

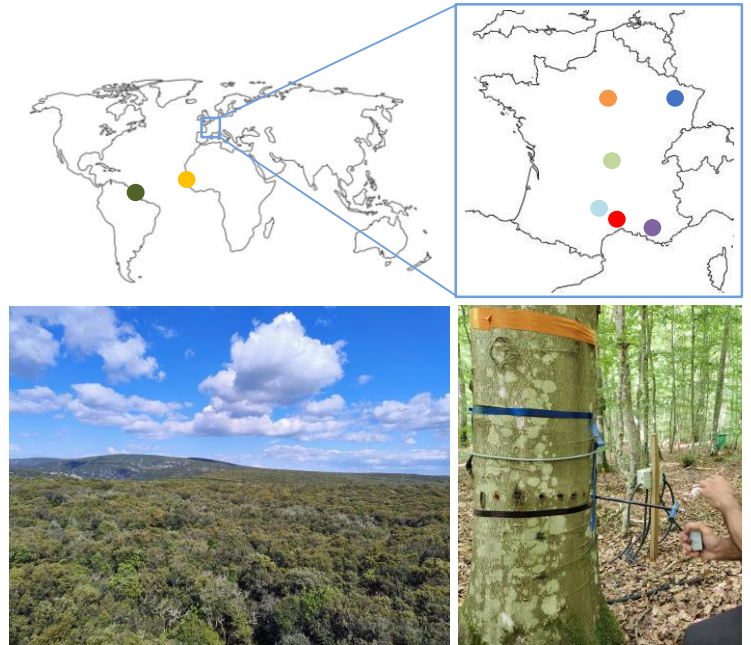
Quantification of water stocks in forest environment by a multidisciplinary approach

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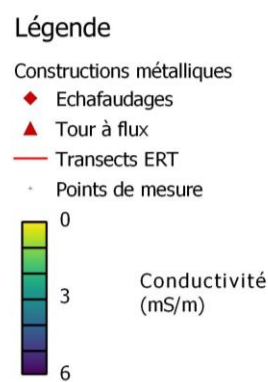
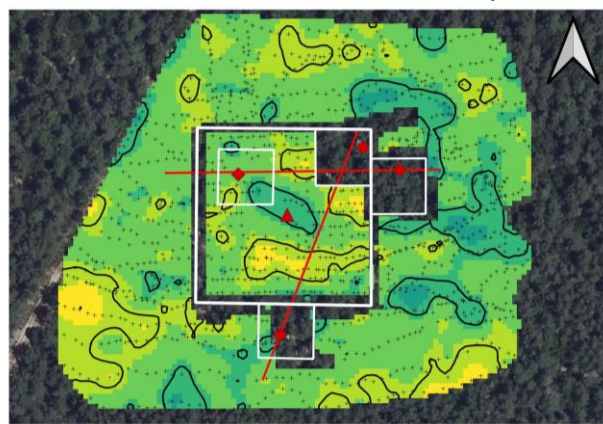
CONTEXT

- Forests play essential roles in regulating the environment but are increasingly threatened by more frequent and intense heatwaves and droughts driven by climate change.
- Soil water is a key factor for tree survival and physiological functioning. However, soil water availability and accessibility to trees can vary greatly within a forest and is difficult to quantify.
- Conventional methods are mostly limited to point measurements. **New approaches are therefore needed to characterize soil water resources and address these key questions:**

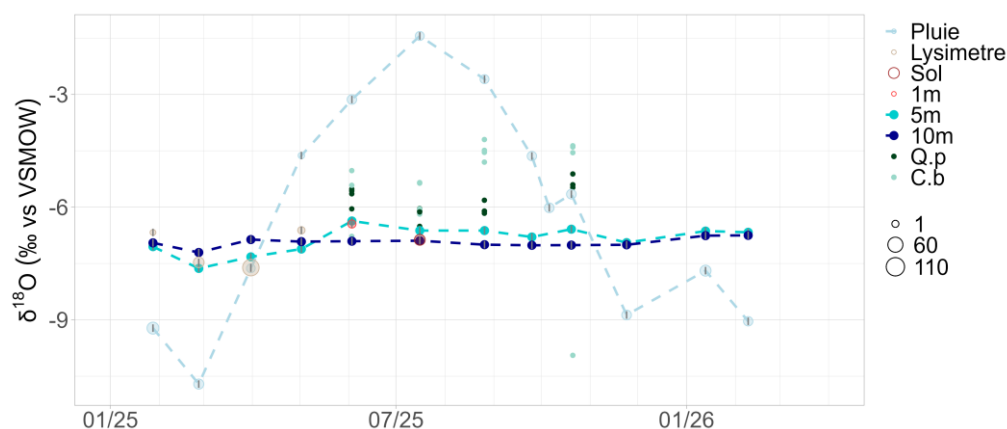
How does soil water availability vary across space and time in forests?
How does this variability influence tree functioning?
How much water do trees extract, and from which soil depths?



Carte de la conductivité électrique à Font-Blanche



Evolution du $\delta^{18}\text{O}$ sur une année à Barbeau



REFERENCES

Carrière et al. 2020. Intra-specific variability in deep water extraction between trees growing on a Mediterranean karst. *JoH*.
Loiseau et al. 2023. The geophysical toolbox applied to forest ecosystems – A review. *STOTEN*.

SCIENTIFIC OBJECTIVES

Our aim is to improve our understanding of how forests function by better quantifying both the amount of water stored in soils and the fraction that is actually accessible to trees. We develop a multidisciplinary approach which aim to:

- Characterize spatial heterogeneities in soil properties using **geophysical methods**;
- Quantify soil water storage by combining geophysical and **ecohydrological data**;
- Investigate water resources accessibility and its actual use by trees with **isotopic tracing**

Proposed In-Lab subject within the same Hydrology/Forest theme

THE MISSION

Field & laboratory work:

- Geophysical measurements (ERT and EMI)
- Sampling for isotope analysis
- Extract water from wood for isotopic analysis

Data analysis:

- Process and analyse geophysical data
- Cross-analysis of geophysical and vegetation data
- Ecophysiological modelling (SurEau)

THE RESEARCH UNIT: HSM

- HydroSciences Montpellier is a mixed research units (UM, CNRS, IRD, IMT Ales) dedicated to the water cycle under global change.
- HSM address research activities on the various components of the water cycle as well as the relation with human activities, regarding both quantity and quality.
- Students will be able to integrate themselves into a rich and welcoming environment of scientific diversity. They will share the building with key structures of the water community in Montpellier (OSU OREME, UNESCO ICIREWARD)

