

Integrative measurements focusing on carbon, energy and water fluxes at the forest site 'Hohes Holz'

C. Schütze⁽¹⁾, S. Marañón-Jiménez^(1,2), H. Zöphel⁽¹⁾, S. Gimper⁽¹⁾, M. Cuntz⁽¹⁾, C. Rebmann⁽¹⁾

(1) UFZ – Helmholtz Centre for Environmental Research, Leipzig, Germany

(2) Centre of Excellence PLECO (Plant and Vegetation Ecology), Antwerpen, Belgium

Surface energy fluxes

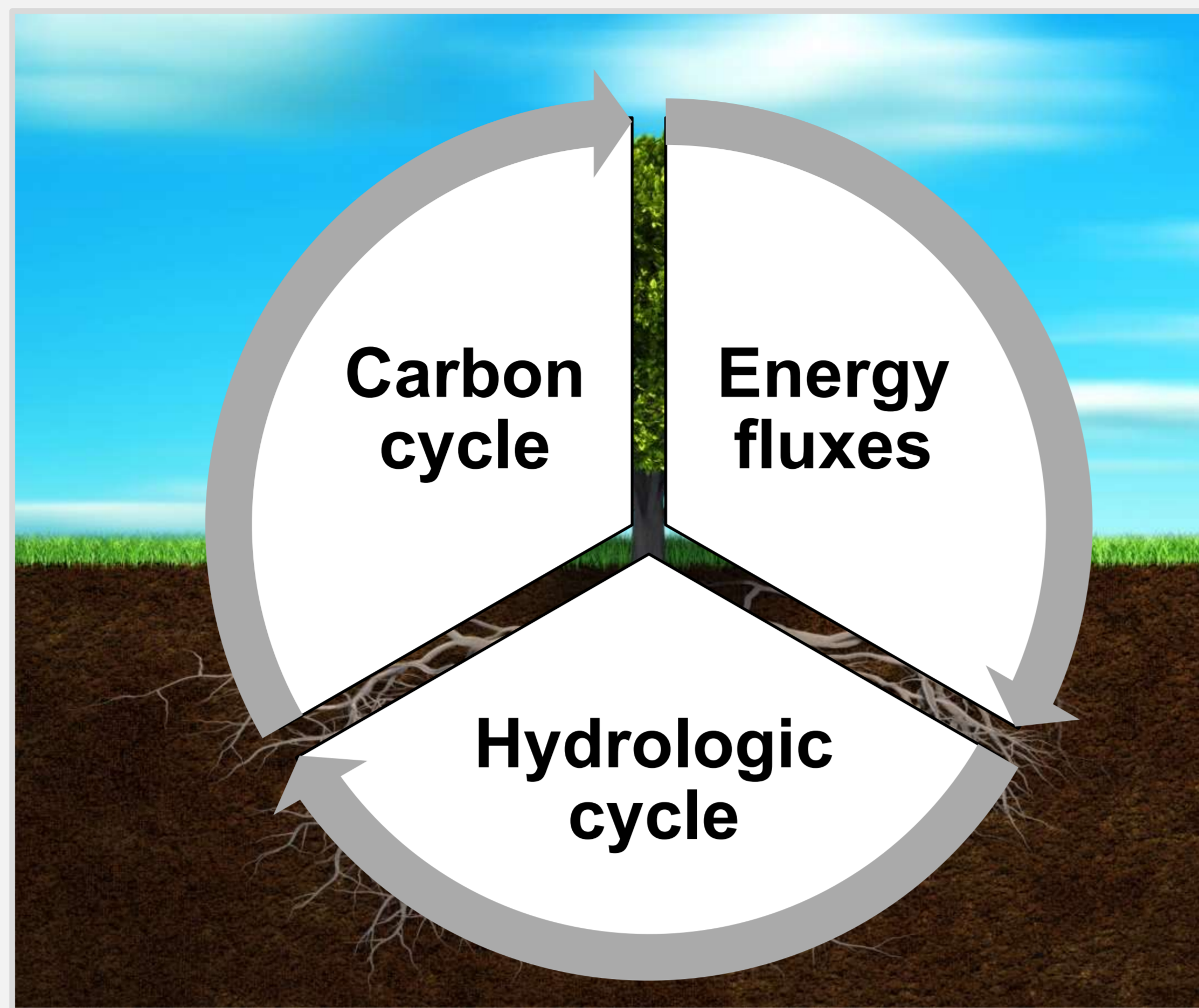
- Latent heat flux
- Sensitive heat flux
- Solar radiation (direct, reflected, diffuse, absorbed)
- Longwave radiation
- Soil heat flux
- Wind speed

