



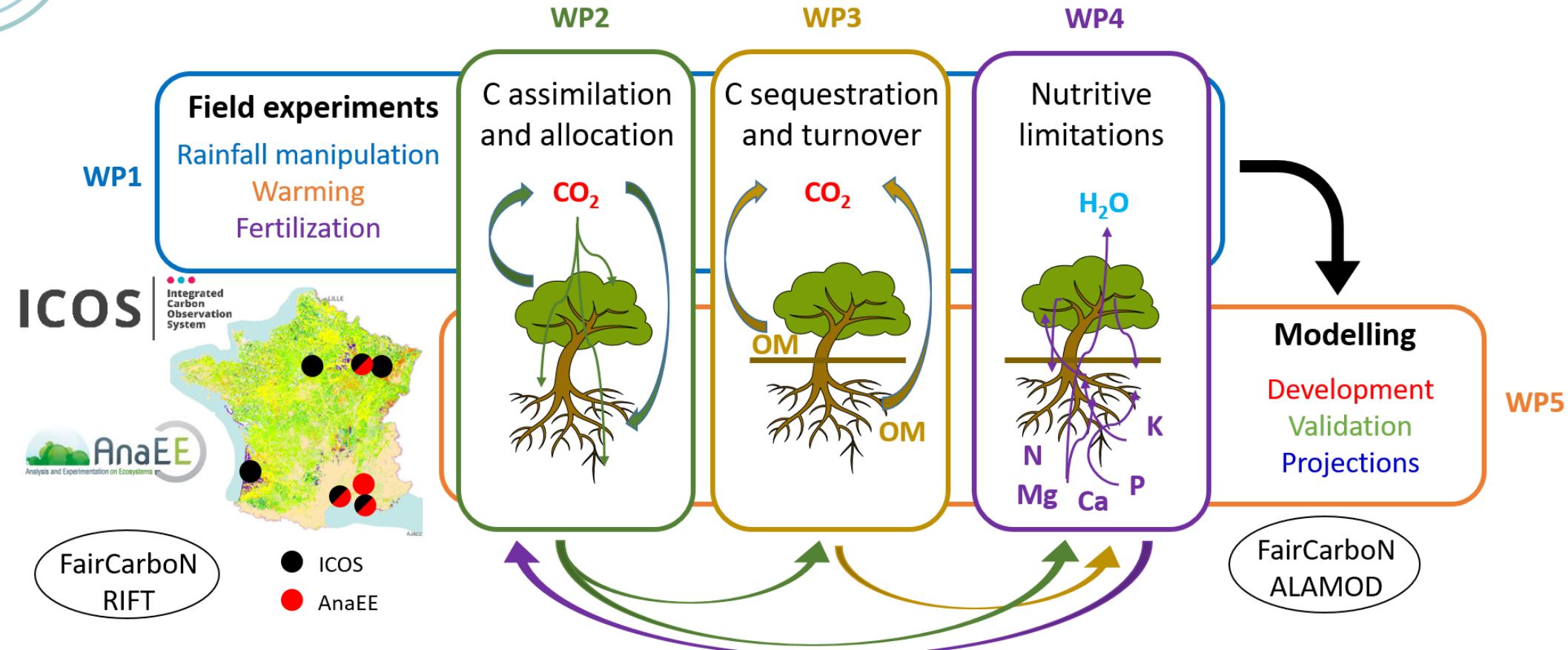
Drought ForC

Drought impacts on carbon stocks and fluxes in forest ecosystems:
experiments and modeling





Drought ForC – Climate change impacts on C sequestration in forests





Monitoring, experiments and modeling



Long-term monitoring of forest C fluxes

Eddy covariance measurements of CO_2 and H_2O exchanges with the atmosphere
→ ICOS ERIC network of Ecosystem stations
→ 5 labelled stations in various French forest ecosystems

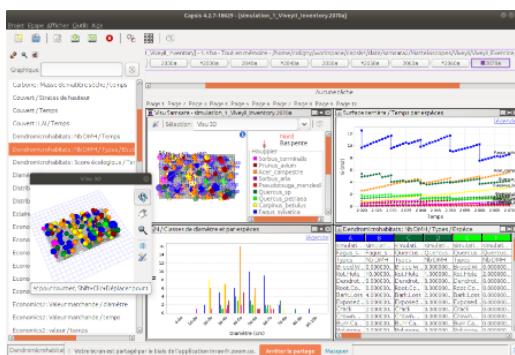
ICOS
Integrated Carbon Observation System



