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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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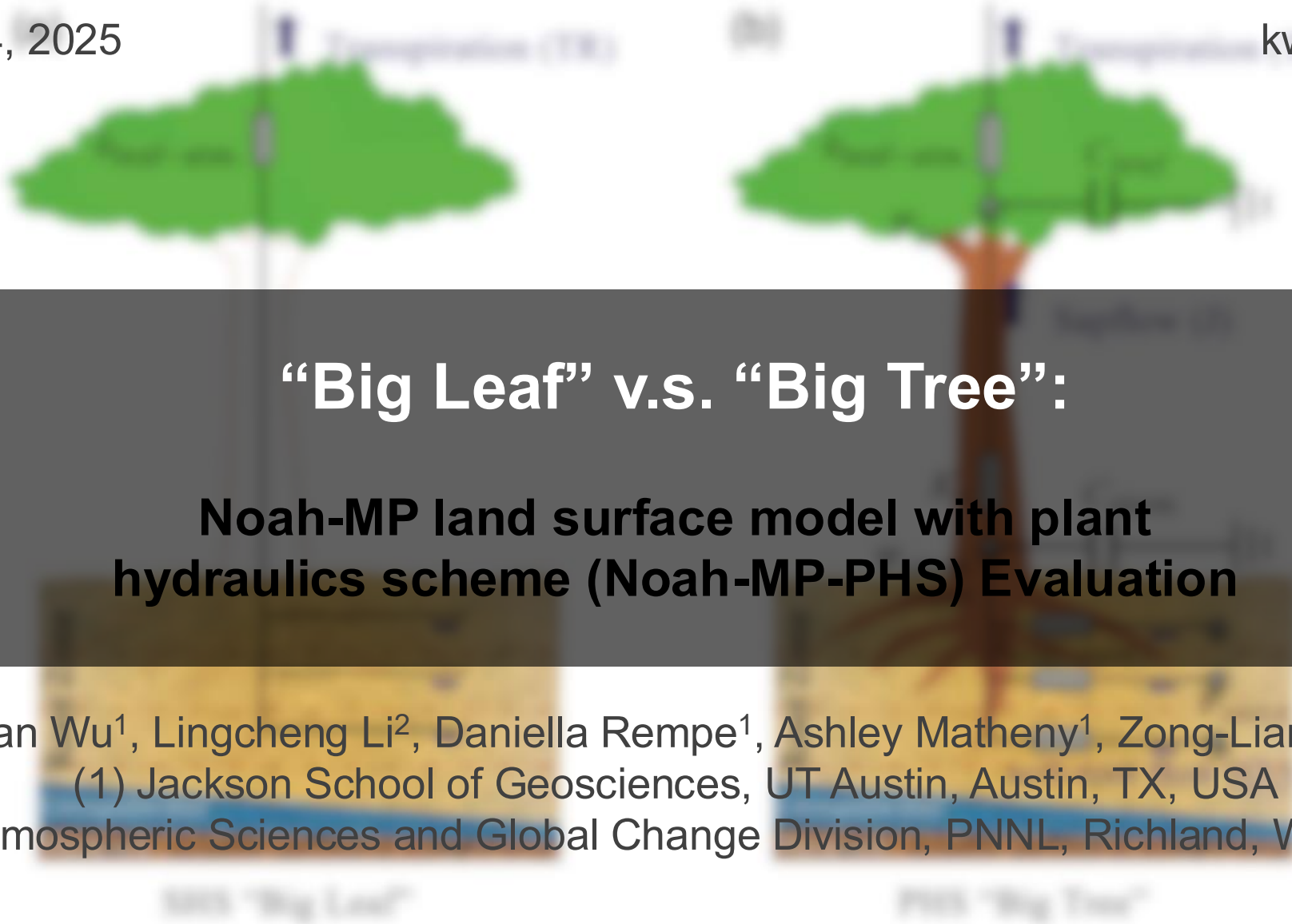


Fig. Difference between the “Big leaf” and “Big tree” approach (extracted from Li et al., 2021).

What are “Big Leaf” and “Big Tree”?

“Big Leaf”

