

Making the connection between imaging spectroscopy and direct measures of ecosystem function

HyspIRI Workshop
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THE UNIVERSITY
OF
WISCONSIN
MADISON

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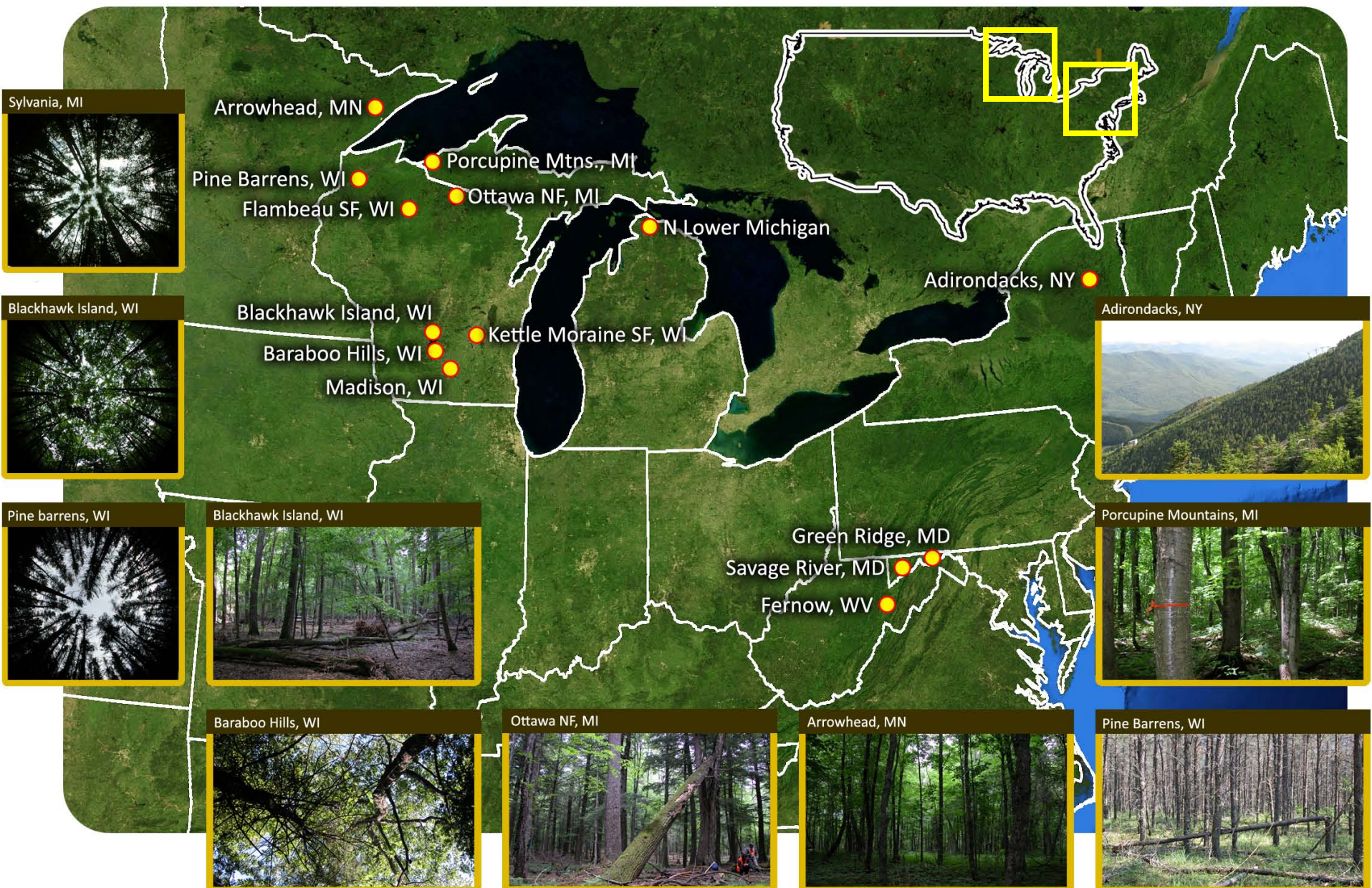
Linking spectroscopy to ecosystem function

- Field data
- Lab measurements
- Scaling-up
- Link to imaging spectroscopy

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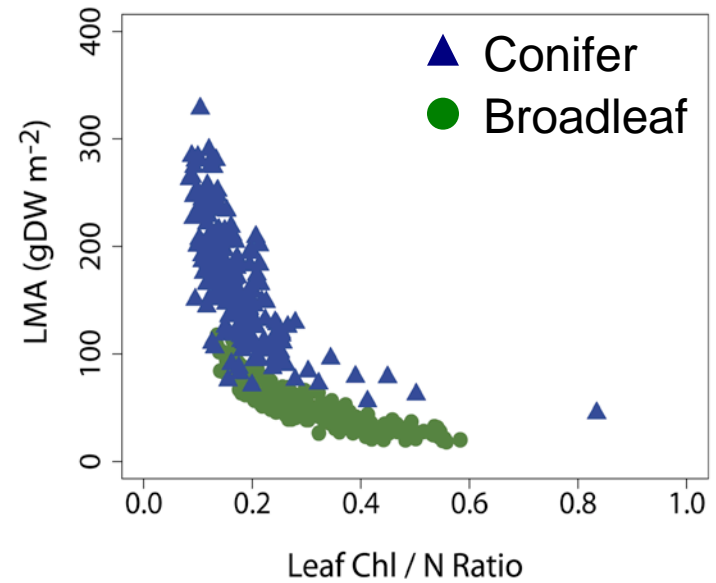
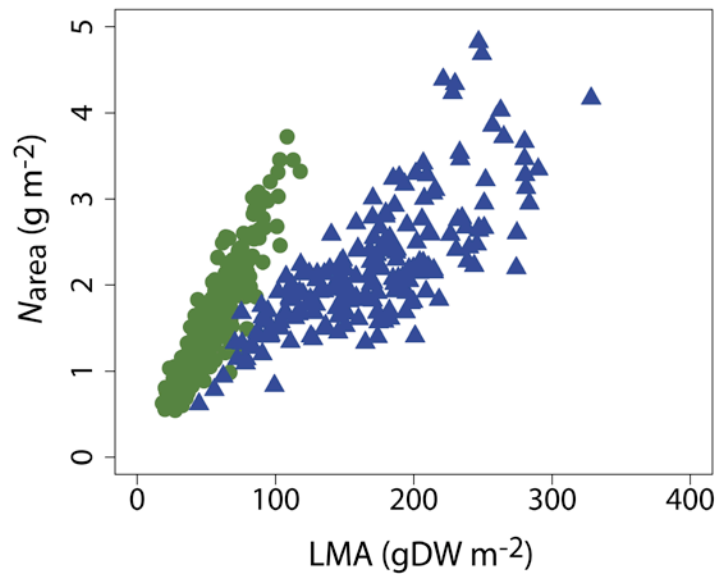
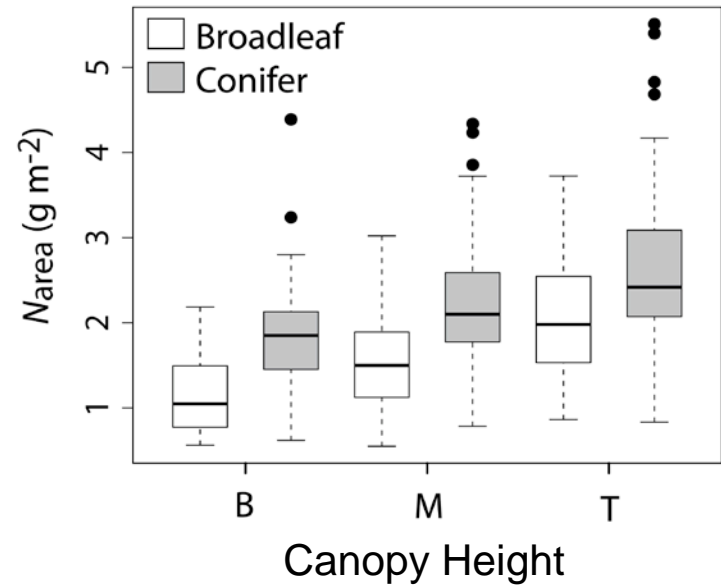
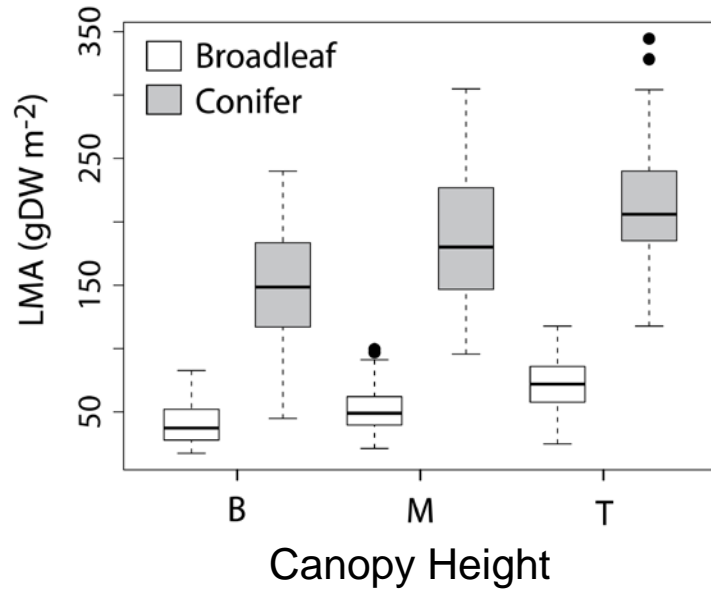
Study areas