Hydrologic cycle

- Evapotranspiration
- Precipitation, interception
- Transpiration (sap flow)
- Stemflow, throughfall
- Soil water content
- Snow, melt
- Drainage

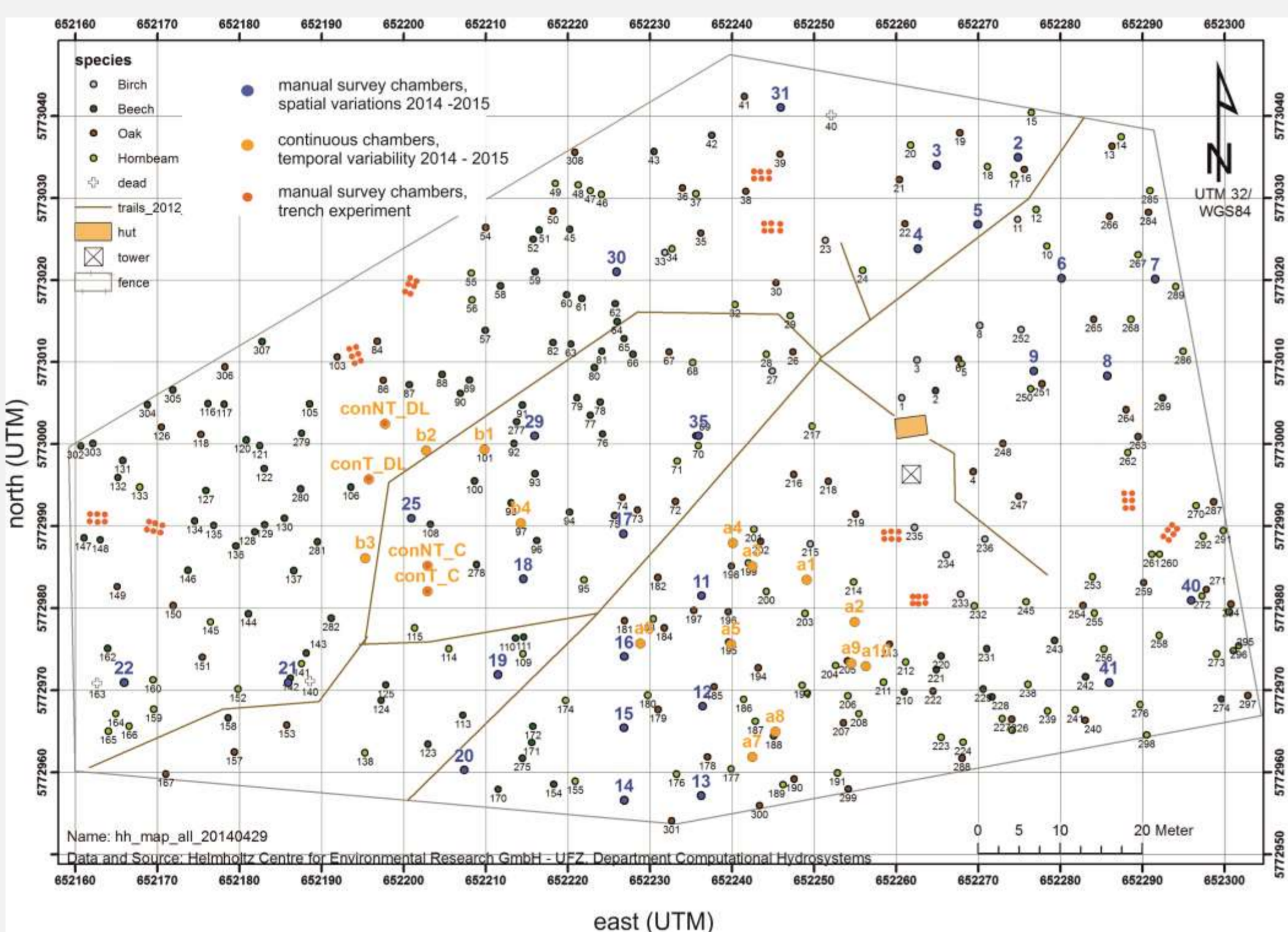
Carbon cycle

- NEE
- Autotrophic respiration
- Heterotrophic respiration
- Foliage, litter
- Nutrient uptake
- Mineralization

