Southern pine productivity: Effects of carbon dioxide increases and related predicted temperature and precipitation changes

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nature climate change

LETTERS

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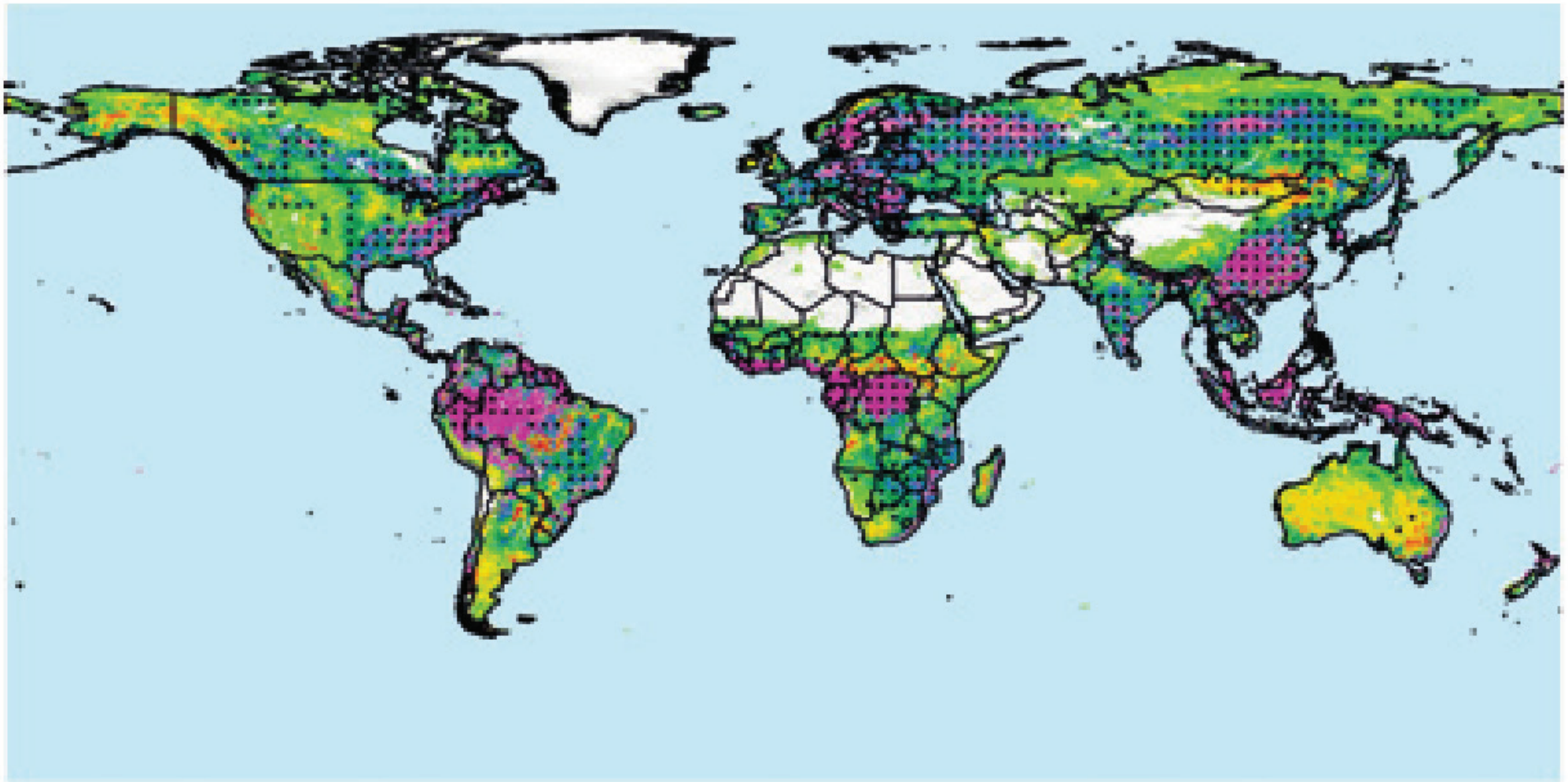
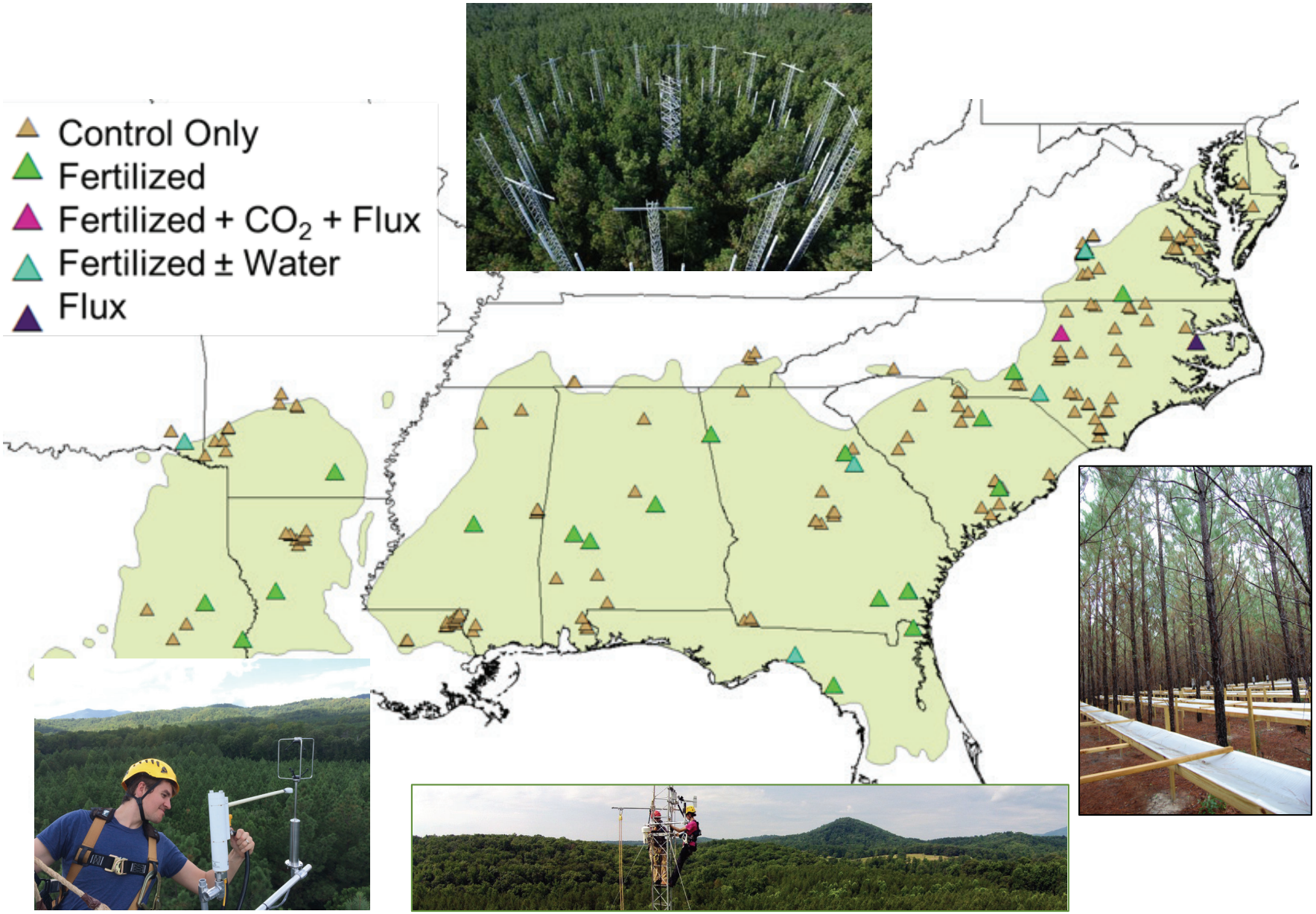
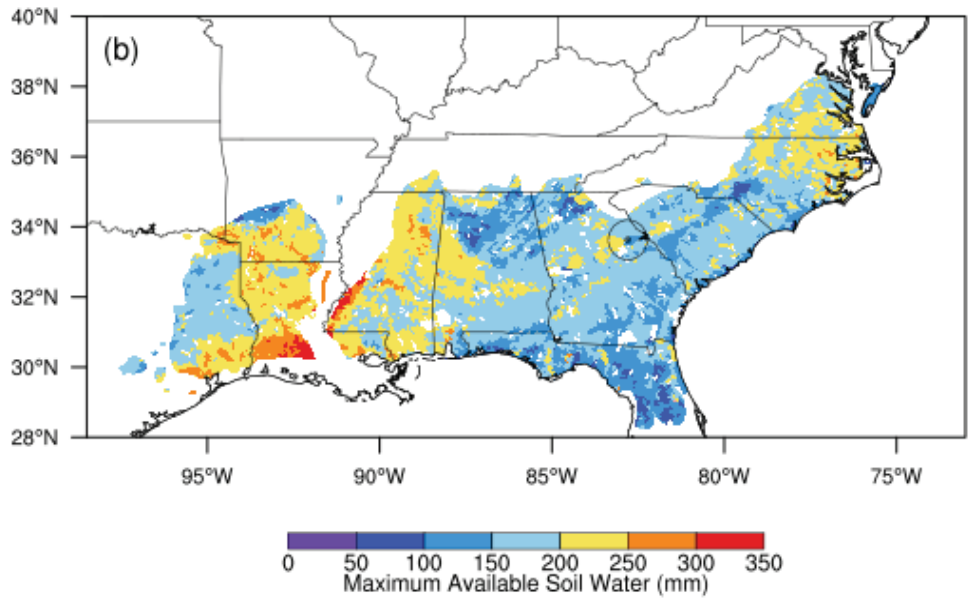


