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kw35262

“Big Leaf” v.s. “Big Tree”:

Noah-MP land surface model with plant hydraulics scheme (Noah-MP-PHS) Evaluation

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Fig. Difference between the “Big leaf” and “Big tree” approach (extracted from Li et al., 2021).

What are “Big Leaf” and “Big Tree”?

“Big Leaf”

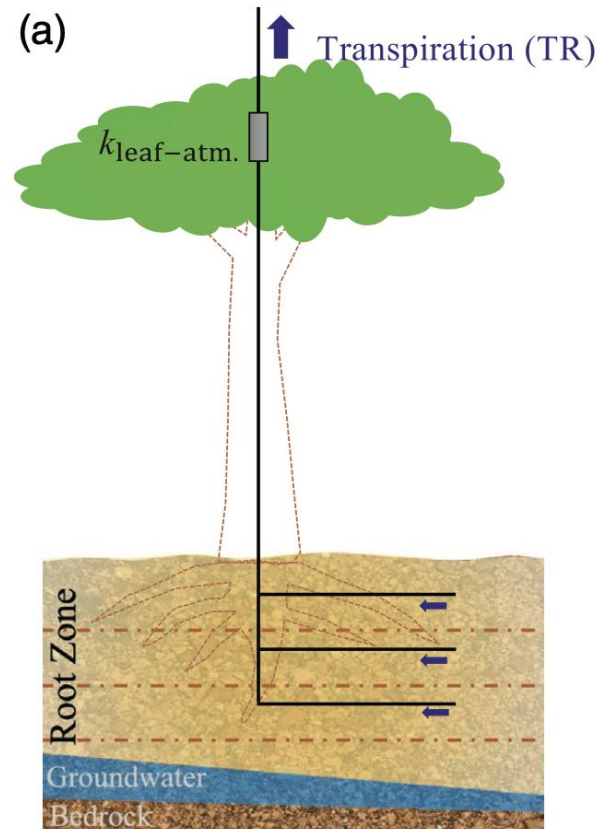
Soil moisture



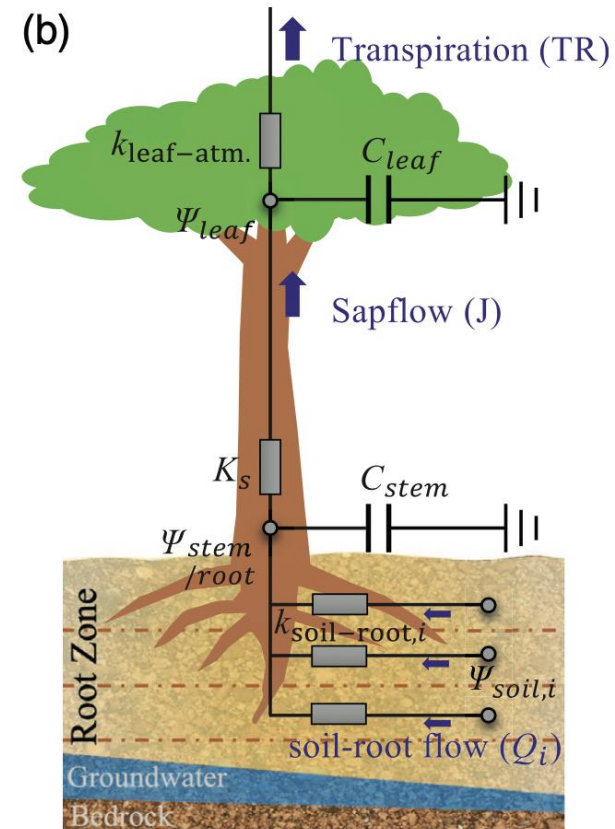
Carbon and water simulations



Uncertainties



SHS “Big Leaf”



PHS “Big Tree”

“Big Tree”

Soil moisture
<add> whole-plant hydraulics



Carbon and water simulations



Uncertainties
expect to reduce

Difference between the “Big leaf” and “Big tree” approach (extracted from Li et al., 2021).

What are “Big Leaf” and “Big Tree”?