Rainfall manipulation experiments

Gutters or mobile roofs preventing the precipitation from reaching the soil
→ AnaEE research infrastructure of open-air experimental stations
→ 5 rainfall exclusion experiments in AnaEE-France

AnaEE
Analysis and Experimentation on Ecosystems



Numerical simulations with forest process based models

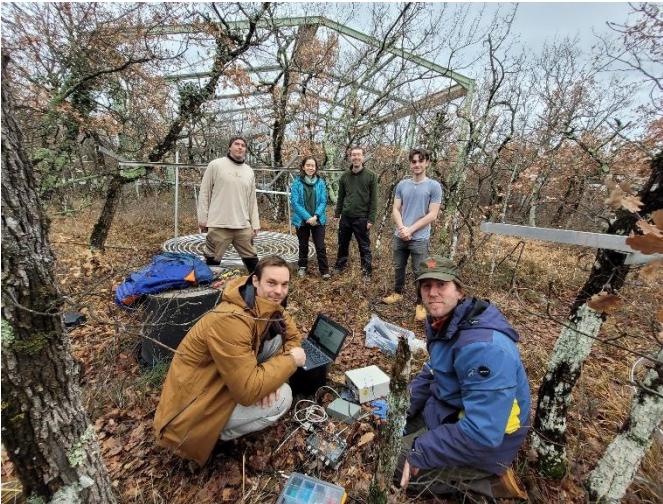
Wide diversity of hypotheses and mechanisms in forest models
→ A large number of forest models developed and used in France
→ 11 forest models brought together for the first time

**FairCarboN
ALAMOD**





Start of a new soil warming and drought experiment in 3 Mediterranean sites



4 treatments: Control; Dry (*5 months Apr-Sep rainfall exclusion*);
Hot (+2 °C); Dry & Hot