Trend in GLASS LAI (10^{-2} m^2 m^{-2} yr^{-1})

Data: Experimental treatments

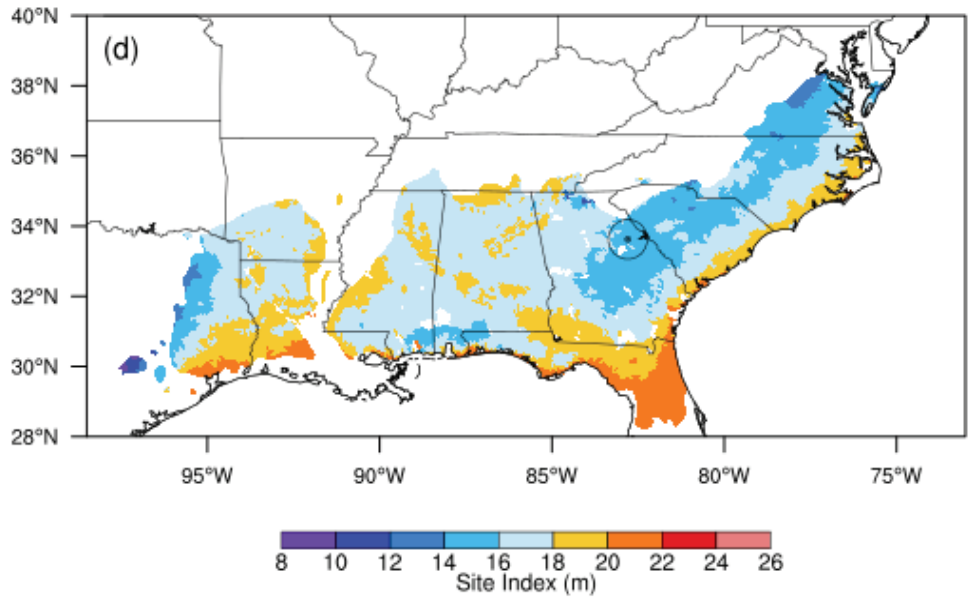


Key inputs in models



Soil information

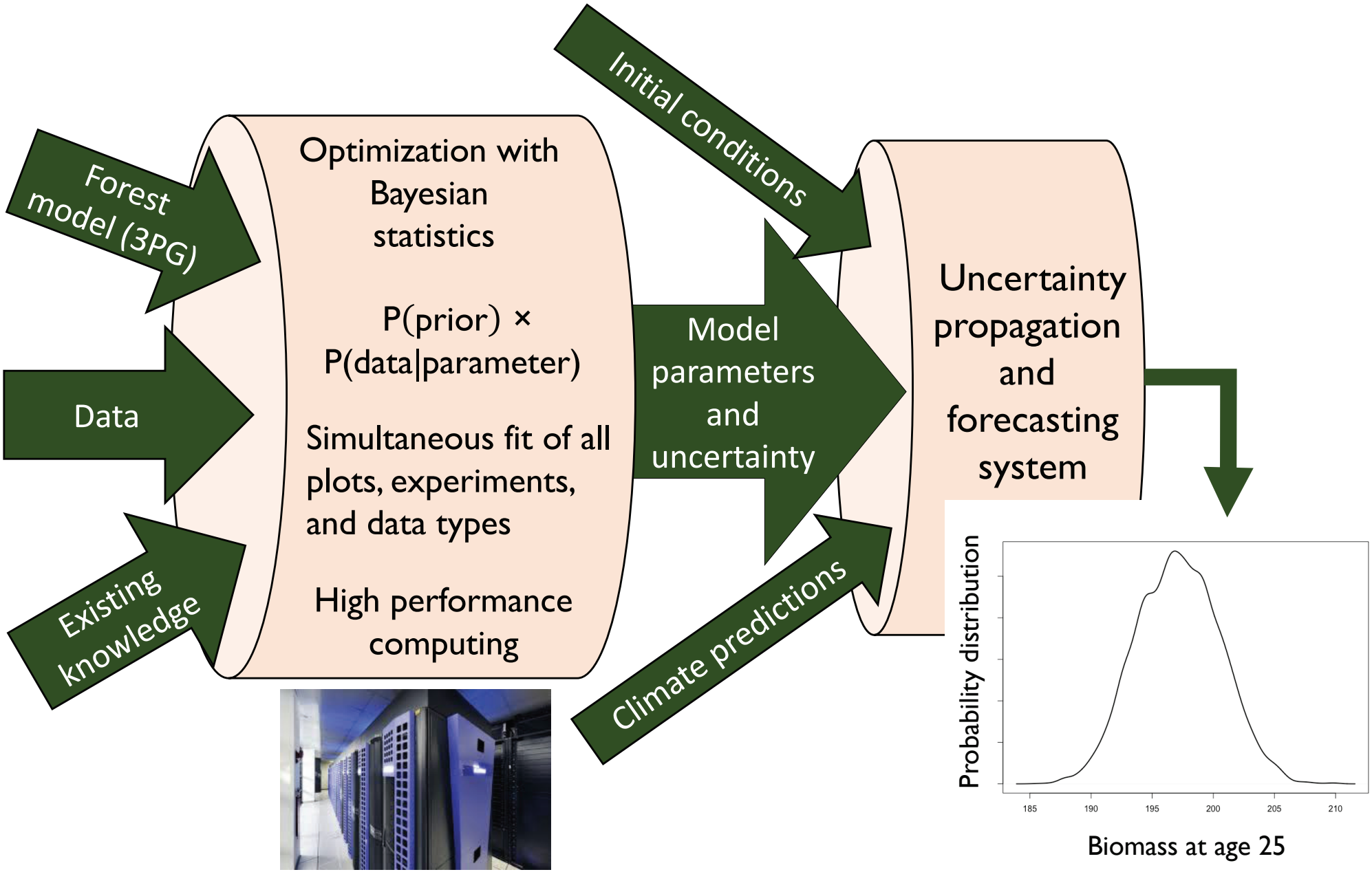
- Maximum available soil water
- Soil texture



