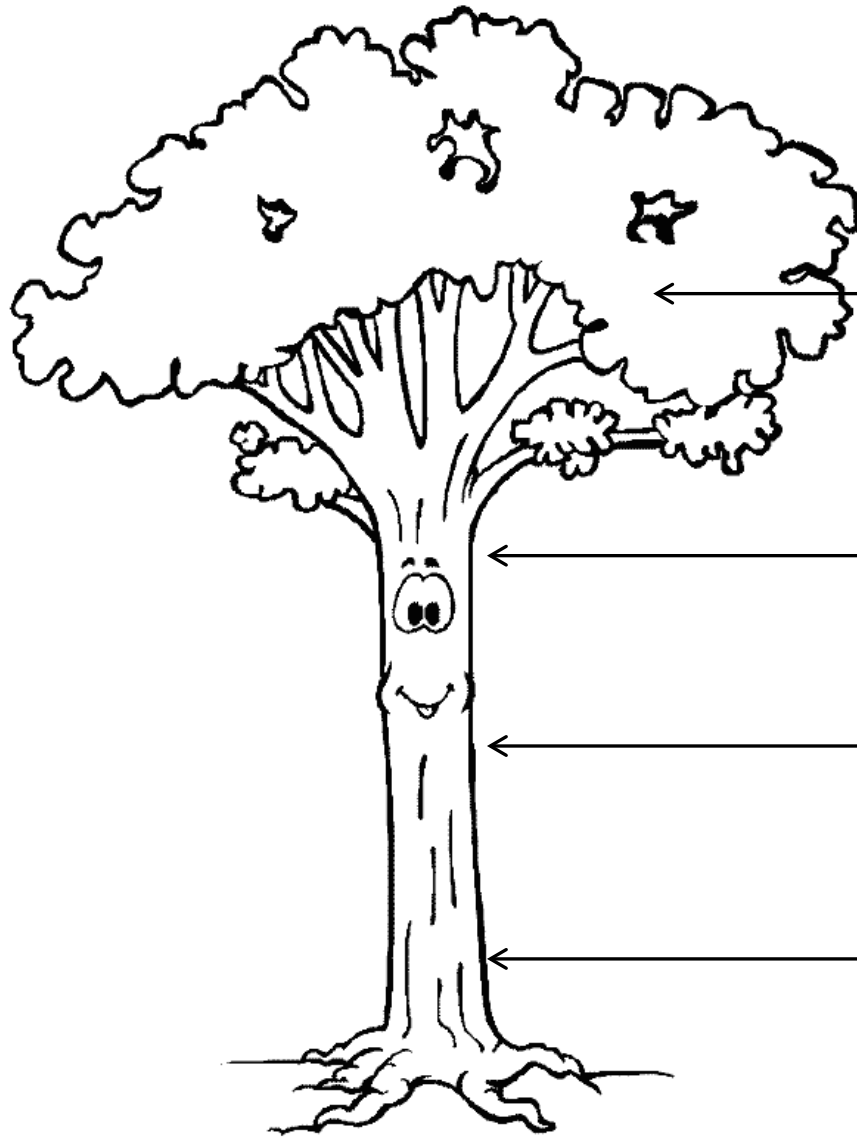
Mean chronology

Intra-discs growth homogeneity

Parkia nitida 6 – 8 rays at 1m30



Intra-discs growth homogeneity



Intra-discs mean similarity index

82.3 % (+/- 10.9 %)

79.9 % (+/- 9.5 %)

