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Post-fire variation of coarse woody debris in oak-pine Mediterranean forest

Thomas Fournier and Christopher Carcaillet

CBAE
UMR 5059
Montpellier
Centre de Bio-Archéologie et d'Ecologie

Context

Woody debris (WD) → Great Ecological Importance

→ Ecosystem biodiversity

→ Wood productivity

Mediterranean ecosystem

→ Oak-pine matoral and forest

→ Structured by disturbance

→ Fire = most important disturbance

→ Fire recurrence = 70 years *(mouillot & al, 2004)*

Problematic

Dynamics of WD in a oak-pine Mediterranean forest ?

Role in disturbance frequency ?

Hypothesis :

Woody debris load should be dependant on the dynamics of abundant early sucessional tree species

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Woody debris load should be dependant on the dynamics of abundant early sucessional tree species

→ WD load varying with leaving biomass of pine

⇒ Data of biomass and necromass

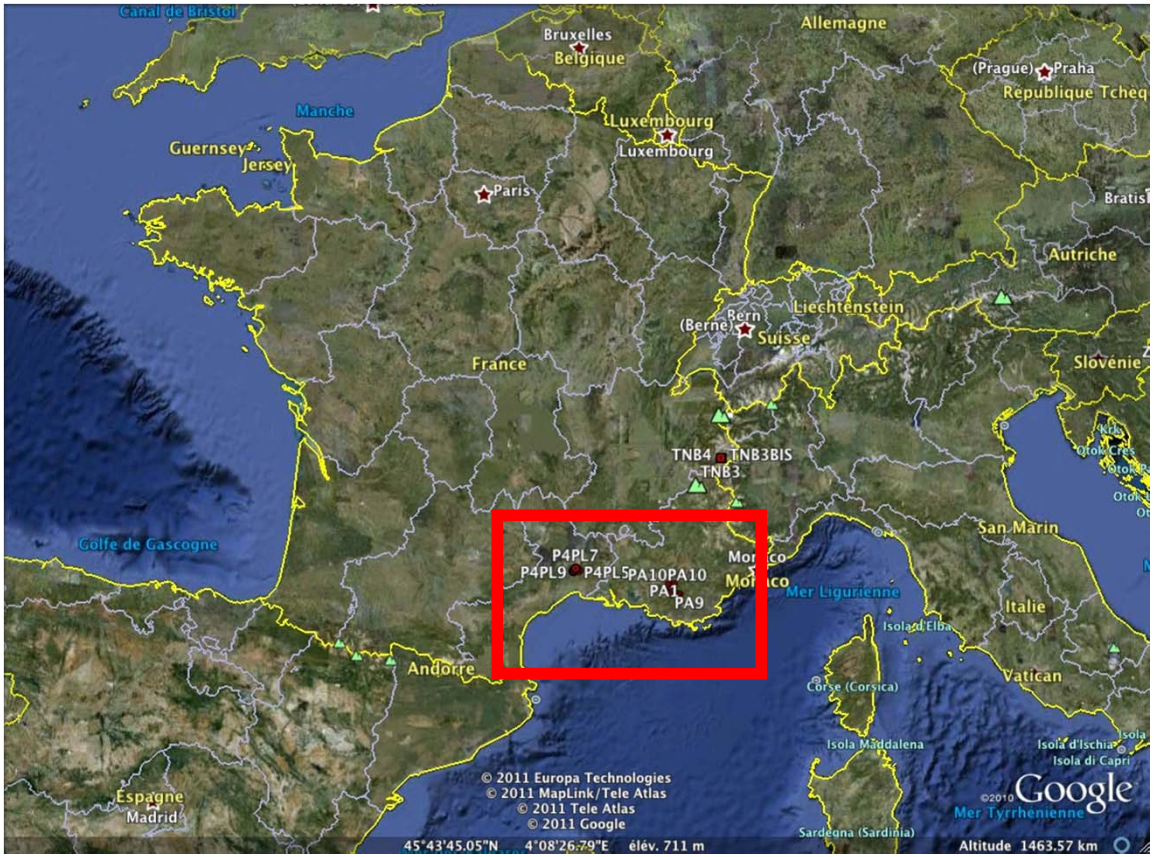
→ Short life of Aleppo pine (senescence after 100 years without disturbance)