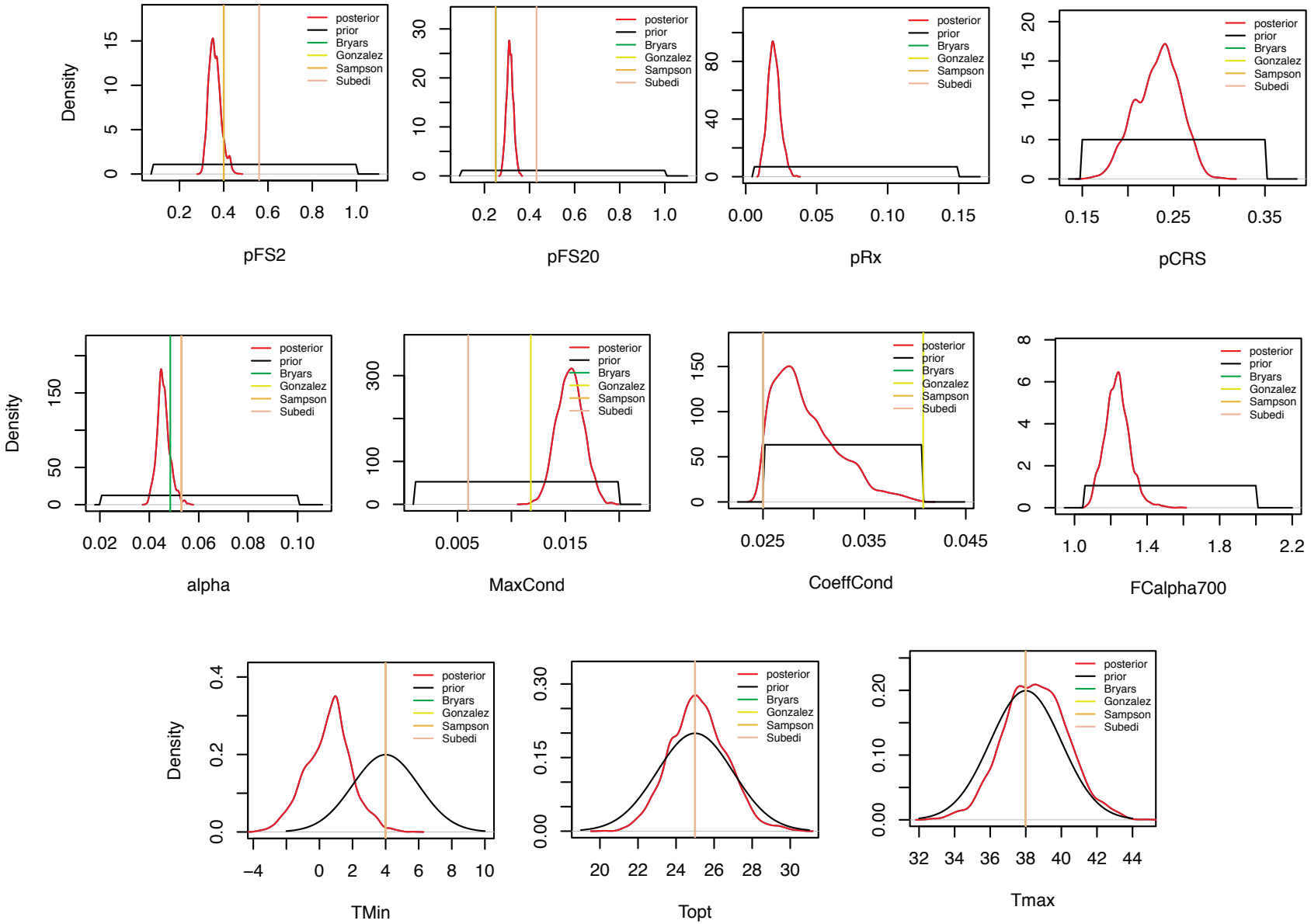
Measure of site quality

- Site index
- Biomass at an age

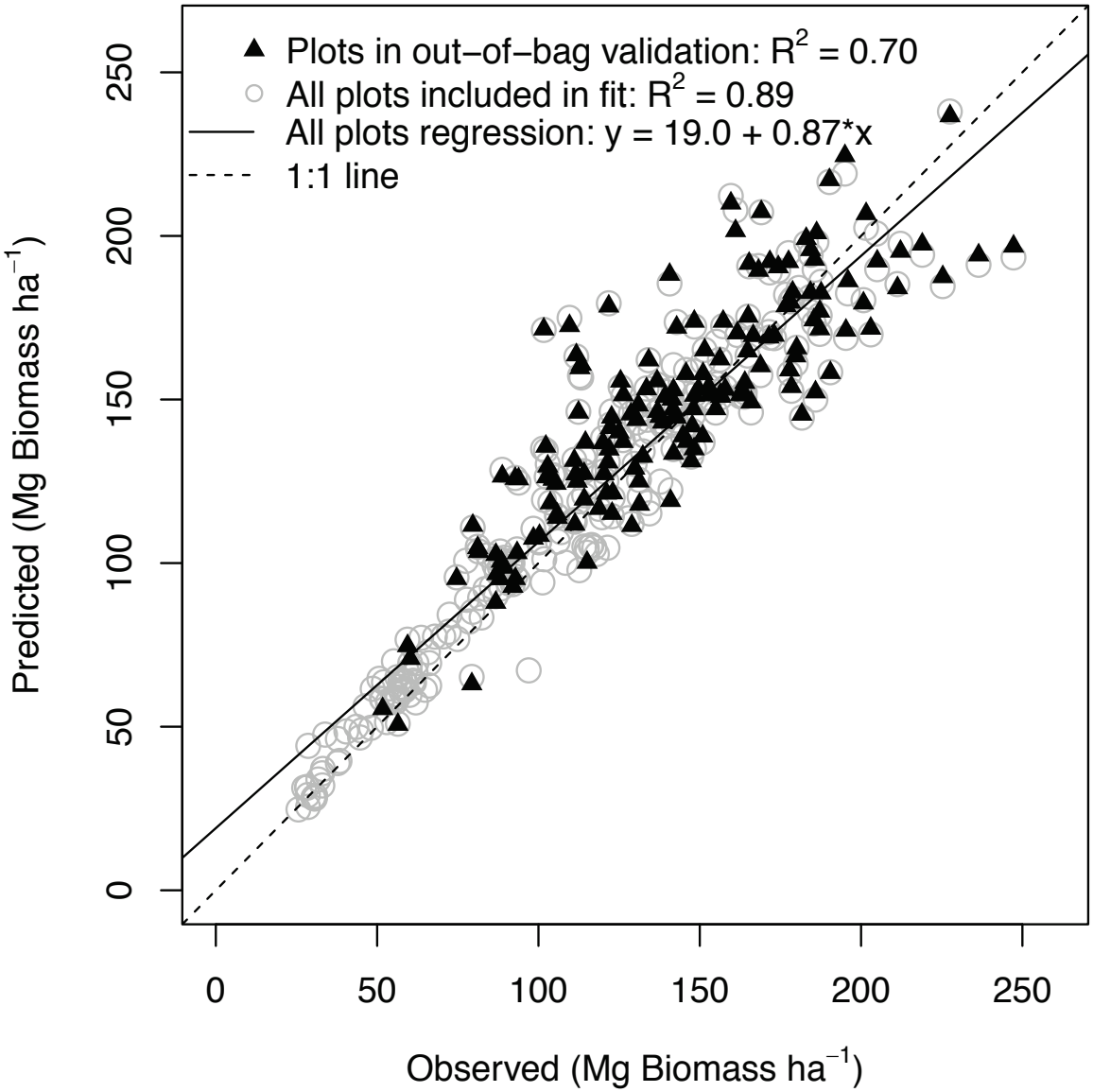
Data **A**ssimilation of **P**ine **P**lantation **E**cosystem **R**esearch **(DAPPER)** System



