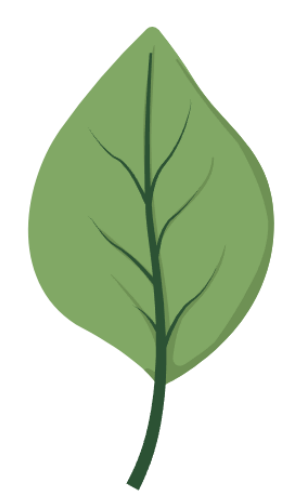


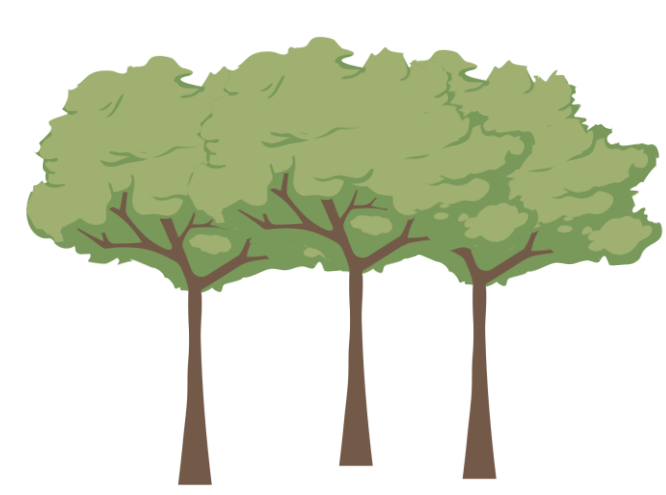
Overall Goal : Tracking Forest Fluxes with Advanced Remote Sensing

Develop a novel mechanistic framework for **monitoring gross primary production (GPP)** and **transpiration** in European forests using **multiscale Sun-Induced Chlorophyll Fluorescence (SIF)** and **Vegetation Optical Depth (VOD)** observations, to improve our **understanding of forest resilience**, support **climate forecasting models** and assess **carbon sink strength** under climate change

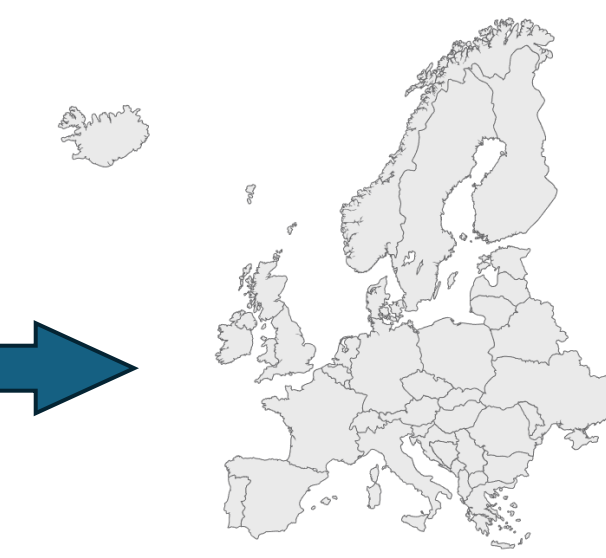
Work Packages



WP1 : Leaf-level measurement to support model development

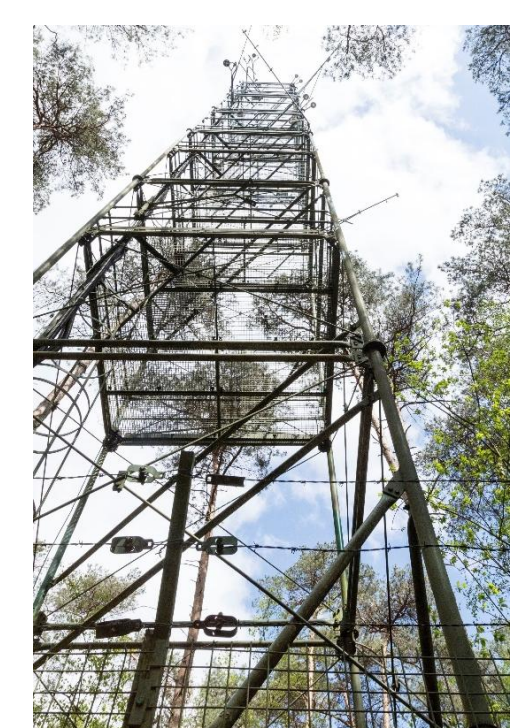


WP2 : UAV data collection and modelling at the stand scale



WP3: Mapping forest fluxes with FLEX and understanding responses to climate change at large scales

Study Sites



BE-Bra
(Scots pine)



FR-Hes
(beech)

Preliminary results

WP1 : March-September 2026 leaf-level measurement campaign at BE-Bra.