⇒ Chronosequence > 100 years

Method : several plots with varying time since last disturbance

→ Increasing of WD load with increasing pine mortality

Study area

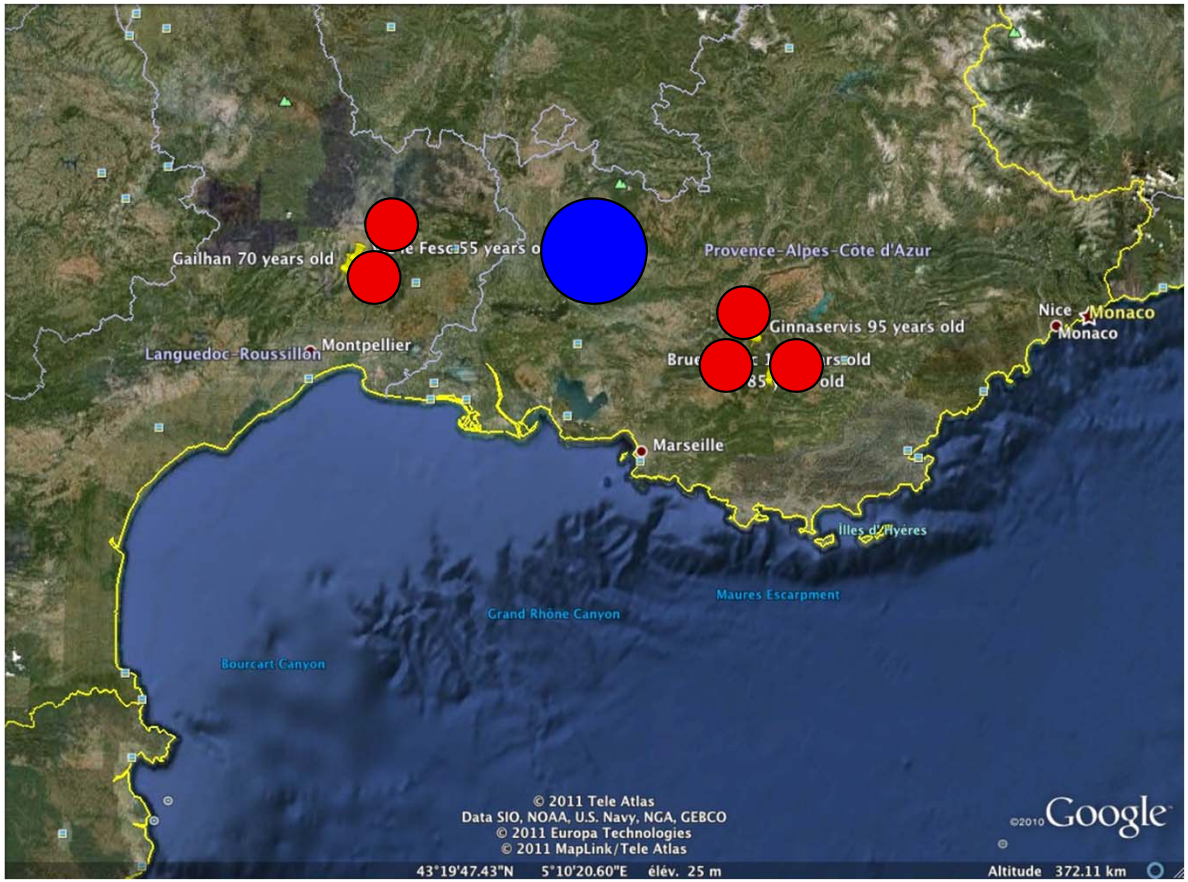


South of France

Meso-mediteranean

Pine -Oak forest

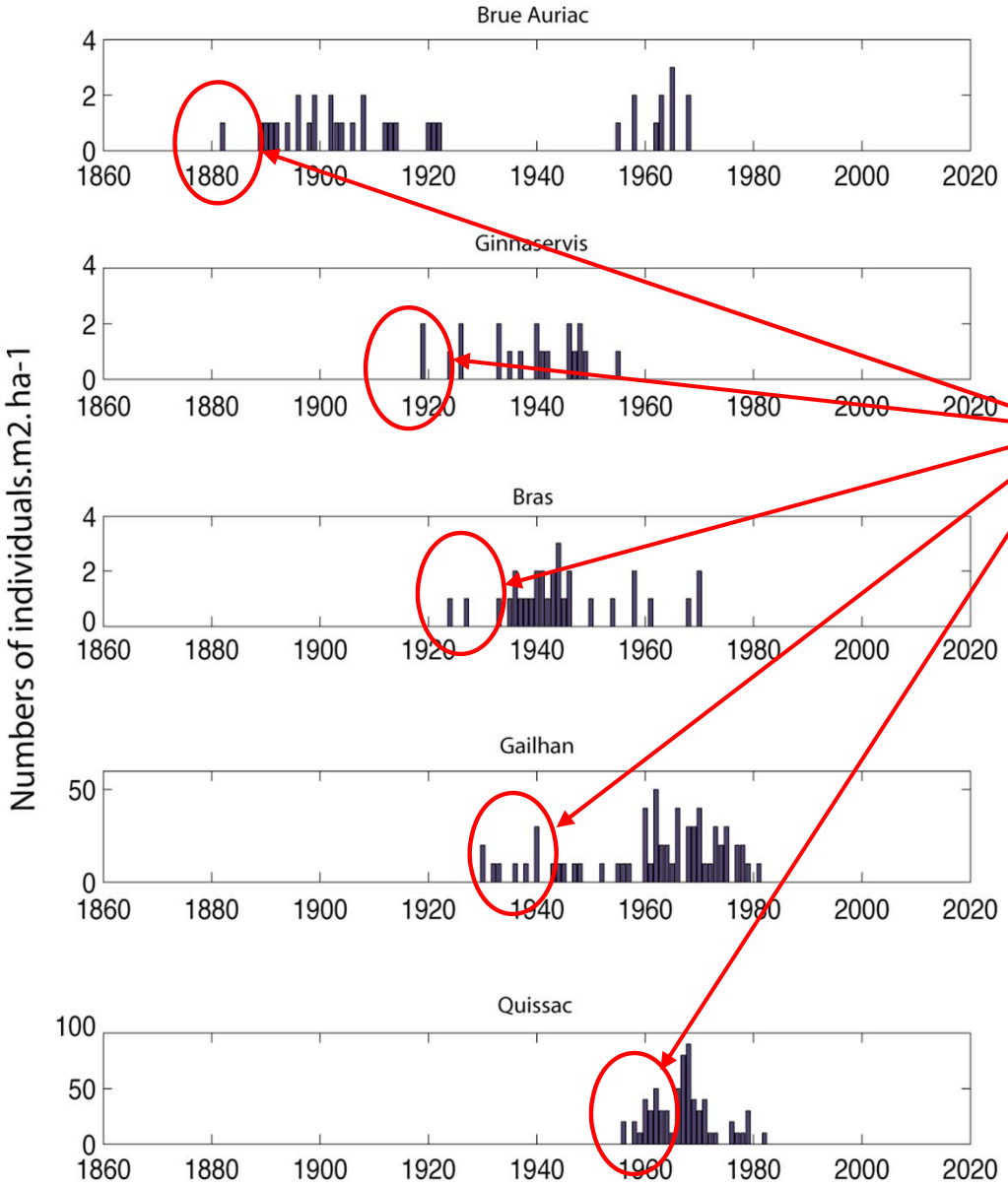
Study area



- Only biomass data