X 3 replicates **X 3 sites :** Puéchabon, OHP, Font-Blanche

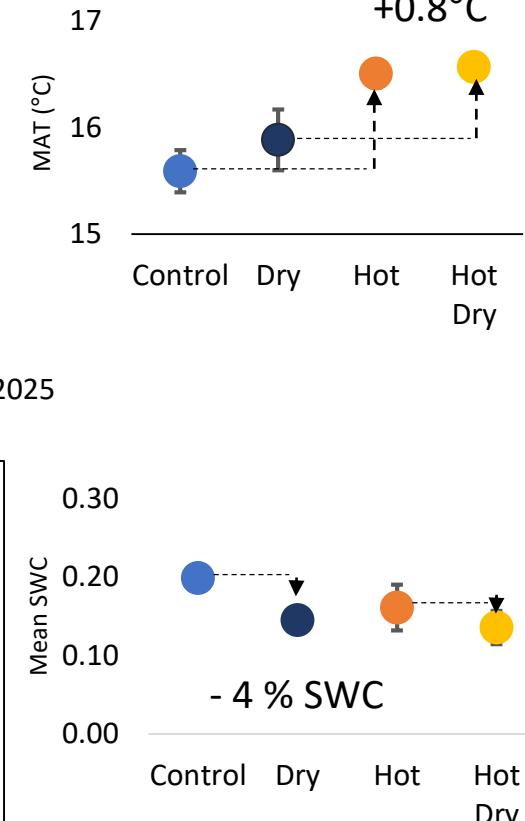
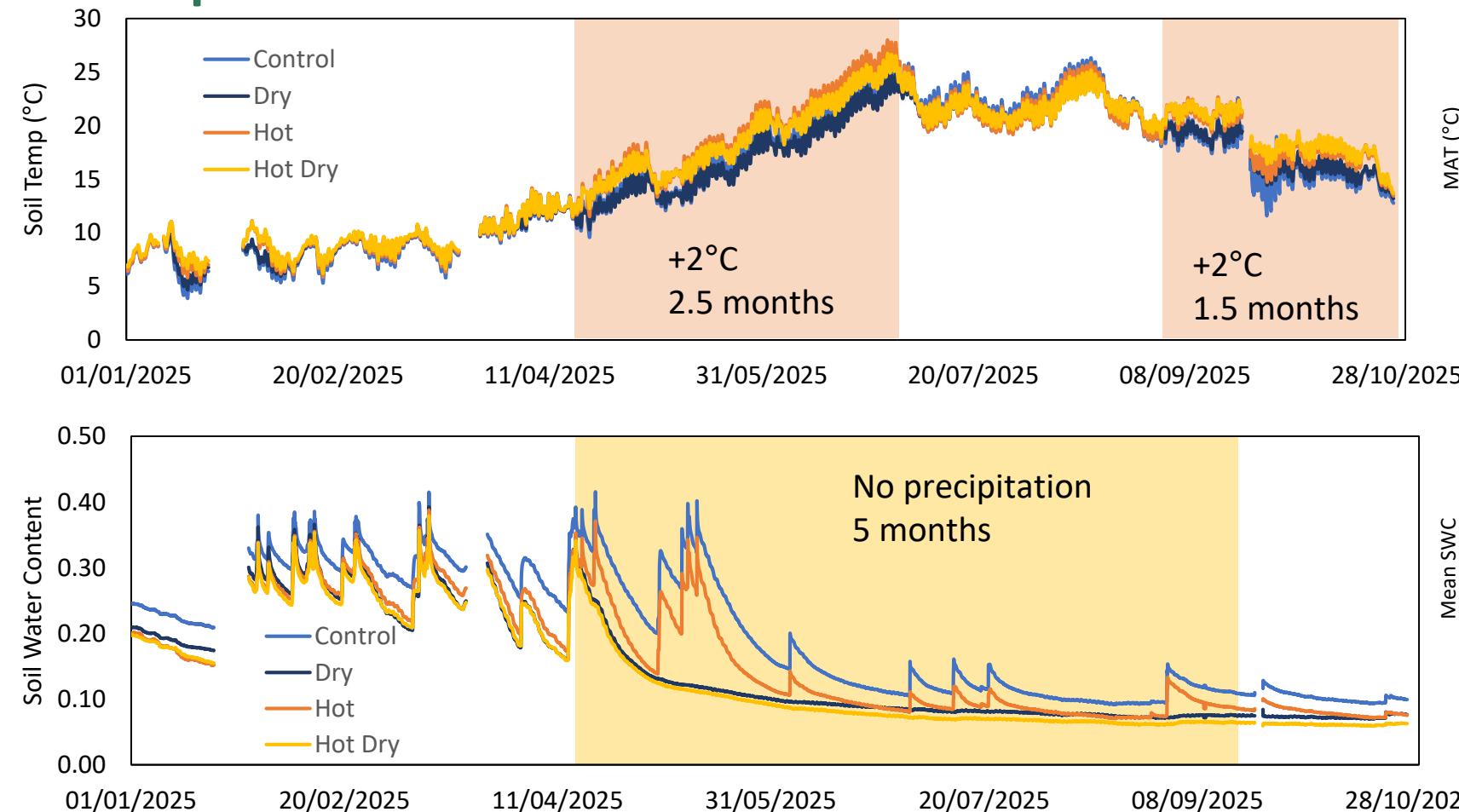


