

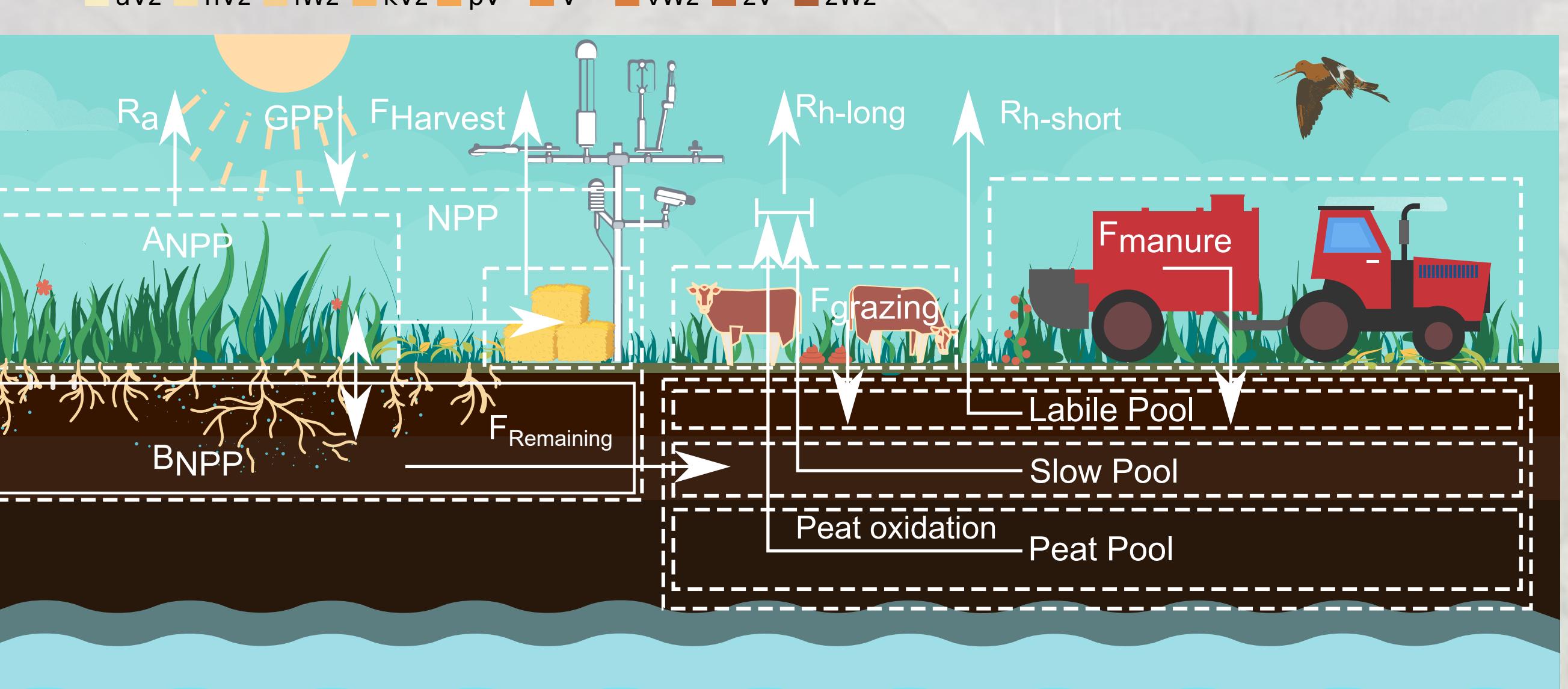
