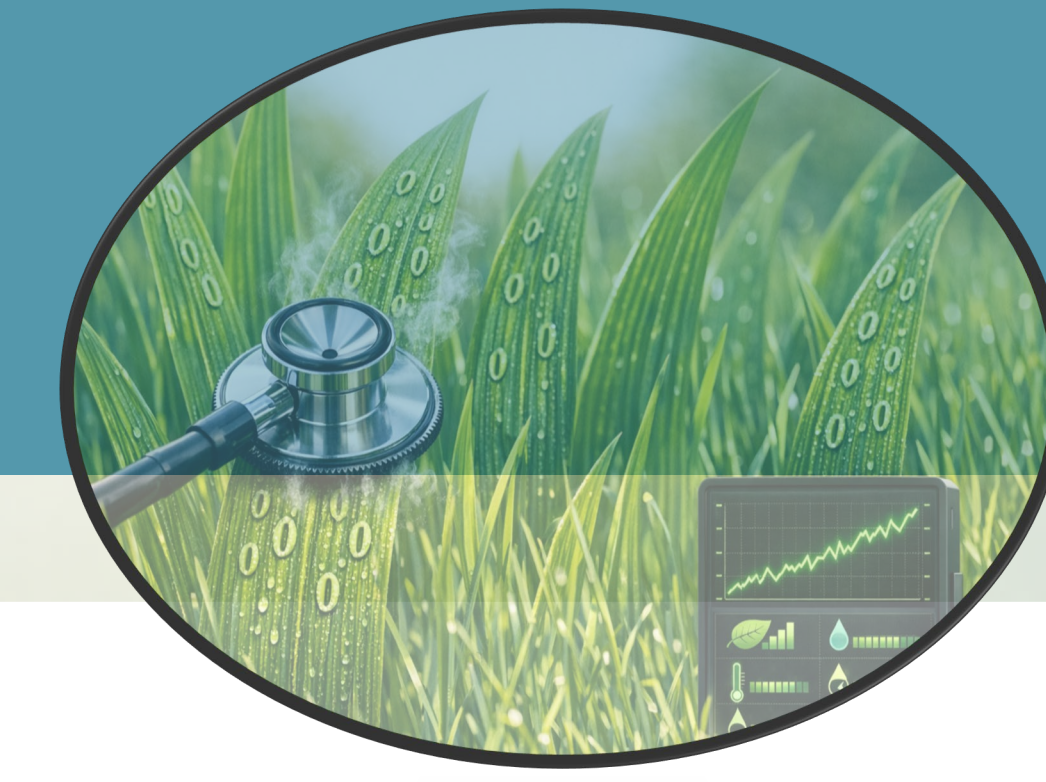




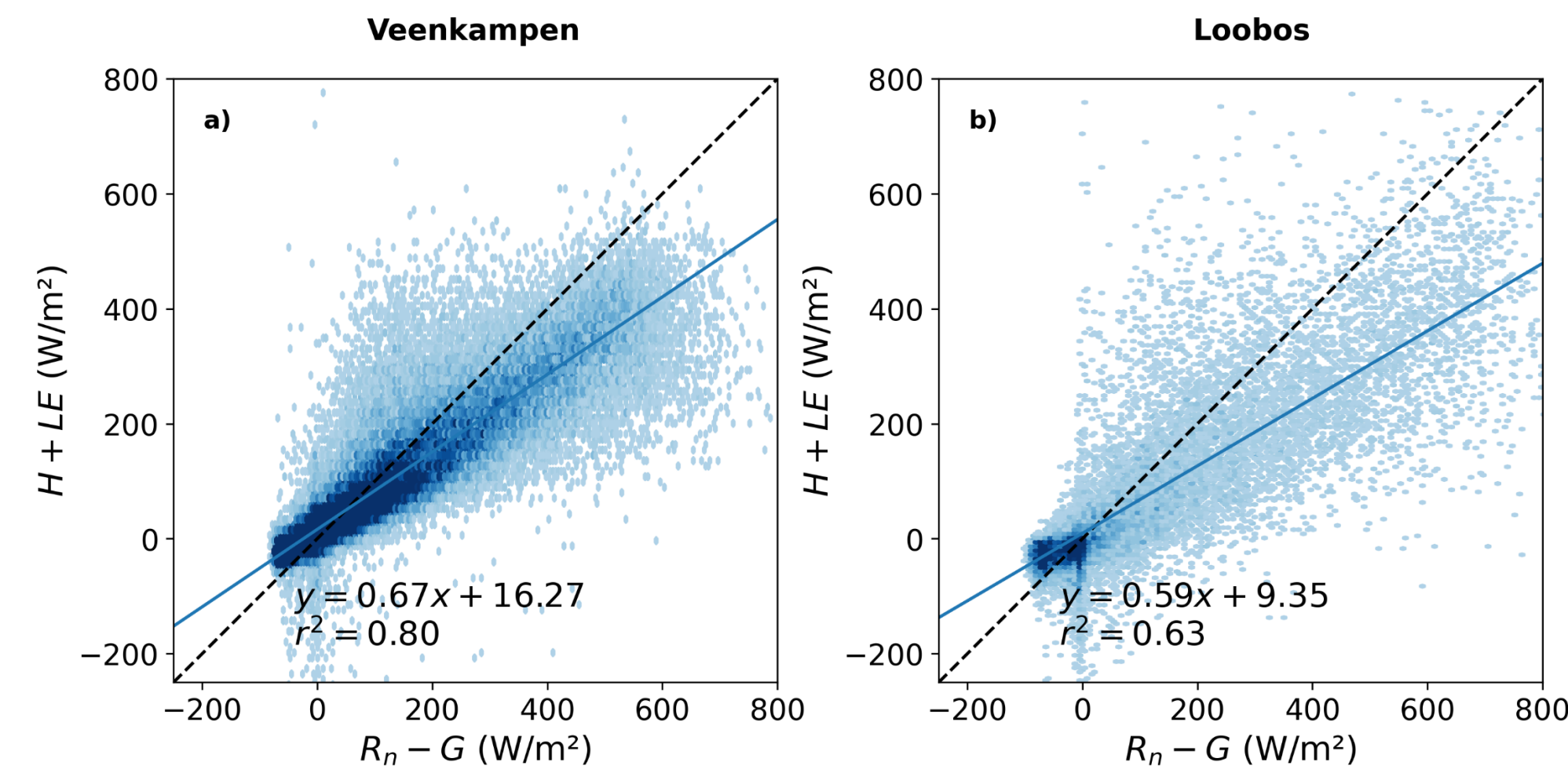
Diagnosing LE: where models and observations match or disagree