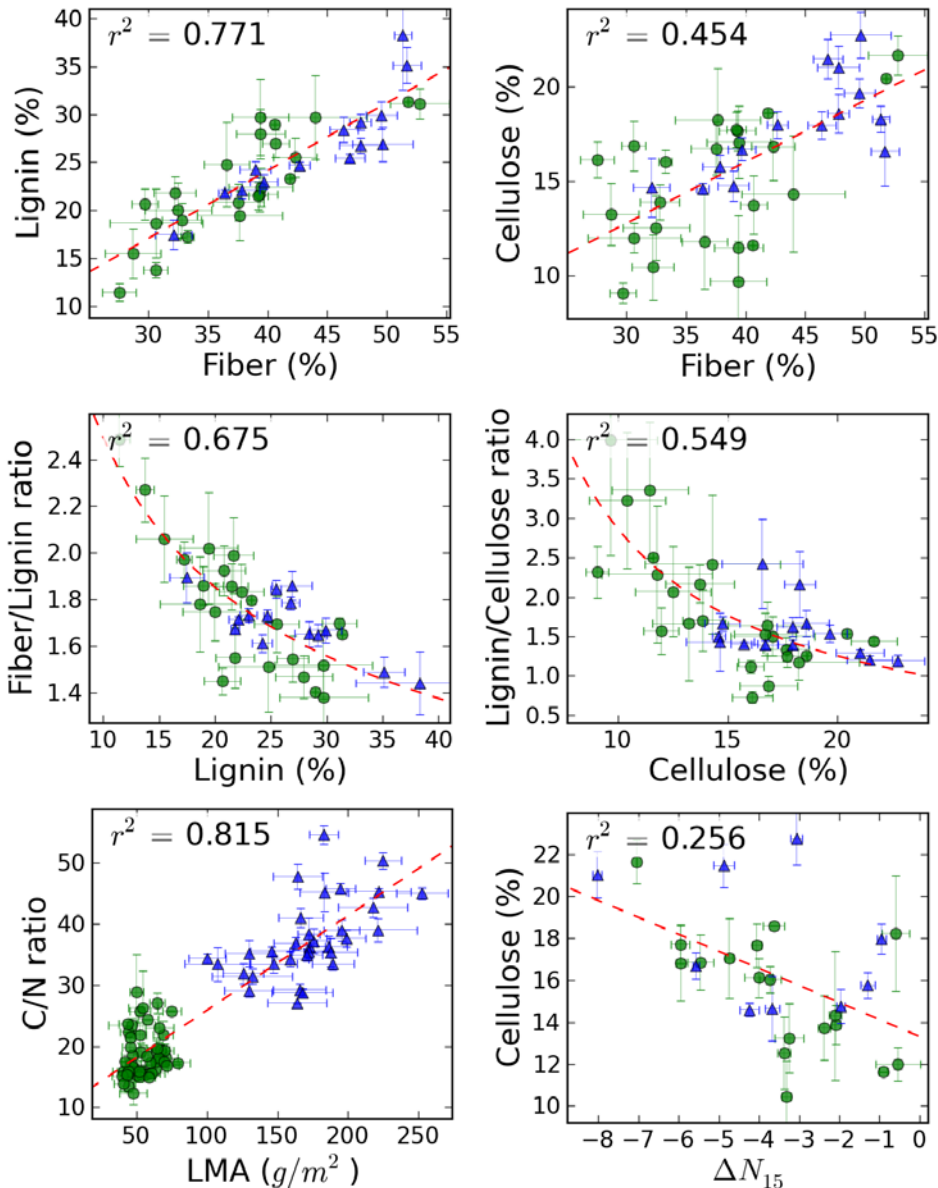
Field / lab measurements



Morphology / Nutrition



Recalcitrance / Nutrient Cycling



- ▲ Conifer
- Broadleaf

- Rates of nutrient cycling vary with many factors including climate and species
- ΔCO_2 and ΔT may alter nutrient allocation, retention, and cycling
- HypsIRI mission will be important for monitoring ecosystem changes

Leaf-level predictions

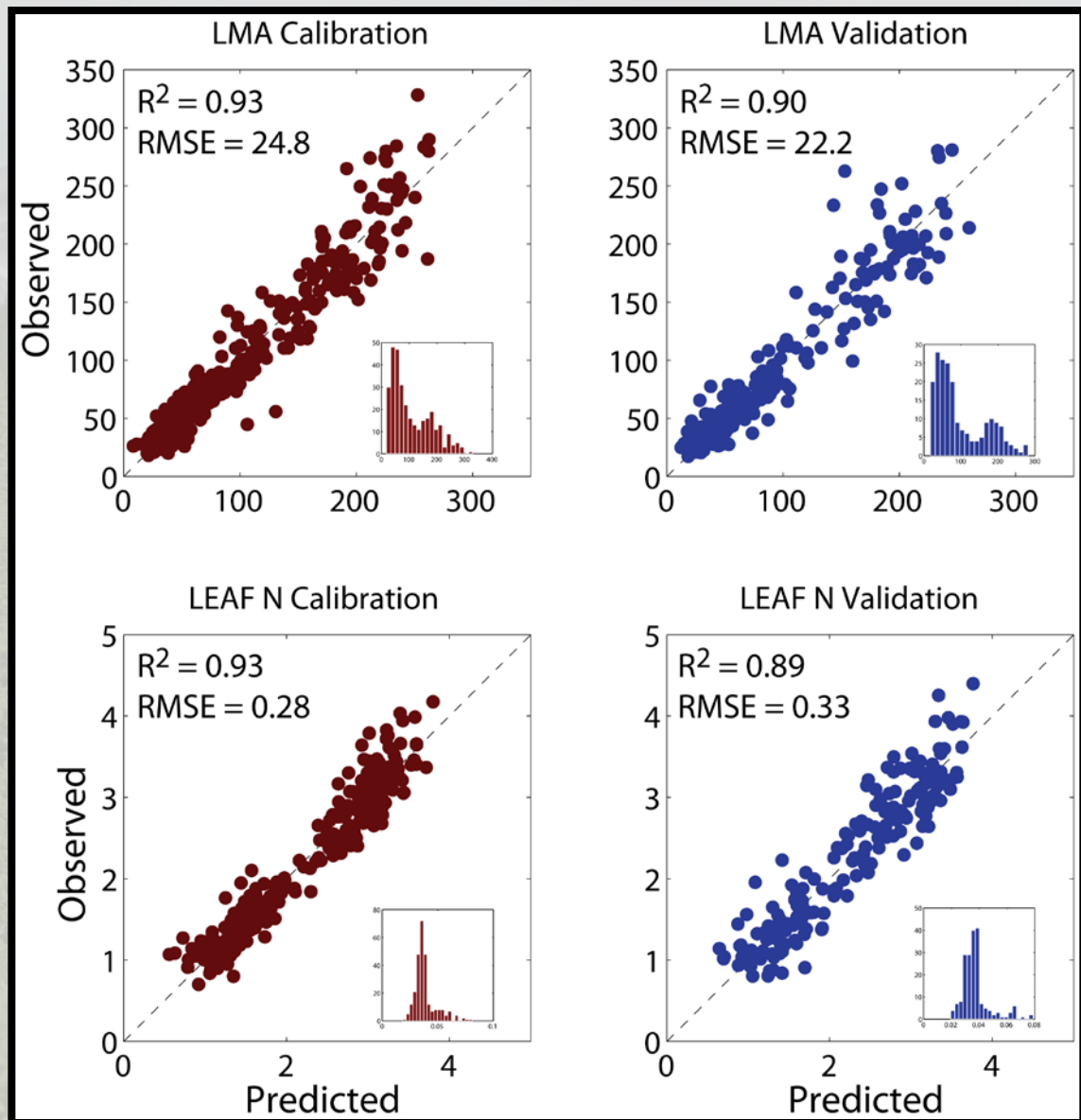
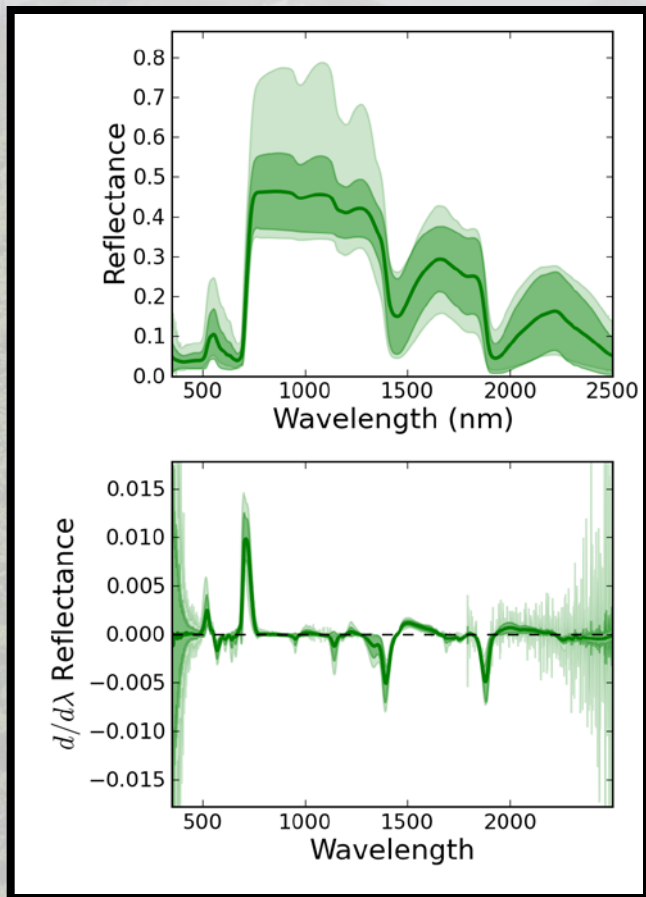