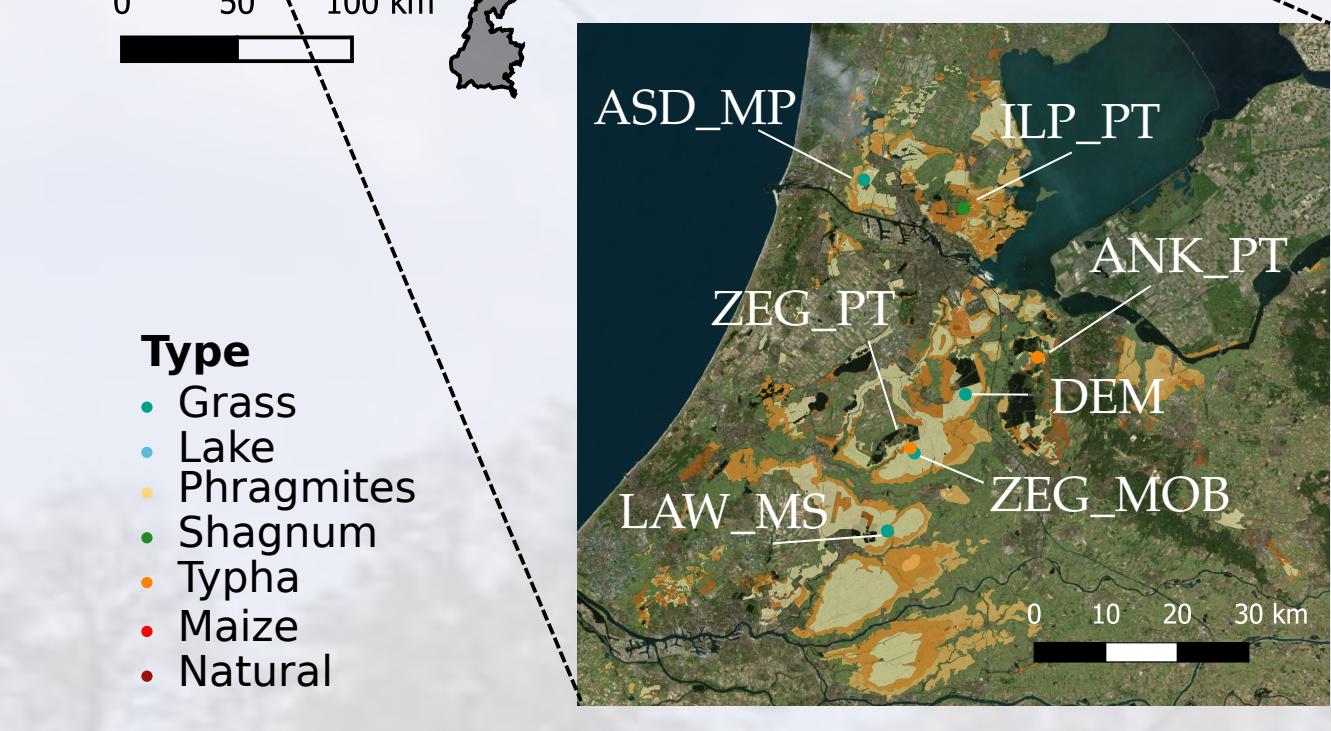
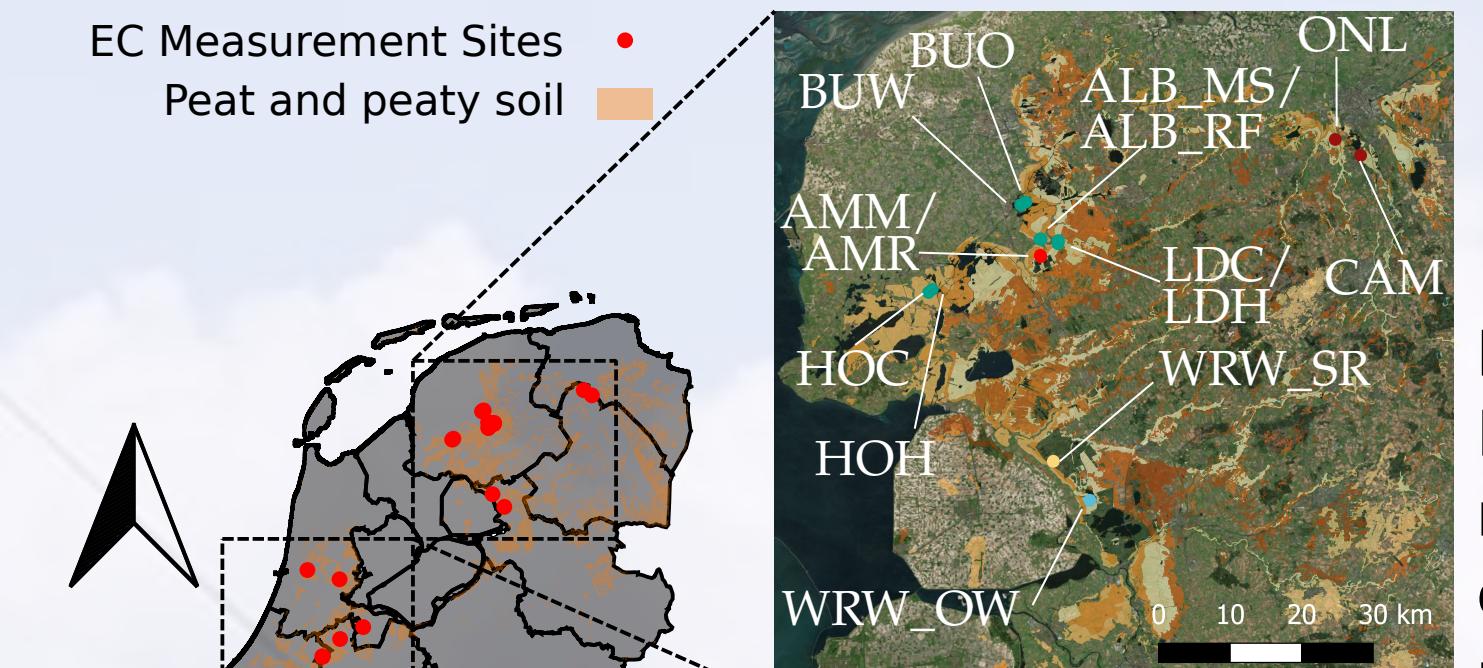