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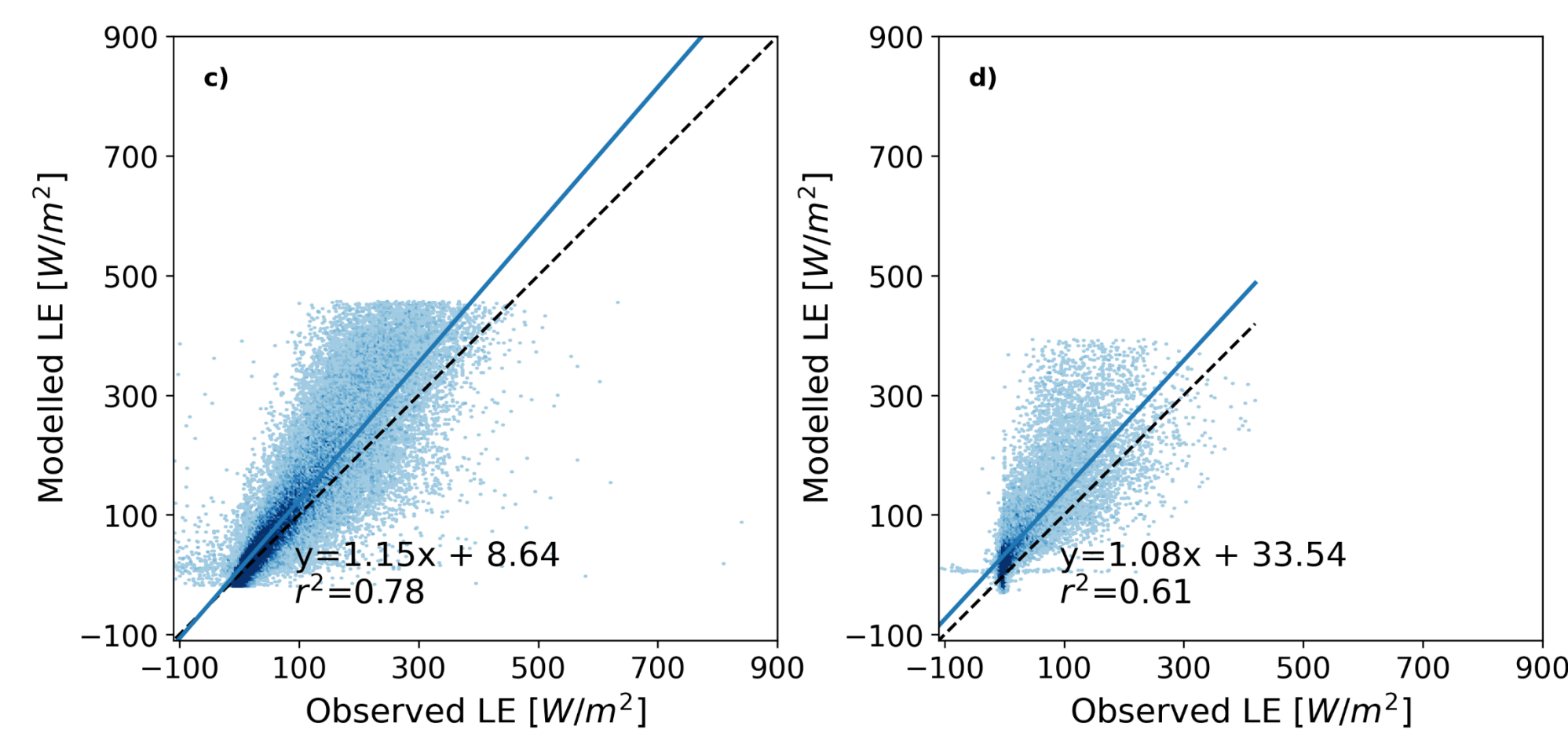


The problem

Surface Energy Balance does not close: $Q_n - G - H - LE \neq 0$



One of the main culprits: Latent heat flux (LE)