Installation 2024-2025

Start of experiment April 2025



Start of a new soil warming and drought experiment in 3 Mediterranean sites





Start of a new soil warming and drought experiment in 3 Mediterranean sites

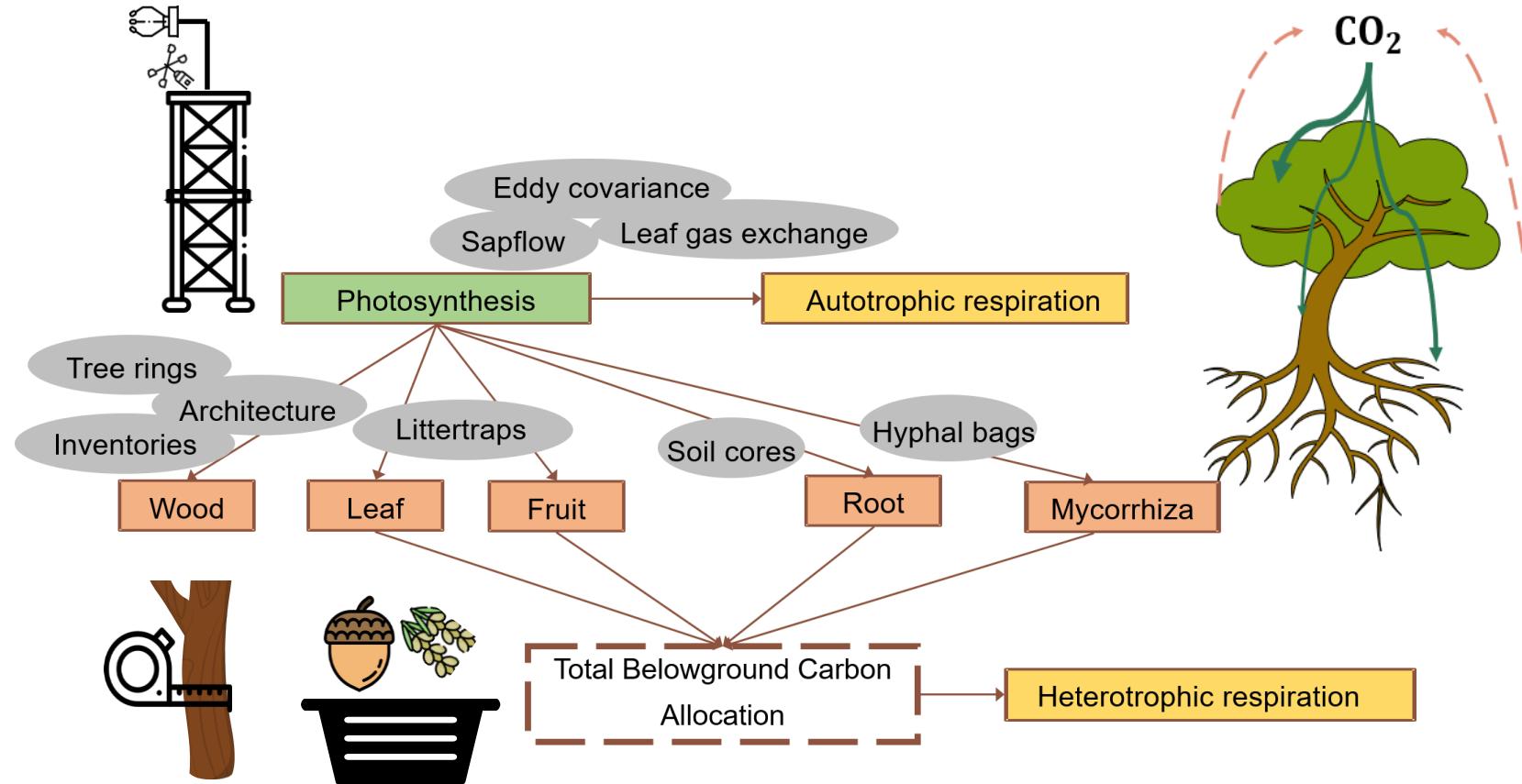
- An AnaEE facility open to the research community to study forest soil response to climate change
- PhD thesis of Joséphine Huet (funded by FairCarboN) starts in November 2025 to study the effects of heat and drought on soil carbon dynamics in forests using this new experiment
- First measurements and experiments :
 - Soil respiration with portable gas-analysers
 - Mycorrhizal growth with hyphal bags
 - Litter decomposition with litter bags
- To come... :
 - Soil fauna identification with DNA meta-barcoding (PEPR FORESTT)
 - Soil B-VOC emission with PTRMS mobile lab
 - Automatic soil respiration with custom-made chambers





Studying the link between carbon assimilation and allocation in forest tree biomass

