TE 2019

Terrestrial Ecology Science Team Meeting

September 23-25 • College Park, MD

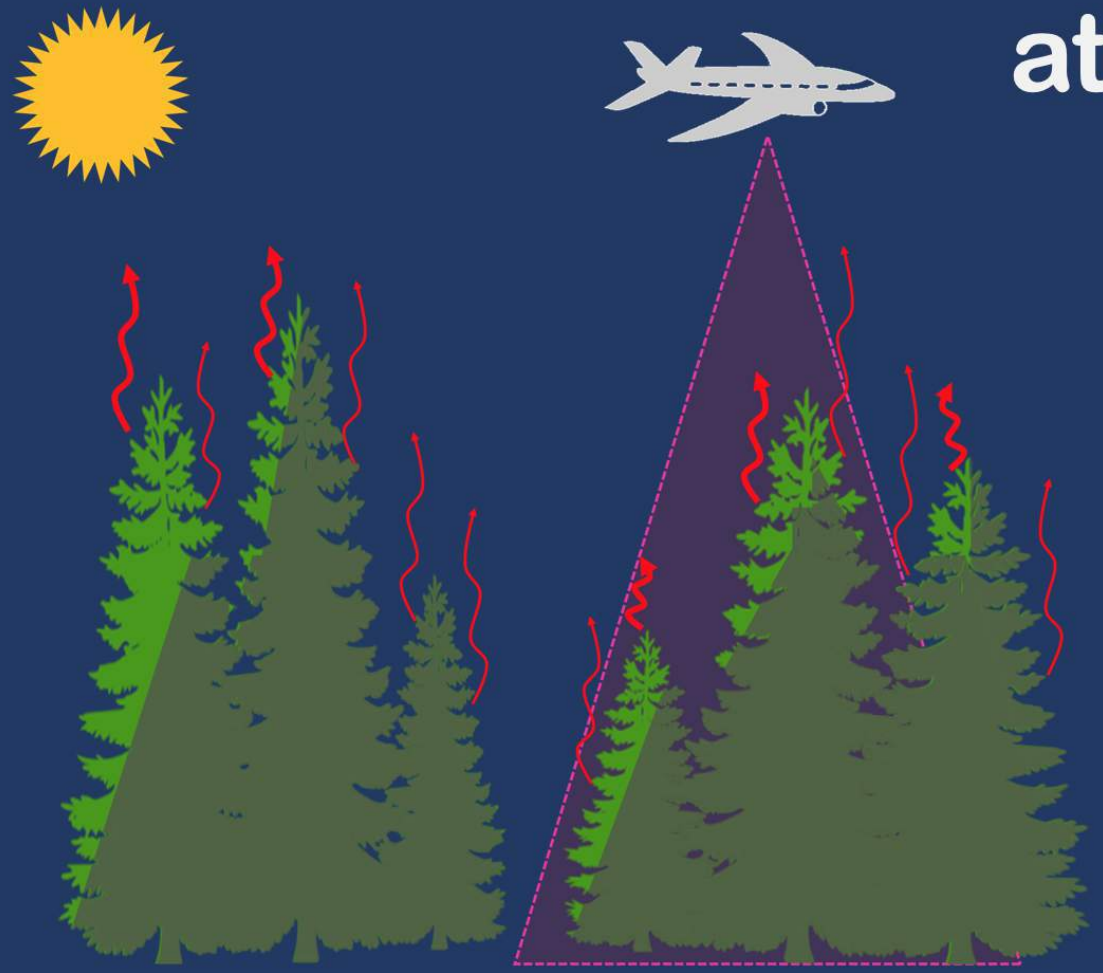
Andy Maguire

University of Idaho

Poster Location #39

SIF and canopy shading at the forest-tundra ecotone

Andrew Maguire
PhD candidate, University of Idaho



1. *Mechanistic understanding at fine scales*
2. *Scaling: conifer shoot → canopy → landscape*
3. *Interpreting photosynthetic phenology*

Please visit me at poster #39 for more information

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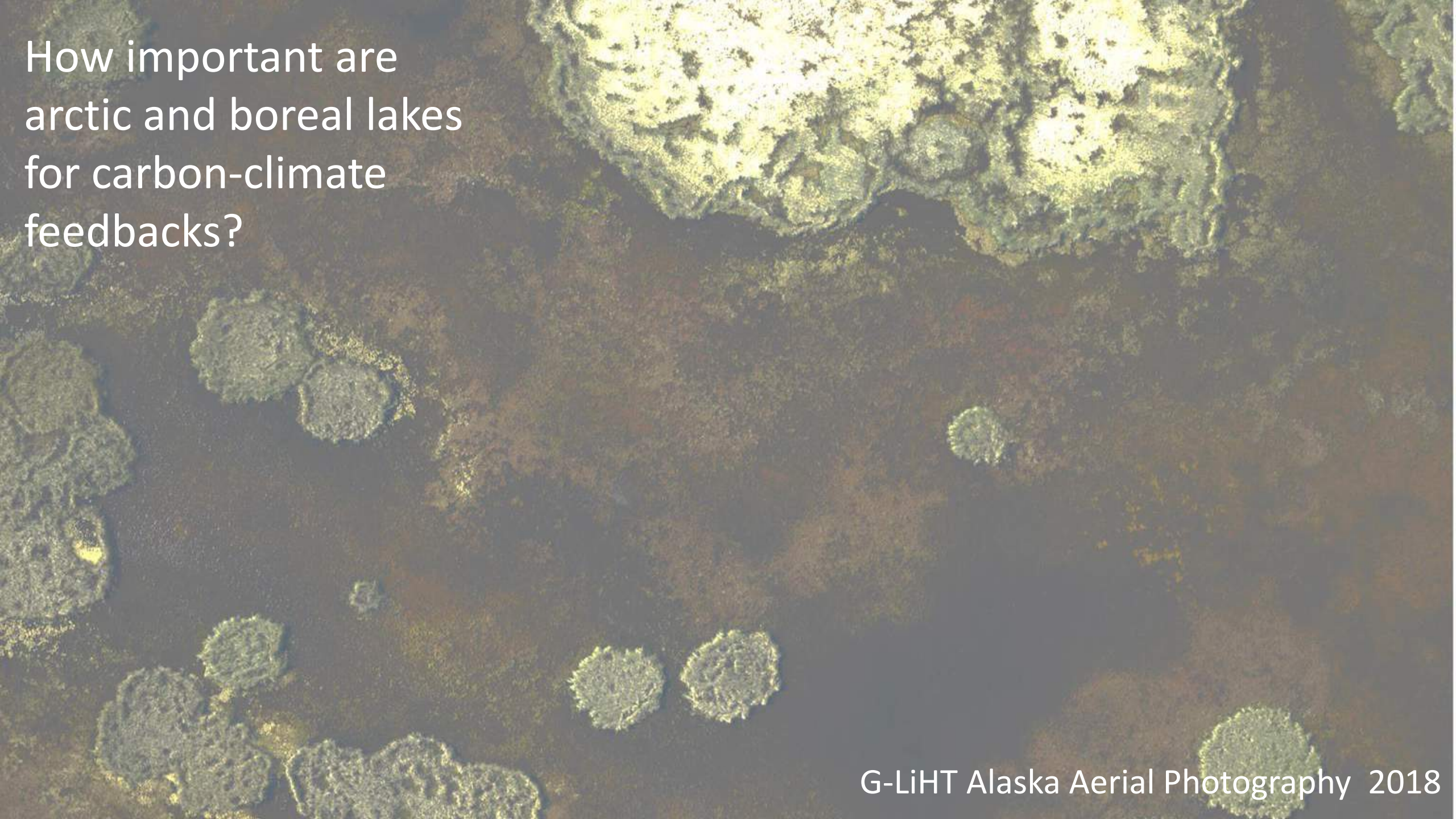
Catherine Kuhn

University of Washington

Poster Location #83


How important are arctic and boreal lakes for carbon-climate feedbacks?
G-LiHT Alaska Aerial Photography 2018

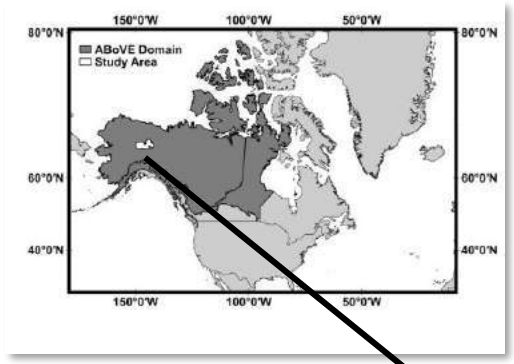
#83 Arctic and boreal lake primary productivity from space