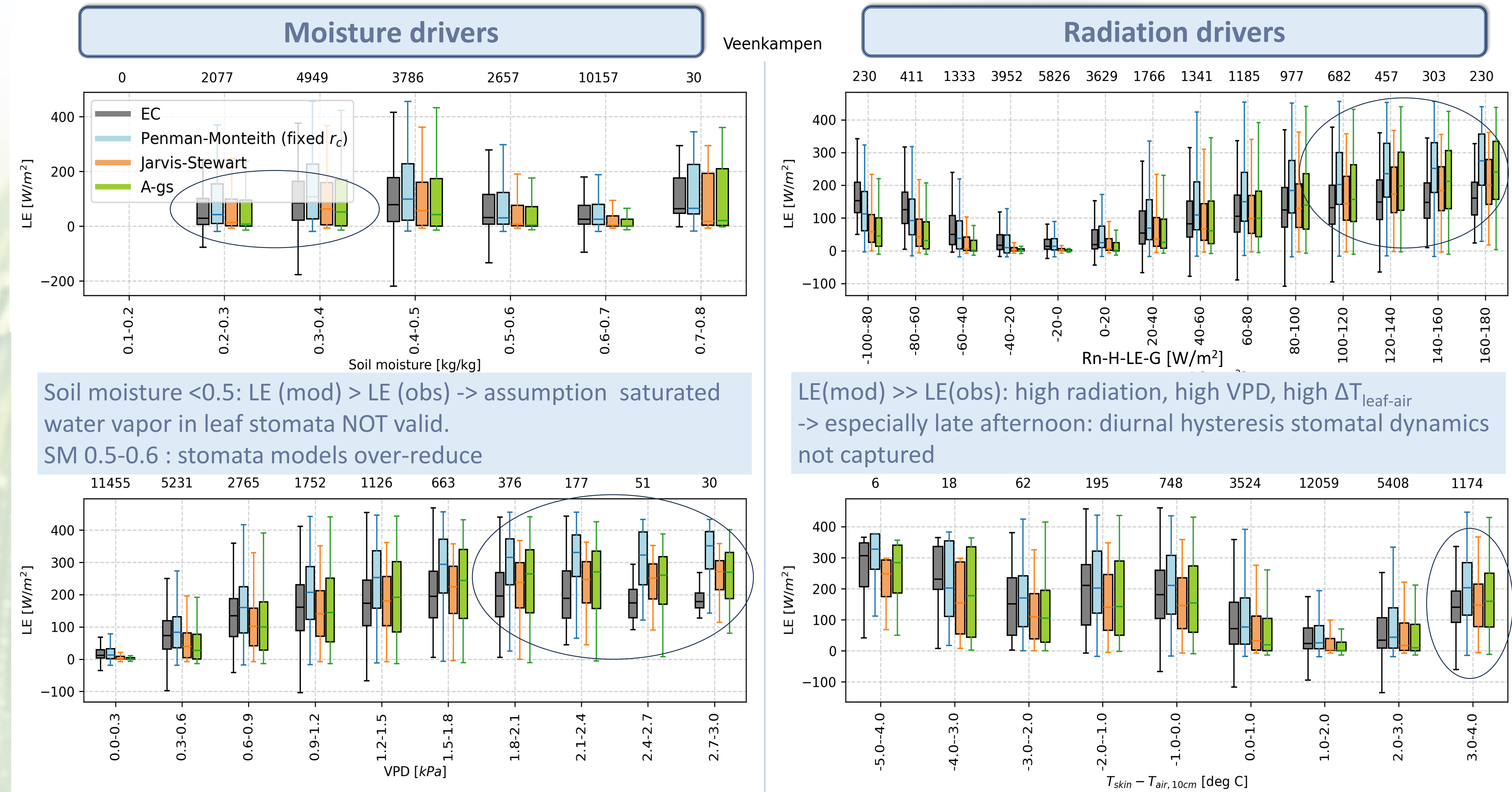


Common Modeling approach: Penman-Monteith (PM)

Questions:

1. Are assumptions PM violated?
2. Mismatch LE flux models vs observations: under what conditions?
3. Can models capture complexity of stomatal behavior?