“Big Leaf”

Soil moisture

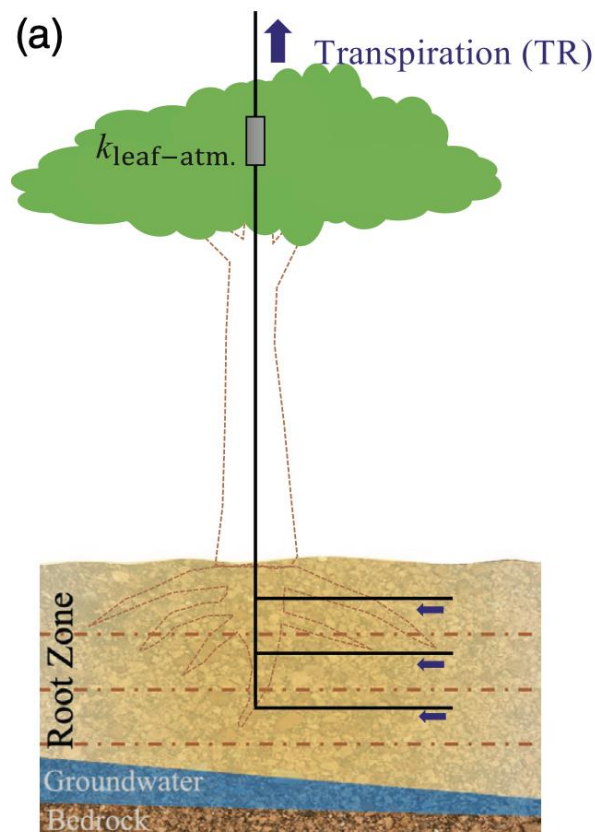


Carbon and water simulations

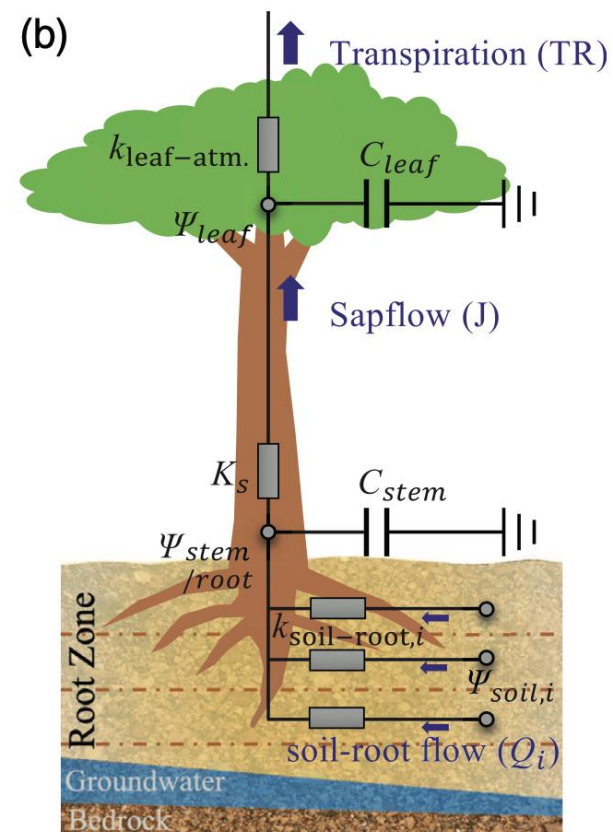


Uncertainties

Most land surface models, e.g.,
Noah-MP



SHS “Big Leaf”



PHS “Big Tree”

Difference between the “Big leaf” and “Big tree” approach (extracted from Li et al., 2021).

“Big Tree”