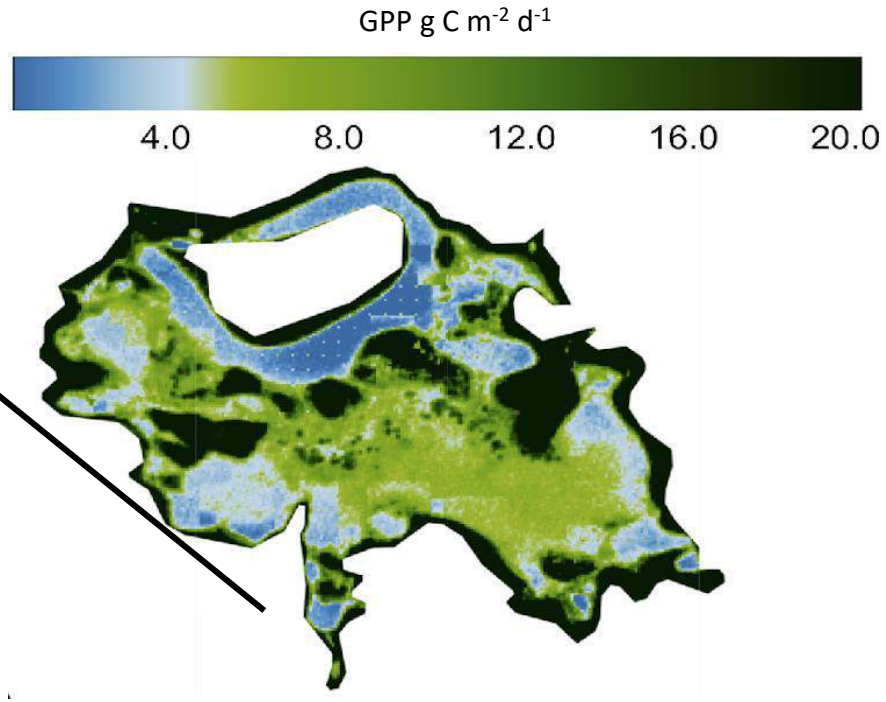
Catherine Kuhn, Matthew Bogard, Sarah Ellen Johnston, Robert G Spencer, Eric Vermote, Mark Dornblaser, Kimberly Wickland, Robert G Striegl, David E Butman

Approach:
Spatially explicit maps of gross primary productivity from satellites (Sentinel-2, PlanetScope) and airborne (AVIRIS-NG) remote sensing. **Landsat time series of lake greening.**

Results:
Lake greenness is a **simple optical proxy** for integrated GPP. Time series show majority of lakes that changing are getting **less green.**

Significance: Space-based optical index sparks exciting new research opportunities across **terrestrial-aquatic gradients** and **bridges scales** between field, airborne and satellite observations





Sentinel-2 GPP

Canvasback Lake, July 2018, Alaska

ckuhn@uw.edu

UNIVERSITY of WASHINGTON

ABoVE ARCTIC – BOREAL VULNERABILITY EXPERIMENT

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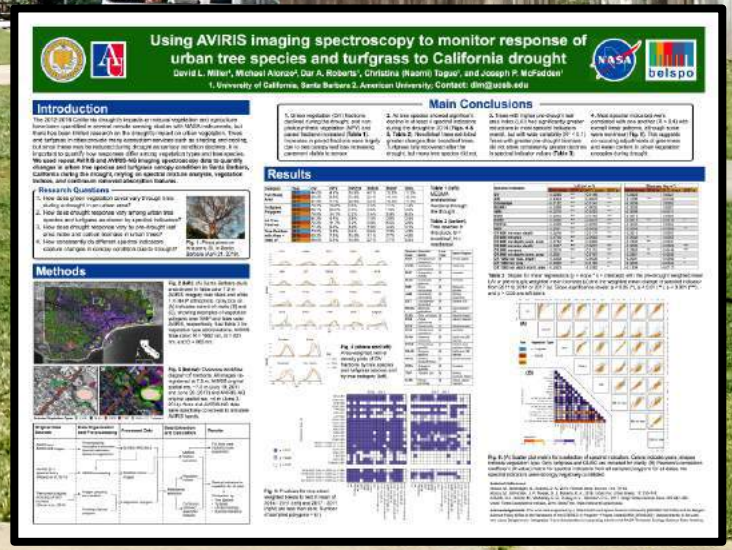
David Miller

University of California Santa Barbara

Poster Location #47

Using AVIRIS imaging spectroscopy to monitor response of urban tree species and turfgrass to California drought

David L. Miller[1]*, Michael Alonzo[2], Dar A. Roberts[1], Christina (Naomi) Tague[1], and Joseph McFadden[1]
1. University of California, Santa Barbara
2. American University
*Contact: dlm@ucsb.edu



https://aviris.jpl.nasa.gov/
https://www.esrl.noaa.gov/gmd/hats/airborne/acats/acats_er2.html

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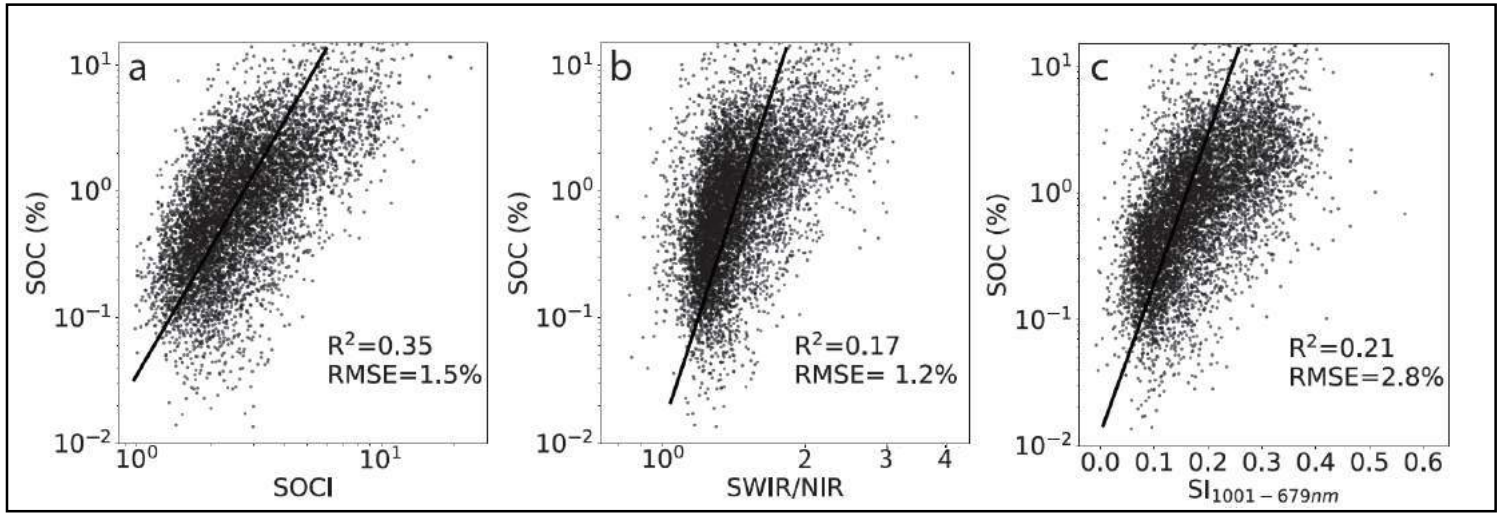
Evan Thaler