Results - 2. Dominant mismatch conditions

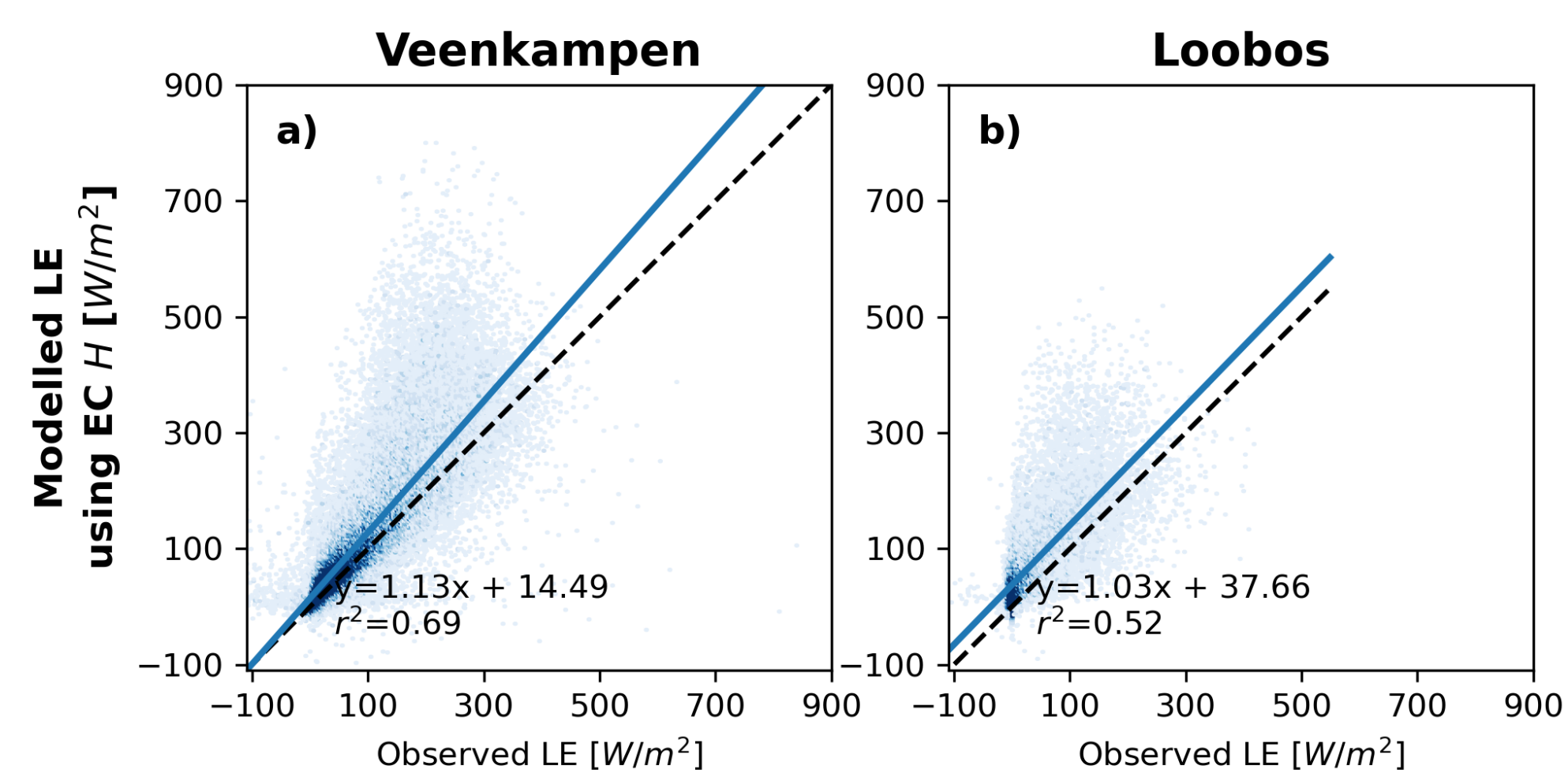


Soil moisture <0.5: LE (mod) > LE (obs) -> assumption saturated water vapor in leaf stomata NOT valid.
 SM 0.5-0.6 : stomata models over-reduce