Soil moisture
<add> whole-plant hydraulics



Carbon and water simulations



Uncertainties
expect to reduce

Noah-MP-PHS

From Problem to Collaborators



Lingcheng Li

**Plant hydraulic
modeling**

PNNL



Daniella Rempe

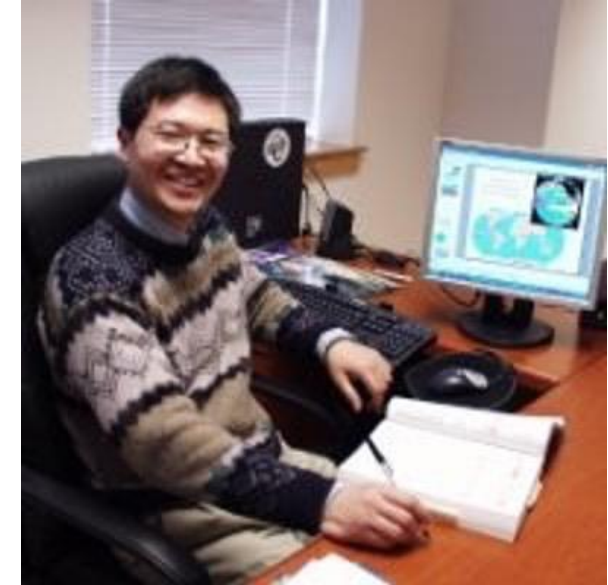
**Near-surface
hydrology**

UT-Austin



Ashley Matheny

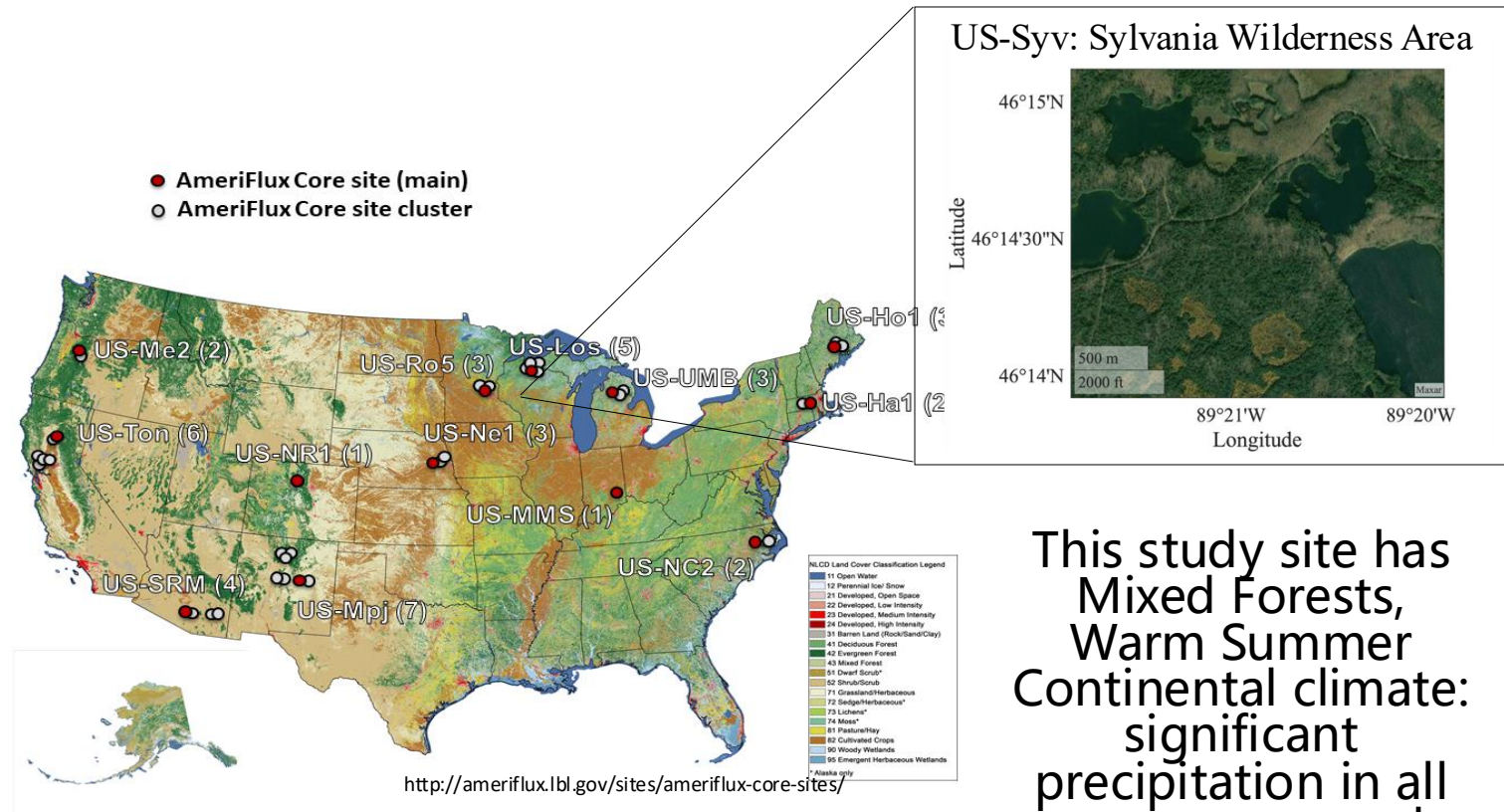
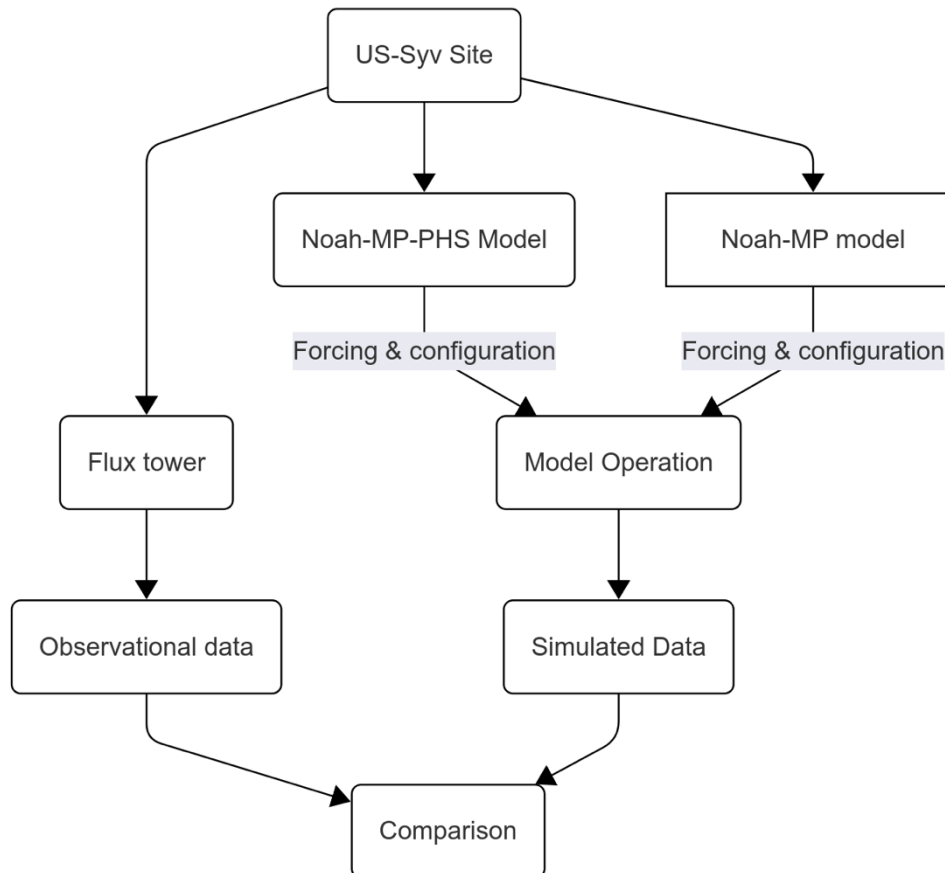
**Ecohydrologist
UT-Austin**