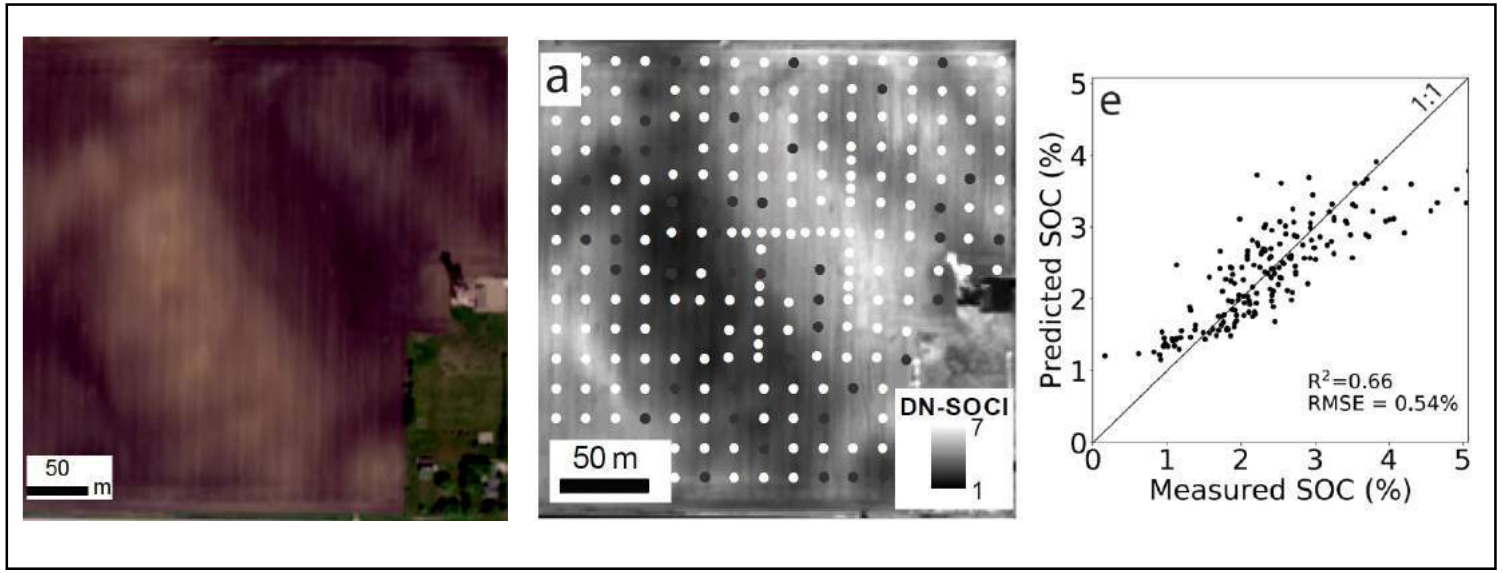
University of Massachusetts

Poster Location #7

- Soil organic carbon (SOC) is a key property influencing soil fertility
- Previous remote sensing indices for SOC rely on SWIR or NIR wavelengths
- SWIR often has low spatial resolution
- NIR requires a multi- or hyperspectral sensor
- An index based on the visible bands would increase our ability to remotely predict SOC
- We used USDA laboratory measurements of soil reflectance and SOC to develop such an index

Soil organic carbon index (SOCI) = $\rho_{blue}/(\rho_{green} * \rho_{red})$





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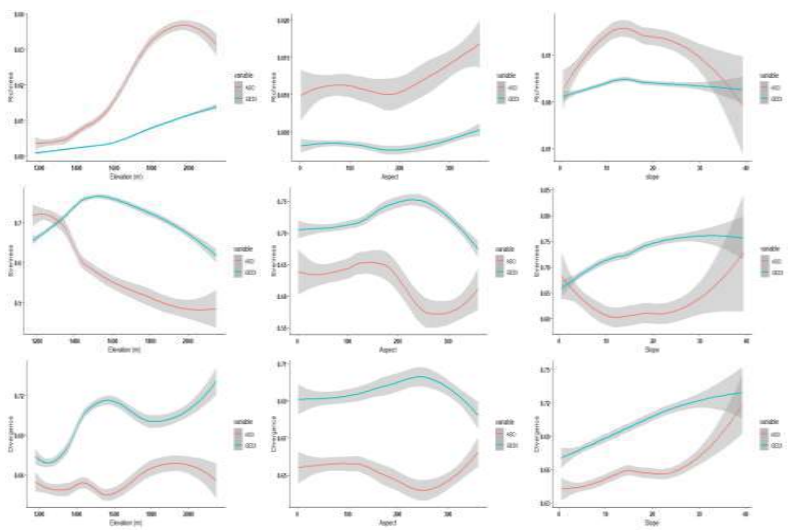
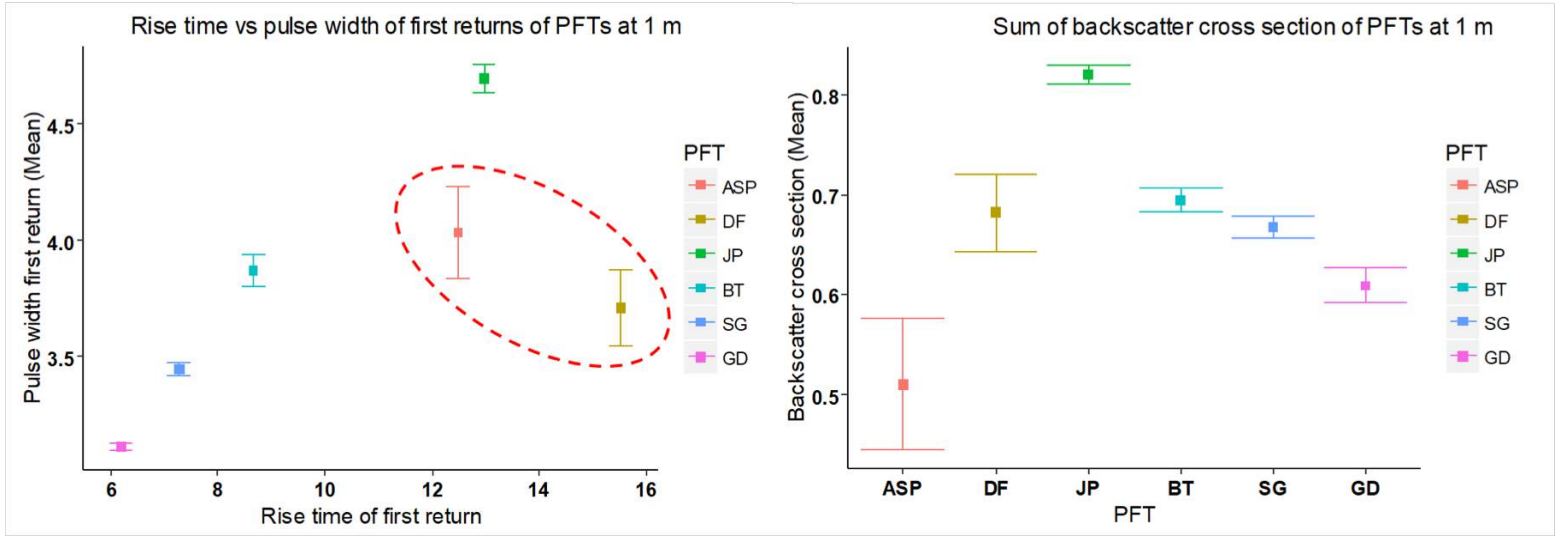
Ginikanda Ilangakoon

Boise State University

Poster Location #27





Full waveform lidar captures plant functional types and functional diversity to inform ecosystem processes in a semi-arid ecosystem

Nayani Ilangakoon
Department of Geosciences
Boise State University

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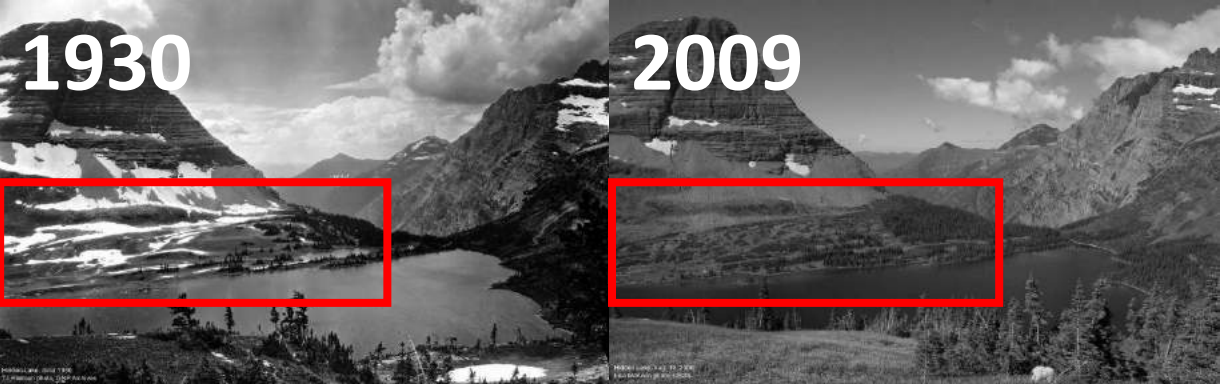
Chenyang Wei

State University of New York, Buffalo

Poster Location #86



(Source: T.J. Hileman photo, courtesy of Glacier National Park Archives)

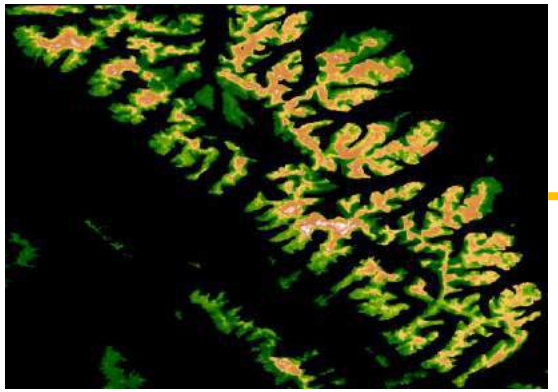
(Source: Lisa McKeon photo, courtesy of USGS)

Alpine Treeline Ecotone (ATE): moving uphill?