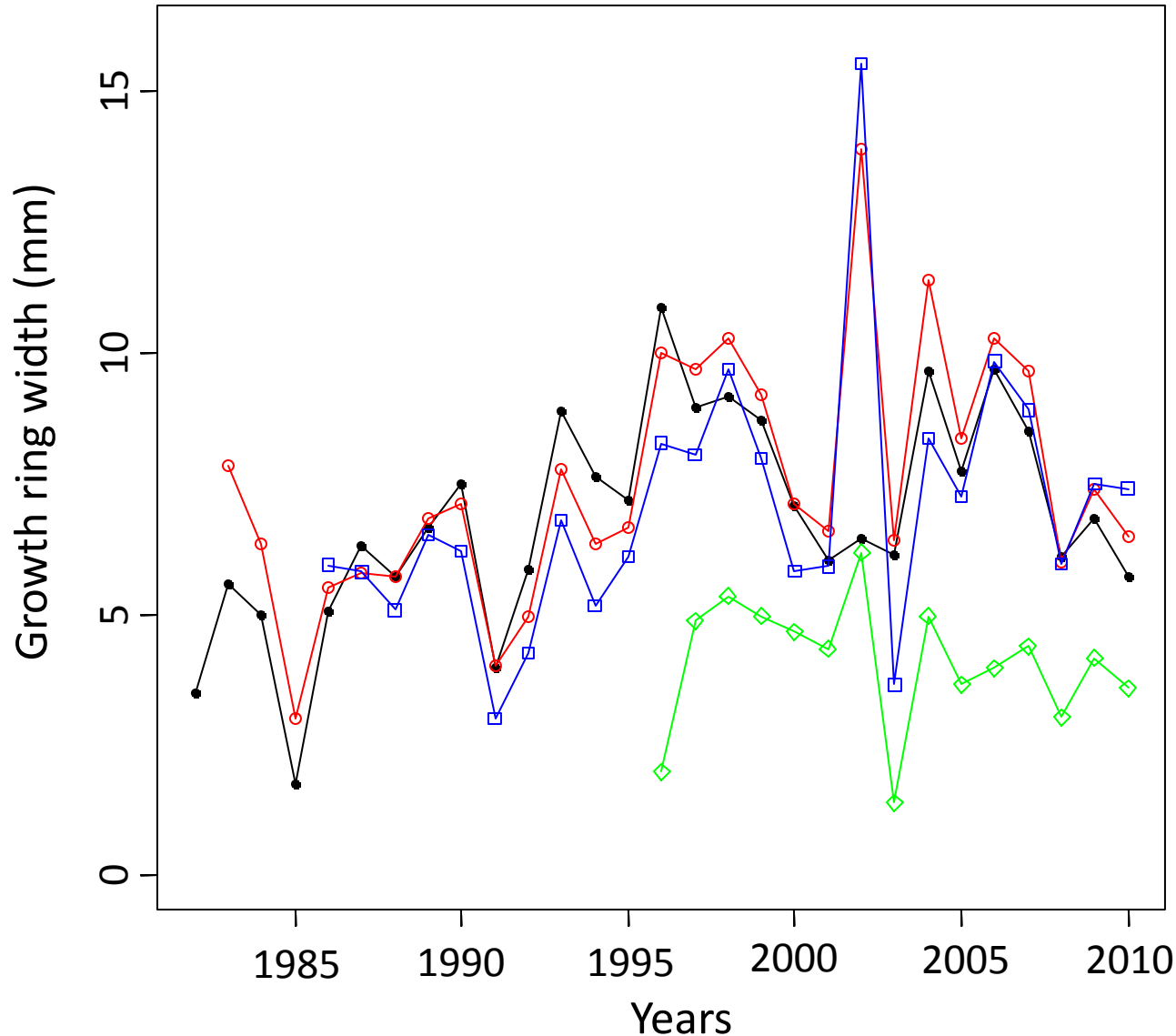
81.5 % (+/- 10.7 %)

80.1 % (+/- 9.0 %)