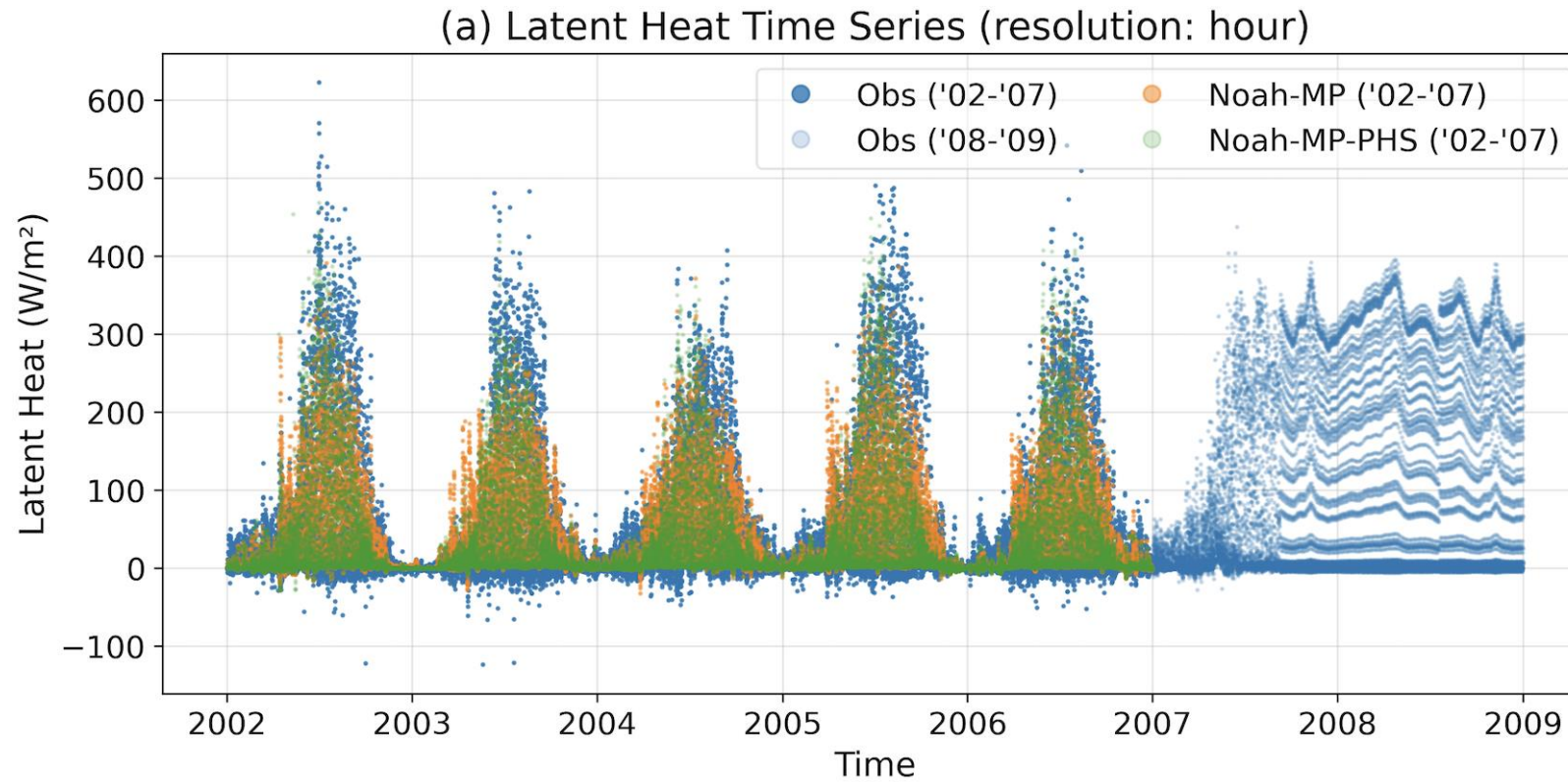
Zong-Liang Yang

**Land-surface
modeling
UT-Austin**

