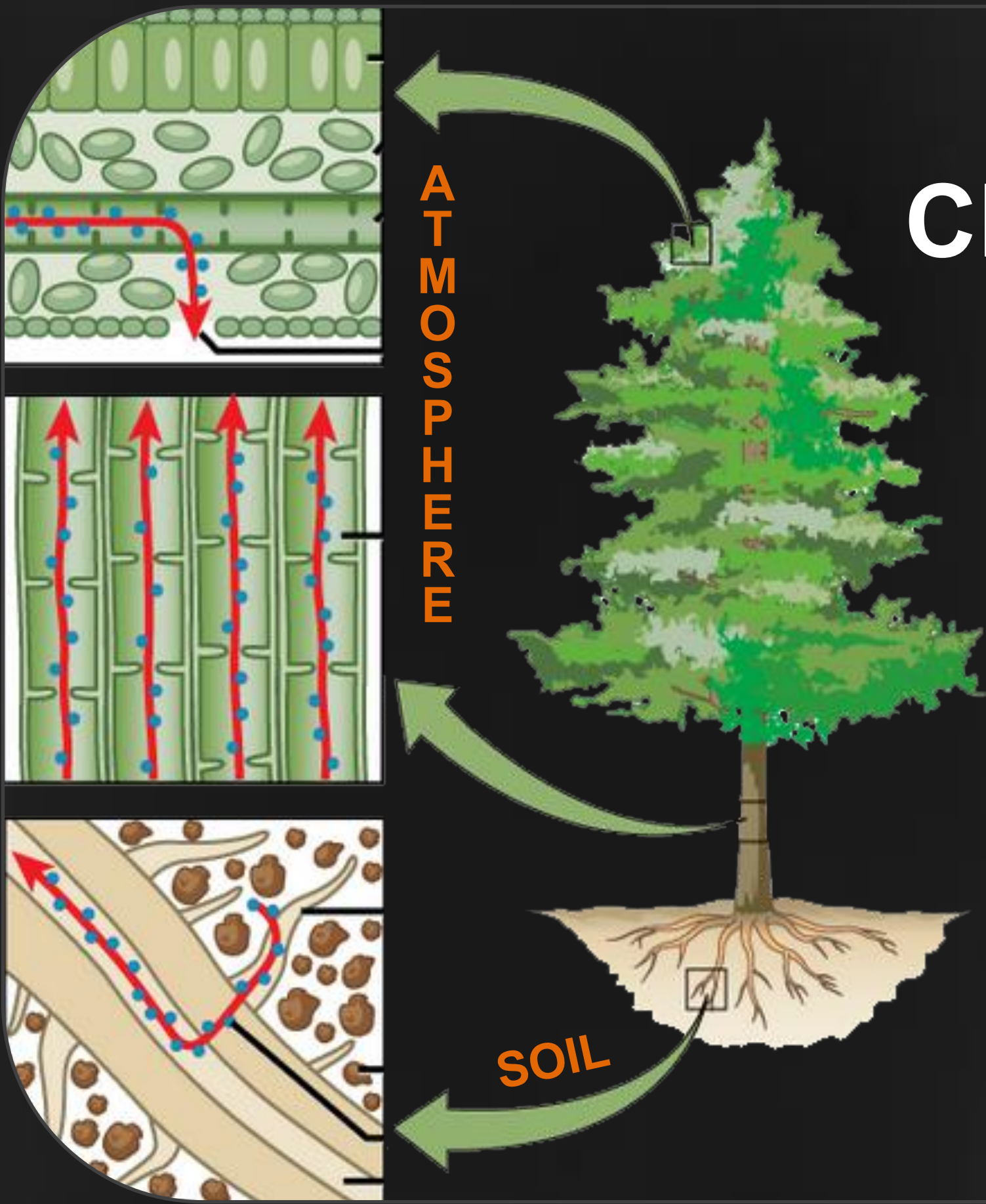


Long-term forest vitality assessment via real-time growth and sap flow measurements

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Forests and Climate Regulation

Besides providing dozens of economical and sociocultural benefits, forests also offer valuable environmental **ecosystem services**. They couple the soil with the atmosphere which makes them an important link in **climate regulation**. **Global change** is directly and indirectly impacting these very important forest functions, for **better** or for **worse**?



Tree growth

Robust high resolution point dendrometers provide insight in the **carbon relations** of trees by measuring the diel **swelling** and **shrinking** with high precision.



Sap flow + more

The **Sapflow+** sensor (Vandegehuchte et al. 2012) allows us not only to measure the **sap flow**, but also for example the **volumetric water content**.