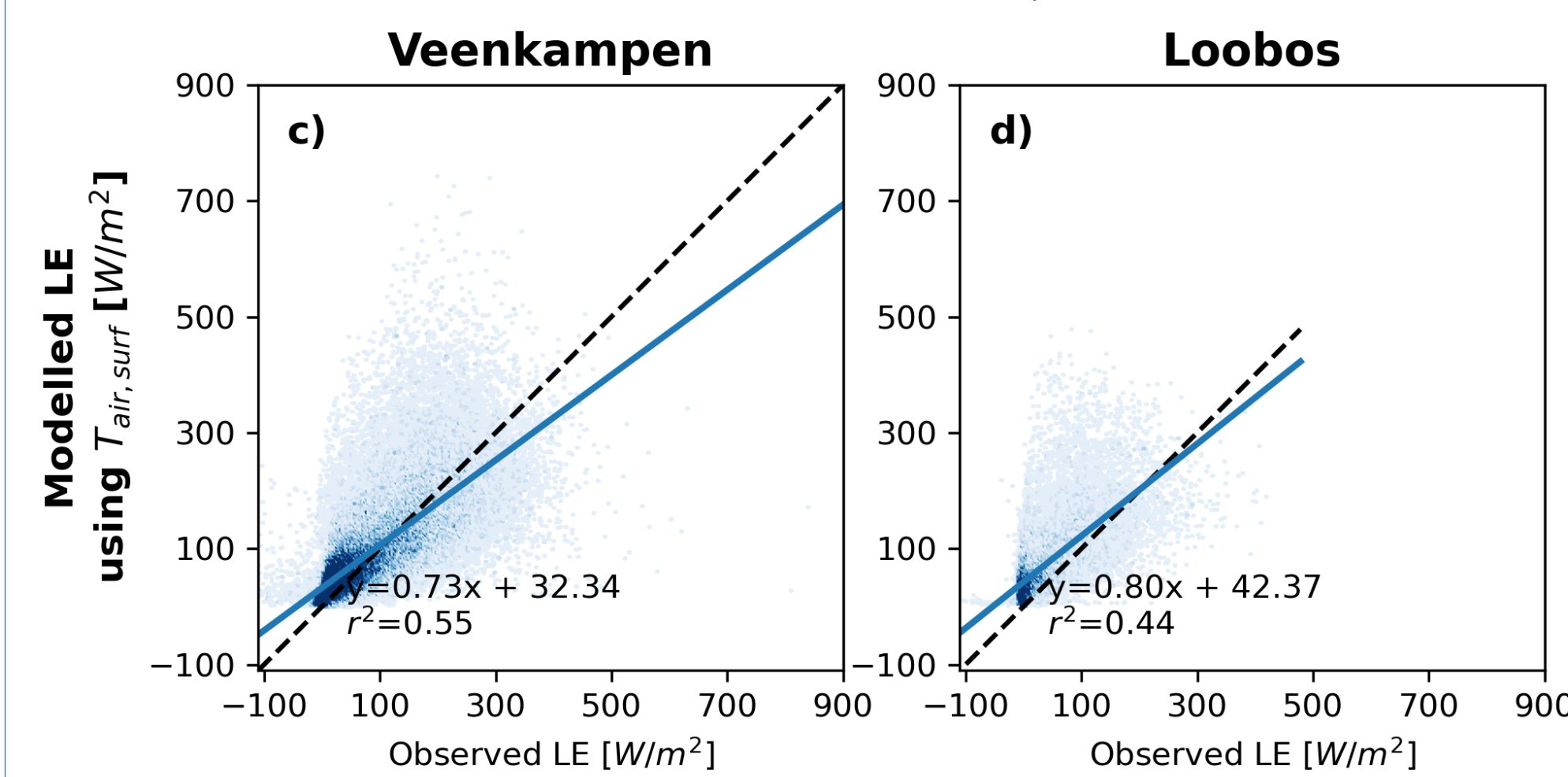
LE(mod) >> LE(obs): high radiation, high VPD, high $\Delta T_{leaf-air}$
 -> especially late afternoon: diurnal hysteresis stomatal dynamics not captured