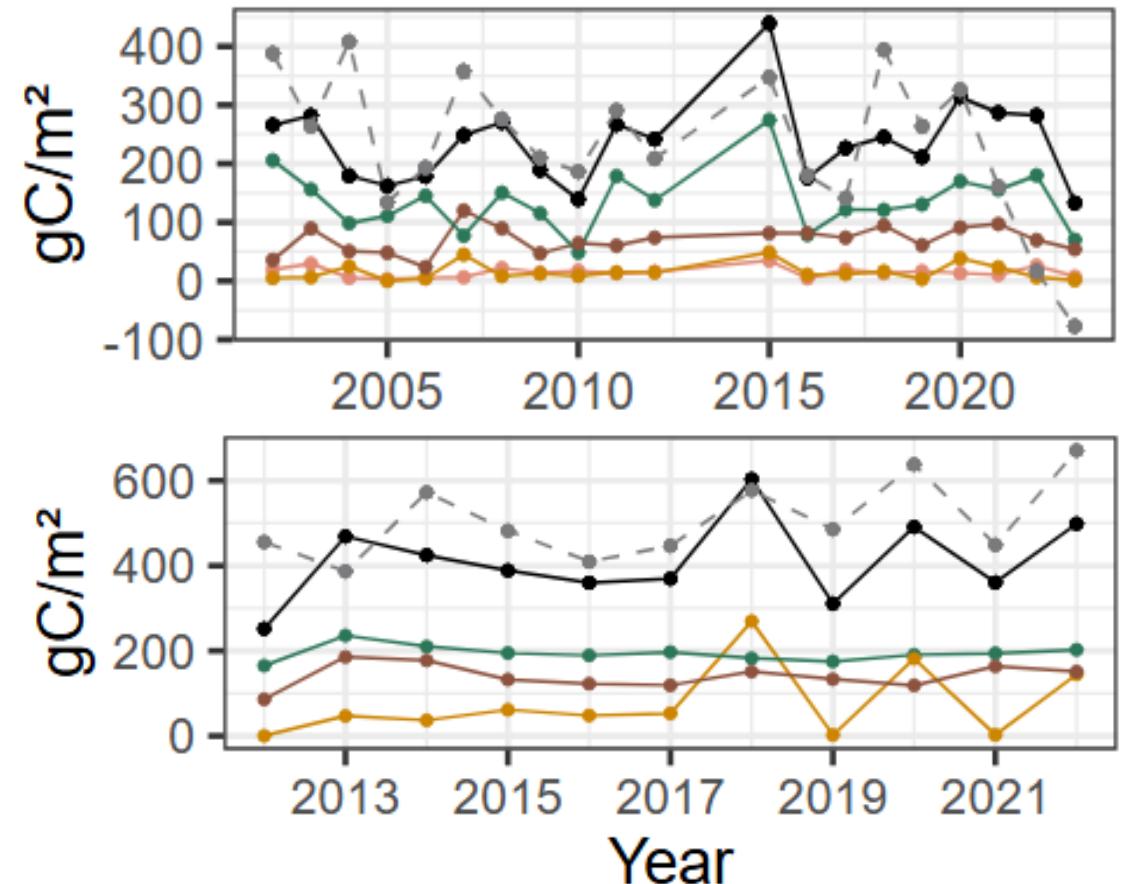
- PhD thesis of Jeanne Poughon (2024-2027; funded by FairCarboN)
- A first study aiming at comparing the inter-annual link between photosynthesis and the production of biomass by trees:
 - 6 forest sites
 - 94 year x site of data
 - Eddy-covariance and dendrometric measurements





Studying the link between carbon assimilation and allocation in forest tree biomass