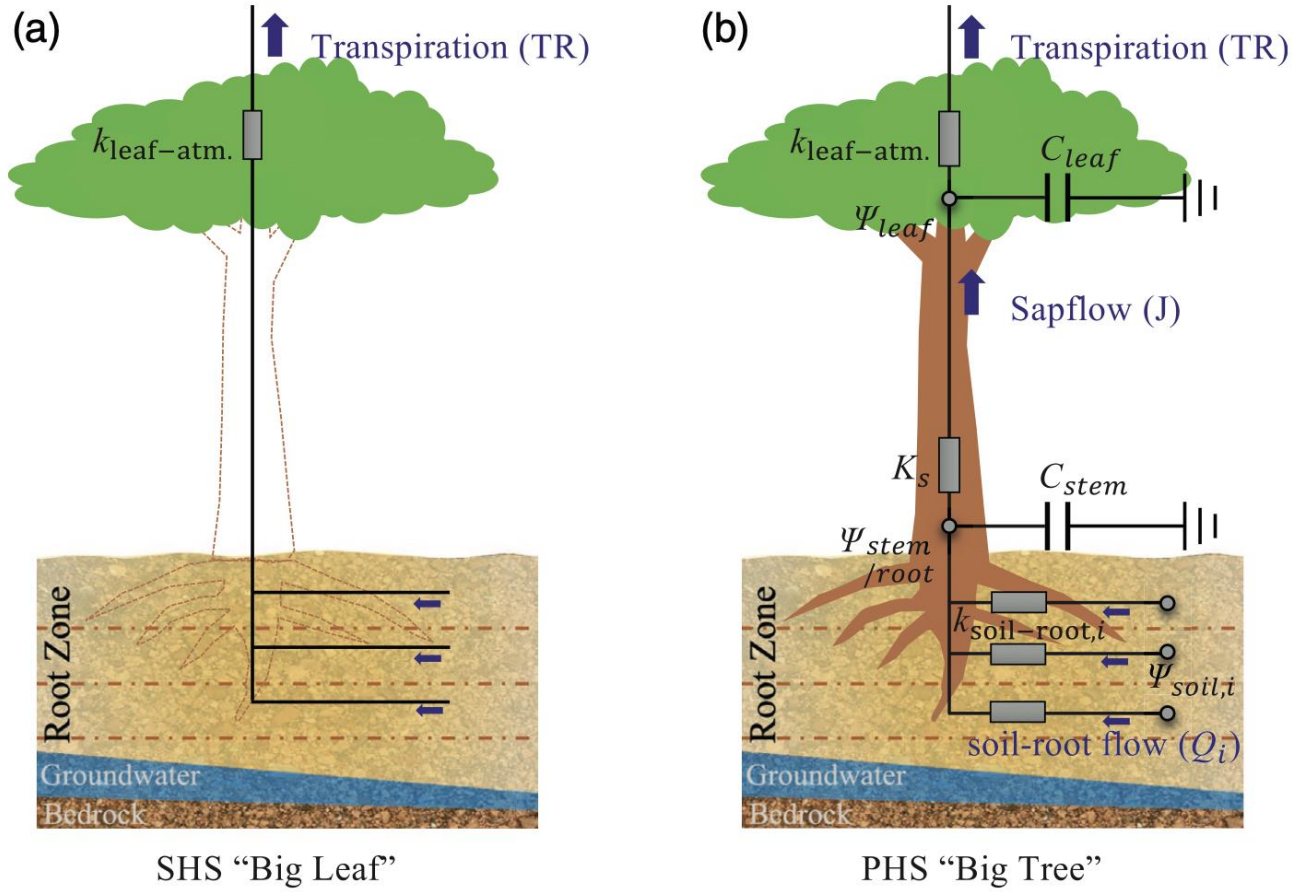
Soil moisture

→

Carbon and water simulations

→

Uncertainties



SHS “Big Leaf” PHS “Big Tree”

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

What are “Big Leaf” and “Big Tree”?

“Big Leaf”