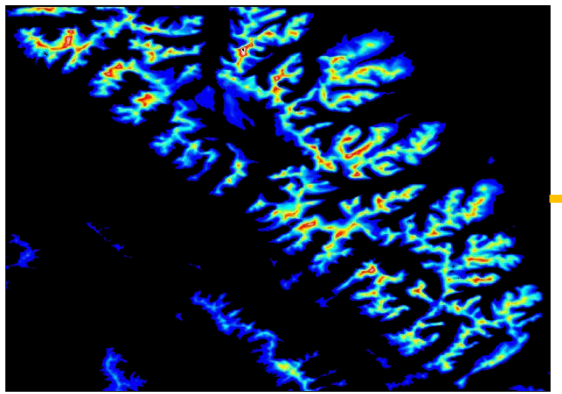
Poster

#86

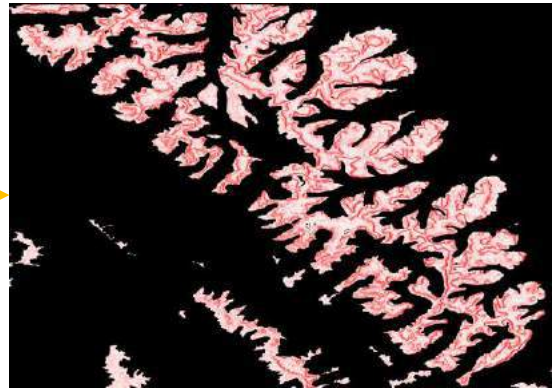
Annual **NDVIs** (1984 – 2018)



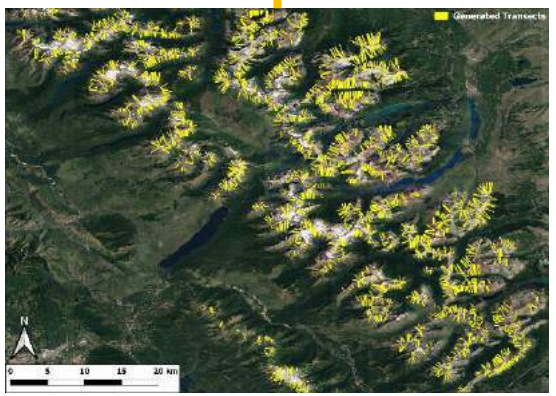
Elevation



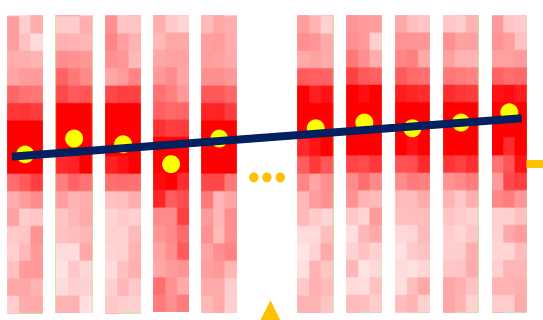
ATE-detection Index *(Wei et al., in review)*

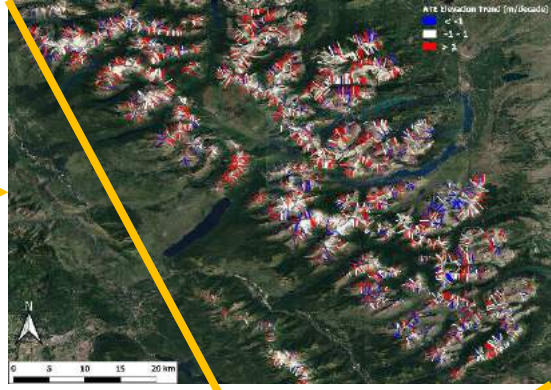


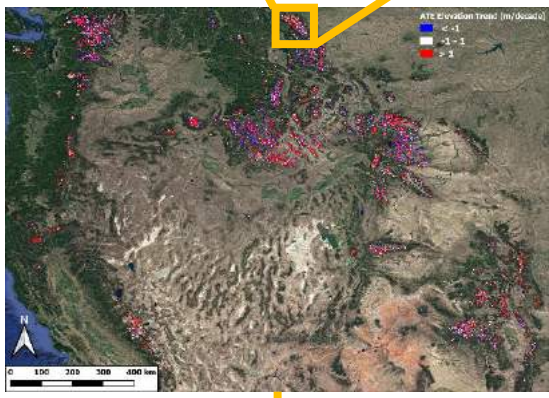
Annual **ATEIs** (1984 – 2018)

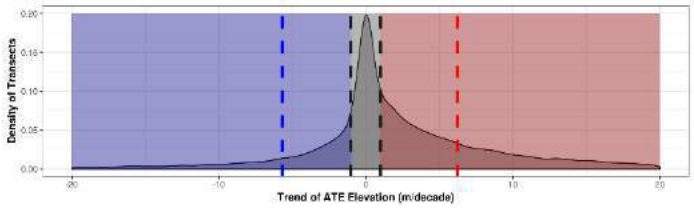


1984 ... 2018









50.9% *moving* ***uphill***

6.25 *m/decade*

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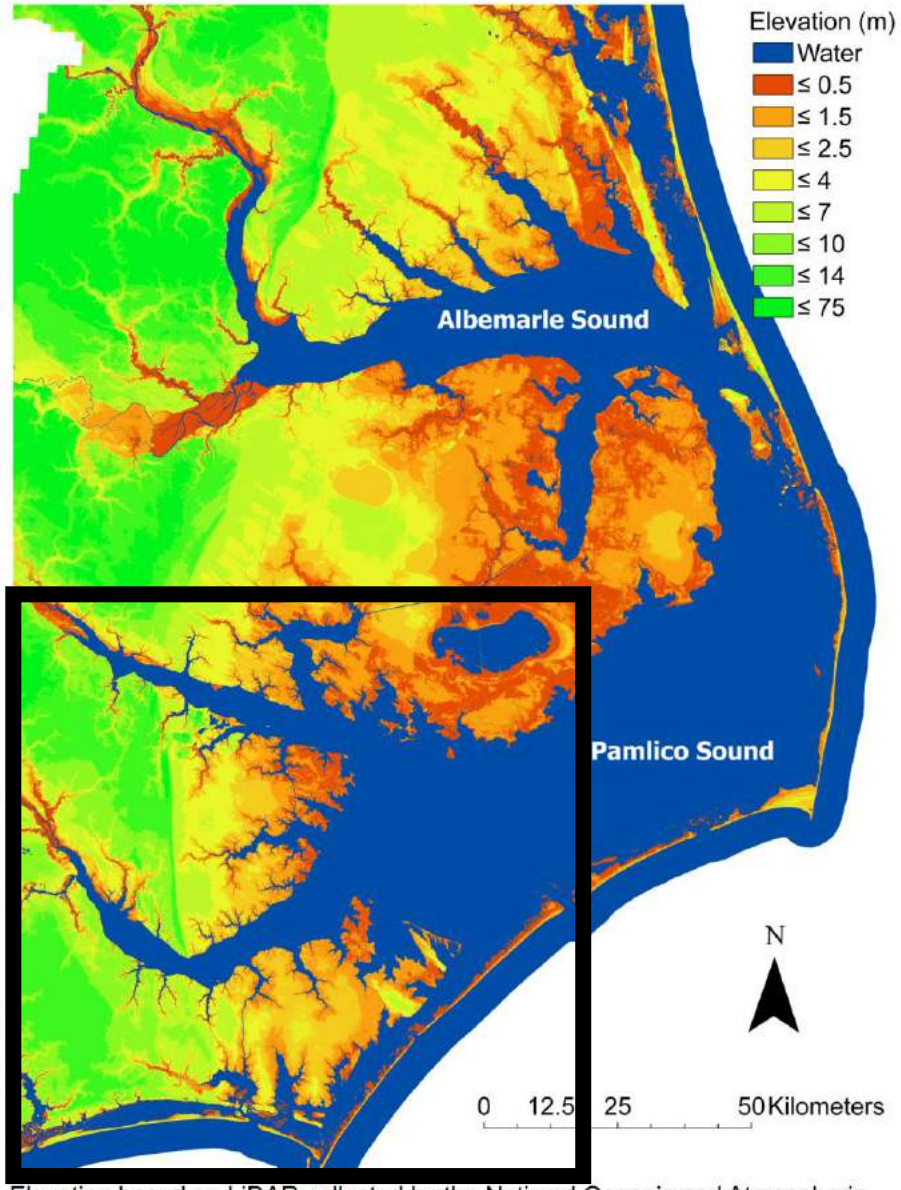
Patrick Gray