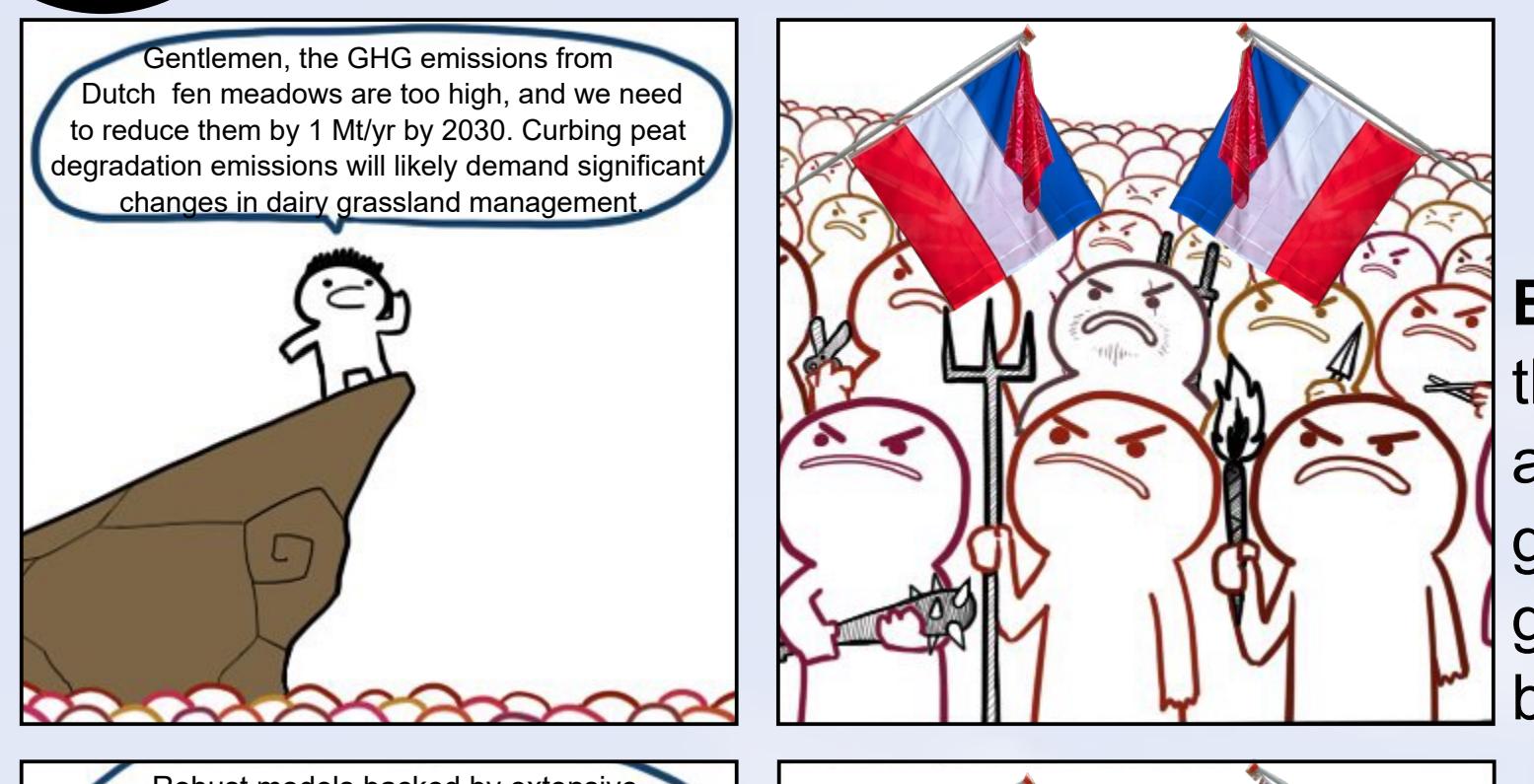