Soil moisture

→

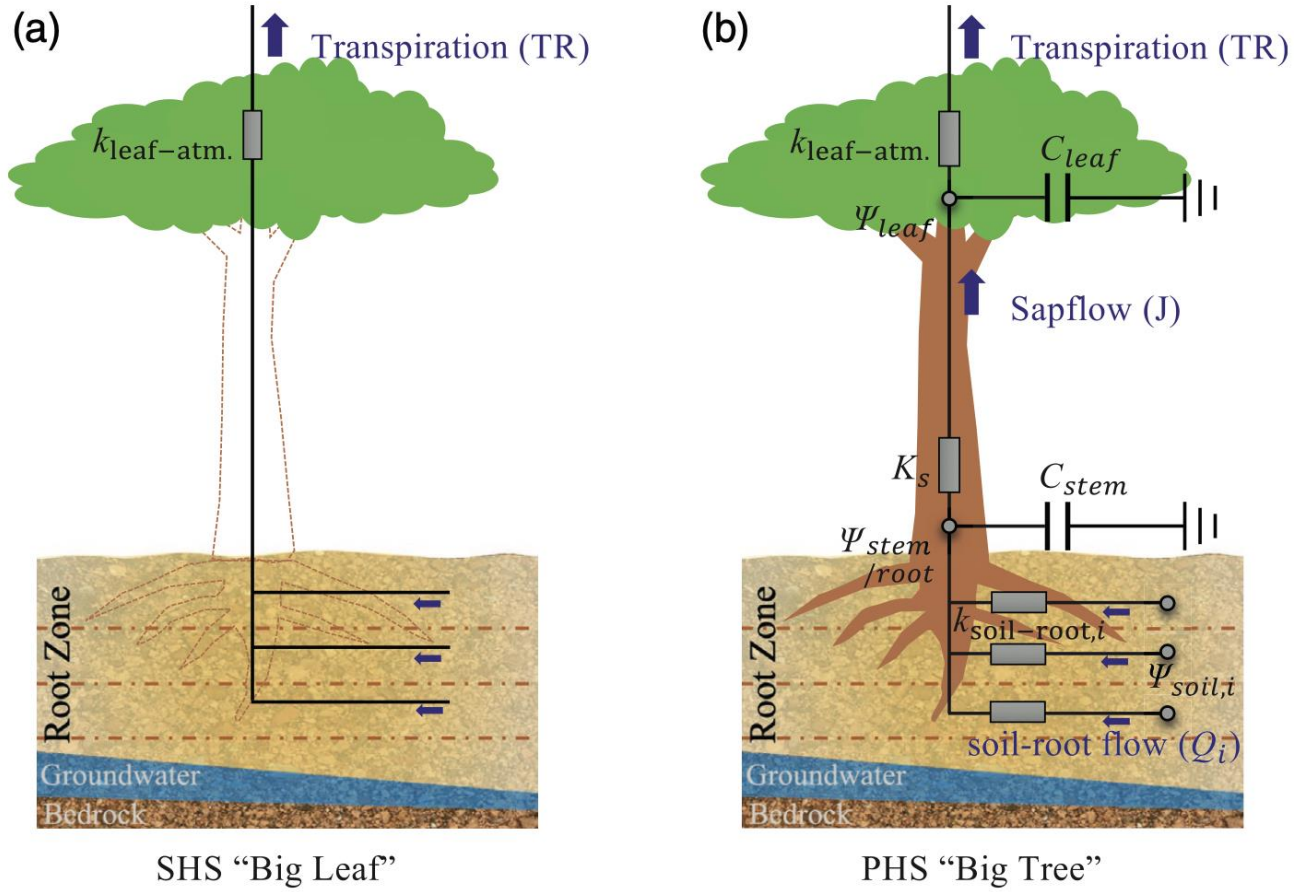
Carbon and water simulations

→

Uncertainties

Most land surface models, e.g.,

Noah-MP



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<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