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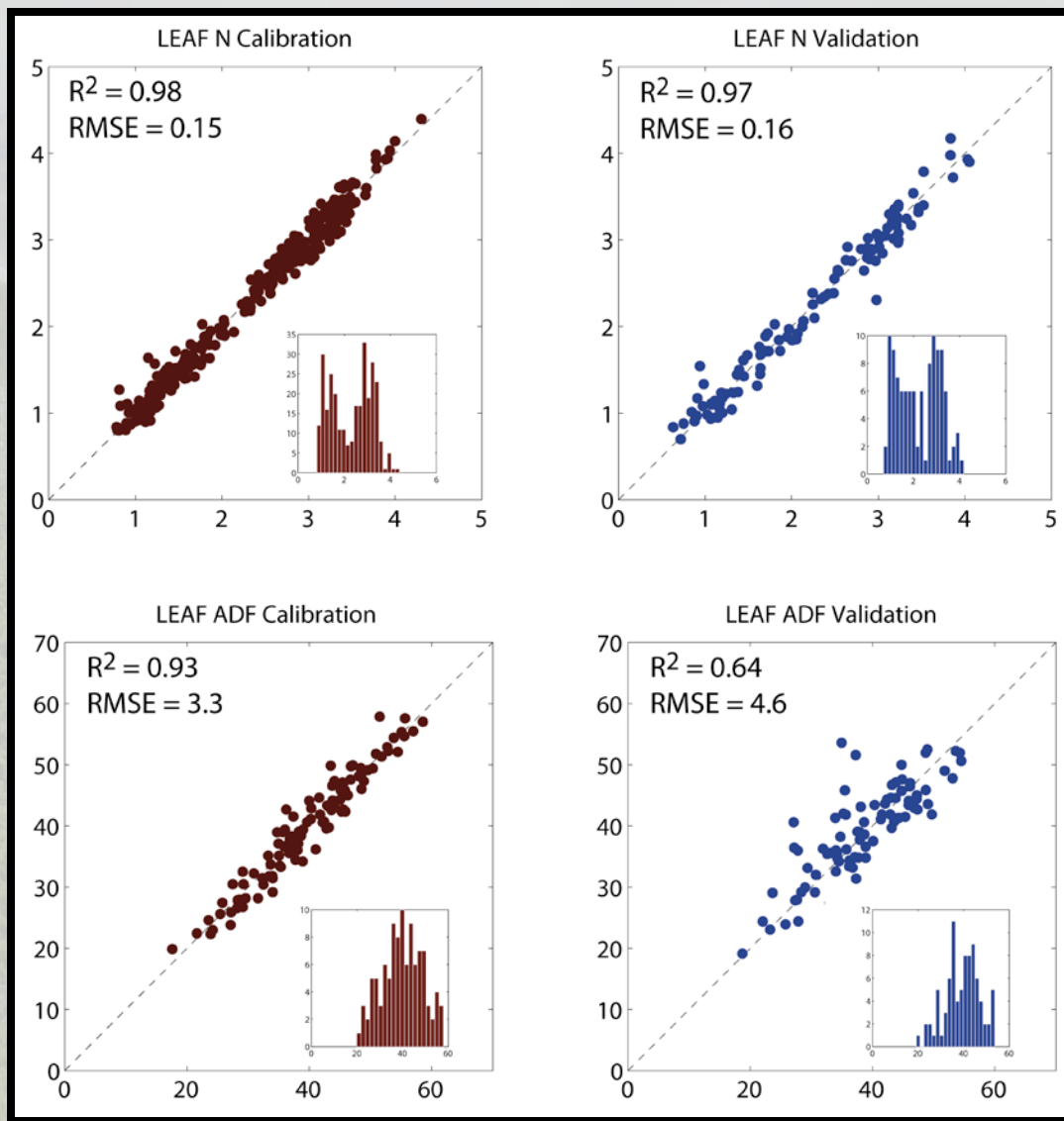
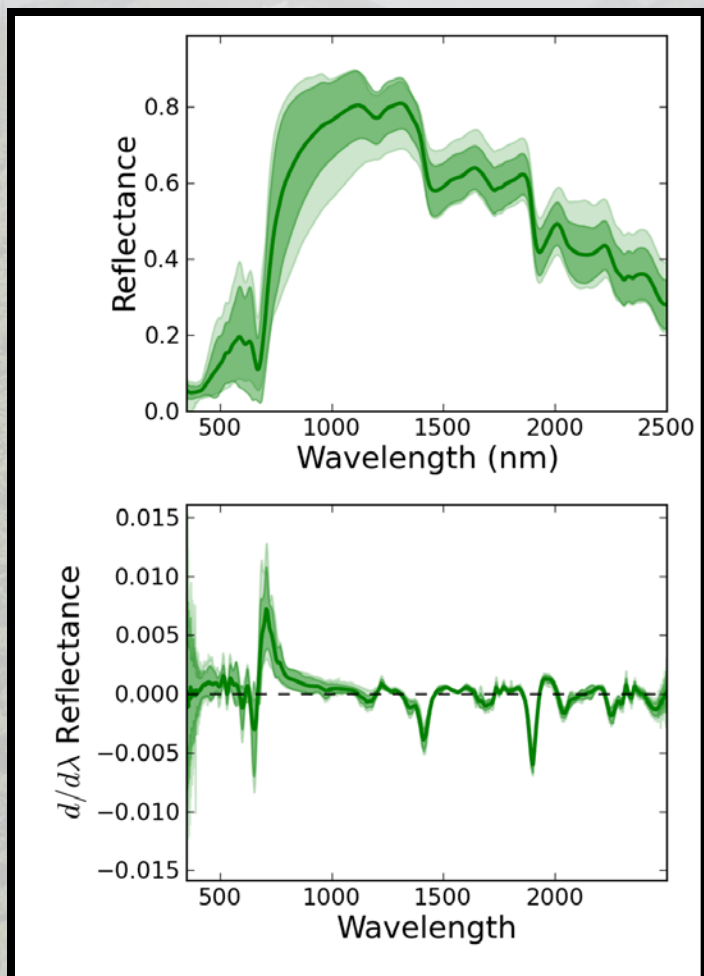
Leaf-level predictions