Puéchabon
Mediterranean
evergreen holm
oak forest



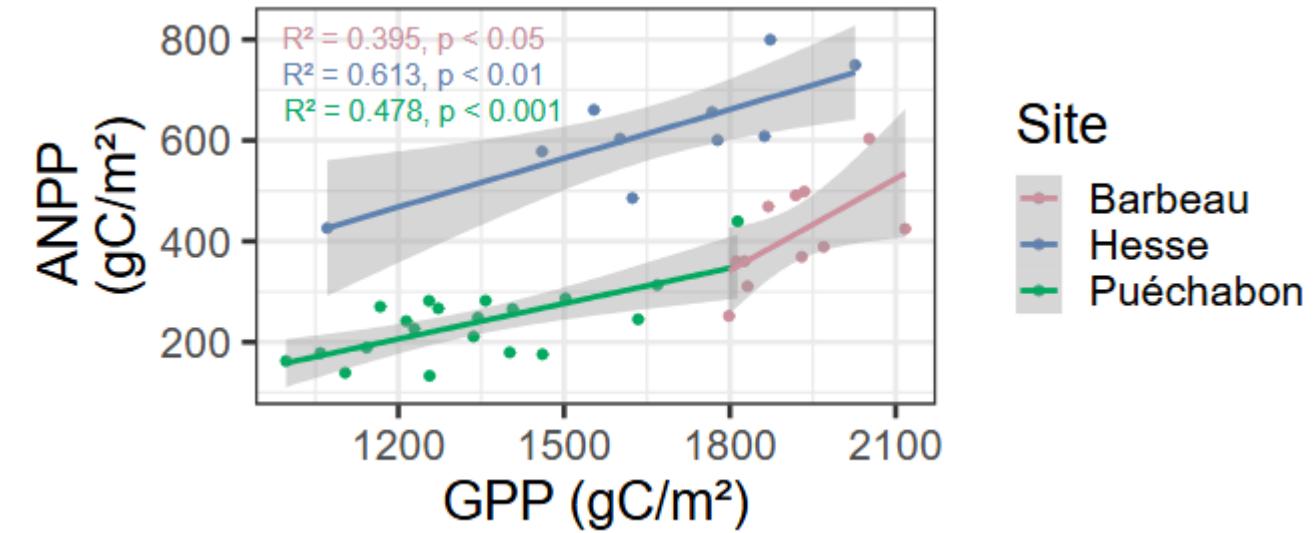
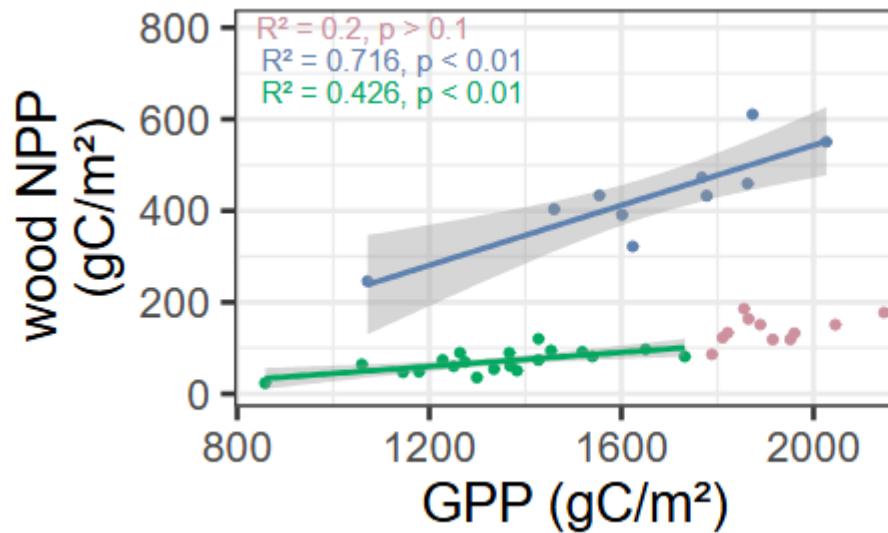
Barbeau
Temperate
deciduous oak
and hornbeam
forest





Studying the link between carbon assimilation and allocation in forest tree biomass