Duke University

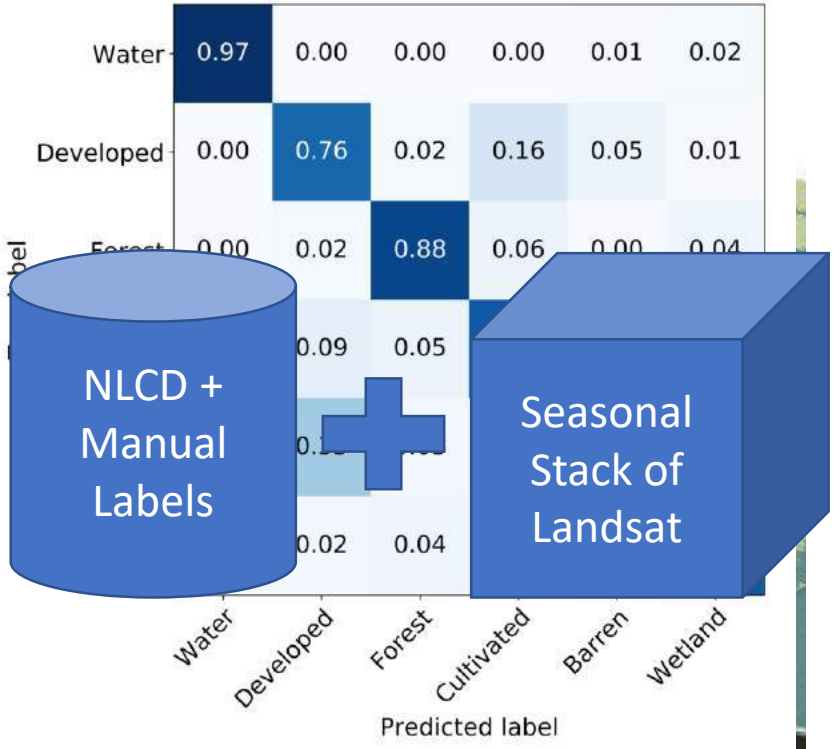
Poster Location #15

Monitoring long-term variability in land cover and forest canopy using a recurrent neural network that incorporates spectral and temporal context



Elevation based on LiDAR collected by the National Oceanic and Atmospheric Administration Office for Coastal Management.

Landcover Confusion Matrix

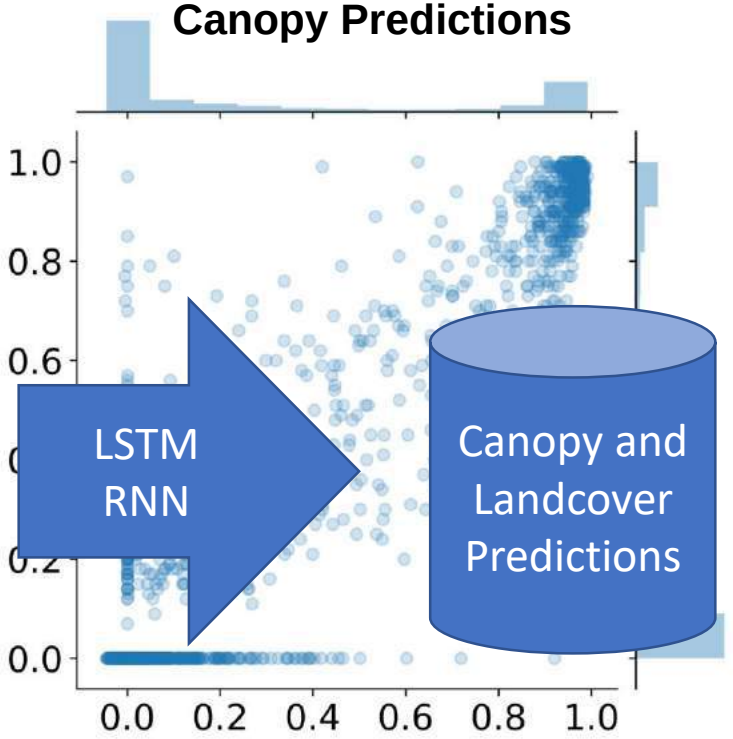


NLCD + Manual Labels

Seasonal Stack of Landsat

overall accuracy = 80.3%

Canopy Predictions



LSTM RNN

Canopy and Landcover Predictions

R^2 = 0.892

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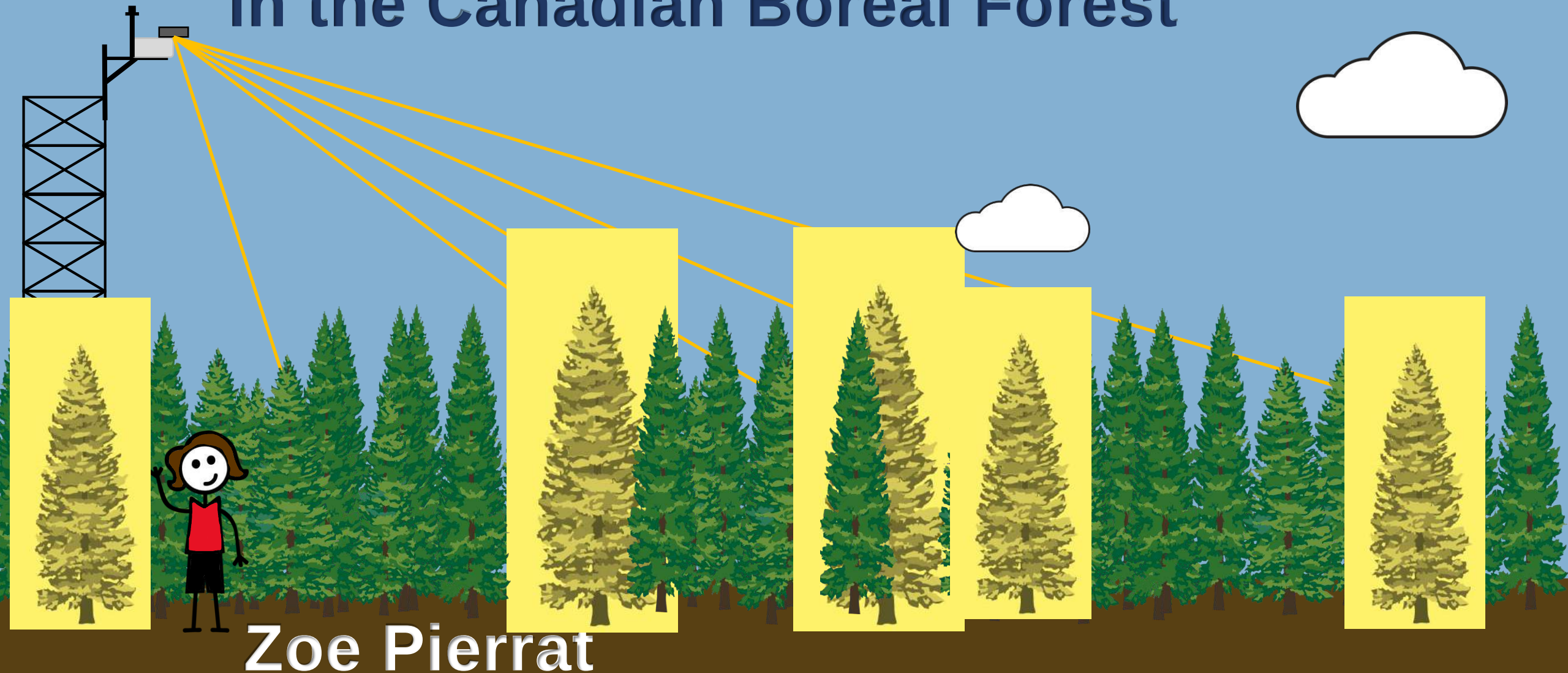
Zoe Pierrat

University of California Los Angeles

Poster Location #51

One year of PhotoSpec Solar-Induced Chlorophyll Fluorescence observations in the Canadian Boreal Forest



Zoe Pierrat

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Liyin He

California Institute of Technology

Poster Location #81

TROPOMI solar induced fluorescence (SIF) for improved monitoring of crop productivity