# Mobile Eddy-Covariance tower network in the Dutch peatlands

## Data-driven gapfilling creating site-specific Ecosystem Response Functions

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### 1 Introduction



NECB can be formulated as a function of NEE and other fluxes described as :

$$\begin{aligned} \text{NECB}_{\text{CO}_2} &= \text{NEF}_{\text{CO}_2} + \text{F}_{\text{Harvest}} - \text{F}_{\text{grazing}} - \text{F}_{\text{manure}} \\ &\approx \text{NPP} + \text{R}_{\text{h-short}} + \text{R}_{\text{h-long}} - \text{F}_{\text{grazing}} - \text{F}_{\text{manure}} \end{aligned}$$

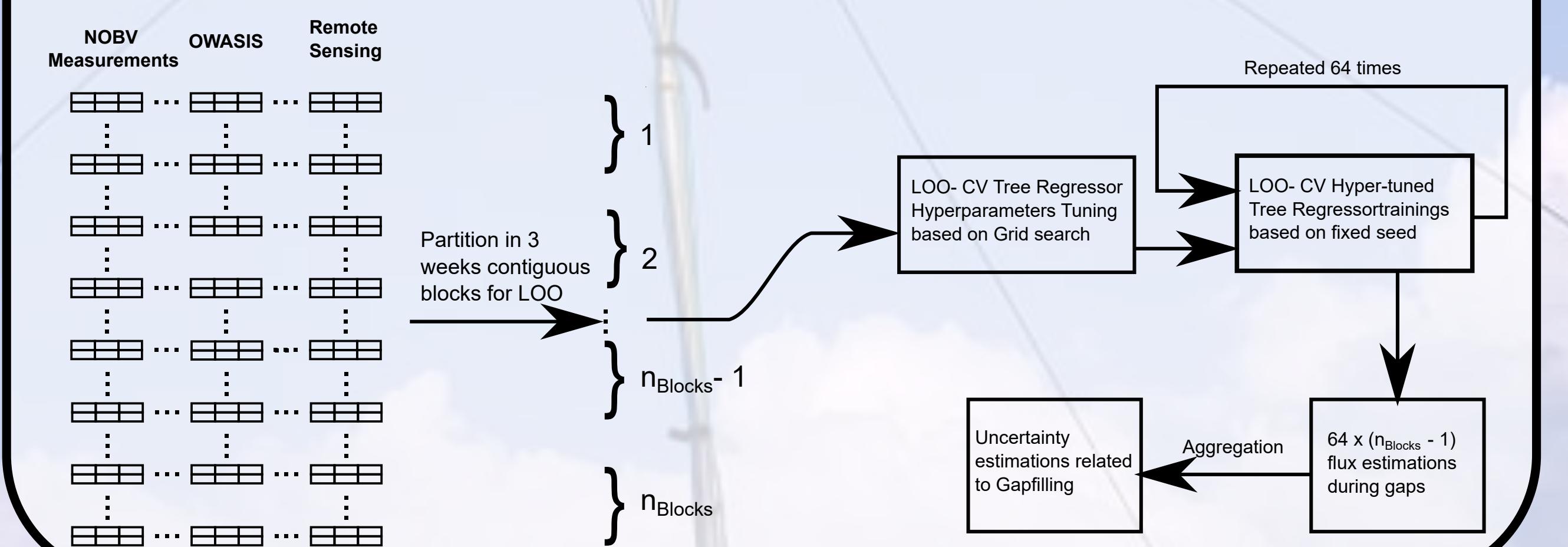
### 2 Objectives & Methodology

#### Objectives

- Develop a ML framework adapted to the mobile EC specificities
- Estimate the uncertainty introduced by the gap-filling algorithm and focus on the model interpretability.
- Partition the fluxes in order to isolate the peat-degradation related ones.
- Develop a data-driven bottom-up model based on Eddy-Covariance Measurements

#### Methodology

- EC Data are prefiltered to ensure data quality.
- Tree regressors (Random Forest and Gradient Boosted Trees) were selected
- Besides NOBV measurements, other external external data sources including remote sensing (NDVI/FAPAR timeseries) and the outputs of OWASIS (proxies of groundwater table depth and top-soil moisture at a daily rate and moderate resolution).
- Gapfilled signals are partitioned through day partitioning, manure inputs/harvest are collected via the each parcel managers.