Distributions of parameters



Model performance



Example of partitioning uncertainty

Parameter uncertainty

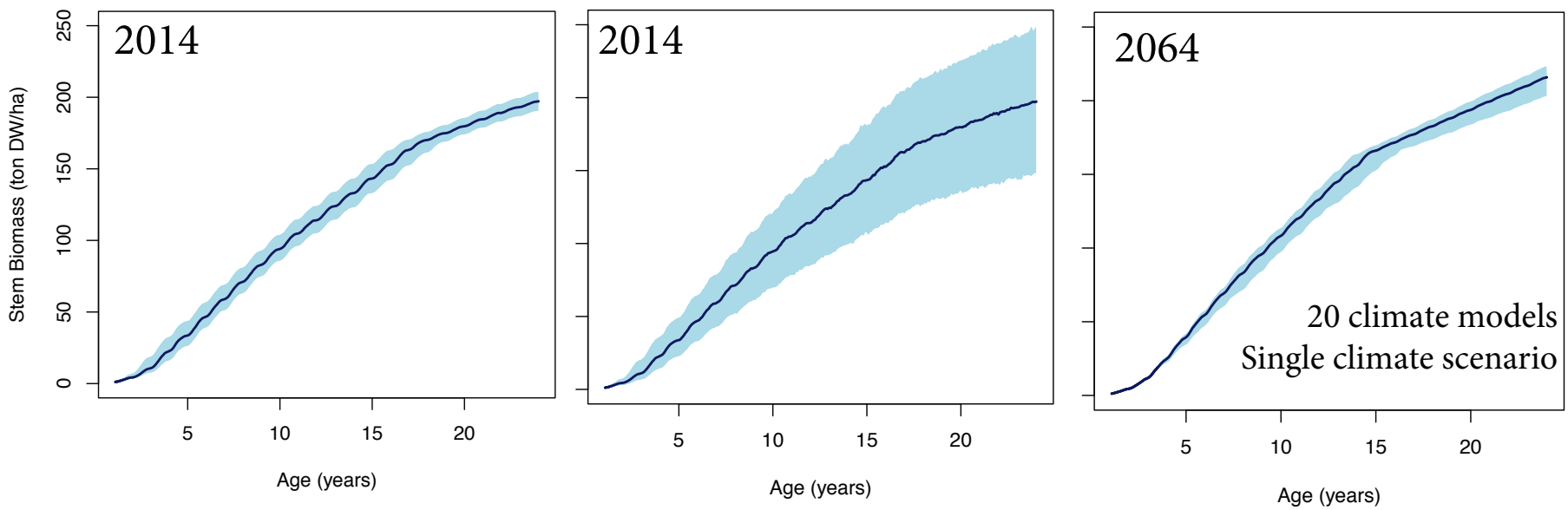
$y = \mathbf{m}x + \mathbf{b} + \varepsilon$