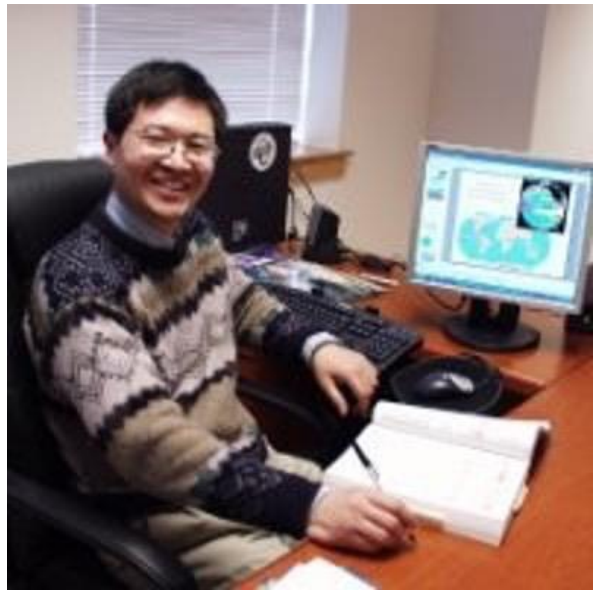
Near-surface hydrology

UT-Austin

Ashley Matheny

Ecohydrologist

UT-Austin

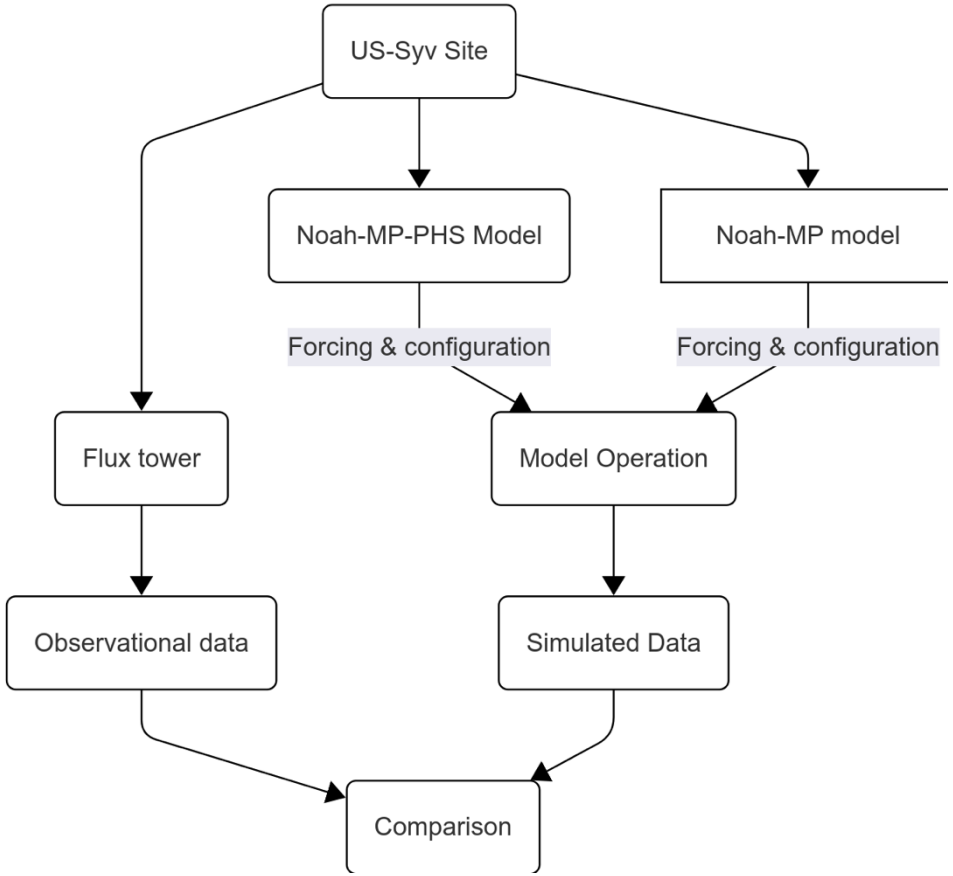