### 5 Conclusion

- Maize crops on peat tends to be outliers
- The natural area and paludicultures shows lower emissions and the best described by ML, also submitted to the lower anthropic disturbance, while intensive grassland showed the highest uncertainty and dispersion.
- The impact of mitigation measurements is limited but this trend needs longer measurement
- The sensitivity of NECB to Mean Groundwater depth is consistent with literature. Slopes of EC and CC are comparable for studied areas, intermediate.
- Optimal cutting points for NECB are located in Jan/Feb

#### Further Research Plans

- Replacing the tree regressors by a Deep-learning, testing specialized architectures, able to take into account measurement uncertainties estimated via EC computation tools.
- Include landscape flux footprint to consider the potential surroundings heterogeneities (ditches, wet vegetation surrounding grassland,...).
- Use a more related EC signals, e.g. energy fluxes
- Make use of Mowing/Grazing detection based on Remote Sensing as additional data
- Develop a data-driven bottom-up model based on EC Measurements

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Abstract



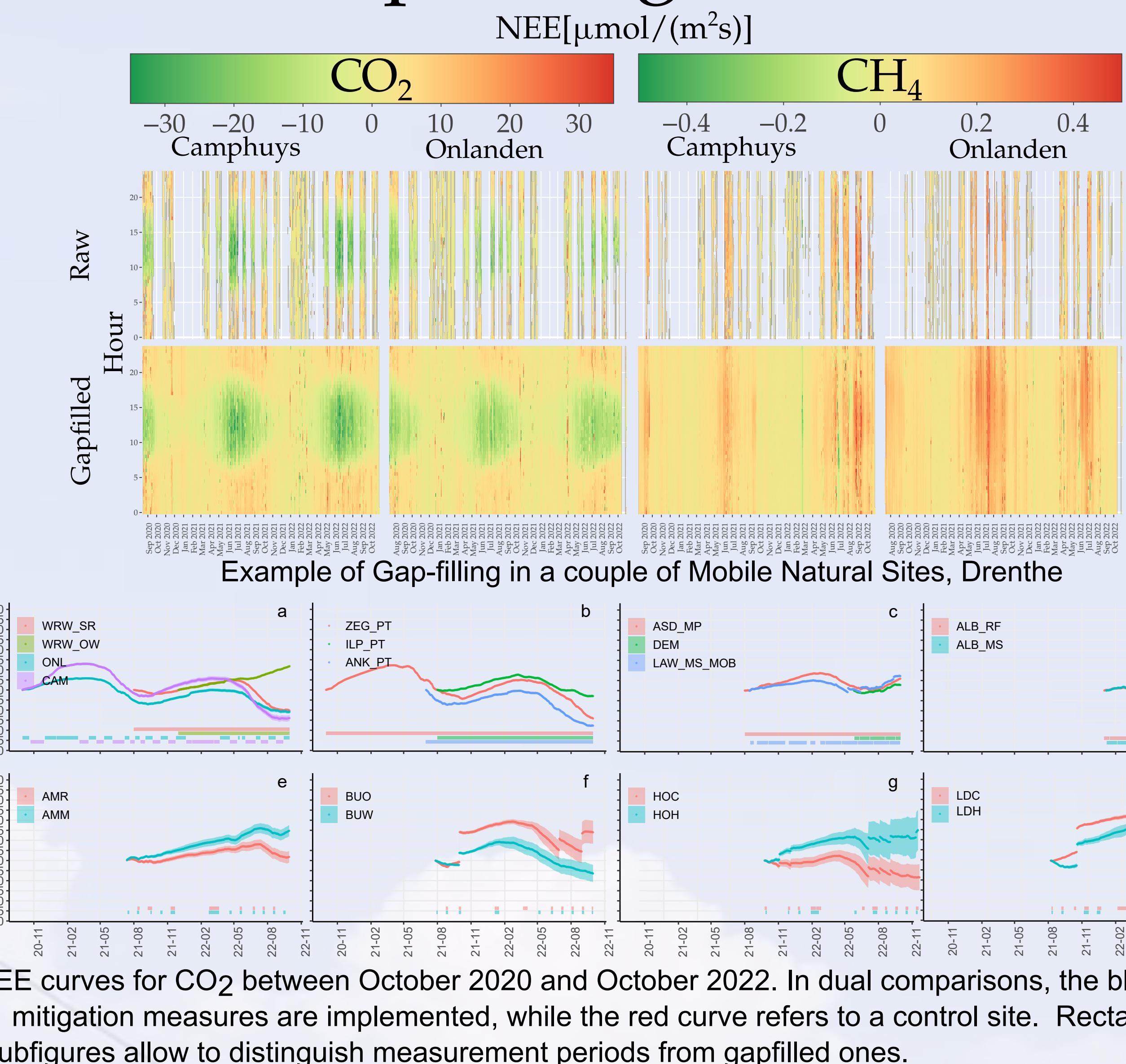
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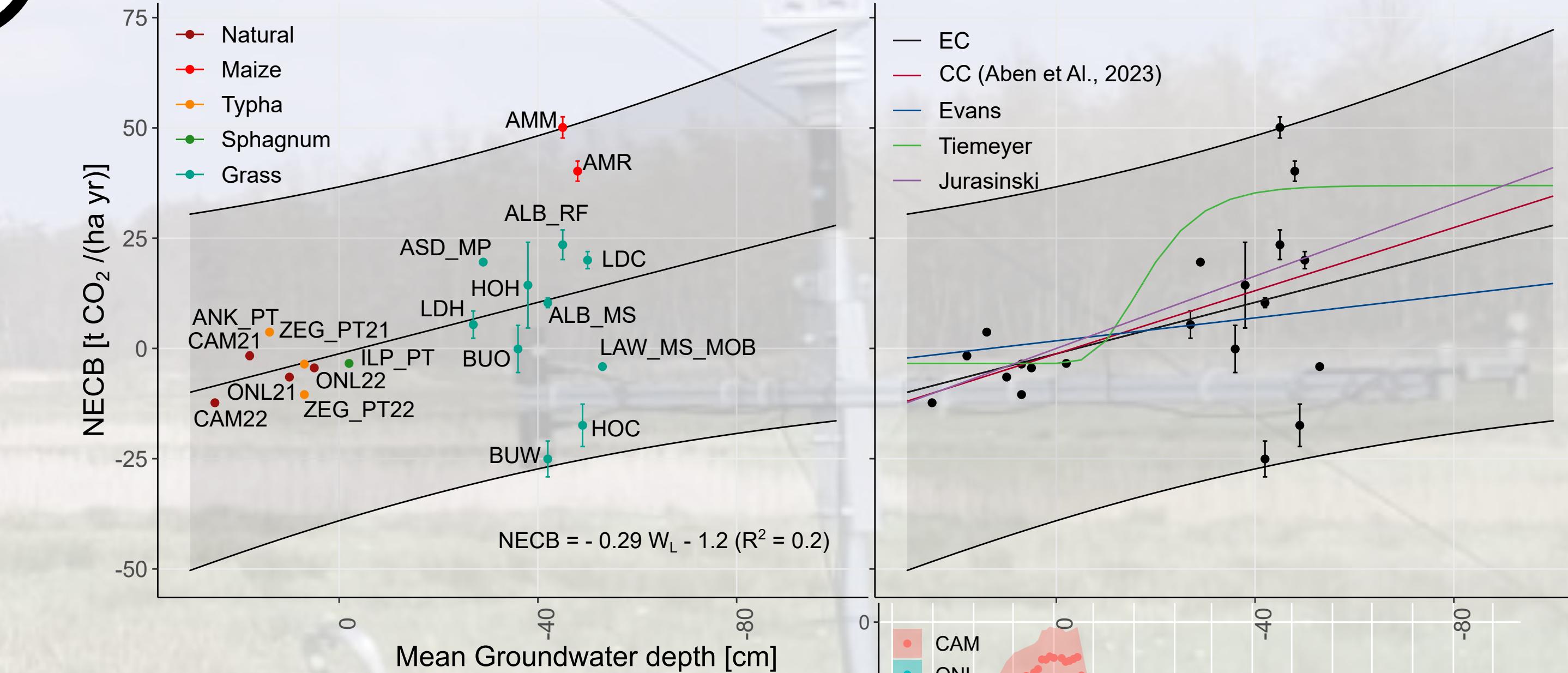
Bibliography  
NOBV Website



### 3 Results - Gap-filling



### 4 Results annual NECB



Relationship between mean groundwater depth and NECB in the different sites.

left - NECB data and site typology and right-comparison with other models (EC: this study; CC: chamber data)

bottom - Annual total NEE dependent on the start date for integration