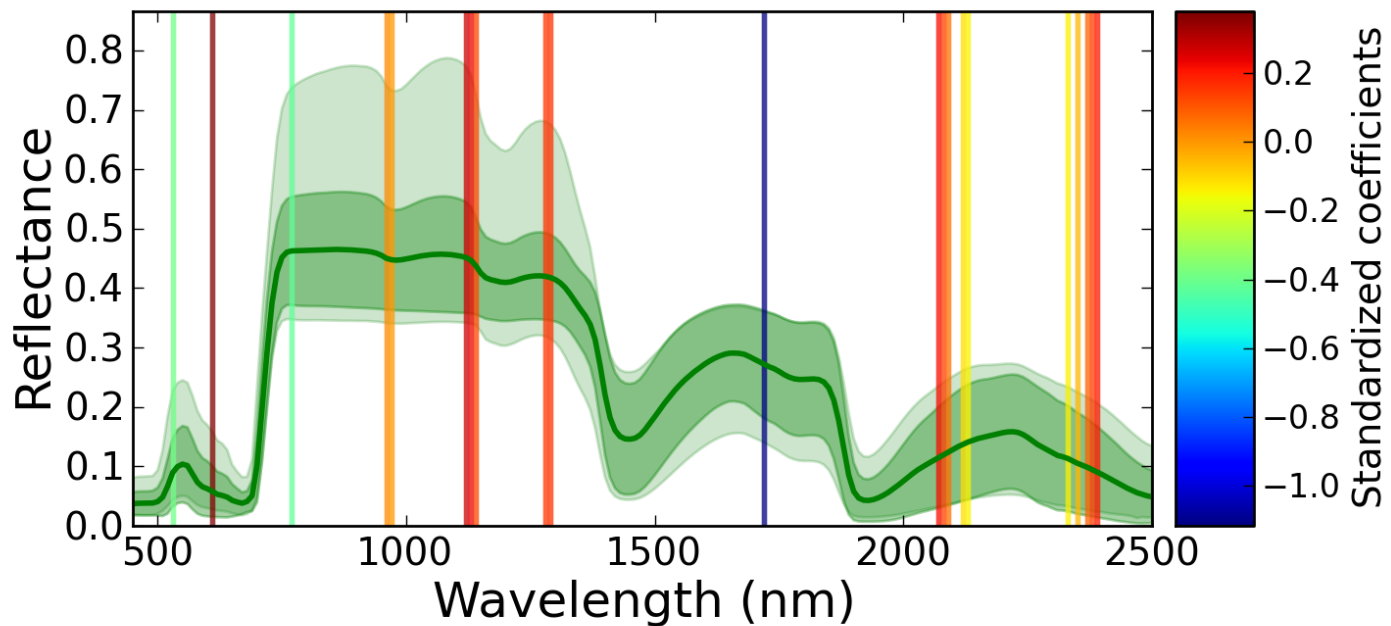
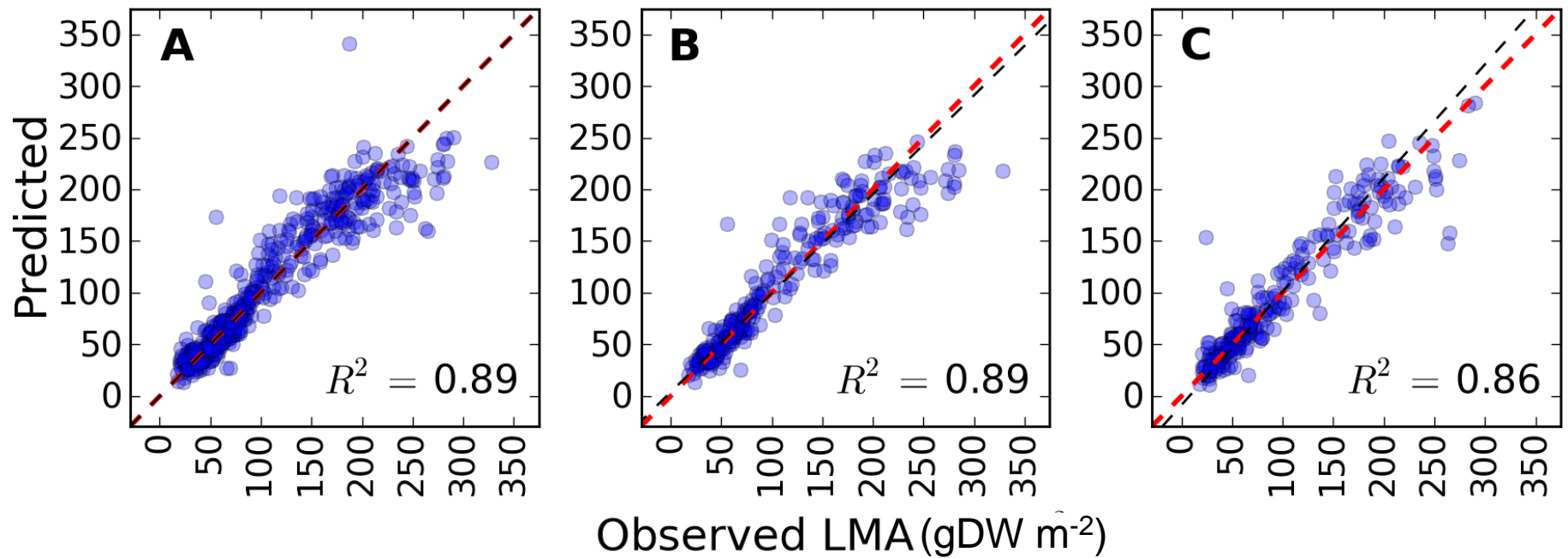
Fresh-leaf spectra