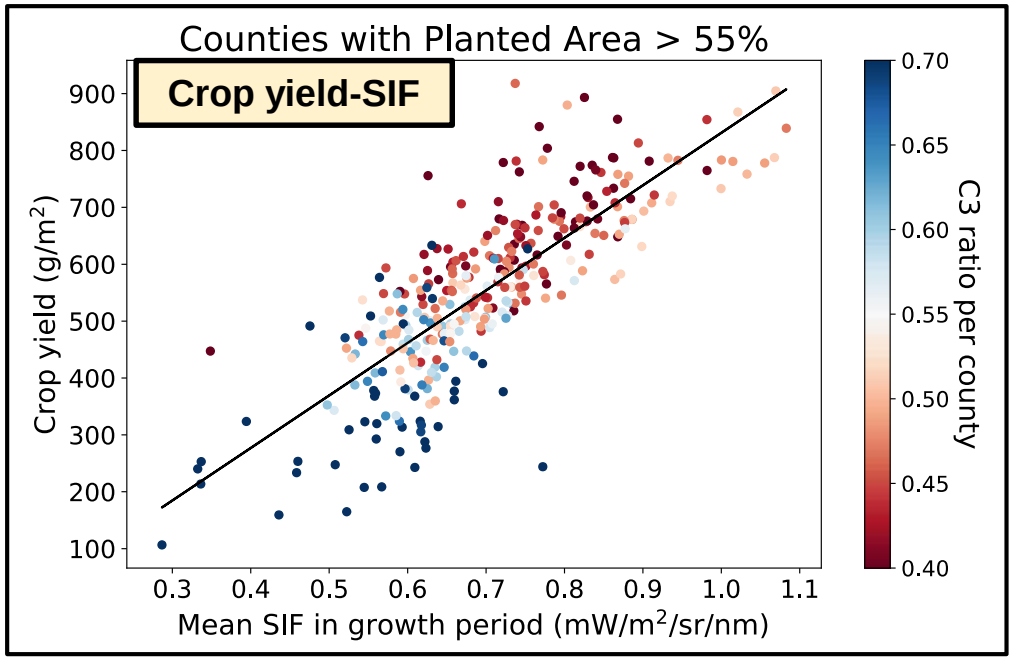
Liyin He[a] | Christian Frankenberg[a,b] | Kaiyu Guan[c] | Troy S. Magney[a] | Philipp Köhler[a] | Vincent Humphrey[a] | Ying Sun[d] | David Lobell[e]

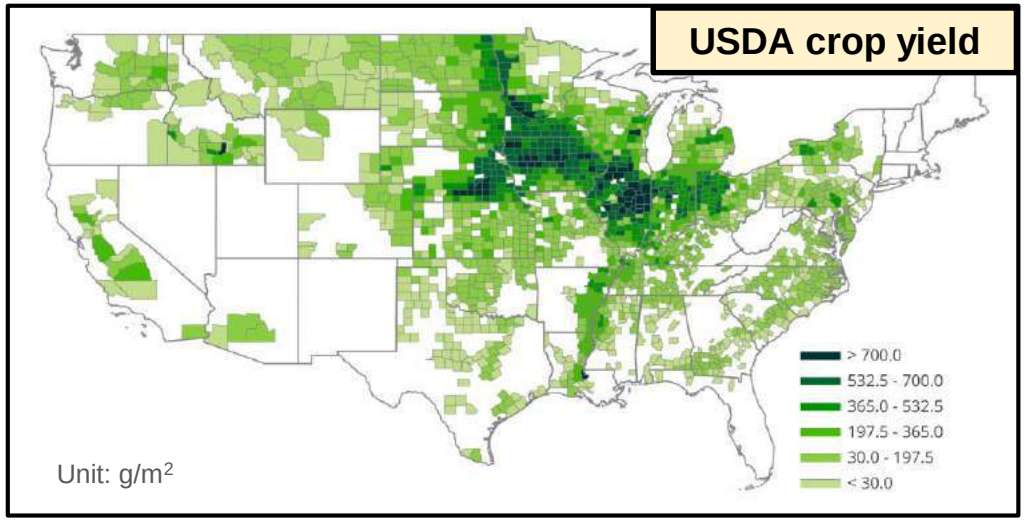
Research Goal: Leverage satellite SIF to improve crop monitoring

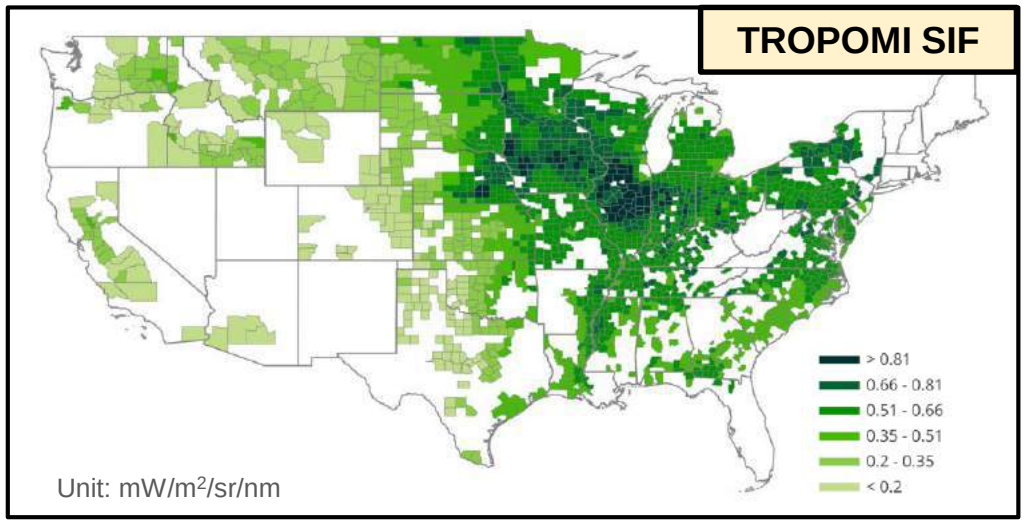
Approach: TROPOMI daily SIF dataset with unprecedented spatial resolution (7km × 3.5km)

Results: 1) SIF ⟷ GPP (Highly correlated)

2) Slope of Crop yield:SIF is different for C3 and C4 crops.







More details refer to POSTER **#81**

a. California Institute of Technology, Pasadena, CA, USA
b. Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA
c. University of Illinois at Urbana Champaign, Urbana, IL, USA
d. Cornell University, Ithaca, NY, United States
e. Stanford University, Stanford, CA, USA