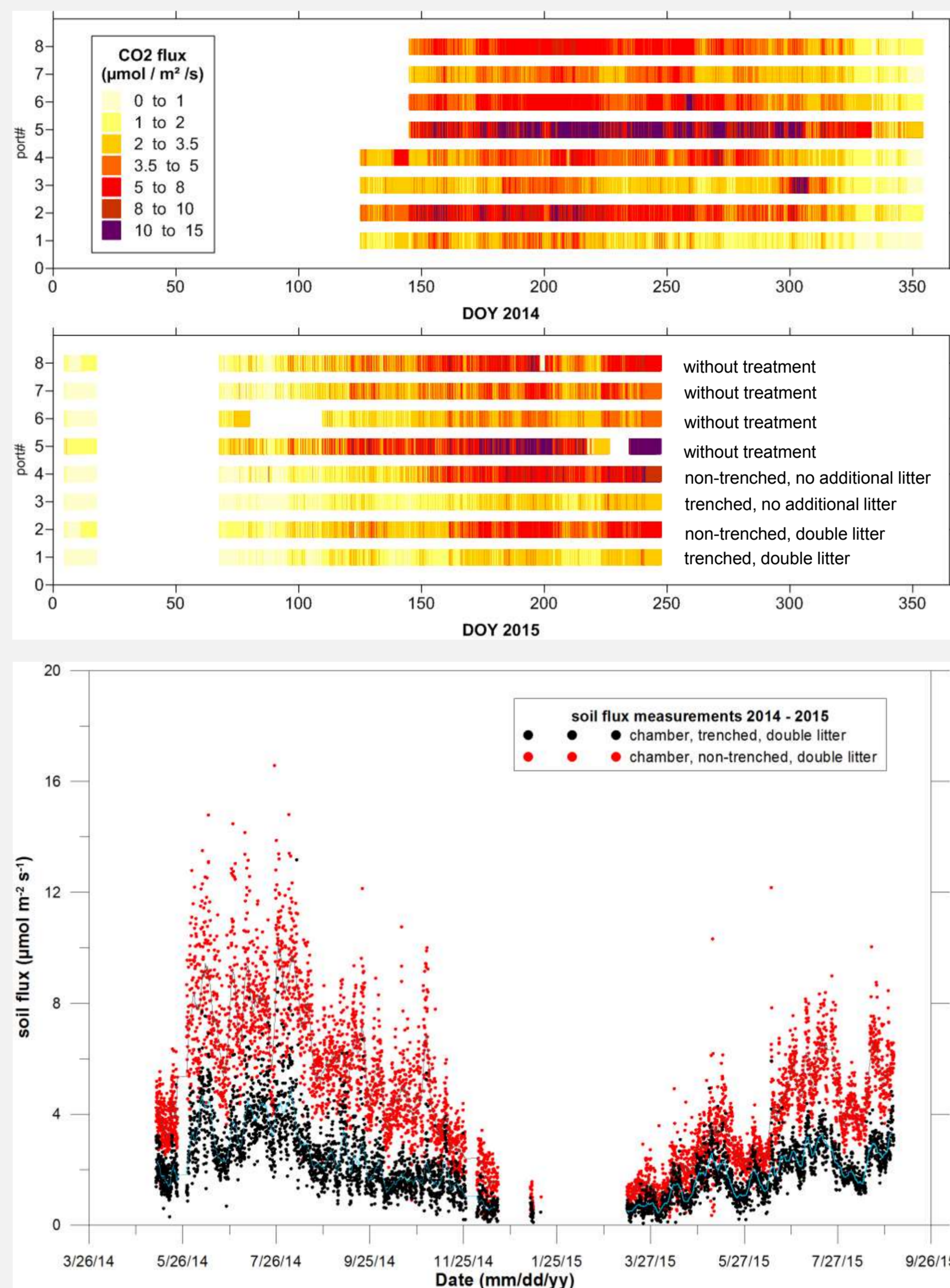


Soil respiration measurements

- Determination of **spatial and temporal variability** of soil gas fluxes within the footprint area → **carbon cycle**
- Estimation of **autotrophic and heterotrophic** parts of soil respiration
- Verification of **abiotic influences** (e.g., texture, soil temperature, soil moisture) on soil respiration