Leaf-level predictions

Dry-leaf spectra





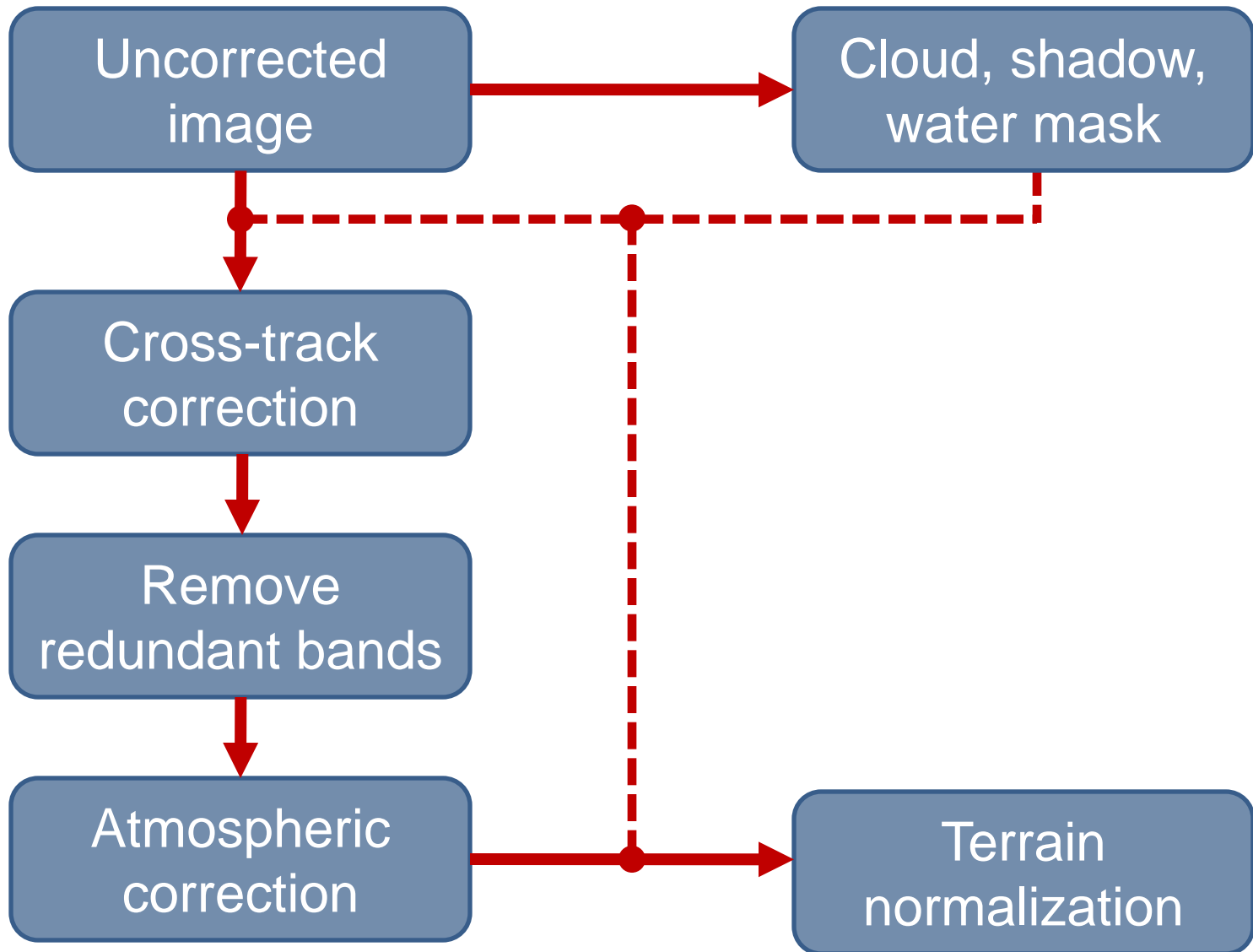
AVIRIS processing



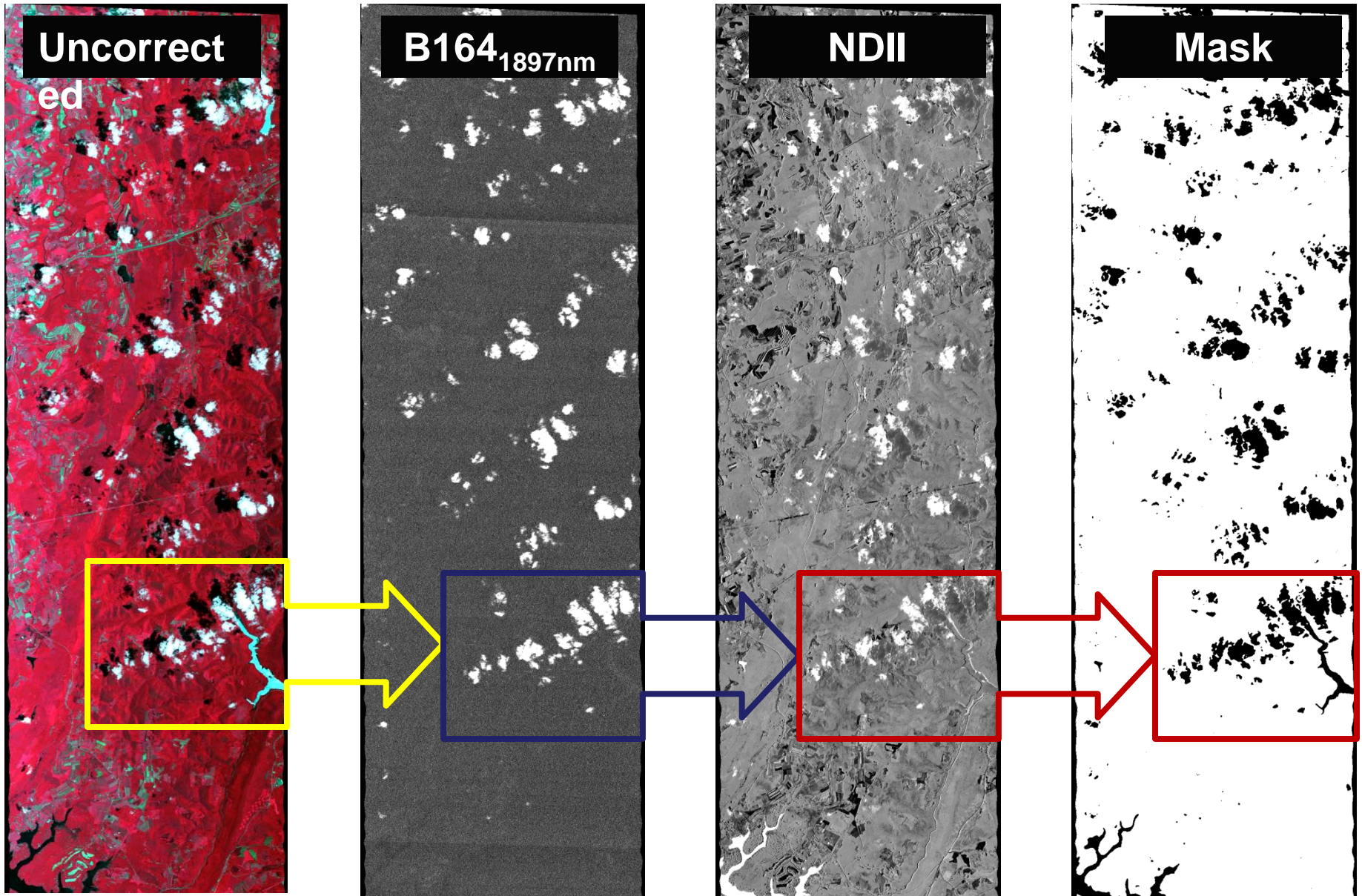
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AVIRIS Pre-processing: Steps



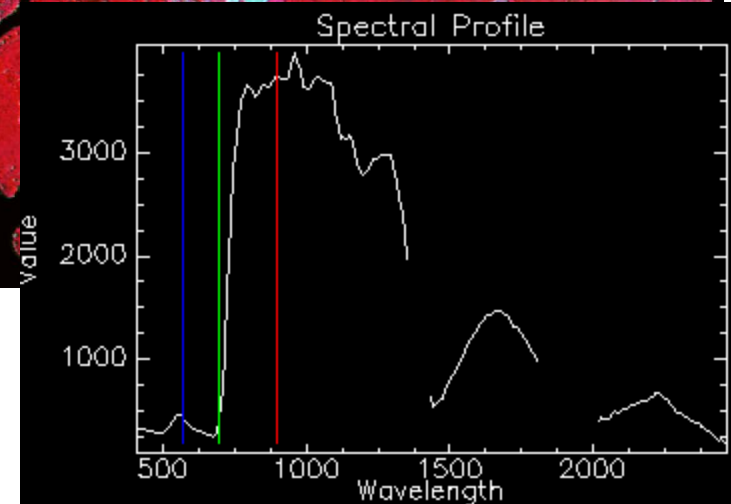
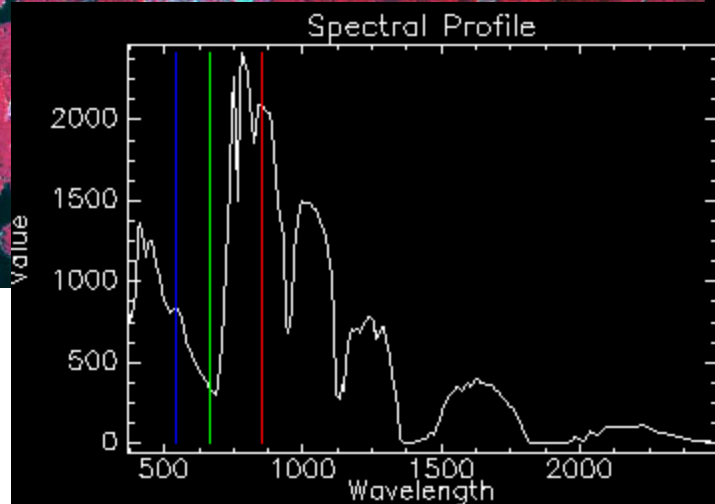
AVIRIS Pre-processing: Mask development