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Elizabeth Webb

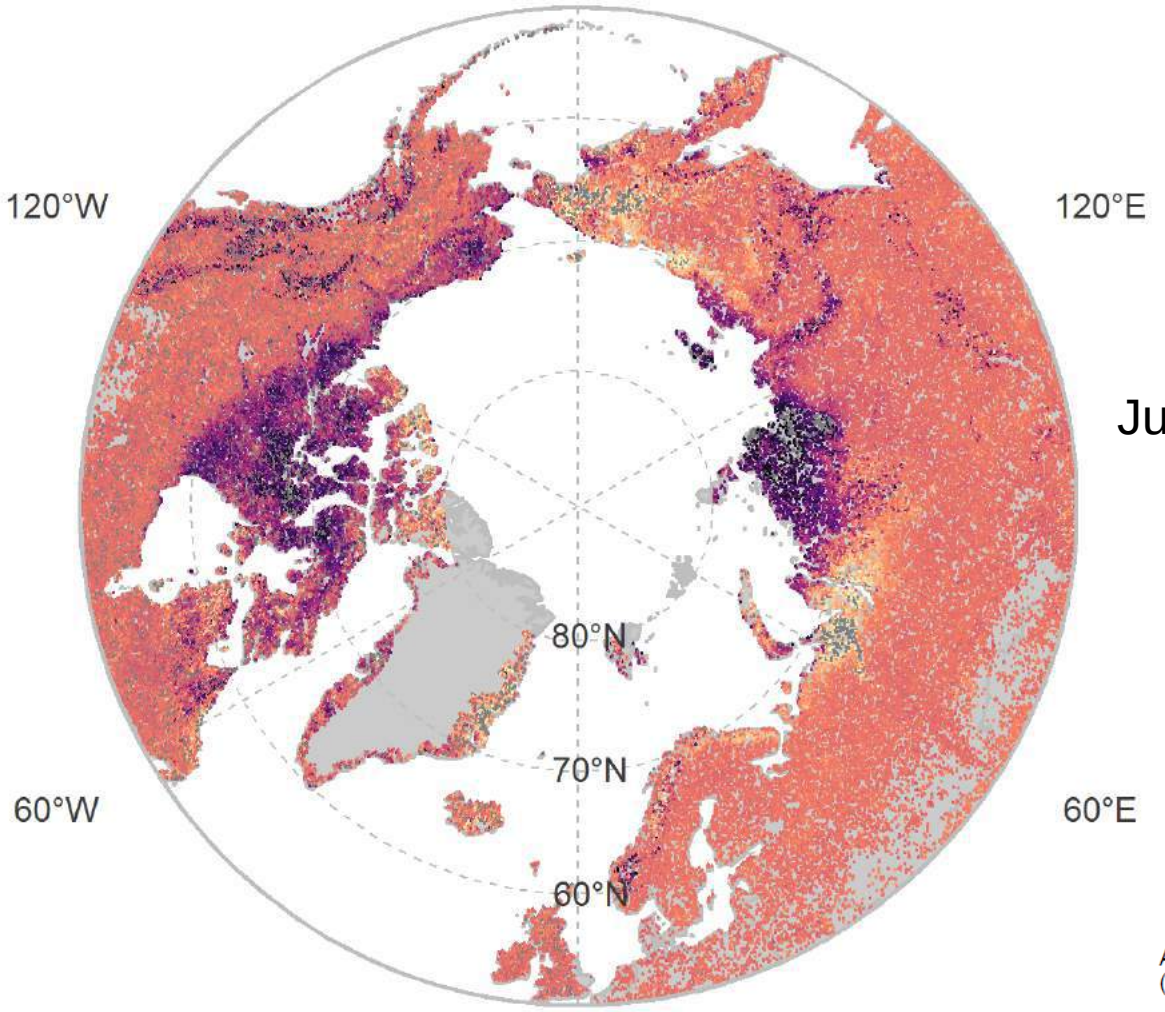
University of Florida

Poster Location #45

DRIVERS OF ALBEDO CHANGE IN NORTHERN HIGH LATITUDE ECOSYSTEMS

Elizabeth E. Webb, Michael M. Loranty, Jeremy W. Lichstein

Poster 45



June albedo trends
(2000-2019)

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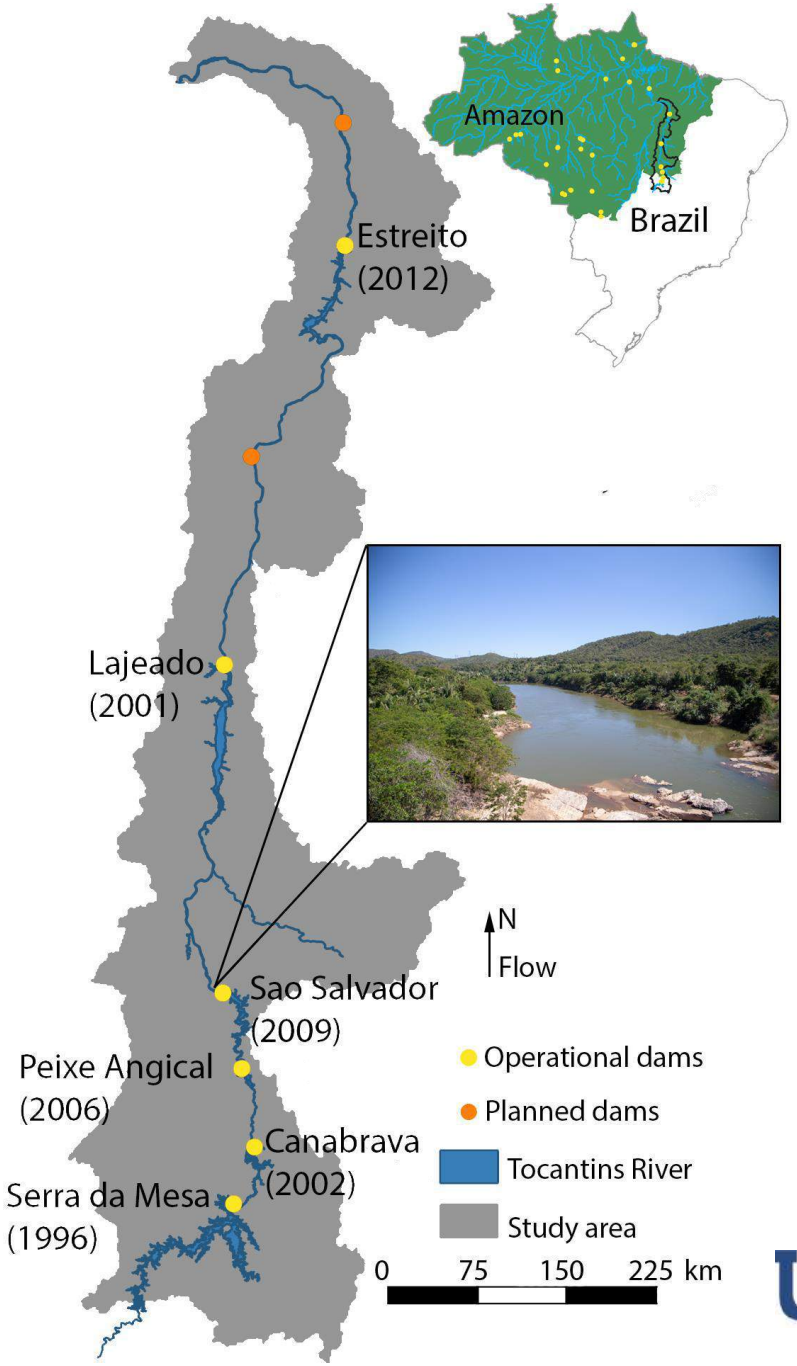
Christine Swanson

University of Florida

Poster Location #55



Effects of dams on riparian vegetation in the Amazon: cumulative impacts and linkages to hydrology

Poster 55

UF Water Institute UNIVERSITY of FLORIDA

SFRC School of FOREST RESOURCES & CONSERVATION

UF Informatics Institute UNIVERSITY of FLORIDA

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Xian Wang

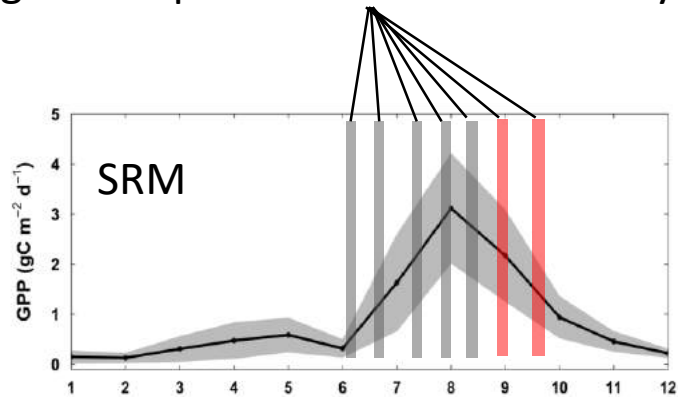
University of Arizona

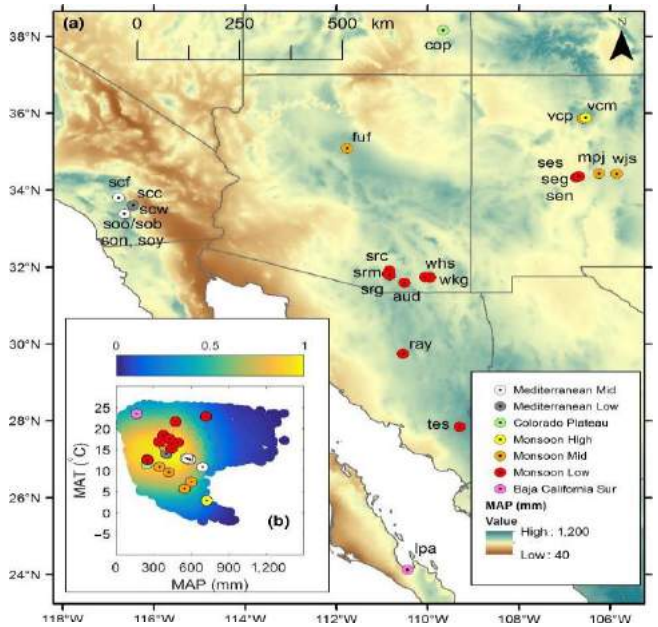
Poster Location #57

Compare GPP to SIF, PRI, NDVI, NIRv (diurnal to seasonal)