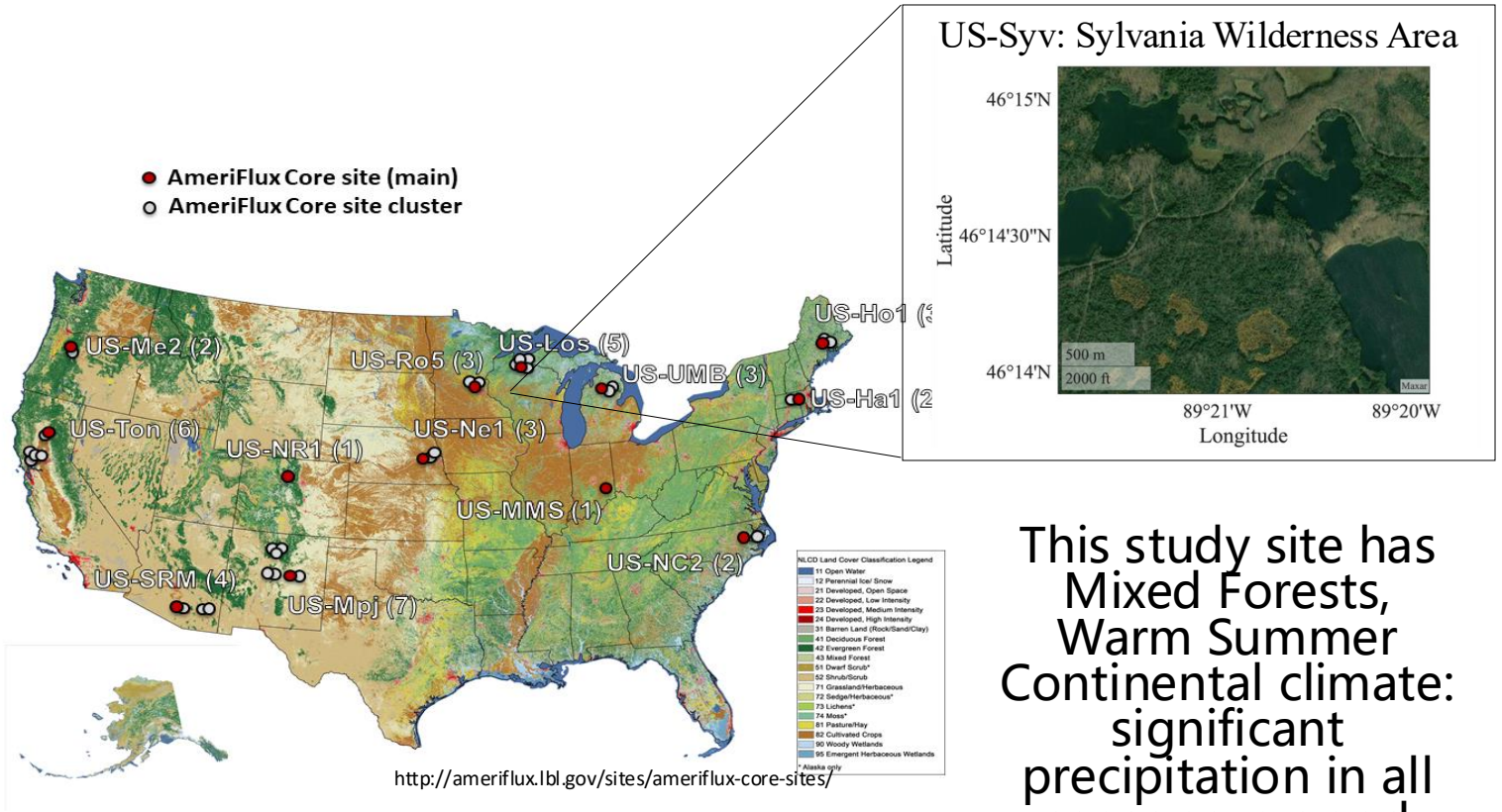
Zong-Liang Yang

Land-surface modeling

UT-Austin

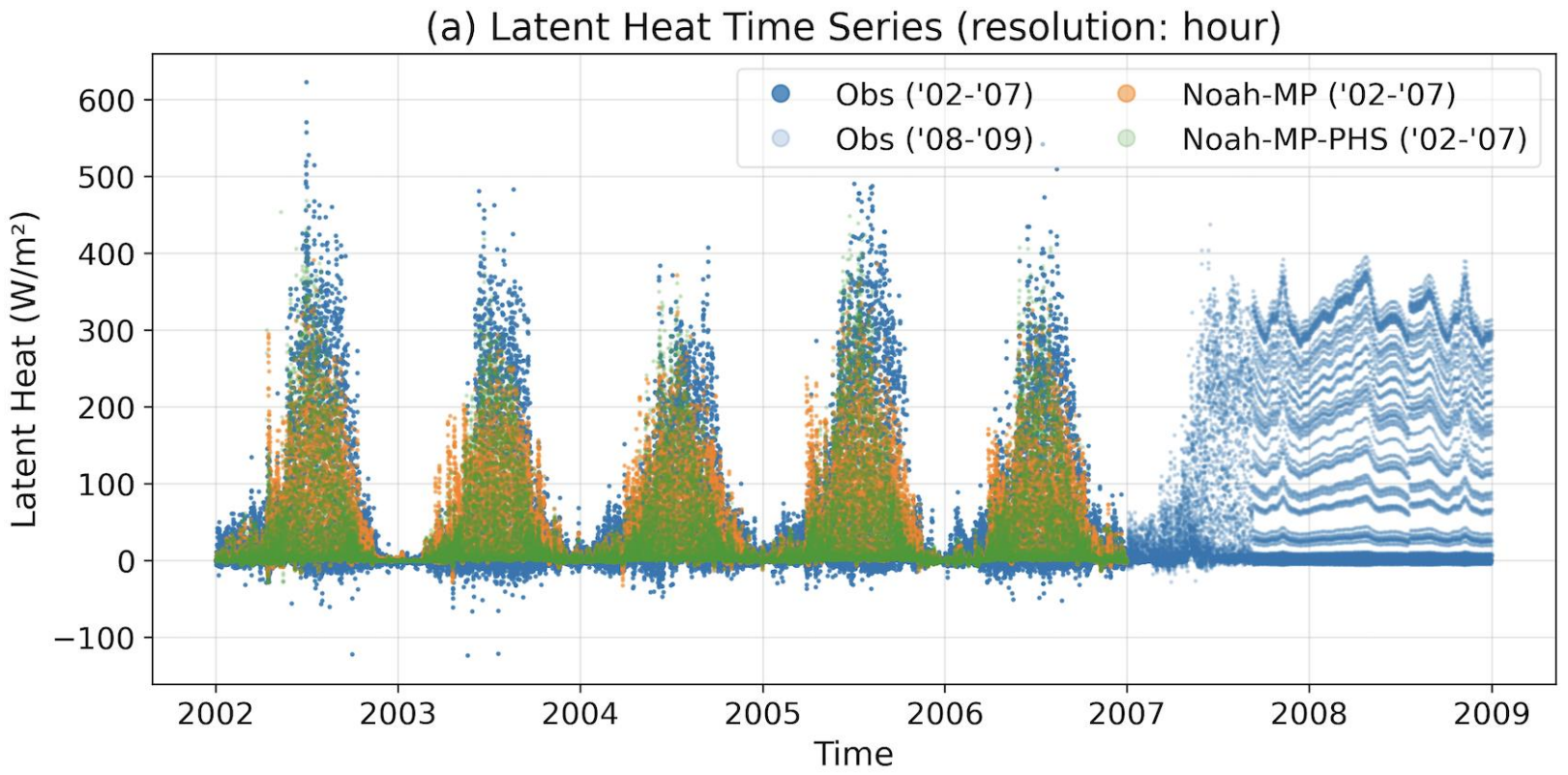
A specific problem: Noah-MP vs Noah-MP-PHS