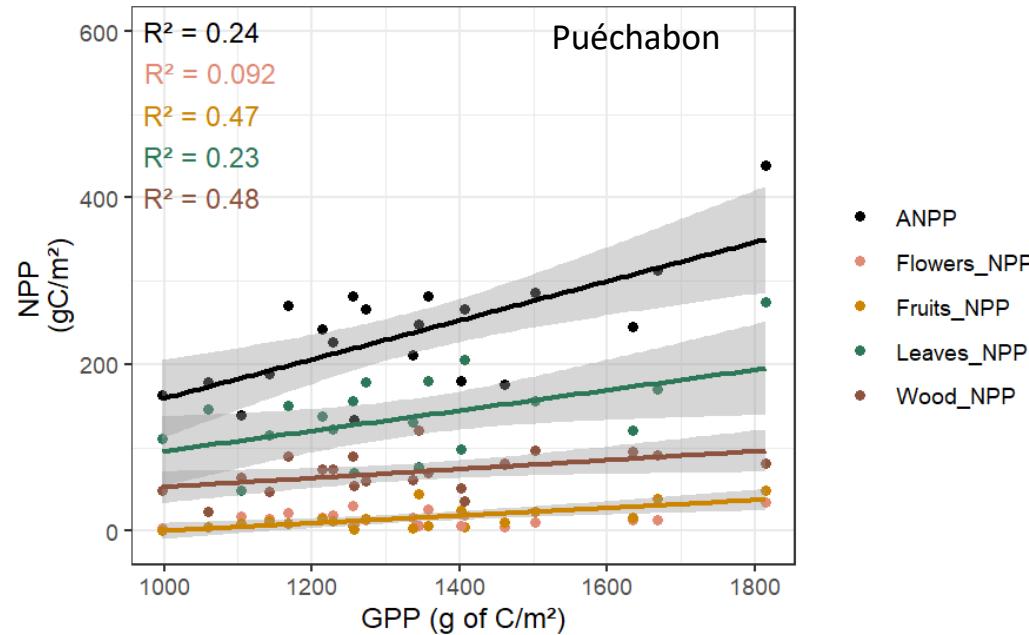
Annual wood production and vegetative biomass production (ANPP) in forests are only partially explained by photosynthetic carbon uptake (GPP), with disparities among sites



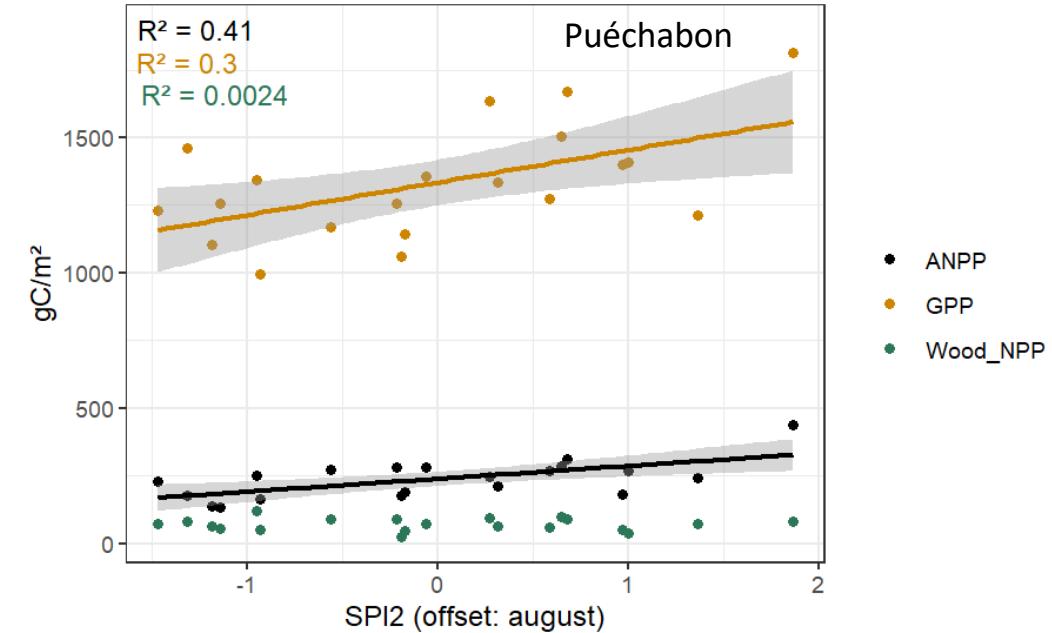


Studying the link between carbon assimilation and allocation in forest tree biomass

Does carbon allocation among the different tree organs change among years with forest productivity?



How does drought impact forest productivity, carbon budget and carbon allocation?



→ Please see poster by Jeanne Poughon during the poster session !





Studying the link between carbon assimilation and allocation in forest tree biomass



- Extend the analysis to rainfall manipulation experiments in a second study to gain a better understanding of drought effects
- Use measurements of secondary growth (dendrochronology) and primary growth (architectural reconstruction) to better understand the allocation rules within trees
- Use root in-growth cores to assess the below-ground allocation of trees
- Link carbon allocation with nutrient immobilization and needs (WP4) and with soil carbon dynamics (WP3)

Thank you for your attention