Results - 1. Assumptions PM

SEB closure: -> Replace by observed H



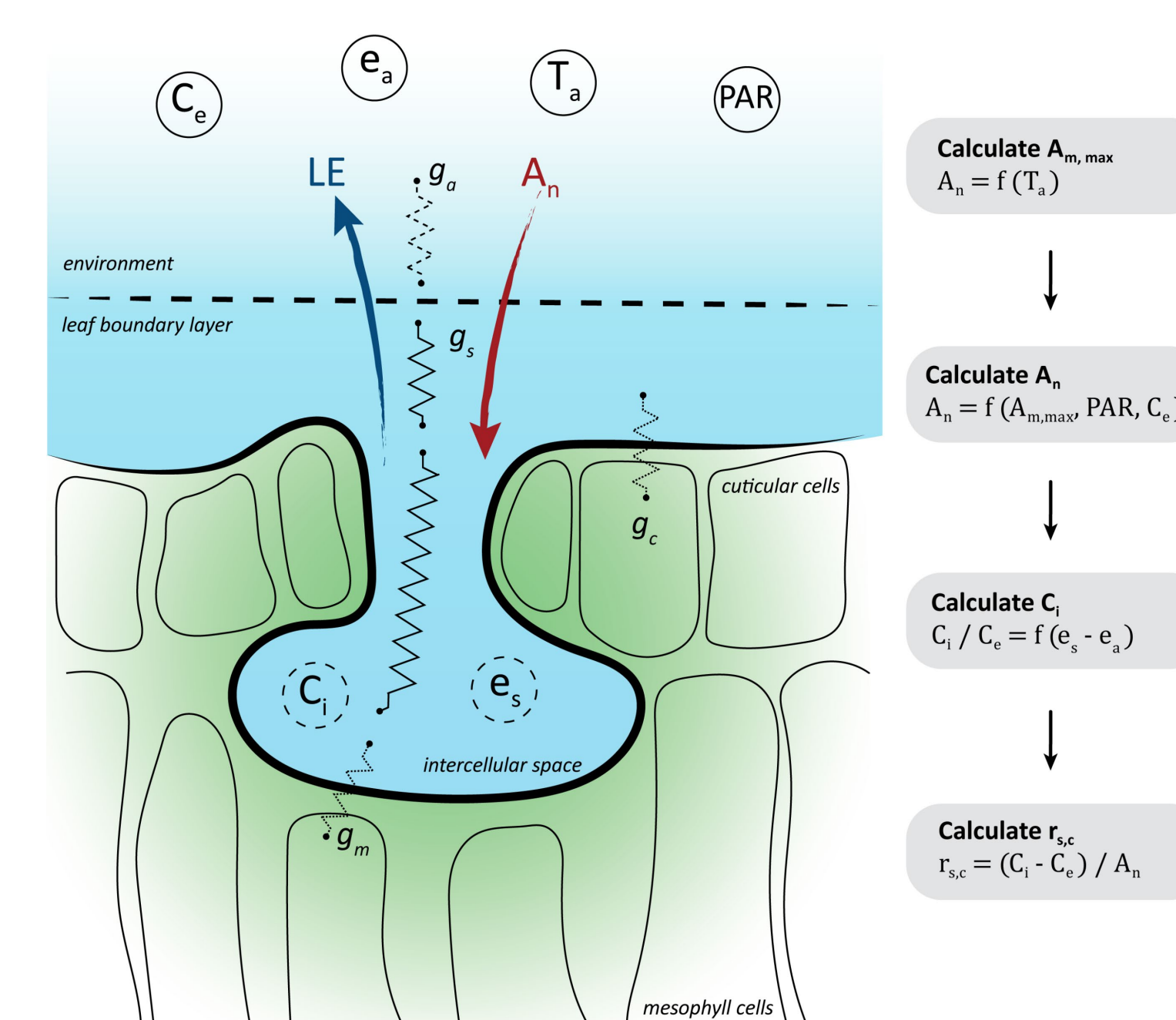
Linearization surface temperature: -> Replace by observed $T_{air,surface}$



Replacing assumptions by observations does not improve modelled LE estimates:

- Same order overestimation modelled LE flux (H_{obs} left) cq underestimation ($T_{air,surf}$ right)
- Poorer correlation (r^2)

Results - 3. Complex stomata behavior



Stomata models: PM-fixed r_c , Jarvis&Stewart, A-gs



Dynamic stomatal resistance models (Jarvis-Stewart and A-gs) do not improve the agreement between modelled LE and observations -> need to revisit dynamic stomata behavior.

Future work:

High resolution observations of temperature, moisture and wind velocity gradients and fluxes inside and above canopy: roles of aerodynamic versus stomatal resistance at top of canopy

→ Check out poster X5.68