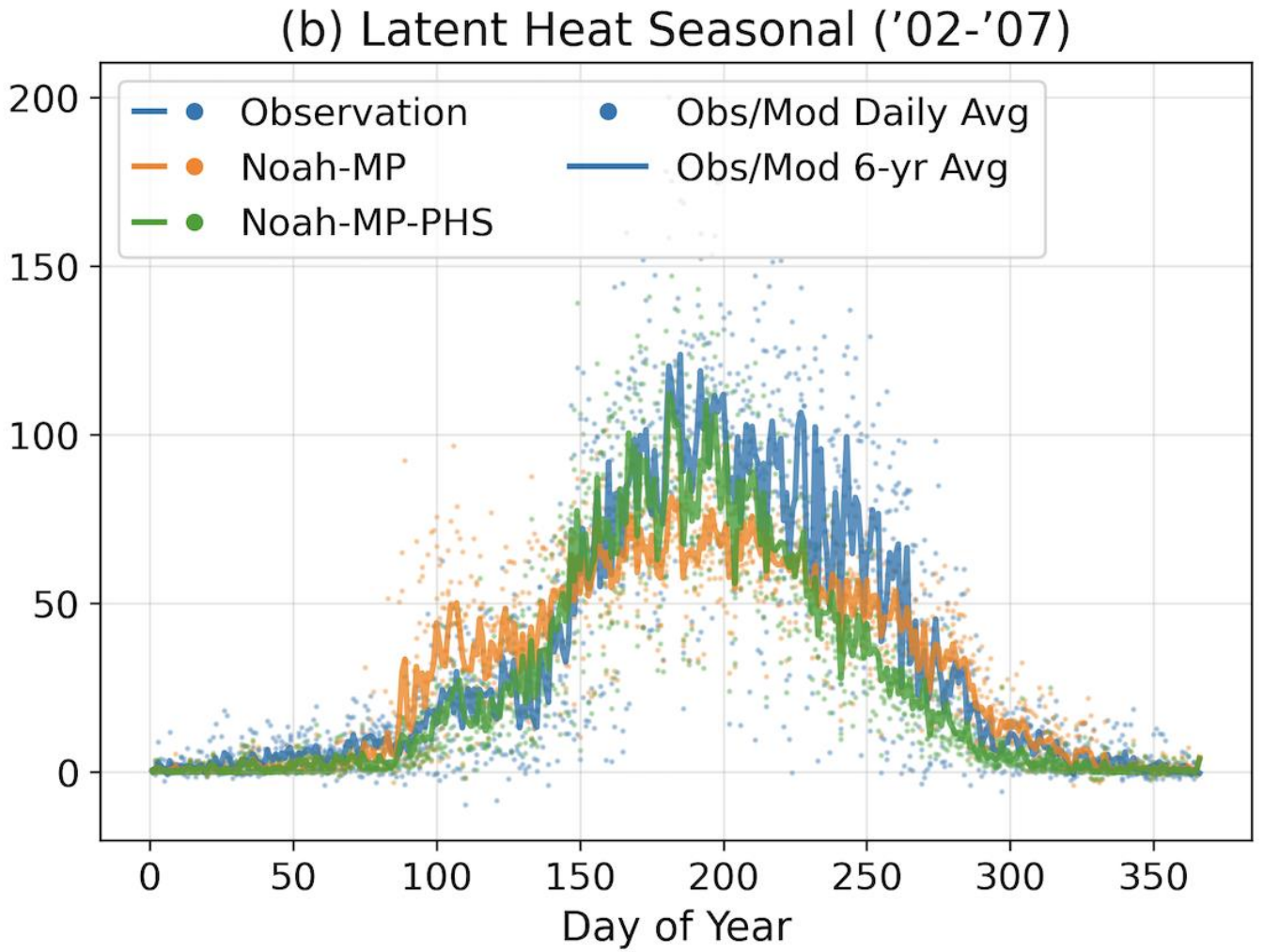


This study site has Mixed Forests, Warm Summer Continental climate: significant precipitation in all seasons, a good testbed for model evaluation.