Intra-trees growth homogeneity

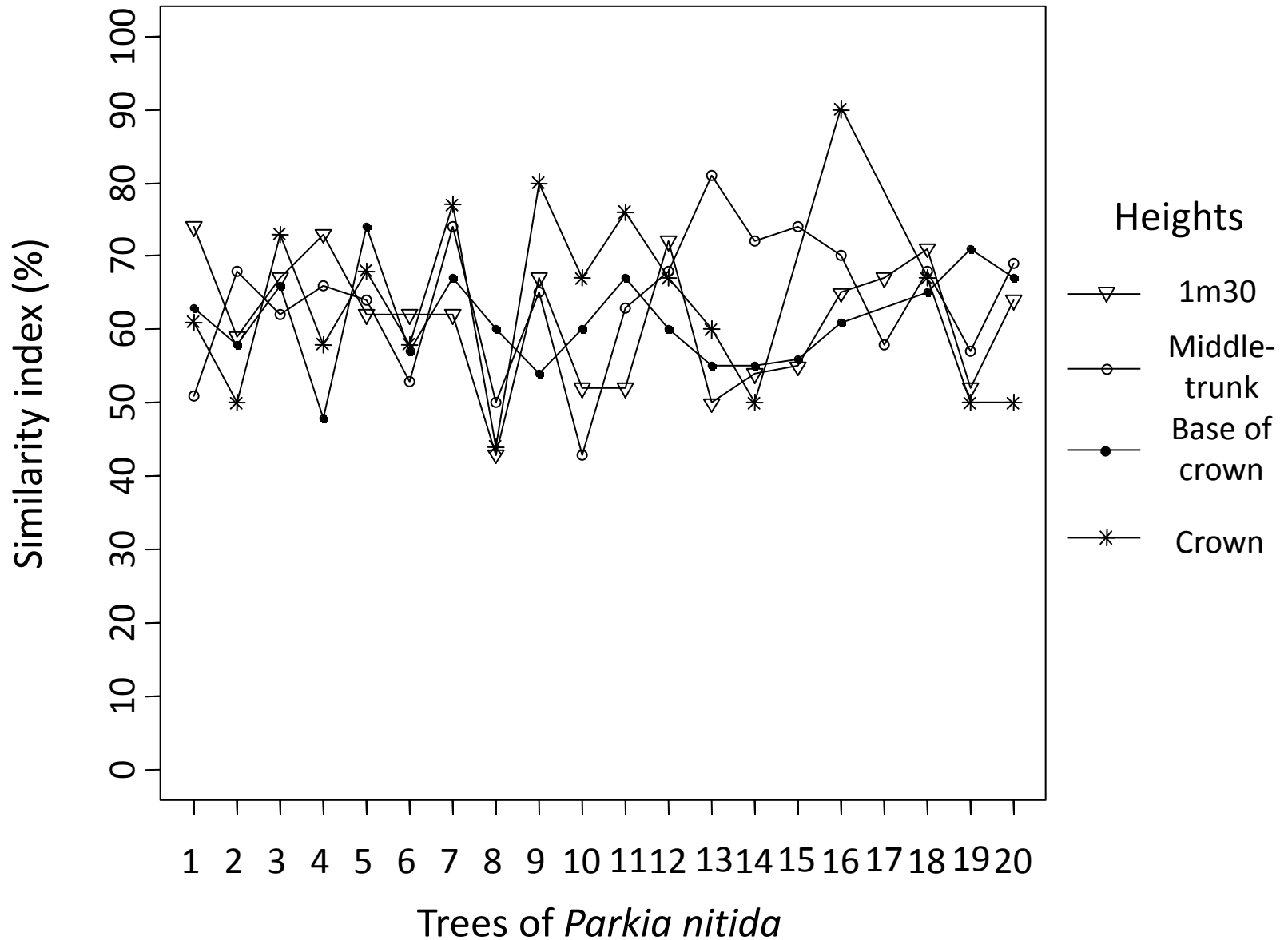
Parkia nitida 10

● 1m30, ○ middle-trunk, □ base of crown, ◇ crown



**Mean
similarity index
79.7 % (+/-12.8)**

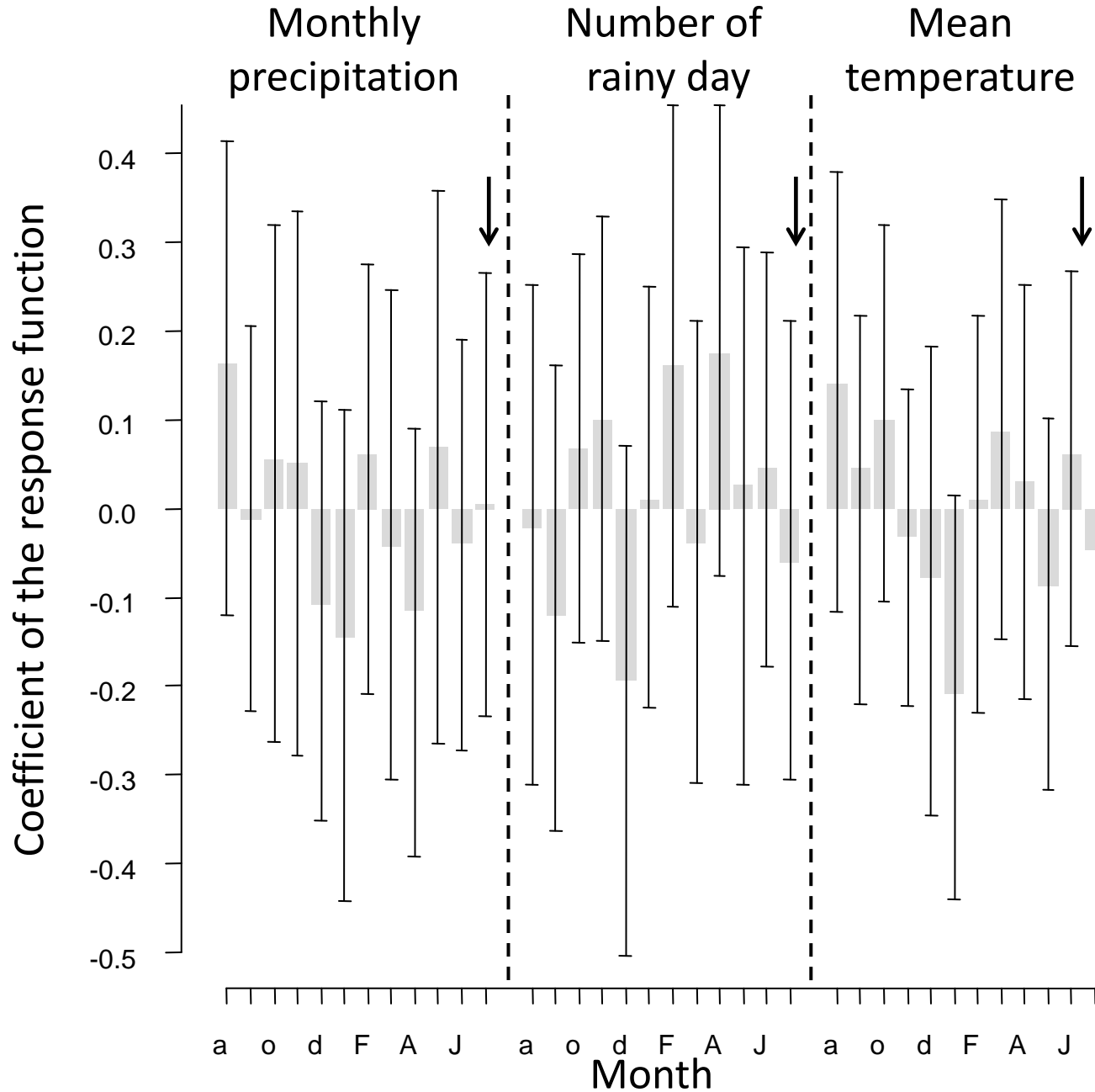
Inter-trees growth homogeneity



Meteorological data

- Data from the meteorological station of Sinnamary
 - Temperature (°C)
 - Precipitation (mm)
- Annual variables
 - From 1st august of the year n-1 to 31 july of the year n
- Package *bootRes* in R software (Zang & Biondi 2012)

No influence of climate on secondary growth



Homogeneous growth but no climatic influence

(1) Identify annual growth rings

▶ ***Annual growth rings***

(2) Know if the secondary growth is homogeneous and synchronous intra-tree and intra-species

▶ ***Synchronous and homogeneous growth in Parkia nitida***

(3) Identify the influence (or not) of climate on secondary growth in French Guiana.

▶ ***No influence of tested factors***

Difficulties and Perspectives

- ▶ Growth ring visibility **but** not always obvious
 - ▶ Fast growing **but** short-lived
 - ▶ Species long life **but** low resource availability
-
- ▶ Others statistical analysis (others parameters, others methods)
 - ▶ Others species
 - ▶ Relationship between features years and major climate events (El Niño, drought)



Thank you for your attention !