Forest site „Hohes Holz“ infrastructure: distribution of tree species and locations of soil respiration measurements.



Flux data of all 8 continuous chambers

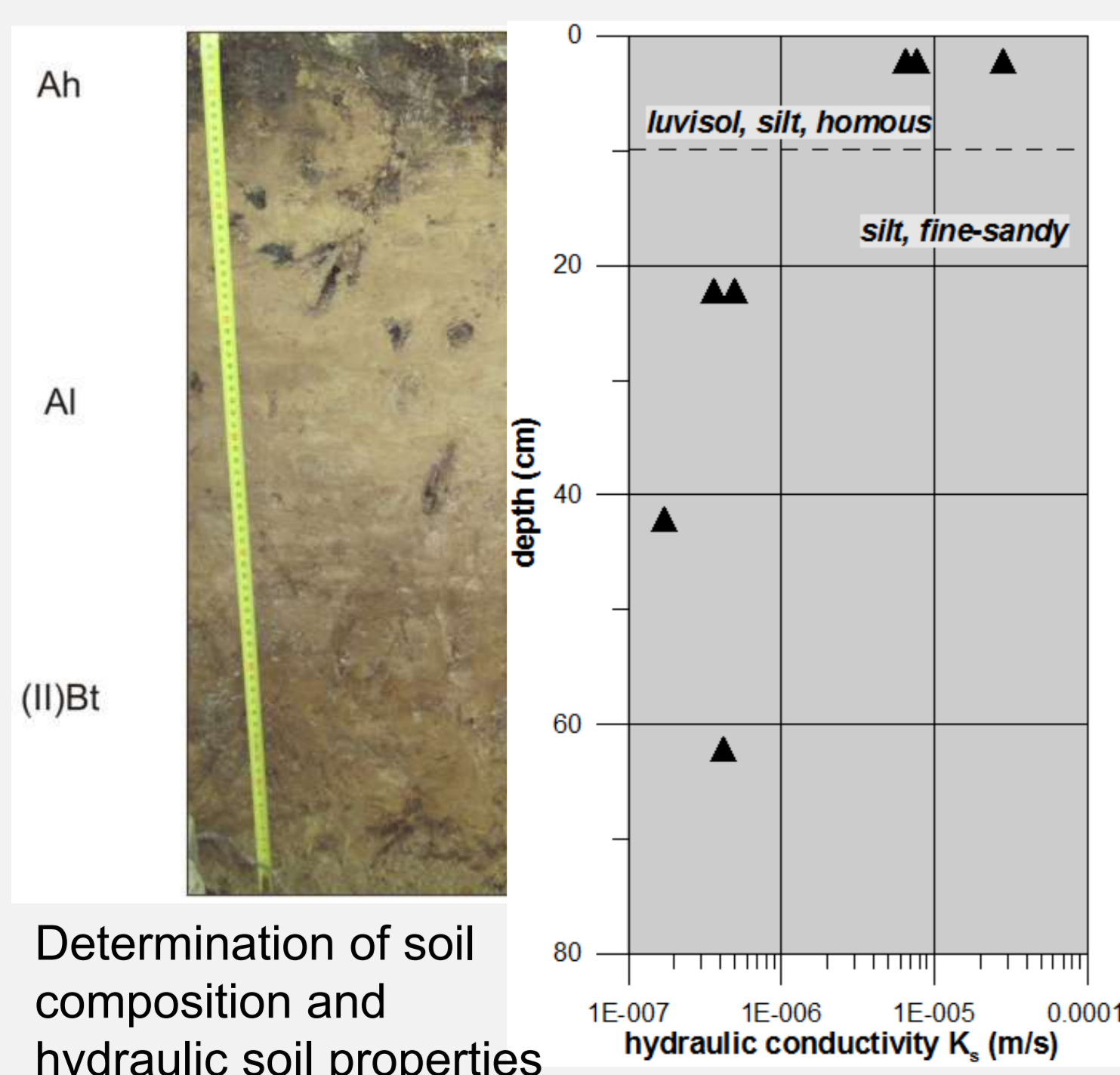
- Start of trenching experiment in May 2014 (winter break January – March 2015)
- Data acquisition in progress
- Combination of continuous chamber measurements with instantaneous surveys using portable chambers

