FOREST MICROCLIMATE ASSESSMENT: PROJECT FORMICA
Sanne Govaert, Camille Meeussen, Pieter Vangansbeke, Kris Verheyen & Pieter De Frenne
Forest & Nature Lab, Ghent University, Belgium

Background

• Global air temperature is rising. However, do temperatures in forests change in the same way as the temperatures measured by weather stations?

• On a hot summer day the climate inside a forest is much cooler than in an open field. Likewise, during a summer night it is warmer inside the forest (see fig. 1). This buffering capacity of forest microclimates can help understorey plants and animals to cope with climate change. With significant buffering, species indeed need to migrate slower than anticipated, and therefore plants could have more time to adapt to the changing climate.

* The microclimate is the local climate mediated by factors that vary at small scales, this in contrast to the macroclimate.

Strategic goal

Quantify, understand and predict microclimatic buffering of plant responses to macroclimate warming in temperate forests

Work packages

1. WP1: Observatory
2. WP2: Warming & light experiment
3. WP3: Transplant experiment
4. WP4: Demographic modelling

Set up

Innovative multigradiient approach

• Temperature gradients across 4 spatial scales
• 225 plots of 5x5m² and 45 plots of 10x10m²

Scale 1: North to south
Scale 2: Elevation
Scale 3: Management
Scale 4: Edge to forest interior

Current phase: work package 1 - observational study

In FORMICA, we assess:

• Plant biodiversity
• Plant functional traits
• Light and forest structure
• Temperature
• Soil
• Water

Vegetation surveys

Plant height
Seed release height
Specific leaf area
Biomass
Nutrient analysis

Data loggers logging every hour, protected by a radiation shield (see fig. 2) or buried in the soil.

Evaporimeter
Soil moisture

Terrestrial LiDAR (Light Detection and Ranging)

Tree species composition & diameter
Forest height
Dead wood
Spherical densiometer
Hemispherical pictures

Chemical analysis

Texture analysis
Profile description
Litter biomass
PLFA (Phospholipid-derived fatty acids)

Figure 2. Field work in full progress. From left to right: edge to forest interior transect (7), temperature data logger inside radiation shield (2), collection of soil and litter samples (5).

Impact

We build knowledge on the importance of microclimates.

We get new insights in responses to climate change.

We soundly inform policy makers and land managers.

Contact
sanne.govaert@ugent.be
@SanneGovaert

FORMICA/ERC project: microclimatic buffering of plant responses to macroclimate warming in temperate forests

Copyright: European Denis Sutaj Mountains (adapted) by WarisFrans, Tree (adapted) by Moniwa, Global warming by Georgiandrews, Policy makers by PRPA, from The Nook Project

This research project received funding from the European Research Council (ERC) through the FORMICA project (ERC Starting Grant 757833)