- Biomass and necromass

Plot description

Pattern of age structure

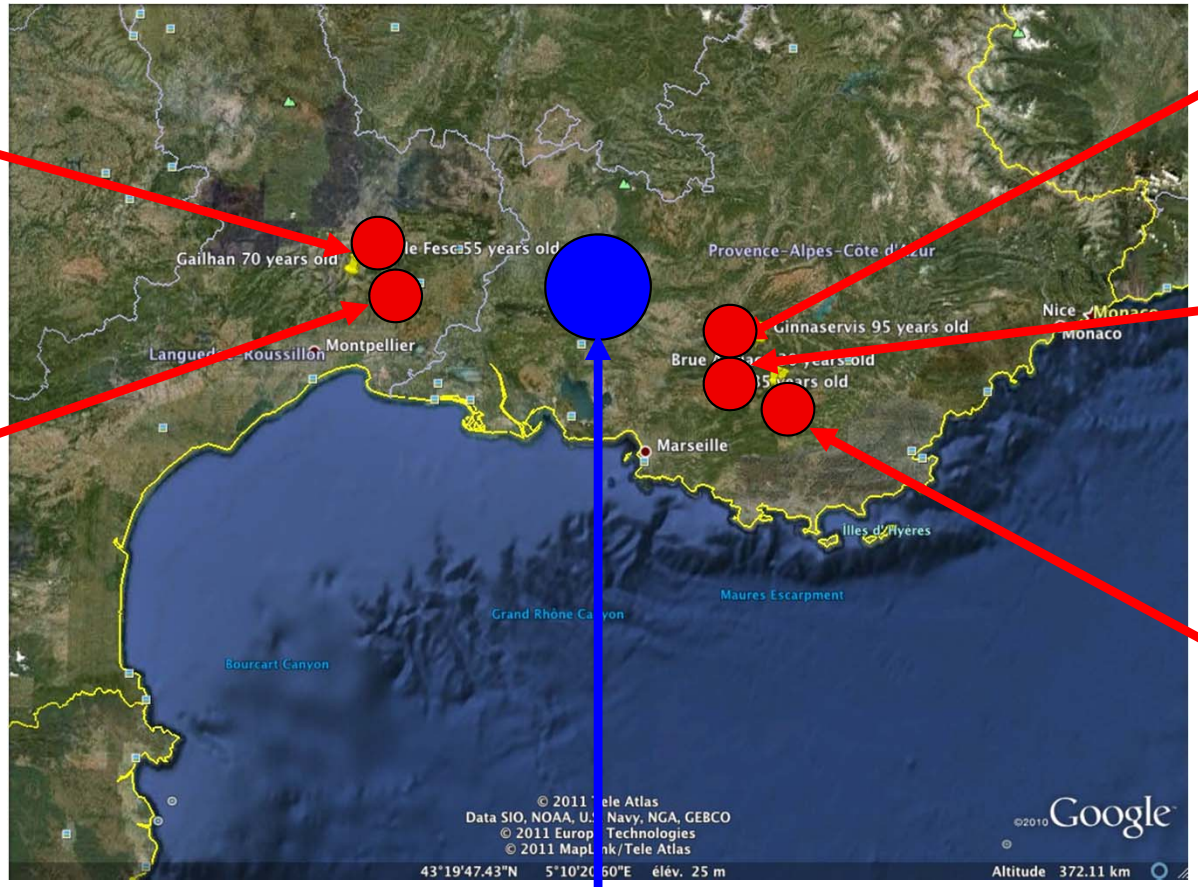


→ Dendrochronology used to estimate age structure of pine population

→ Assumption : Oldest cohort of pines = date of the last disturbance

→ *High regeneration of Pinus halepensis* after fire