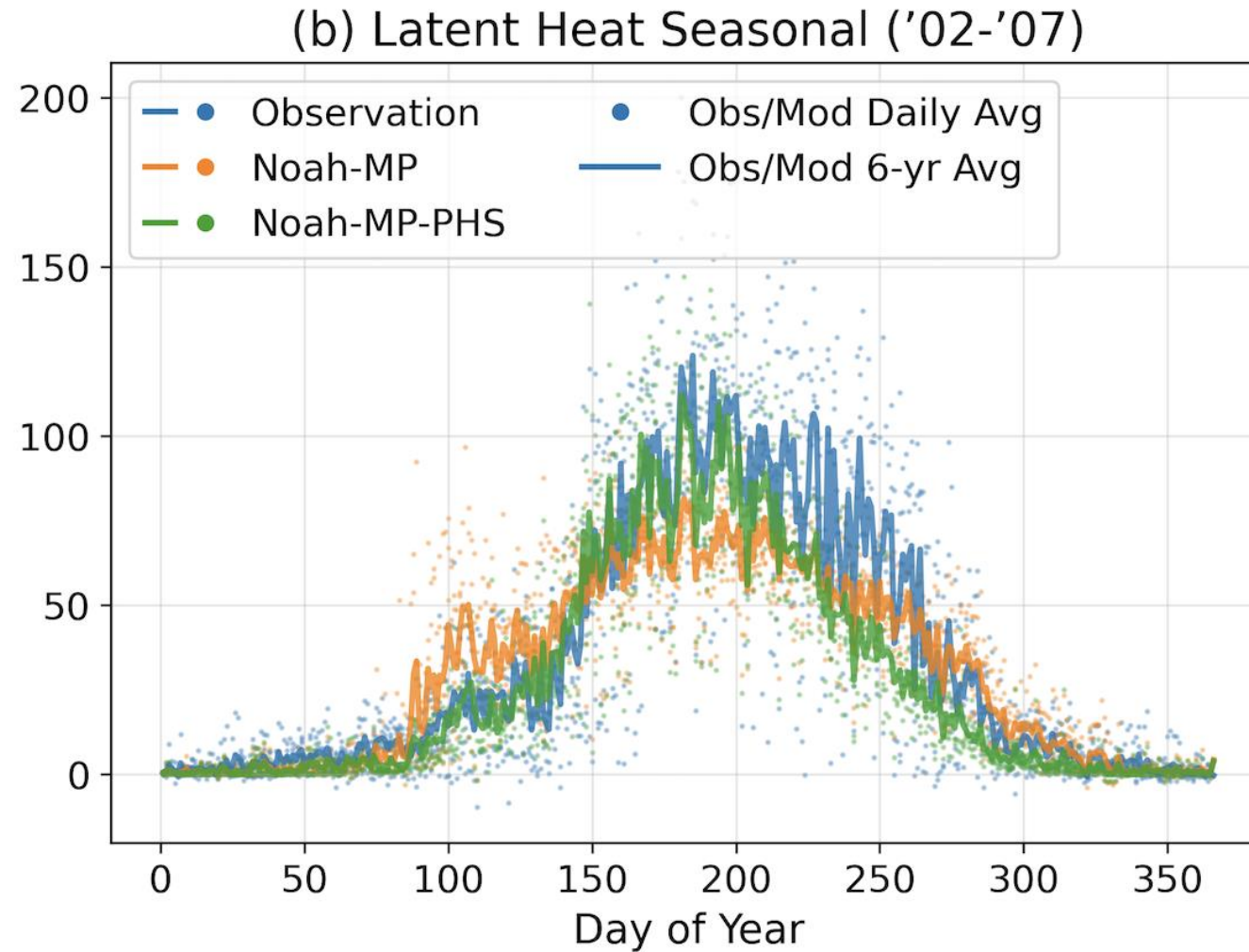
A specific problem: Noah-MP vs Noah-MP-PHS