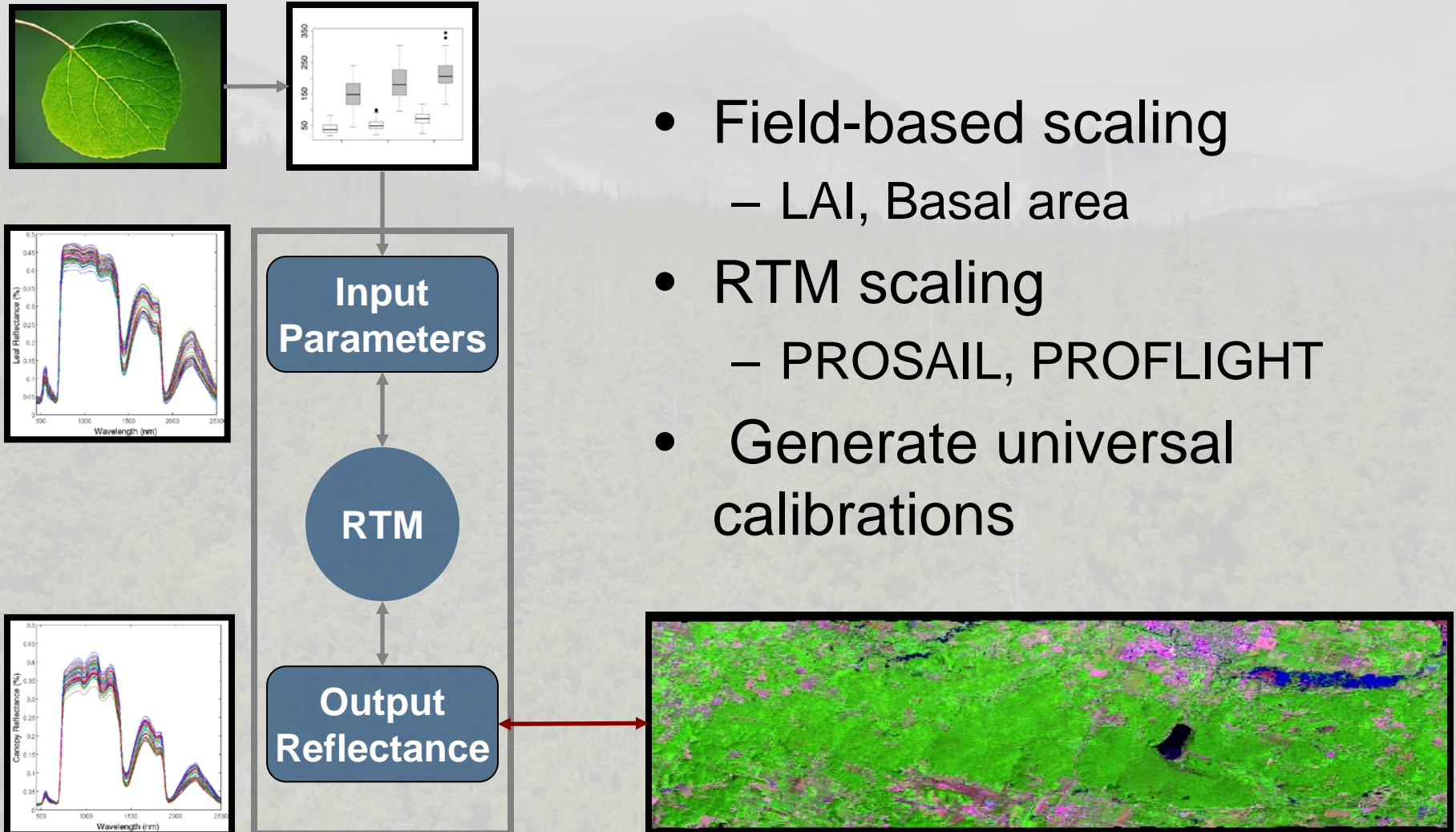
AVIRIS Pre-processing: C-factor terrain normalization

Uncorrected

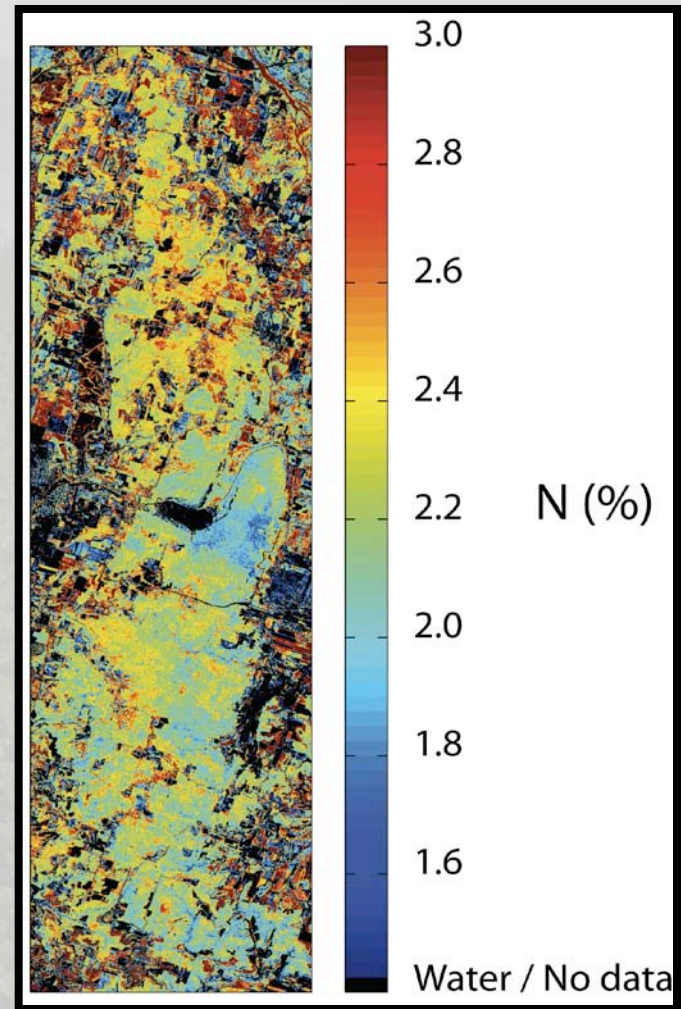
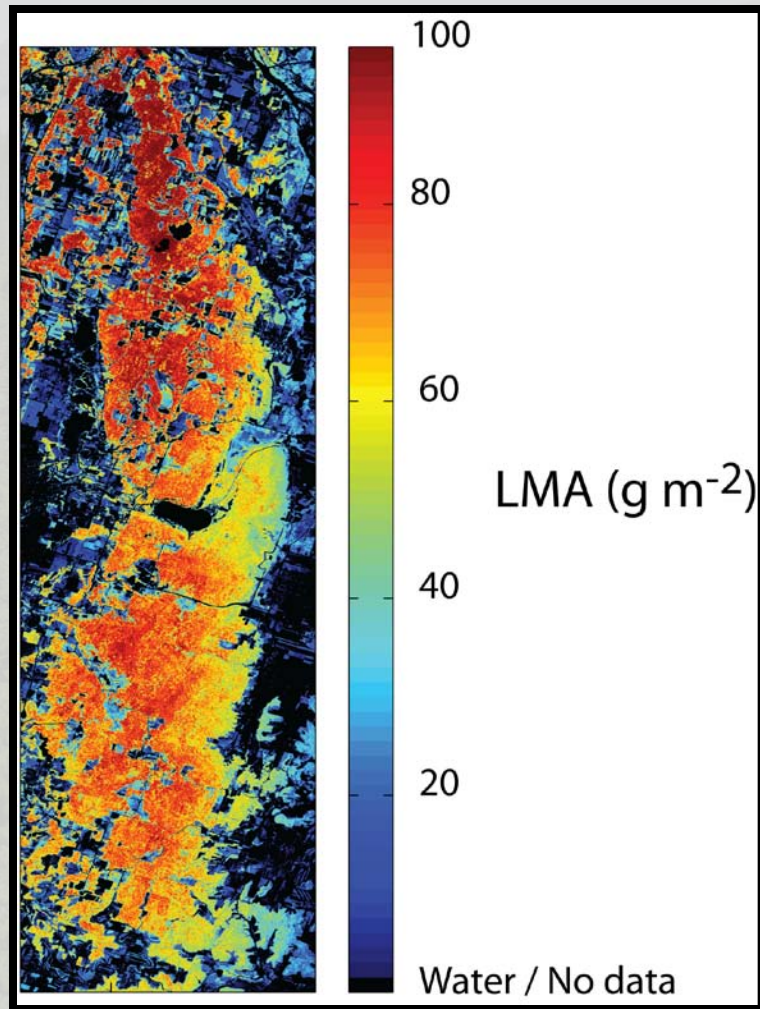
Cross-track,
atmospheric
and terrain
corrected