Time since last fire



55 years

70 years

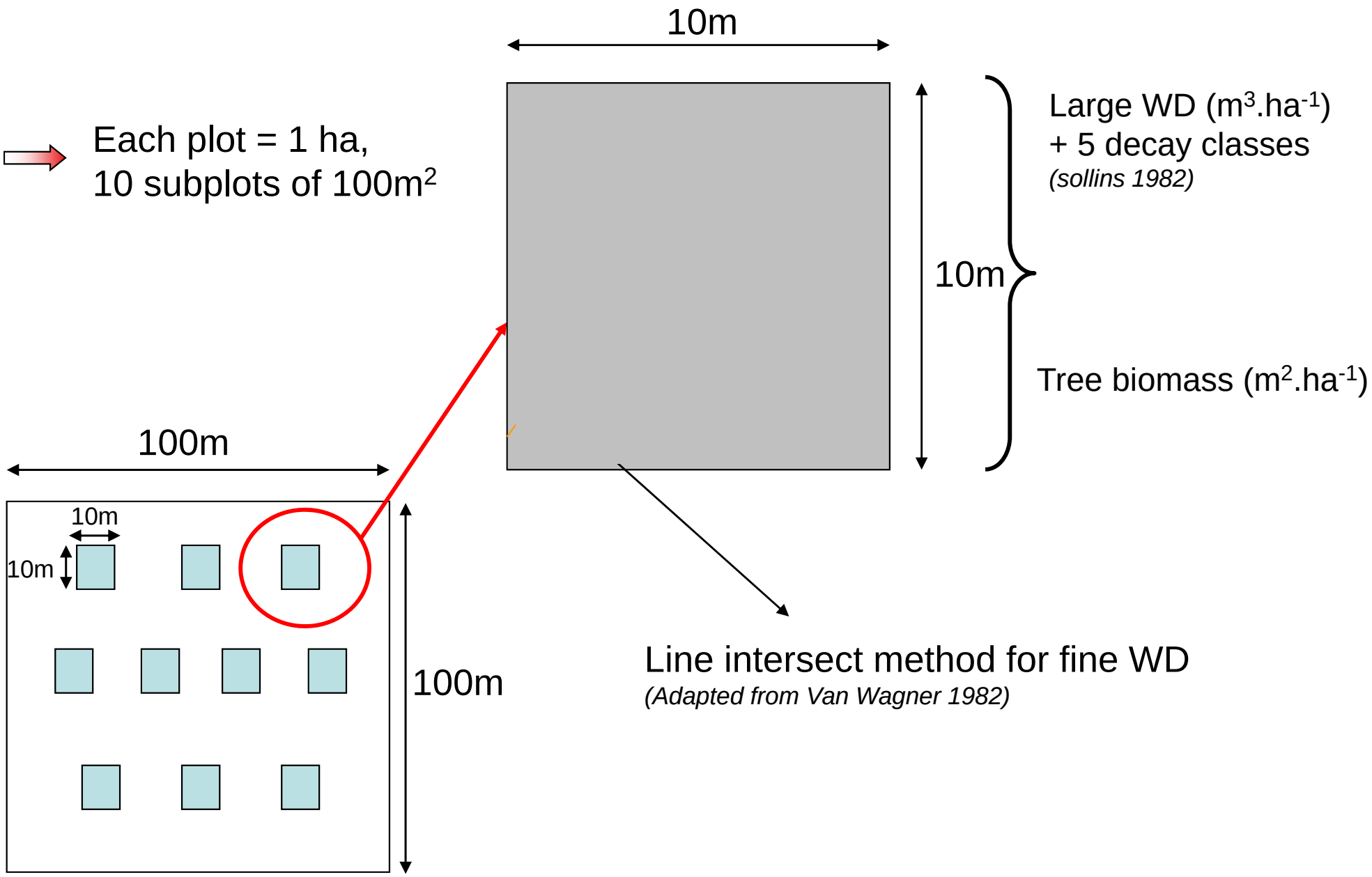
95 years

130 years

85 years

2 years
6 years
18 years
22 years
28 years

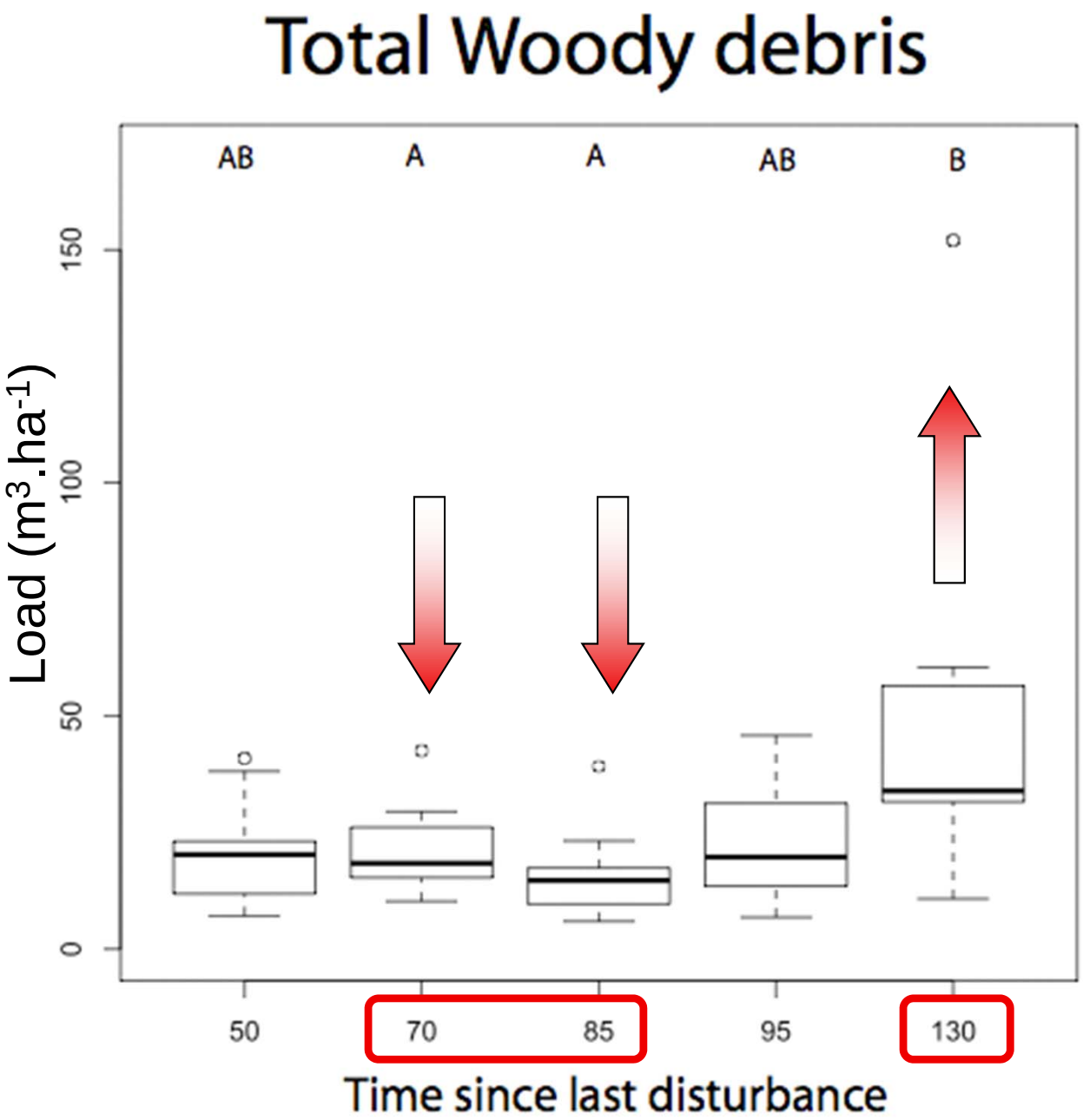
Sampling design



Sampling Method

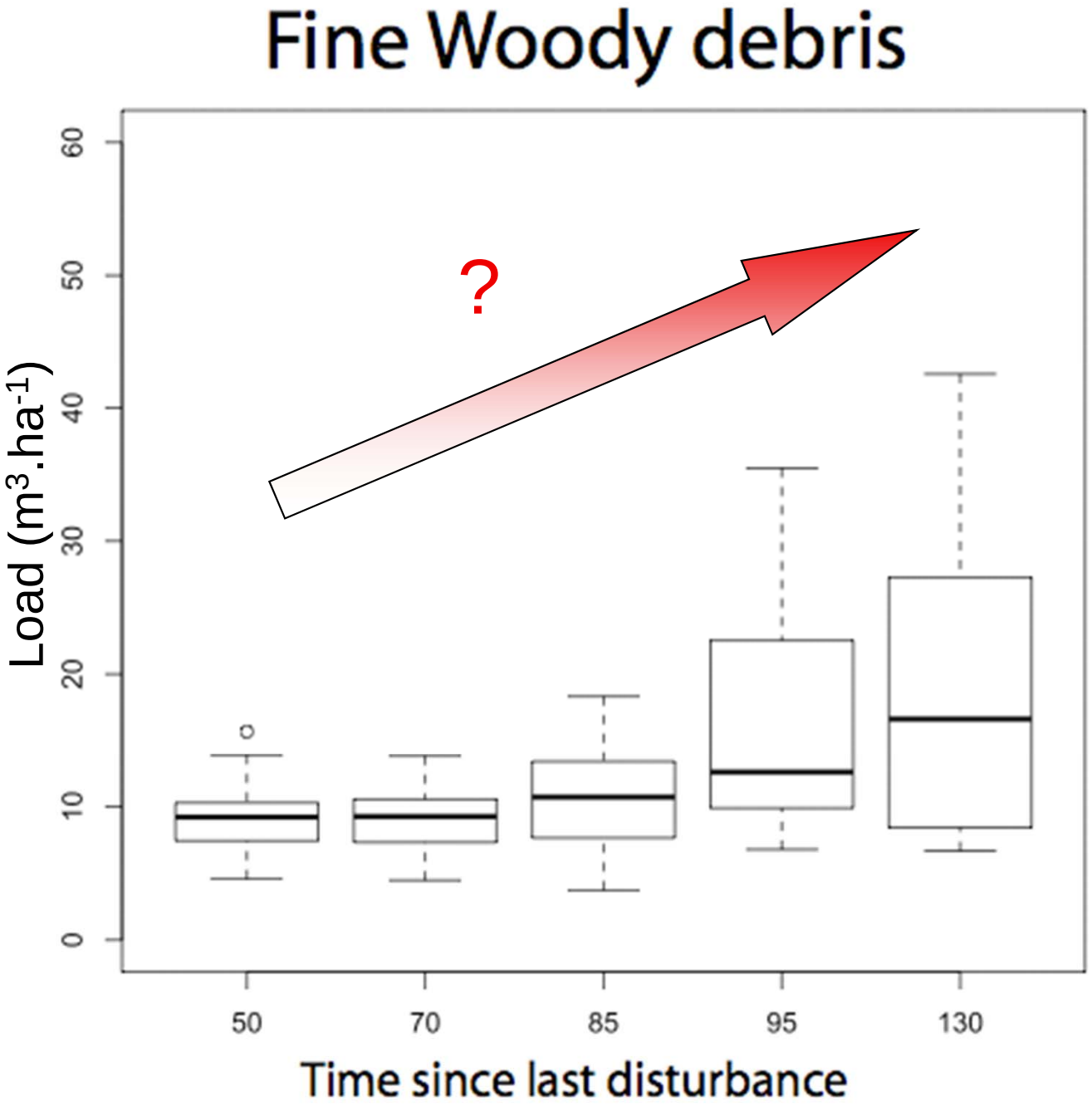
- Measurement of large logs and snags
- Measurment of WD