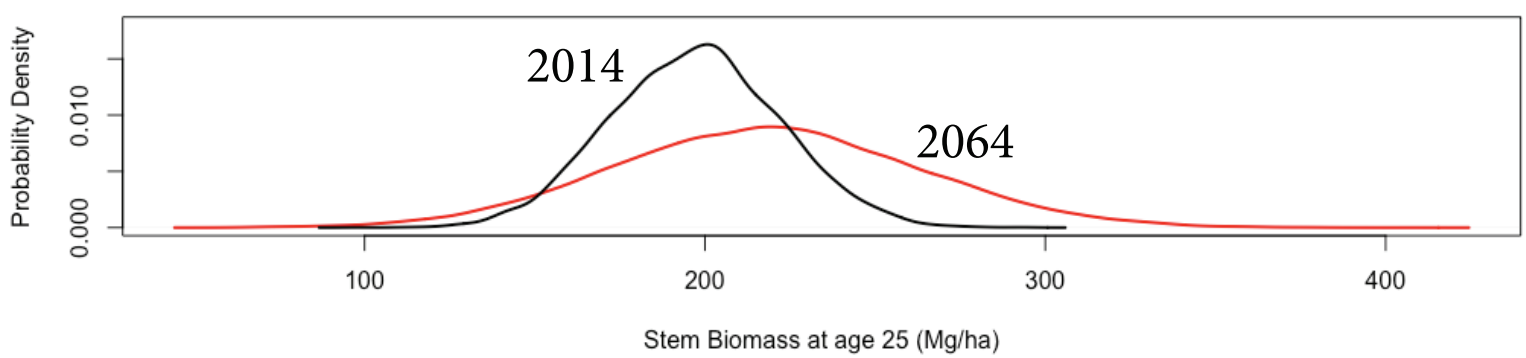
Model process uncertainty

$y = mx + b + \boldsymbol{\varepsilon}$

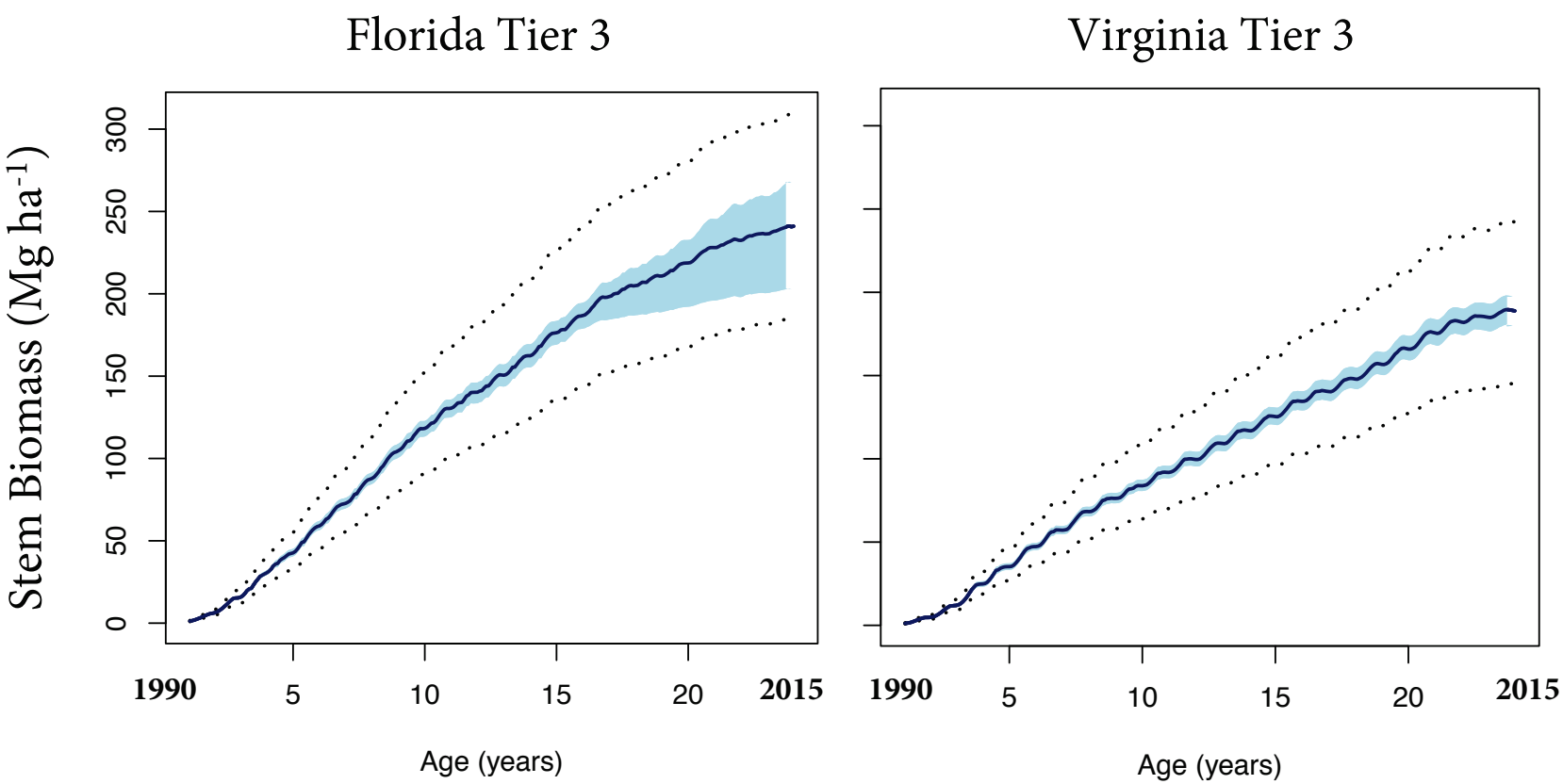
Future climate uncertainty

$y = m\mathbf{x} + b + \varepsilon$