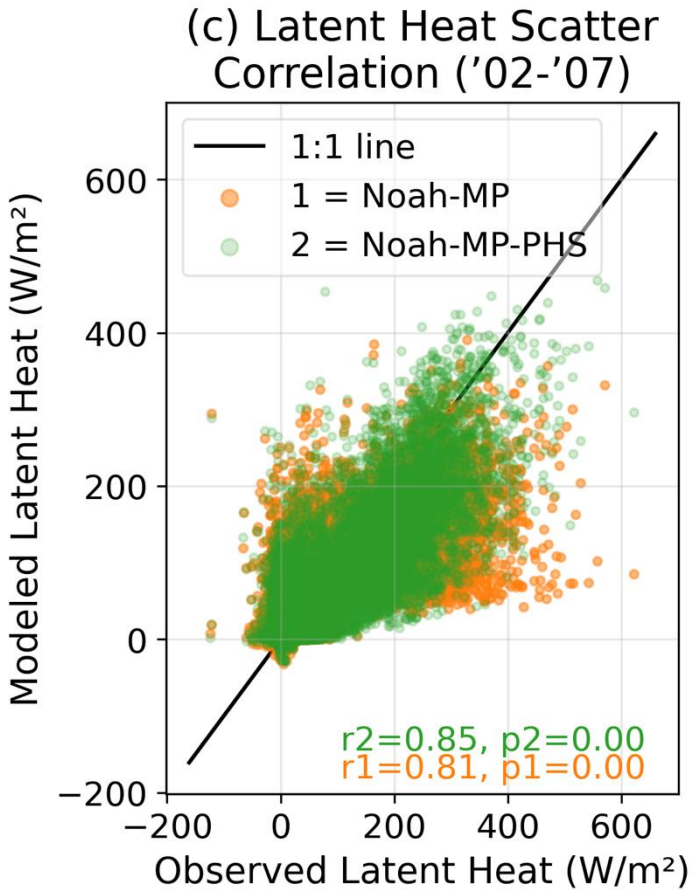
Results: Noah-MP vs Noah-MP-PHS

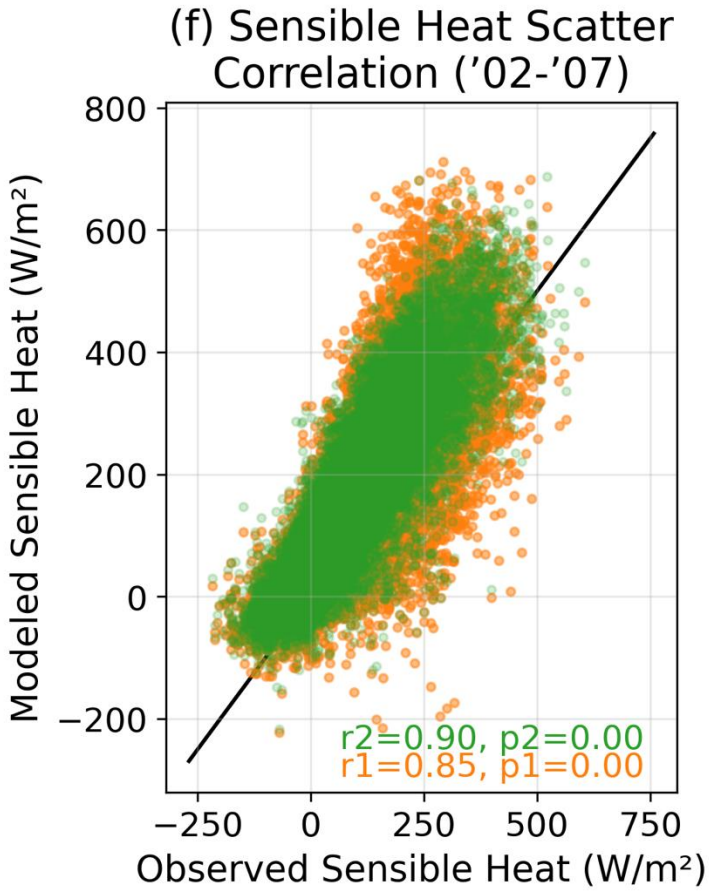


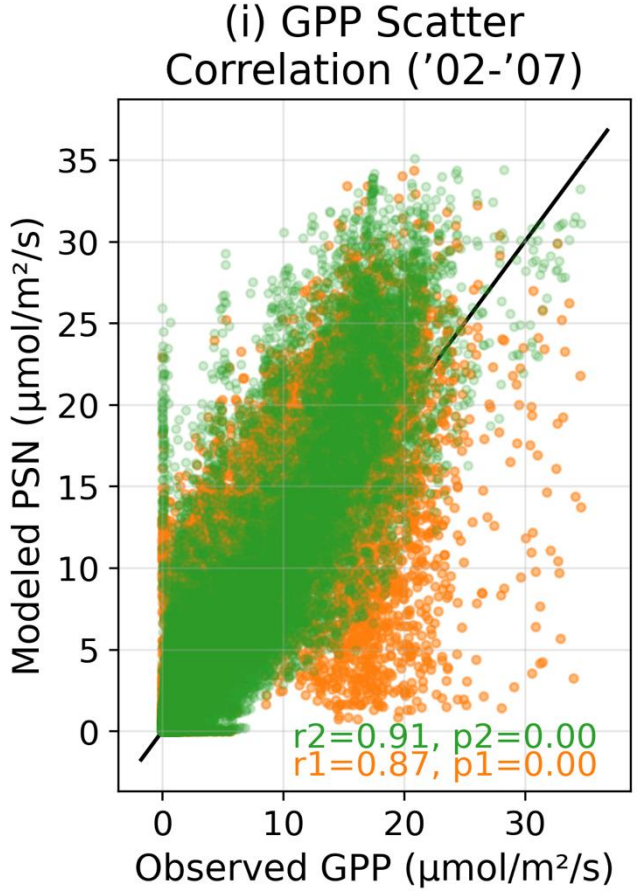
Results: Noah-MP vs Noah-MP-PHS



Results: Noah-MP vs Noah-MP-PHS



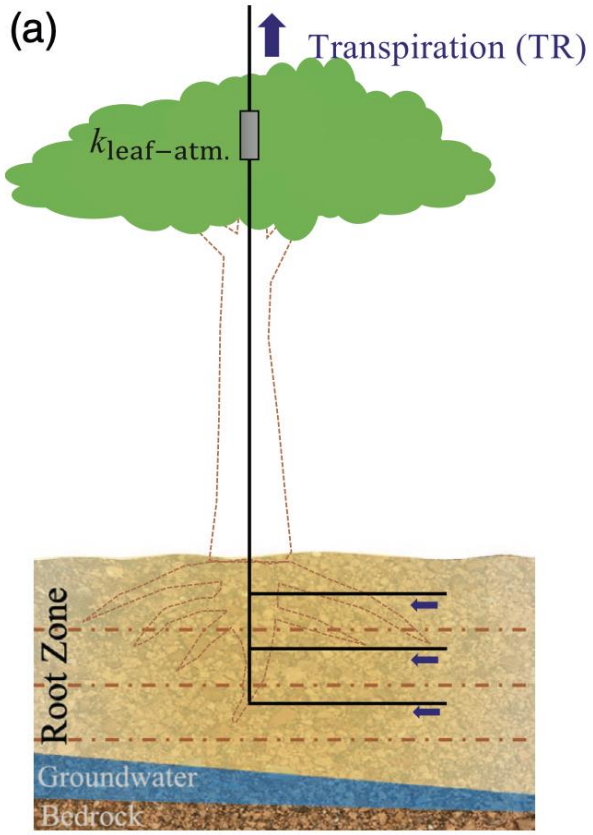




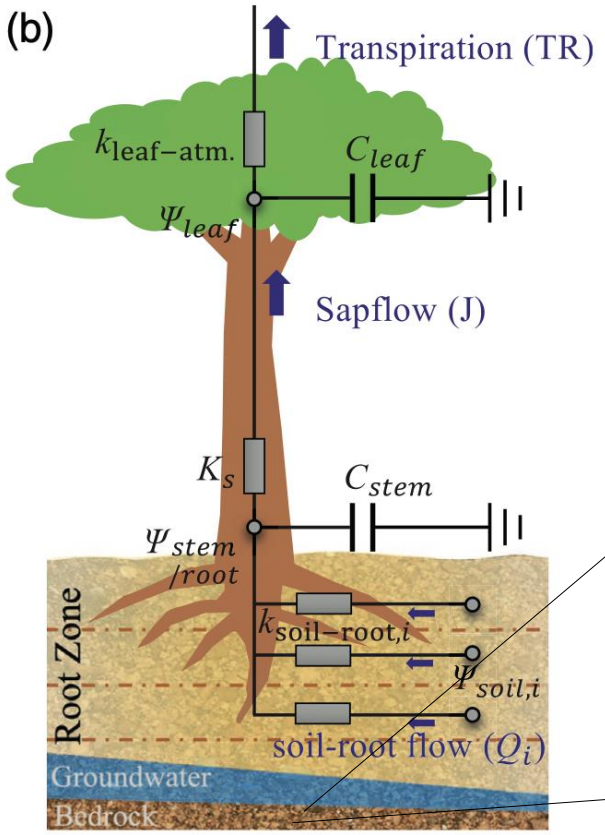