Results



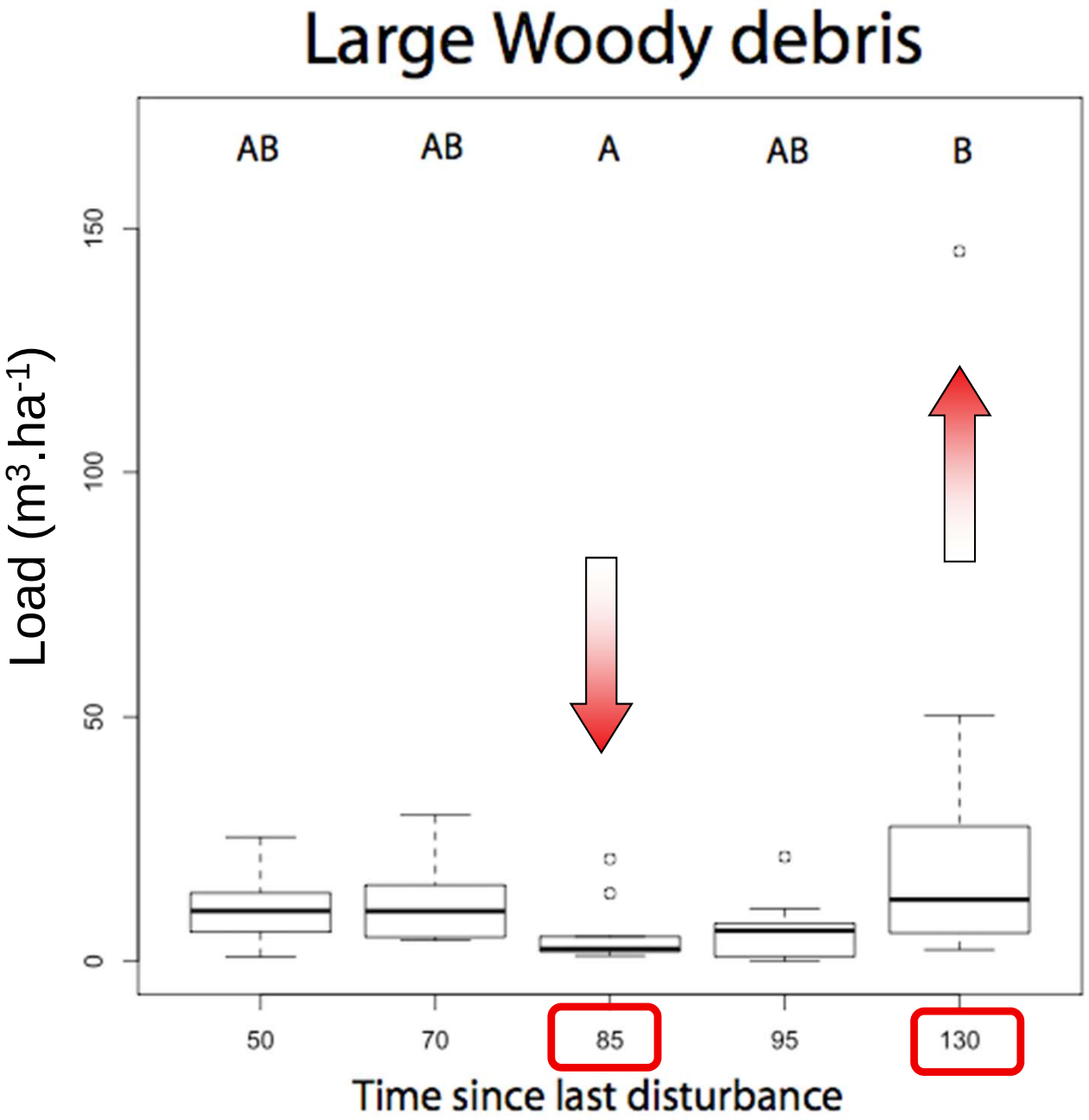
Differences between ages
(Kruskal test, P < 0.05)

Intermediate plots < oldest plot
(test post hoc)