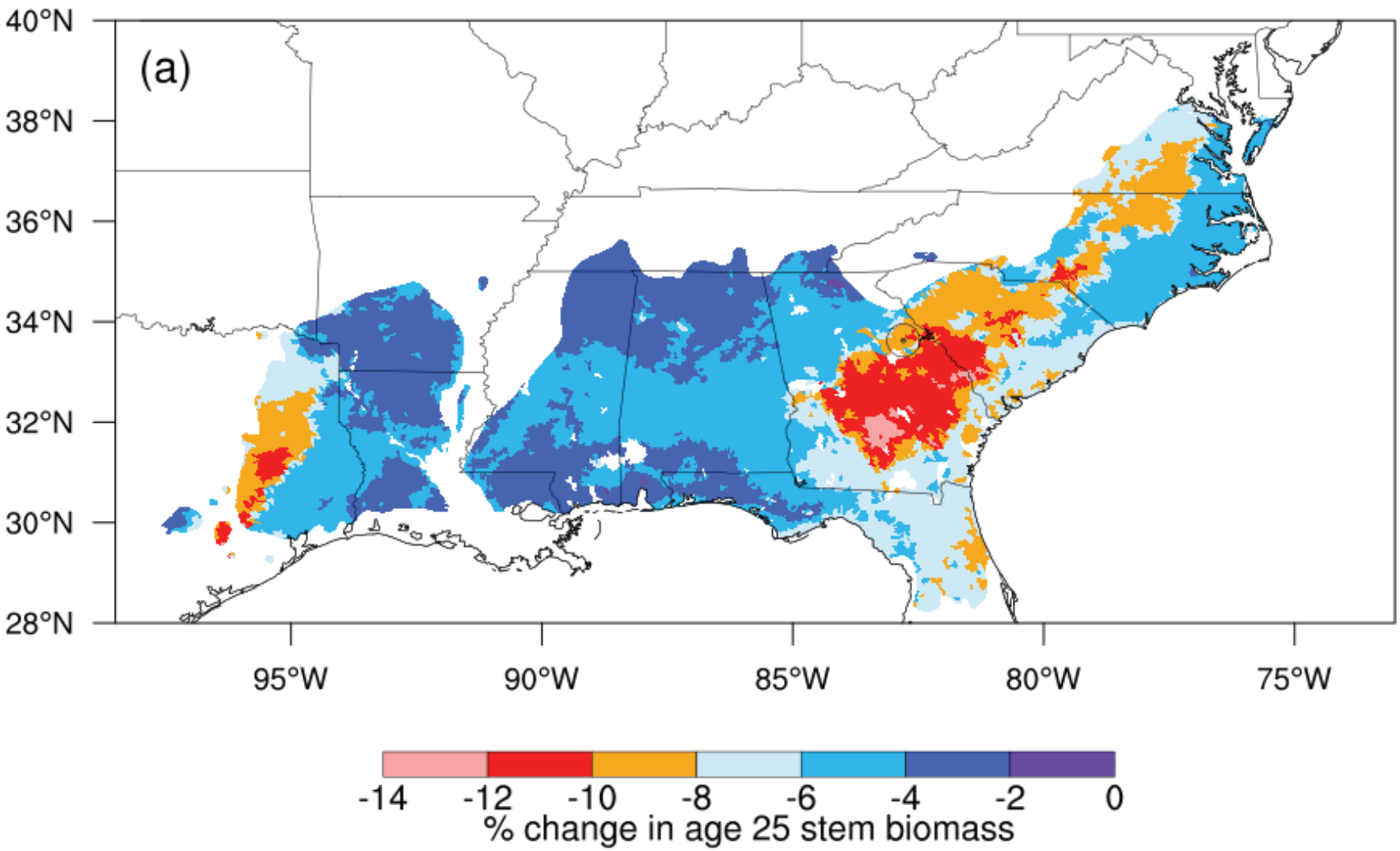
Uncertainty estimation



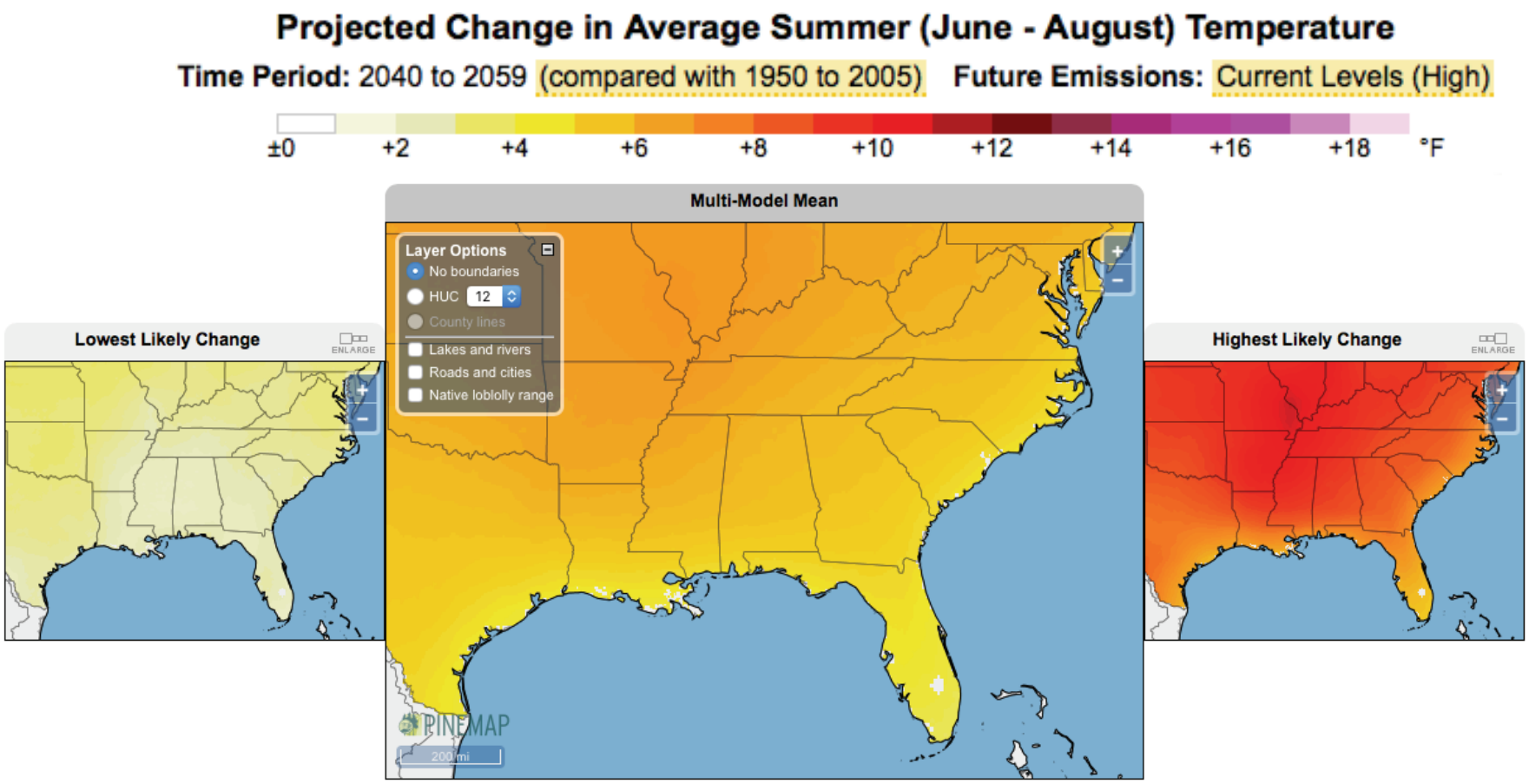
Dark line = median prediction
Shaded = 95% C.I. on parameter uncertainty
Dotted = 95% C.I. on total uncertainty