Trenching experiment

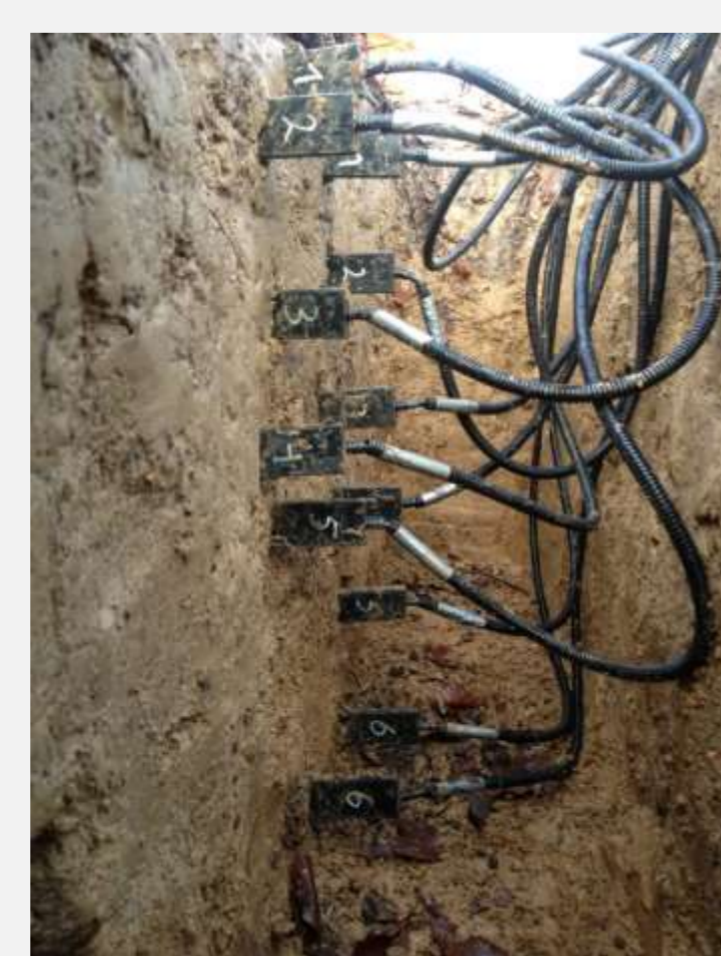
- Comparison of non-trenched plots and trenched plots, at both additional litter added
- Significant higher soil CO₂ fluxes in non-trenched plots → increased microbial activity due to rhizosphere
- Decreased flux rates in both plots in 2015 compared to 2014 → influence by the lower soil water content