No significant difference

Trend = Increasing



Differences between ages
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Intermediate plots < oldest plot
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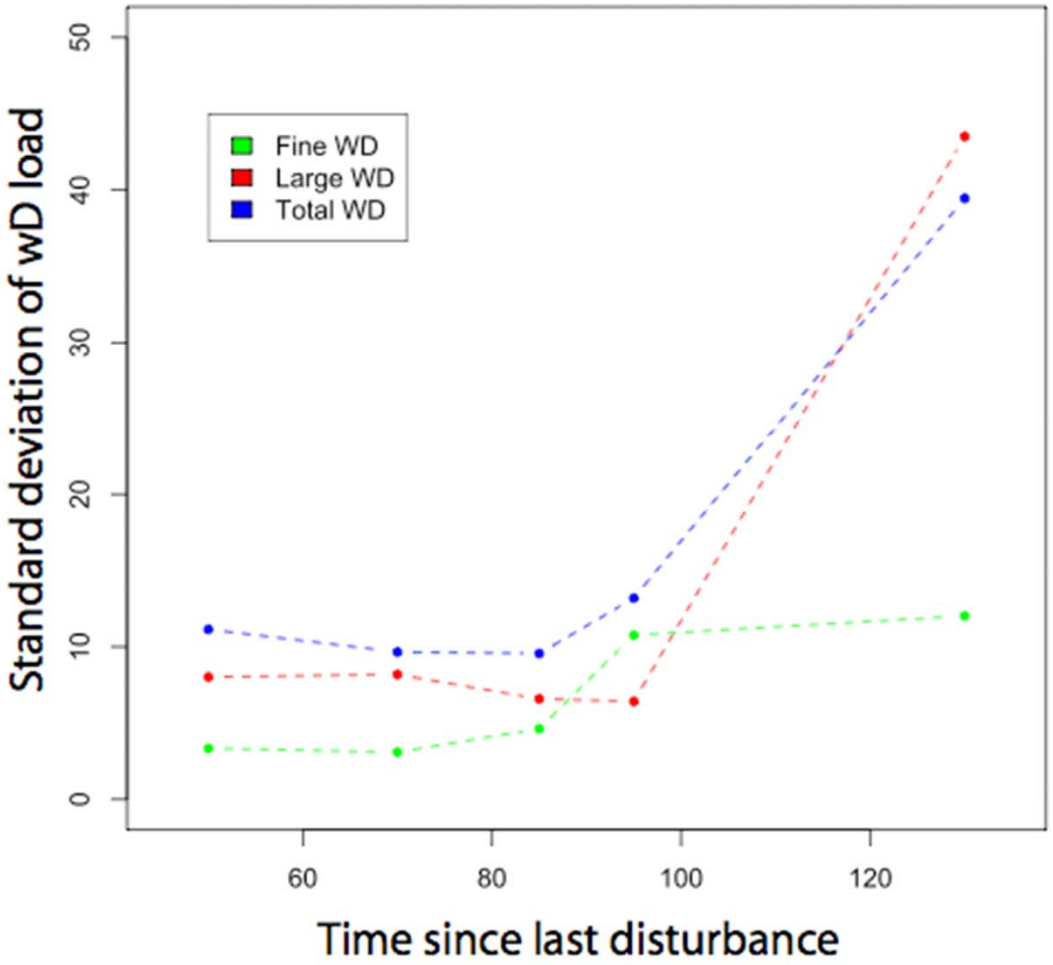
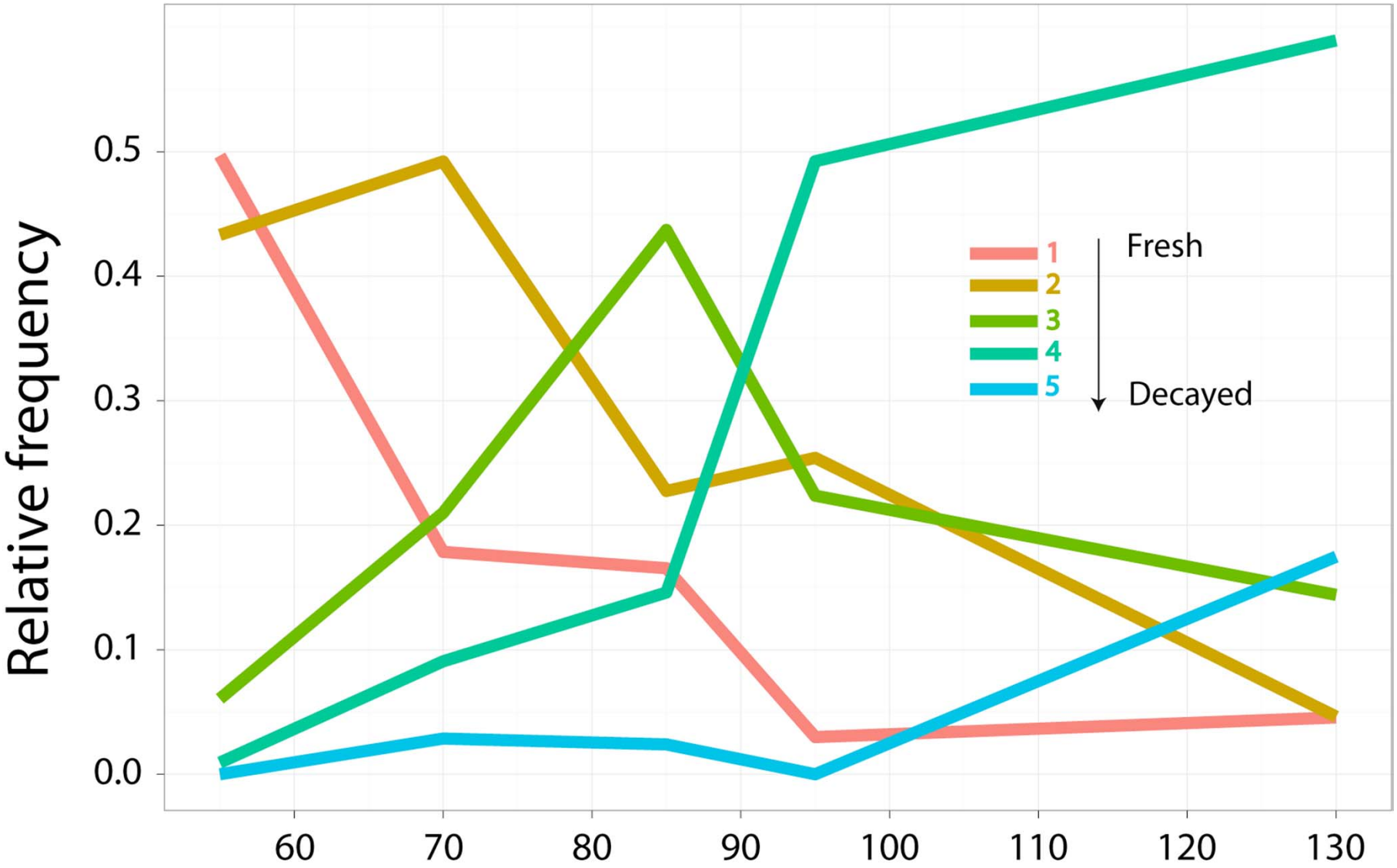
Standard deviation dynamics of WD load