Regional patterns in drought sensitivity

30% decrease in annual precipitation

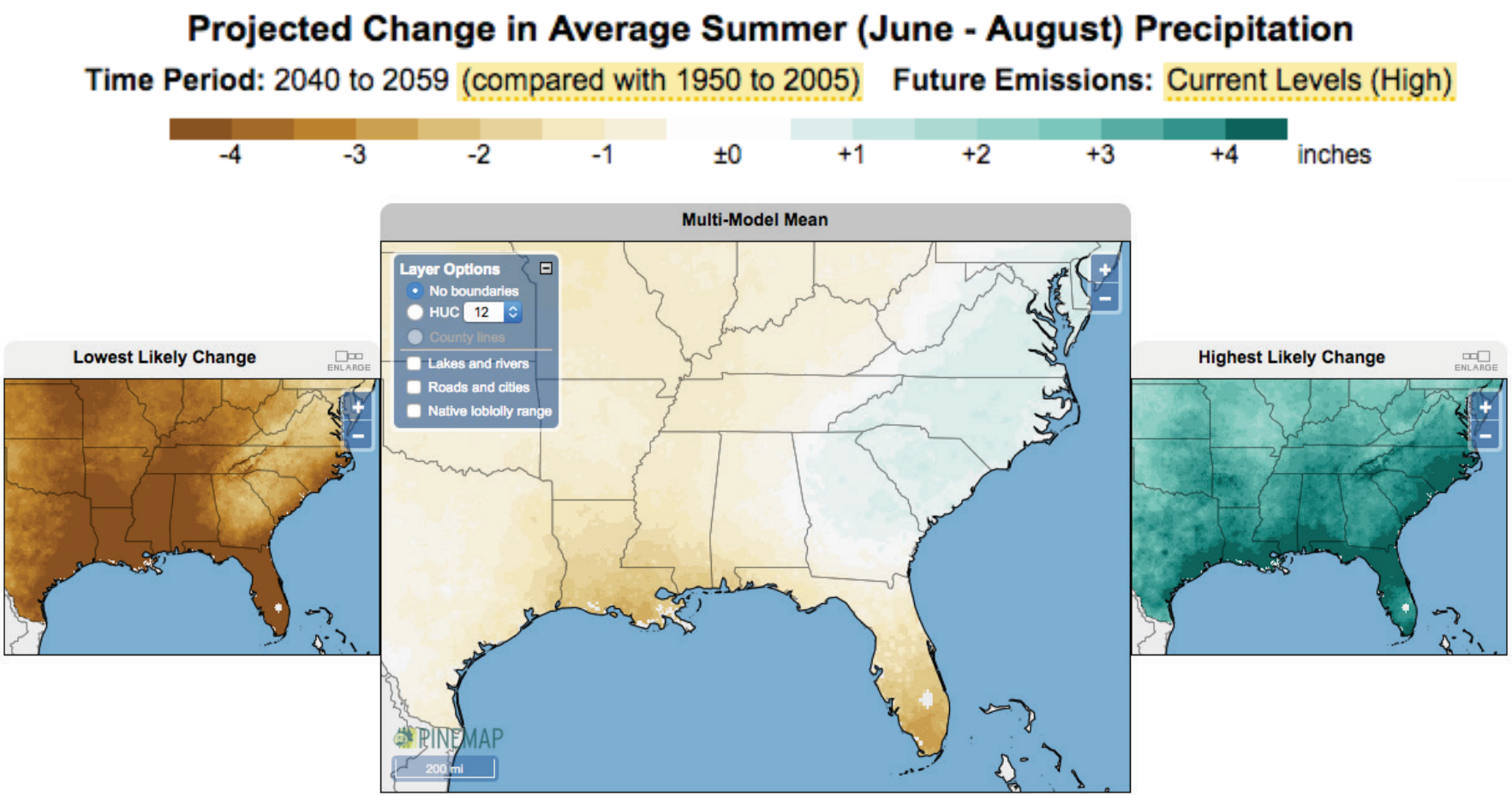


Summer temperatures will be hotter



See PINEMAP Decision Support System
http://climate.ncsu.edu/pinemap/index.php

Summer precipitation is uncertain



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3PG Results in DSS

- Live demo of latest results from regional 3PG simulations in DSS