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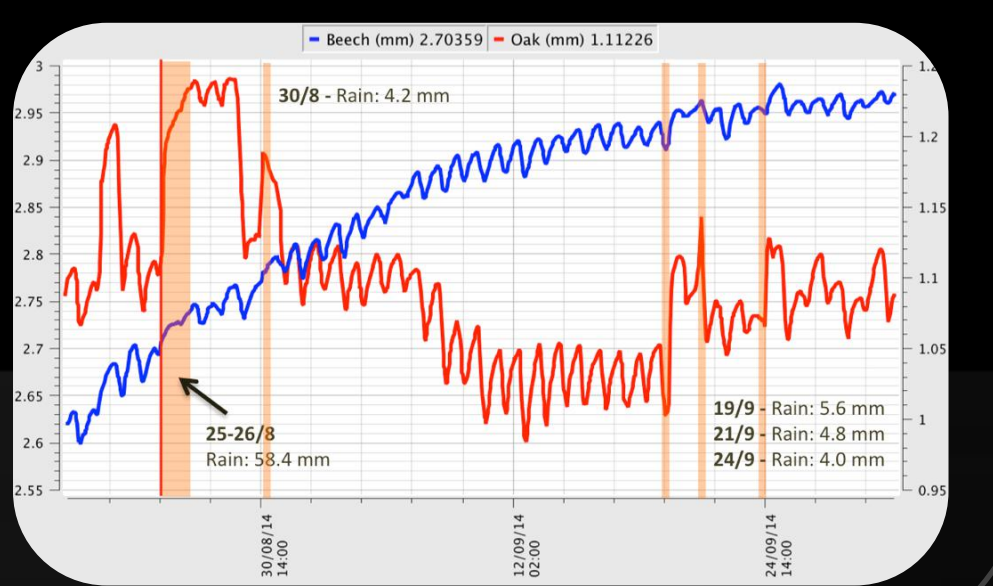


DENDRO-METER

SAPFLOW+ SENSOR

Real-time monitoring

Continuous, real-time and long-term tree measuring and simulation by using the **PhytoSense cloud service**.



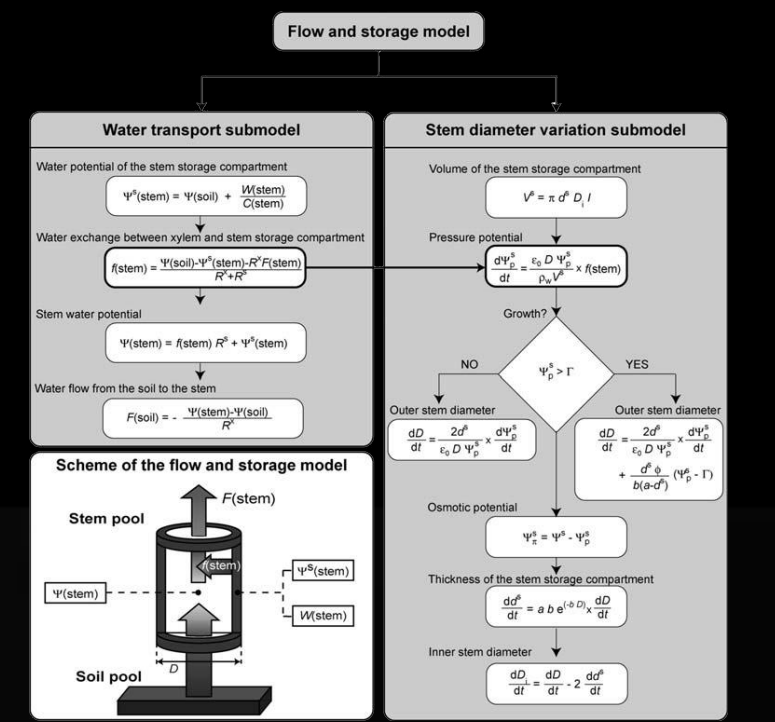
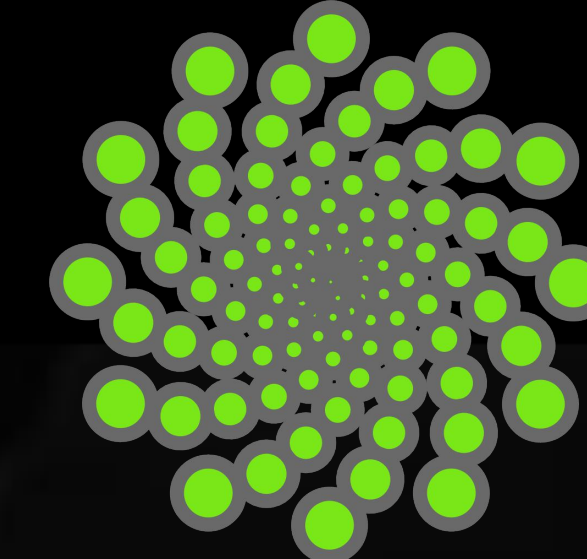
Upscaling

By upscaling **individual tree** data it will be possible to evaluate the vitality status of a **complete forest** (ecosystem).



Plant modelling

Underlying plant processes can be simulated using the powerful **dynamic plant modelling software PhytoSim**.



- ❖ Focus on **beech** (*Fagus sylvatica* L.) and **oak** (*Quercus robur* L.) in **ILTER site 'Gontrode'**.
- ❖ Six trees equipped with **dendrometers**, **Sapflow+ sensors**, **stem psychrometers**, **stem water content sensors** and **soil moisture sensors**.



- ❖ Further development of the **mechanistic STACI model** (Steppe et al. 2008).
- ❖ Identification of **hydraulic vitality indicators**.
- ❖ Creation of real-time and long-term **vitality maps** for forest vitality assessment.