- Increasing variability of WD load
- Heterogeneity of ecosystem increasing with time without fire

Relative frequency of decay class

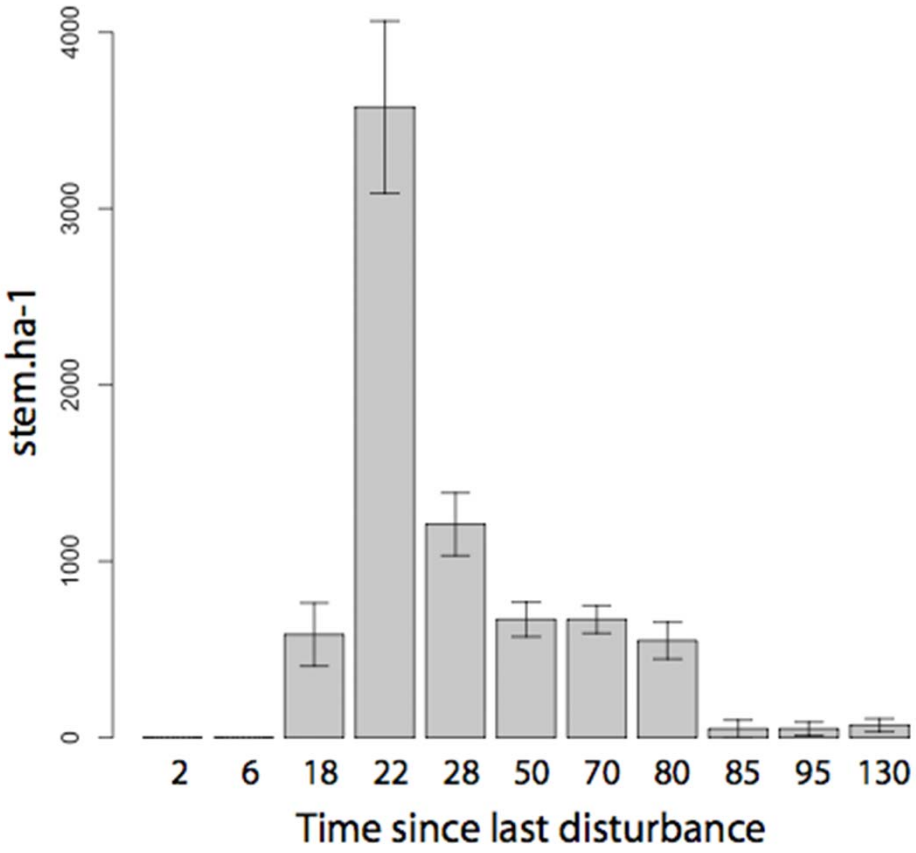


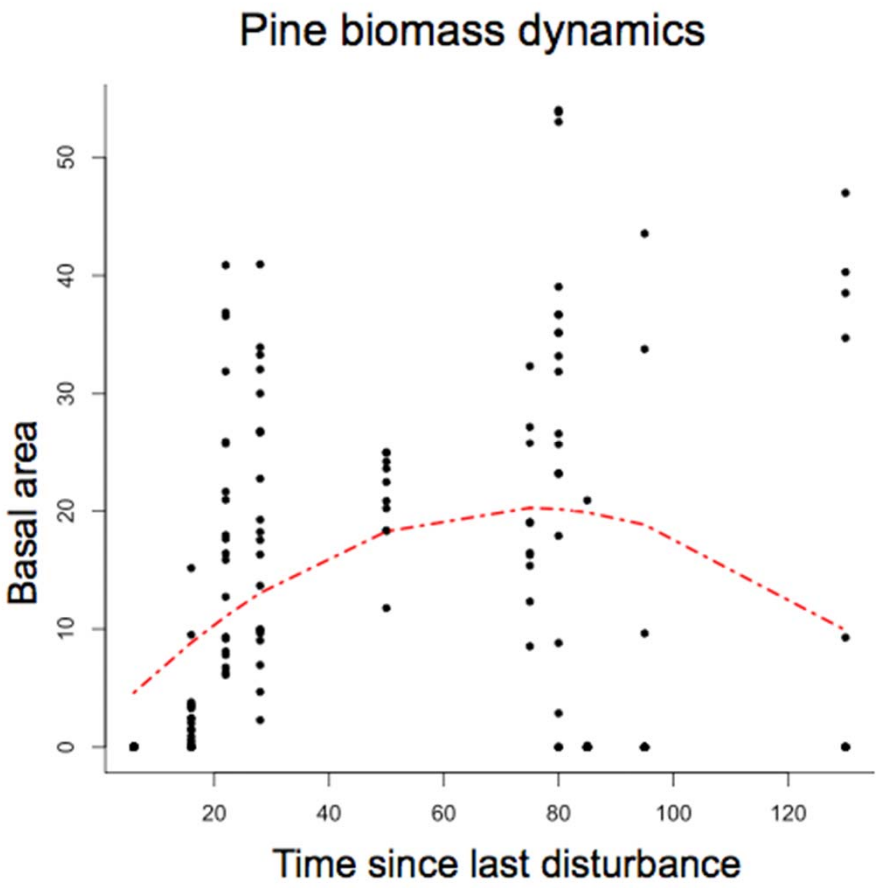
Mostly Fresh WD

Mostly decayed WD

⇨ What about Aleppo pine biomass dynamics ?