Scaling



Canopy-scale predictions



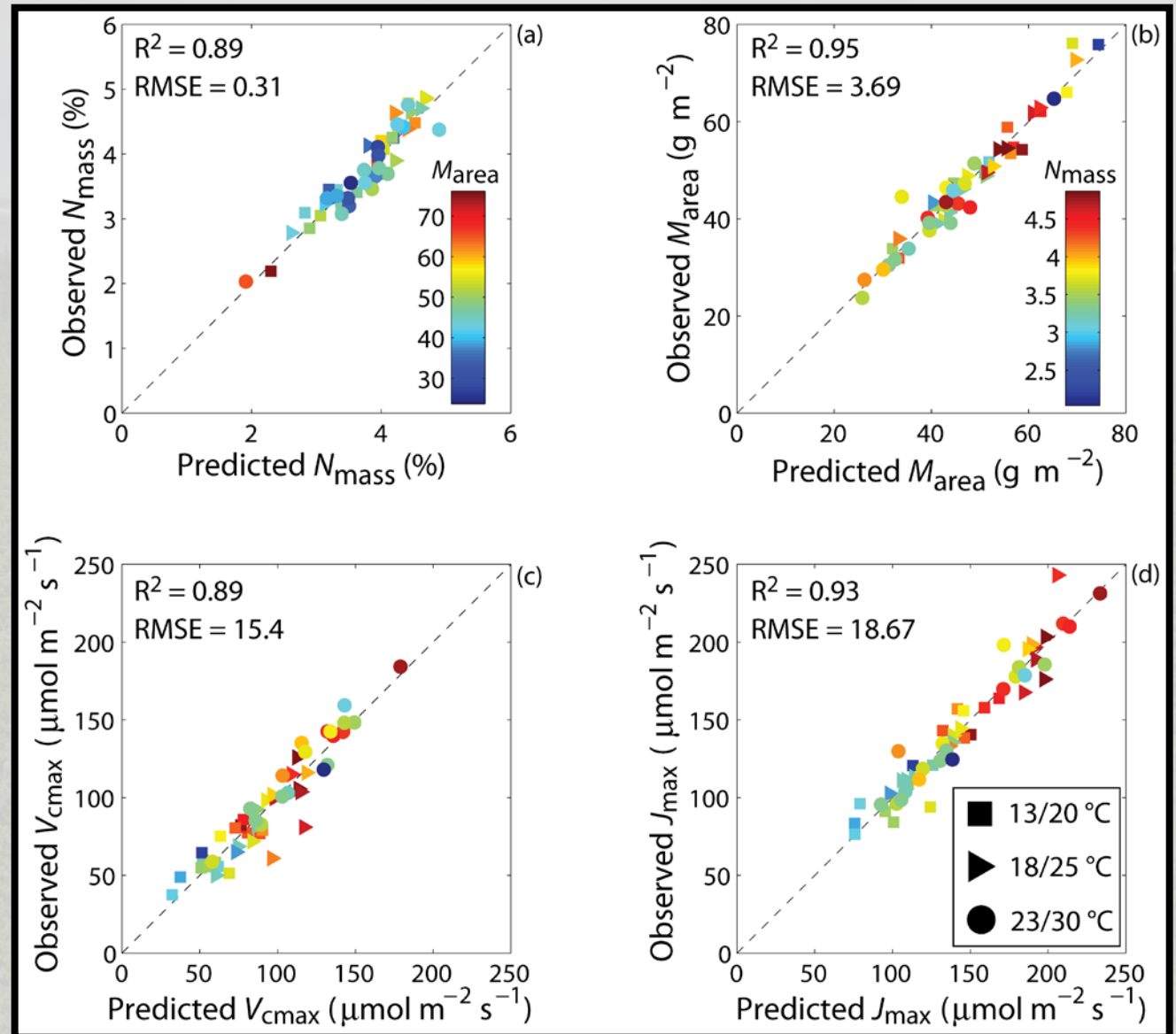
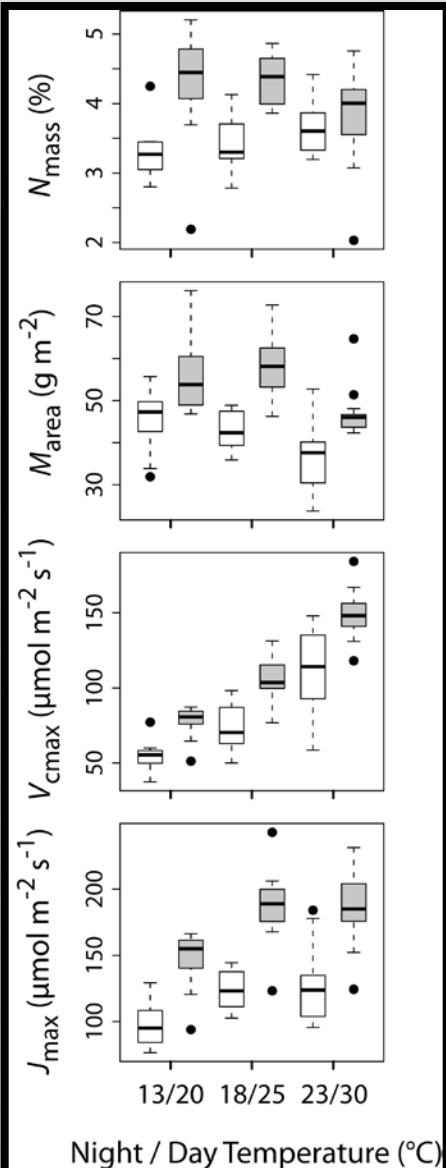
Forest metabolism



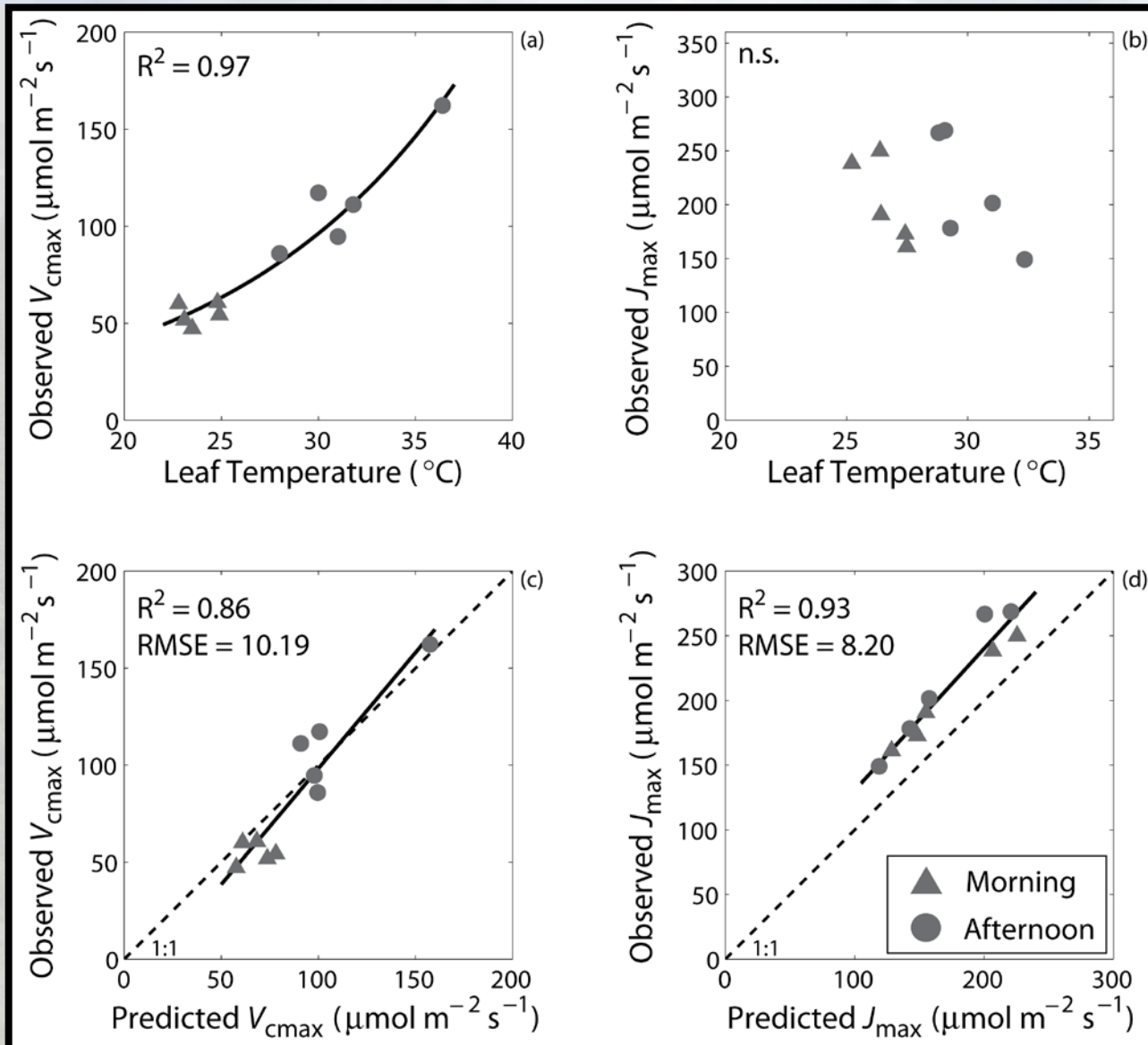
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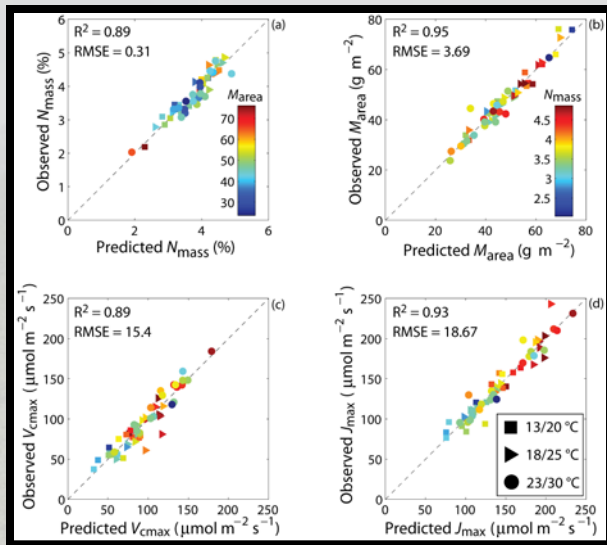
Forest metabolism