Results: Noah-MP vs Noah-MP-PHS

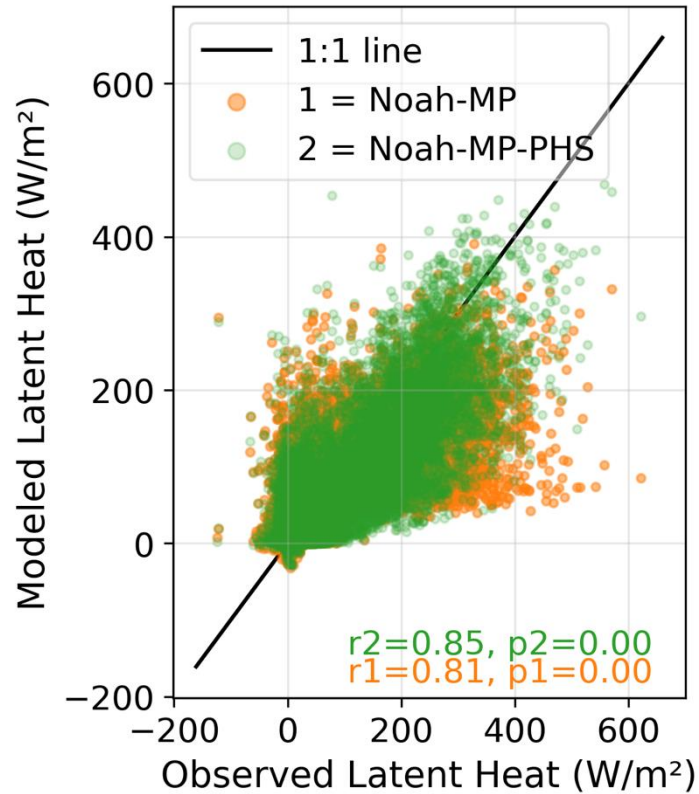


Results: Noah-MP vs Noah-MP-PHS

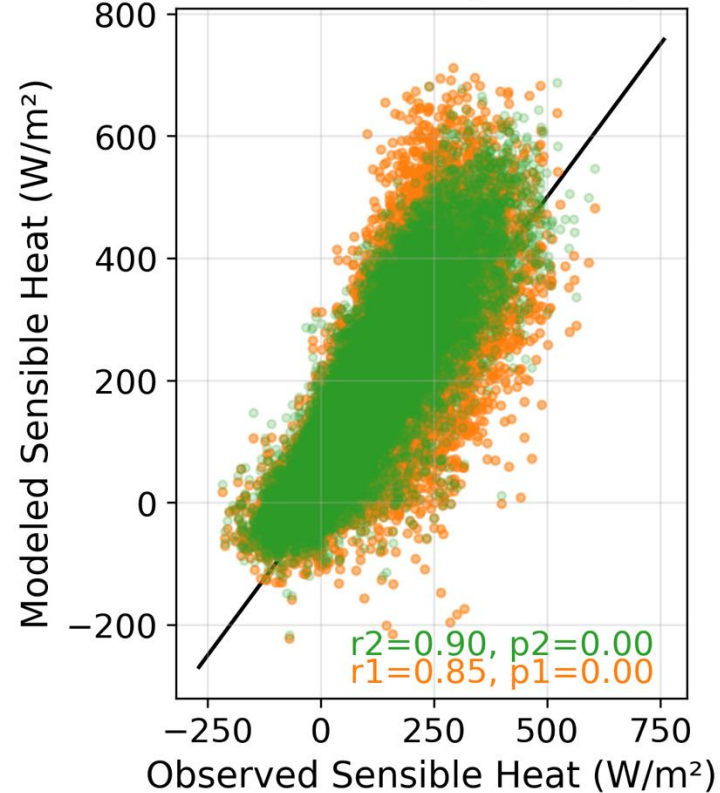


Results: Noah-MP vs Noah-MP-PHS

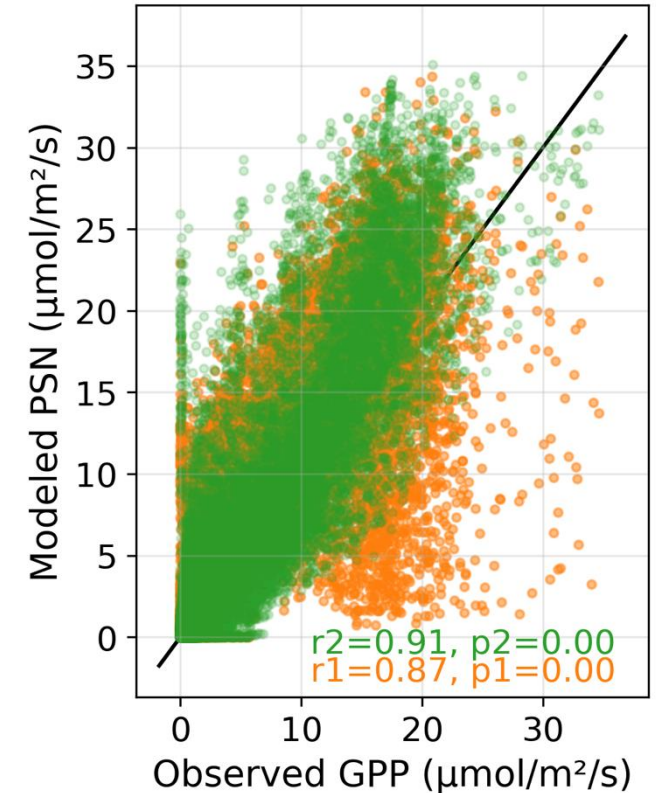
(c) Latent Heat Scatter Correlation ('02-'07)



(f) Sensible Heat Scatter Correlation ('02-'07)