Active fluorescence and gas exchange measurements with LI-6800-F and LI-6400-XT on Scots Pine.

- Calibration of the ‘Open-Close’ (OC) model¹ for the fraction of open PSII centers (qL)
- Application of the ‘Mechanistic Light Response’ (MLR) model² for GPP from top-of-canopy SIF

Instrument fleet



FloX box

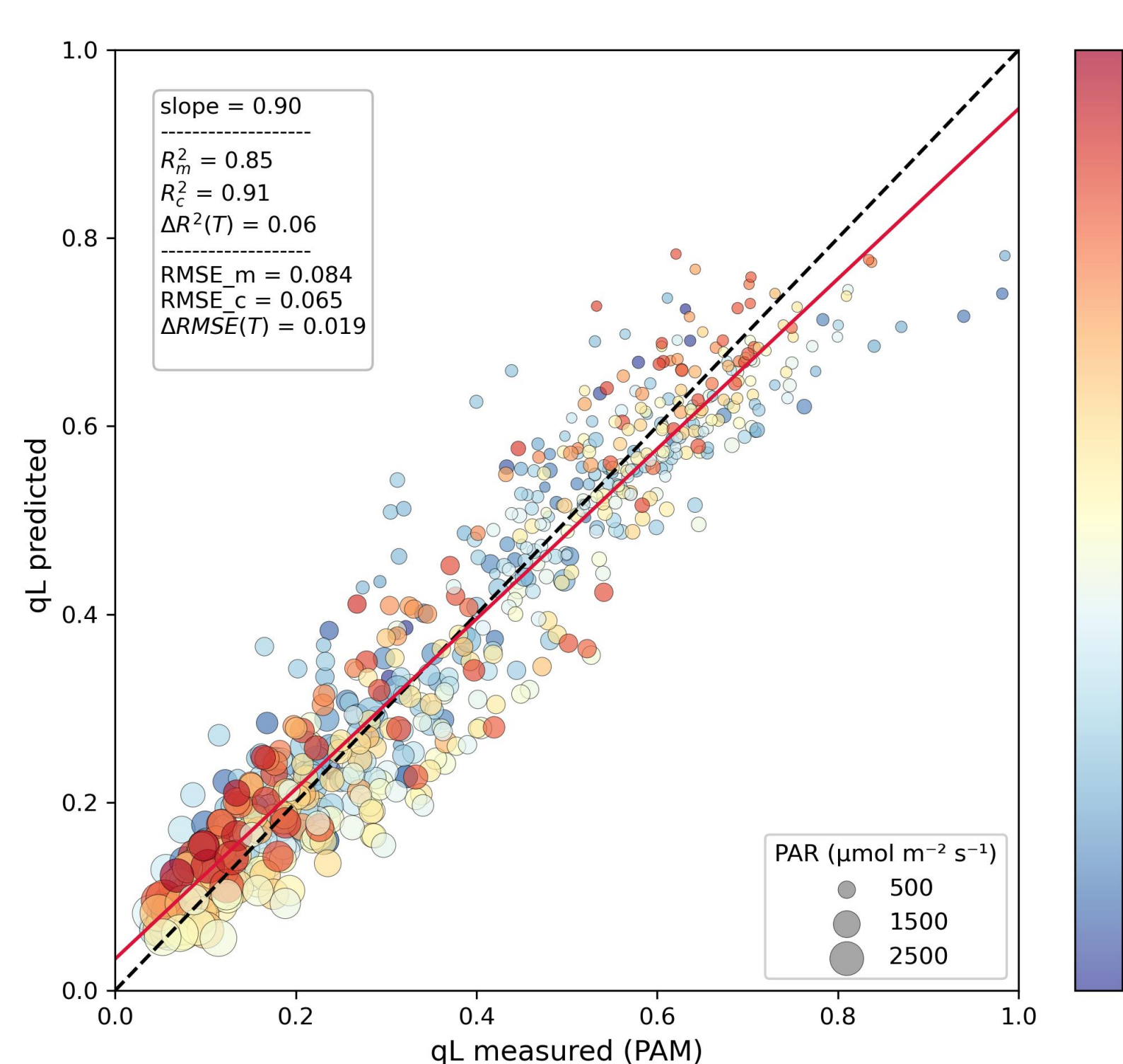


LI-6800-F / 6400-XT

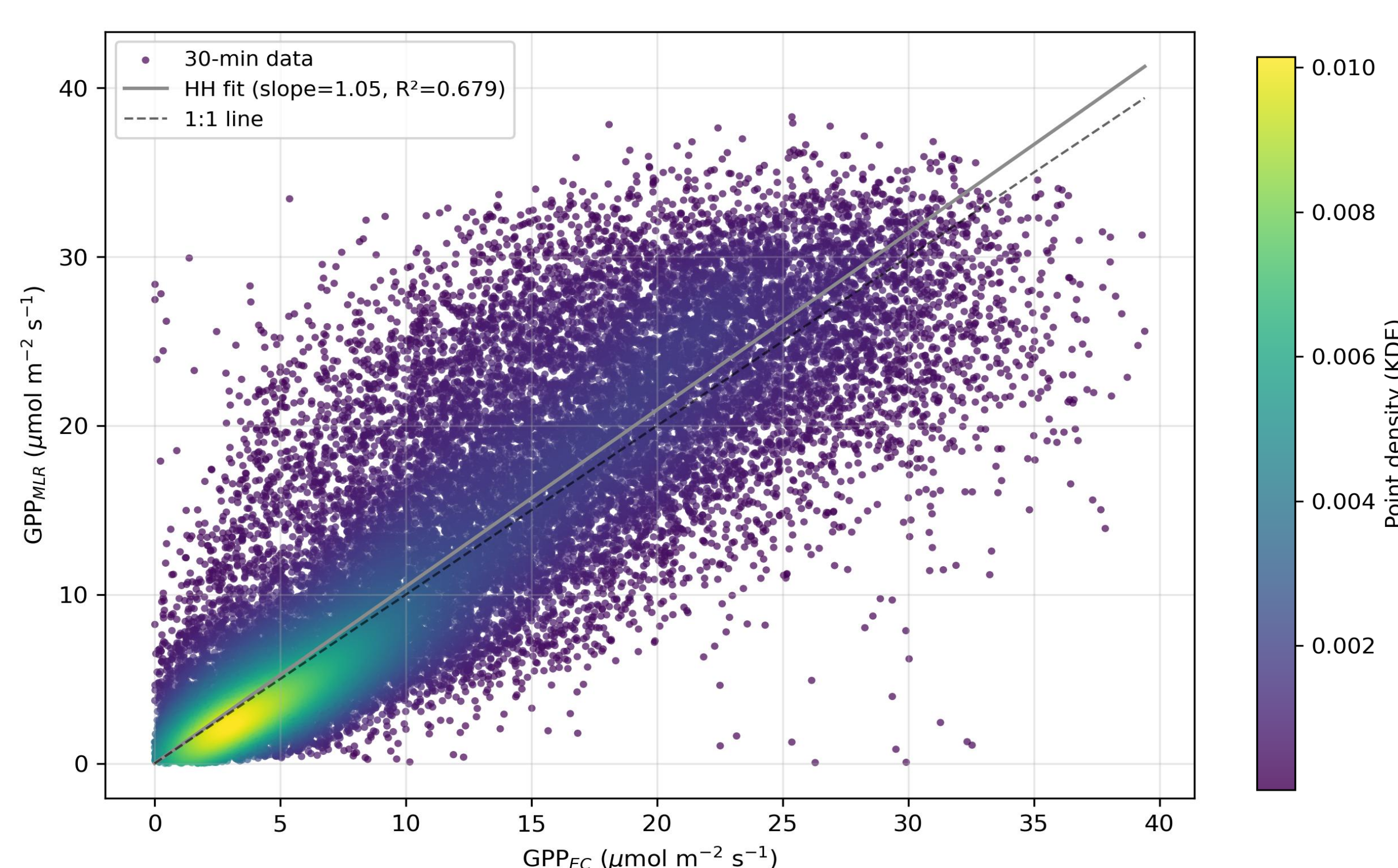


UAV + hyperspectral, LiDAR, thermal, SIF (AirFloX)

Calibration of the OC model for qL



Multilayer MLR model for GPP - 2021 to 2025



1. L. Gu et al., *Plant Cell & Environment*. **46**, 1540–1561 (2023)
2. L. Gu, J. Han, J. D. Wood, C. Y. Chang, Y. Sun, *New Phytologist*. **223**, 1179–1191 (2019).

Perspectives

Next steps in 2027

WP1 :

- Leaf-level measurements campaigns in Hesse
- Comparison of MLR model parameters and model performances between evergreen needleleaf and broadleaf deciduous forests.

WP2 :

- Determination of GNSS-T-based VOD in Brasschaat and Hesse
- UAV campaign in Hesse : SIF signal variability within the EC footprint and FLEX pixels. First flights of the AirFloX.
- Compare model performances with representation of canopy vertical structure

Leveraging TROPOMI/FLEX SIF data

- **Early detection and Higher-resolution monitoring** of physiological changes in vegetation
- Support **evidence-based** forest policies across Europe
- Regional implementation in **Belgium** for localized climate impact assessments