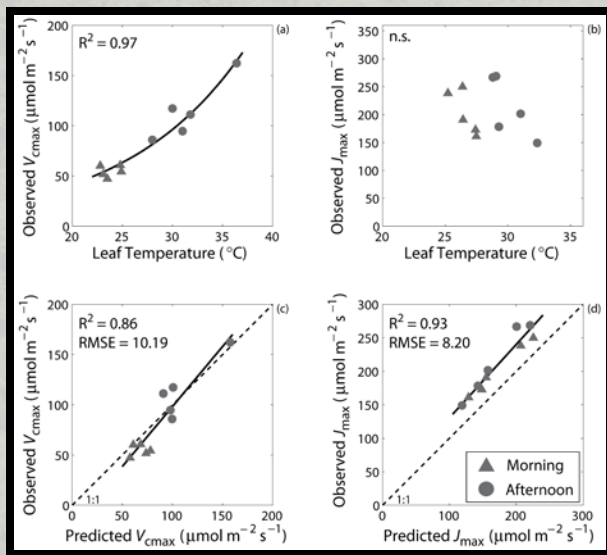
Forest metabolism



Ecosystem metabolism



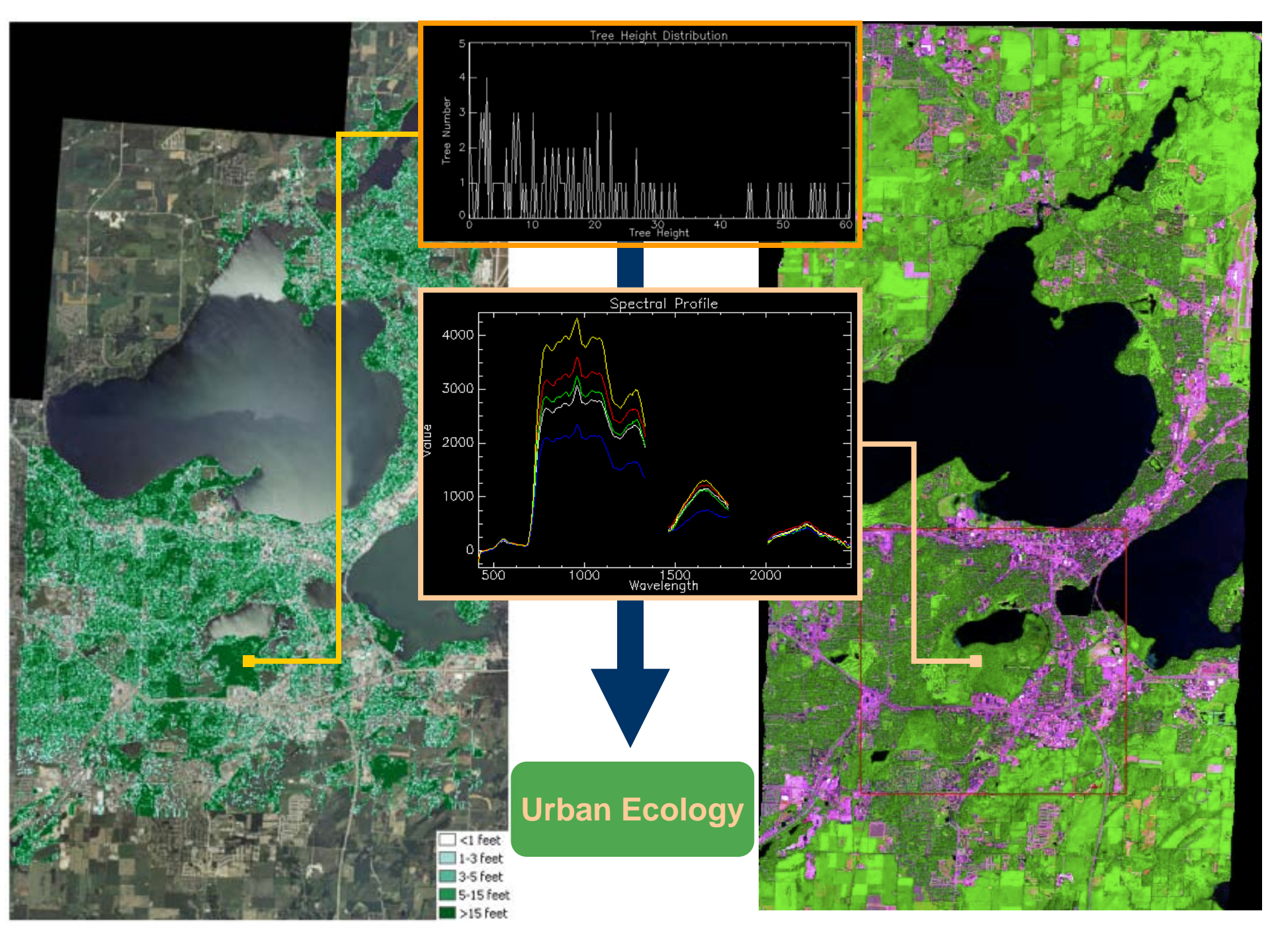
- Changes in the biosphere will broadly impact vegetation dynamics
 - e.g. Phenology, physiology, nutrient content / retention, productivity



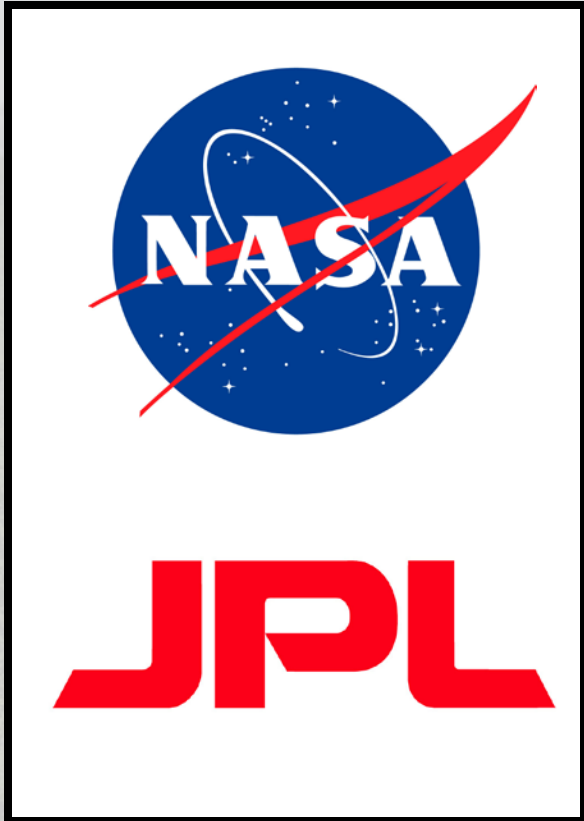
- VSWIR / TIR sensors can provide key information for monitoring vegetation function
 - e.g. Pigments, LUE, stress
- HypsIRI will provide the means for broad-scale monitoring of the changes in ecosystem metabolism

Sensor fusion





Thank you



Funding:

NASA Terrestrial Ecology

NASA HypsIRI Preparatory Activities

NASA Earth and Space Sciences Fellowship

Dr. Laurel Saulton Clark WSGC Fellowship

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