Soil moisture / soil temperature sensor network

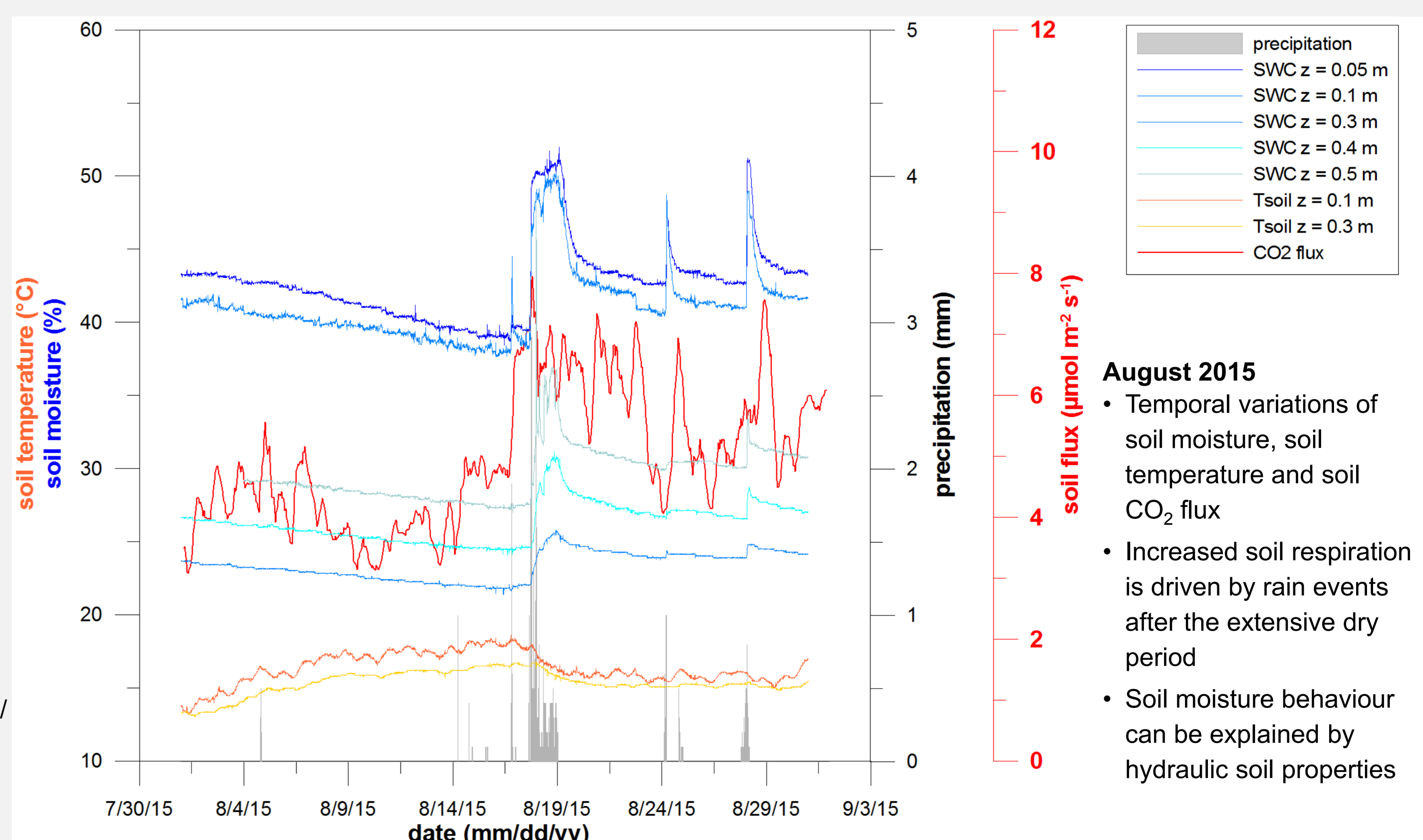
- Determination of **spatial and temporal variability** of soil moisture and soil temperature within the footprint area → **hydrologic cycle + energy flux**
- Estimation of influences on soil respiration / carbon flux driven by **abiotic soil parameters**



Determination of soil composition and hydraulic soil properties



Installation of soil moisture / soil temperature sensors in different depths



August 2015

- Temporal variations of soil moisture, soil temperature and soil CO₂ flux
- Increased soil respiration is driven by rain events after the extensive dry period
- Soil moisture behaviour can be explained by hydraulic soil properties