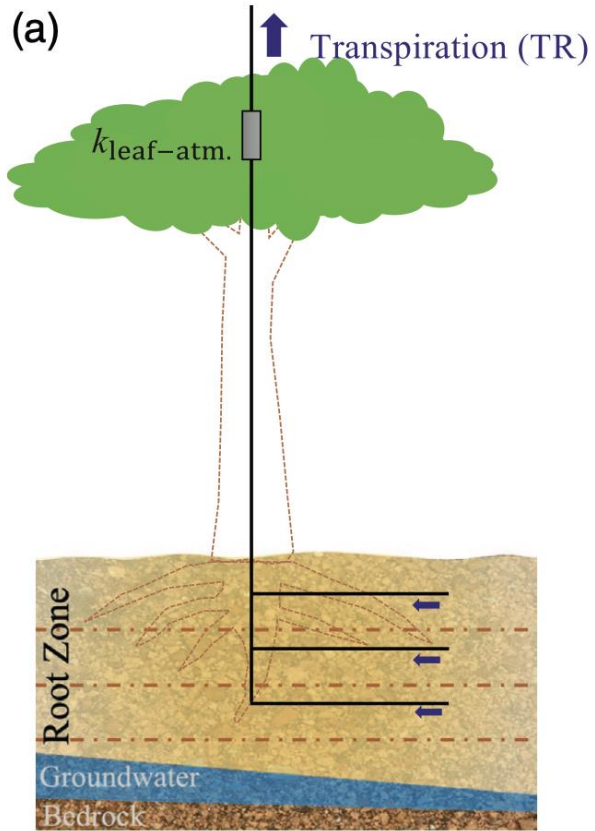
(i) GPP Scatter Correlation ('02-'07)



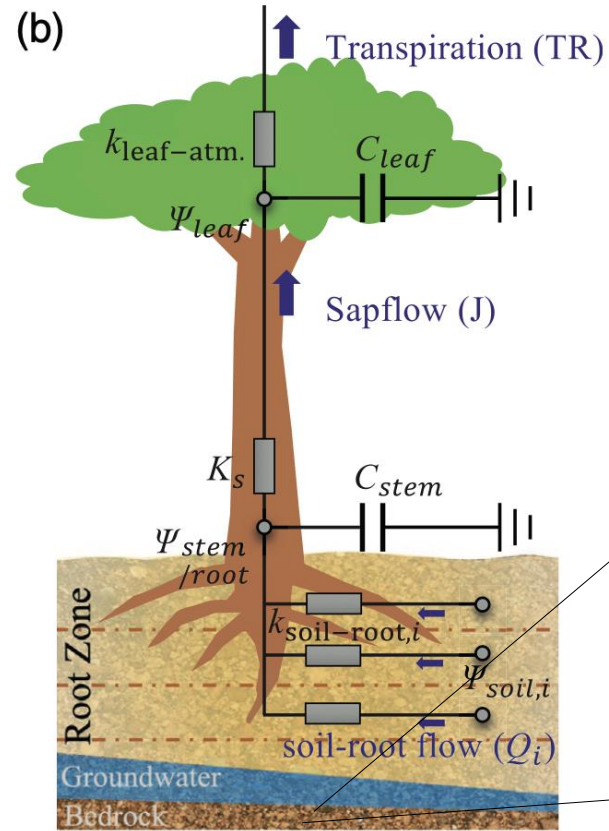
Results: Noah-MP vs Noah-MP-PHS

The Noah-MP-PHS land surface model robustly simulates water–carbon coupling at the US-Syv (Sylvania Wilderness Area) site during 2002–2007. The simulation results exhibit strong agreement with observational data, showing correlation coefficients for latent heat flux, sensible heat flux, and carbon flux as measured by Gross Primary Production (GPP).

Future: Noah-MP-PHS+X



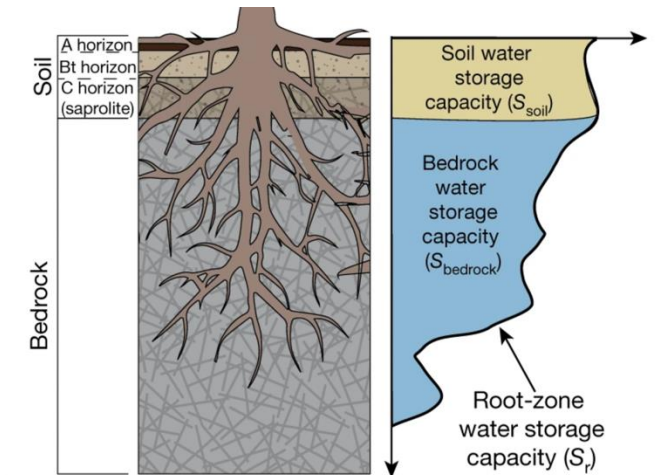
SHS "Big Leaf"



PHS "Big Tree"

X=
Bedrock...
...
Richards equation...
...

McCormick et al. (2021)



Thank you!

Any questions?

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