Results: Noah-MP vs Noah-MP-PHS

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

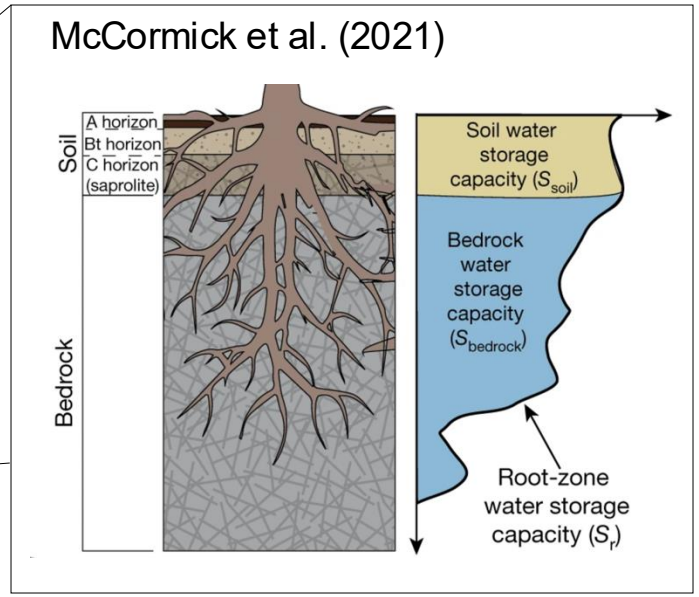


SHS "Big Leaf"



PHS "Big Tree"

X=
Bedrock…
…
Richards equation…
…



TEXAS
The University of Texas at Austin

Thank you!
Any questions?

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