Number of individuals dynamics





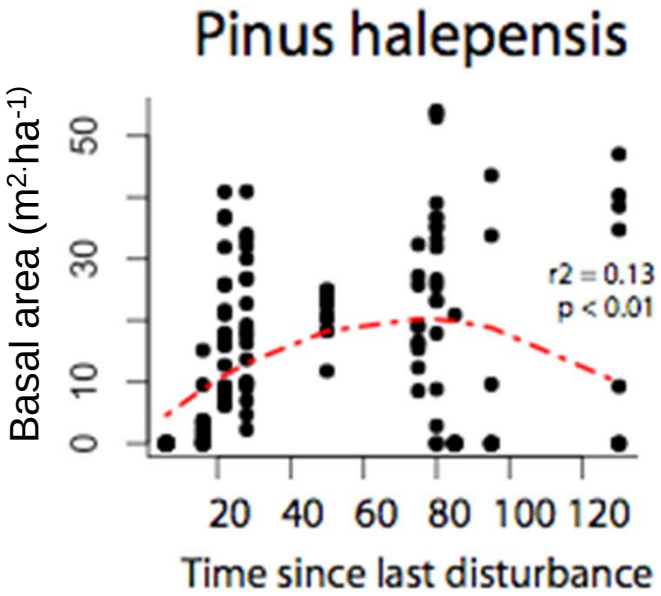
High stem number about 25 years after disturbance

Follow high mortality

Increasing WD load

Decline of Pine after 80 years

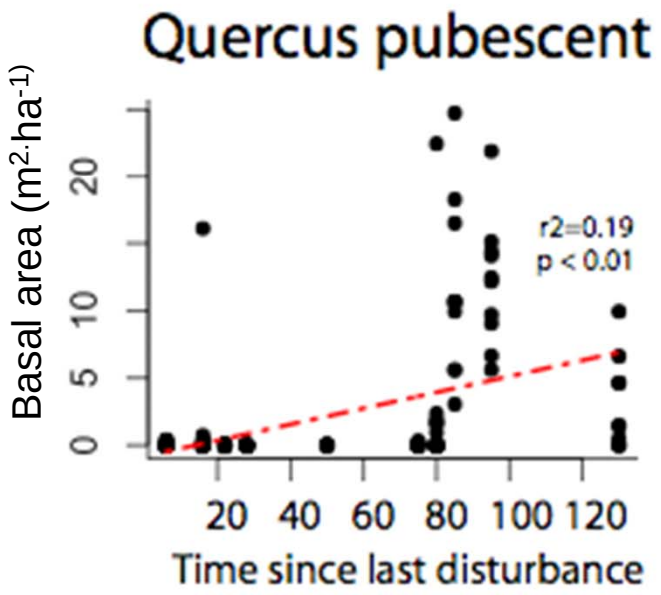
Increasing WD in old plots

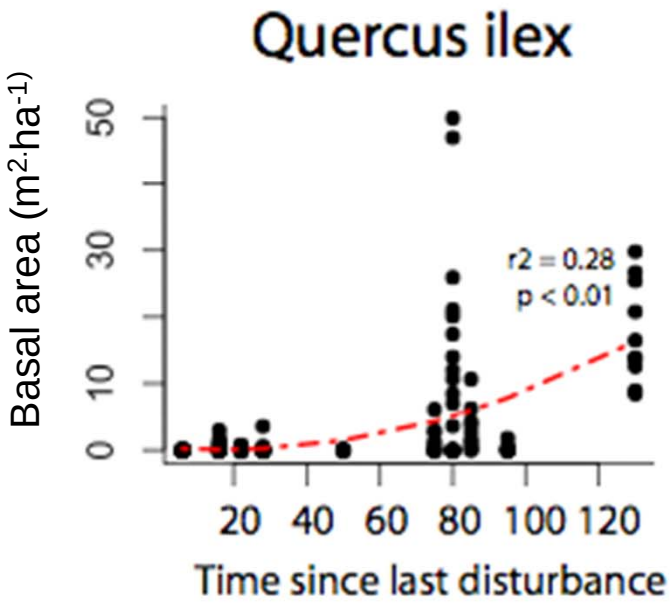


Decline of pine in old plots replaced by oak.

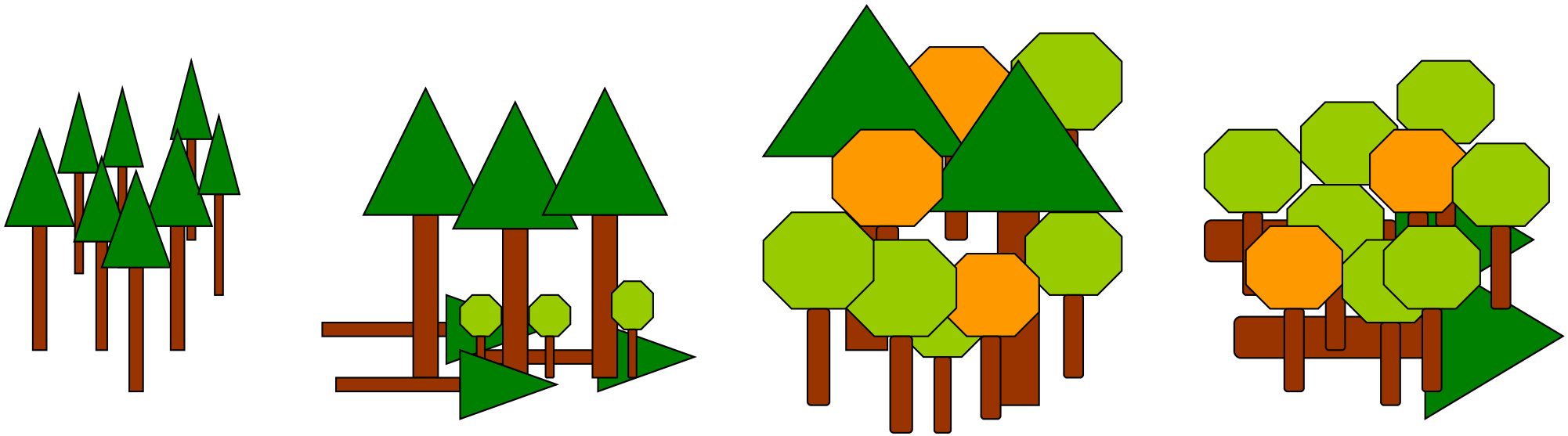
From 80 years after fire

Senescence of pine Responsible for load of high WD





Conclusion



25 years → 50 years → 80 years → 130 years

High pine recruitement

High load of WD by pine competition

Decaying
=
Decreasing WD

High load of WD by pine senescence

Tree biomass=pine

Tree biomass=oak

→ WD dependant to Pinus halepensis dynamics

Conclusion / Perspectives

- WD dependant on the dynamics of short living tree (Aleppo pine)
- Risk of fire ~ load of WD *(Shang 2004)*
- Increasing risk of fire after 100 years
  - Great load of WD
  - Great level of decay

→ Sampling WD on younger plots (2 to 30 years old)

Thanks for your attention

Thanks to :

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CBAE
UMR 5059
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