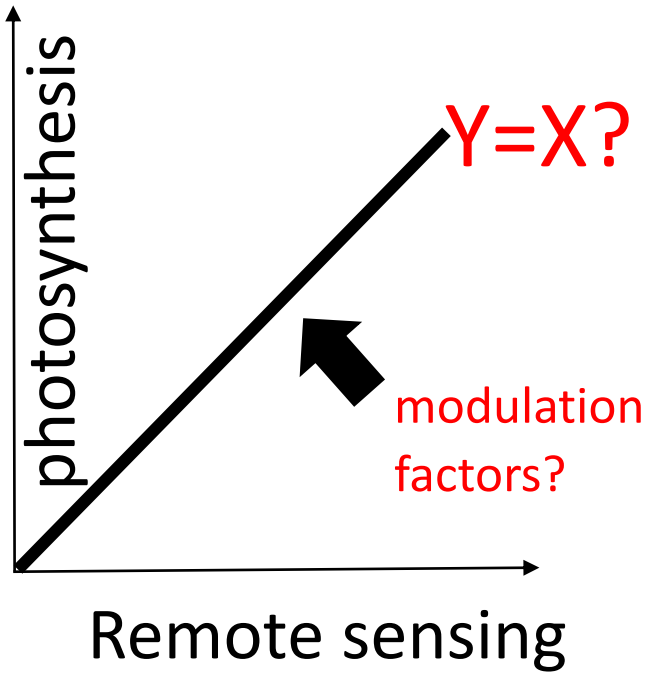
- **Leaf-level (SRM, senescence)**
  - **RS: SIF, NIRv, PRI, NDVI**
  - **LiCor6800: photosynthesis**
- **Tower-level (Dong Yan)**
  - **RS: SIF, NIRv, PRI, NDVI**
  - **Eddy Flux: GPP**
- **Satellite (southwestern US ~20)**
  - **RS: TROPOMI SIF, NIRv, NDVI**
  - **Eddy Flux: GPP, climate factors**

Field Campaigns to capture diurnal leaf-level dynamics





Biederman et al., 2017



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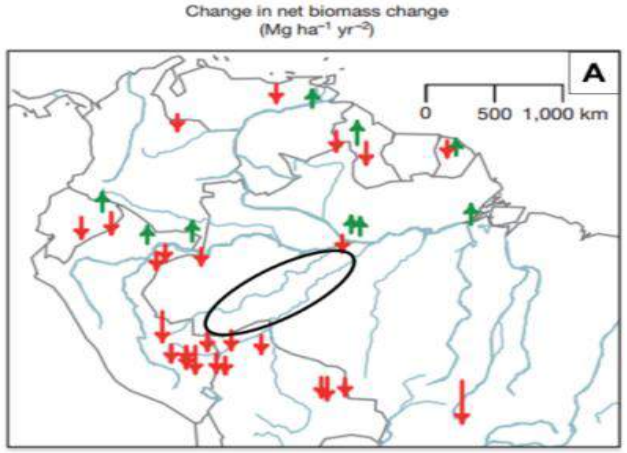
Shuli Chen

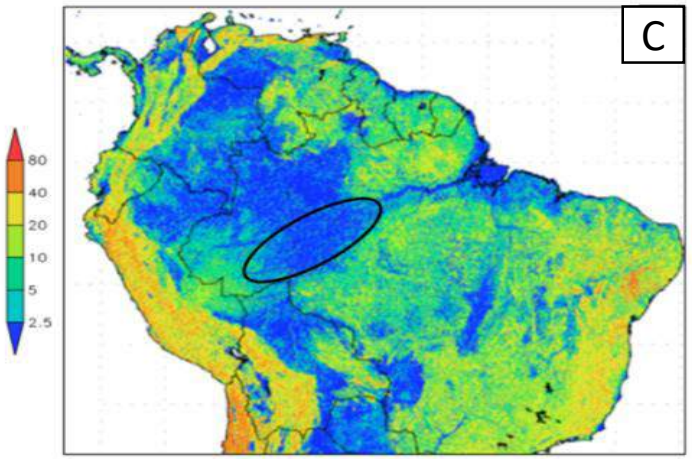
University of Arizona

Poster Location #11

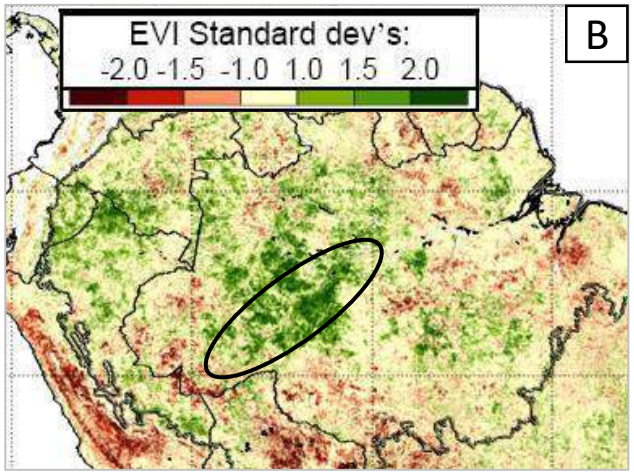
RAINFOR plots (Brienen et al)

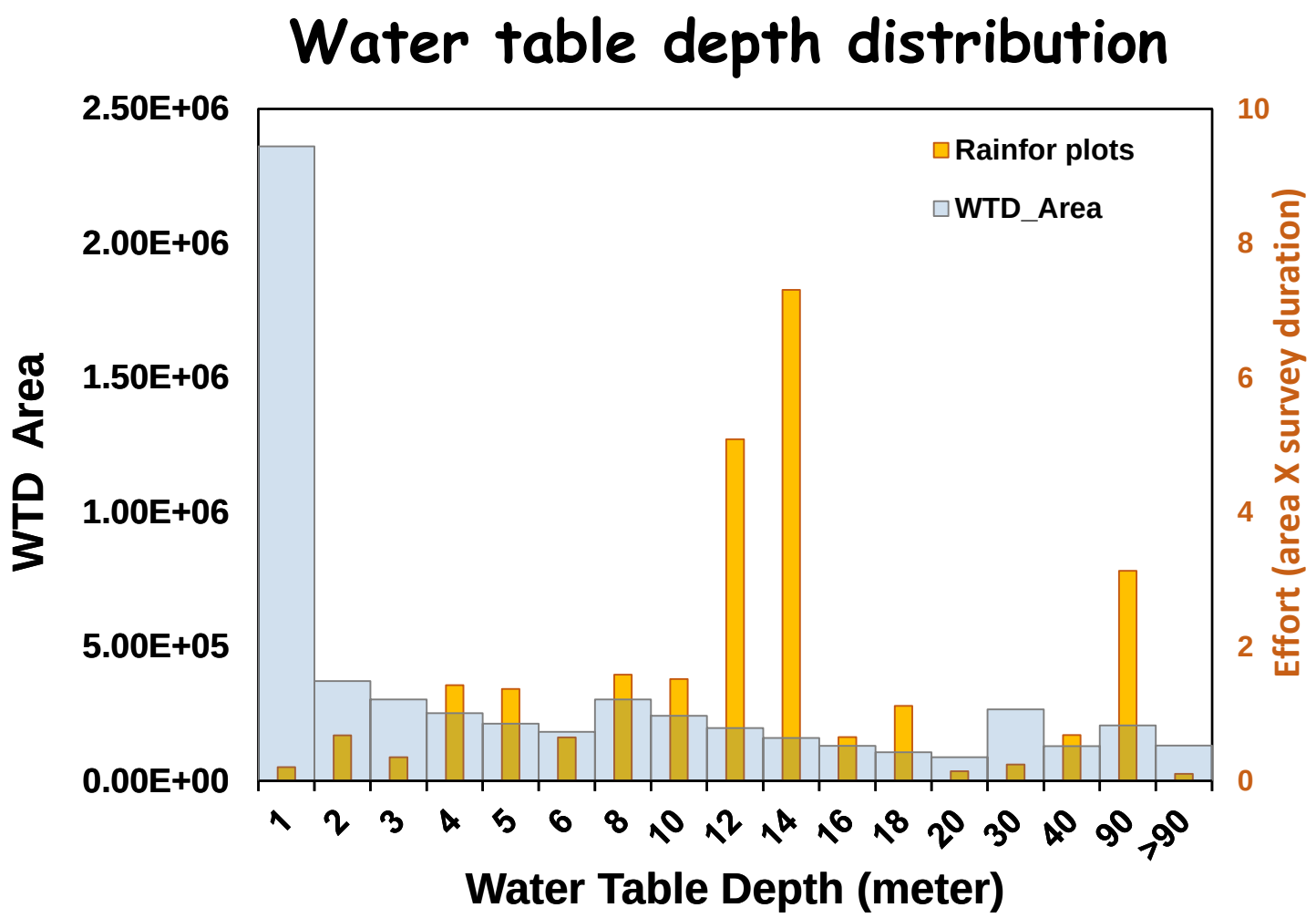


Water Table Depths



2005 Drought Green-up





1. Effort (area x survey duration) on long-term **RAINFOR plots** (showing biomass loss with drought) are concentrated in regions with **deeper water-tables**;
2. While regions (with **"green-up"** during the 2005 drought) tend to overlap with **shallow water-table areas**.

Saleska et al., 2007, Nobre et al., 2011,Fan et al., 2013, Brienen et al., 2014

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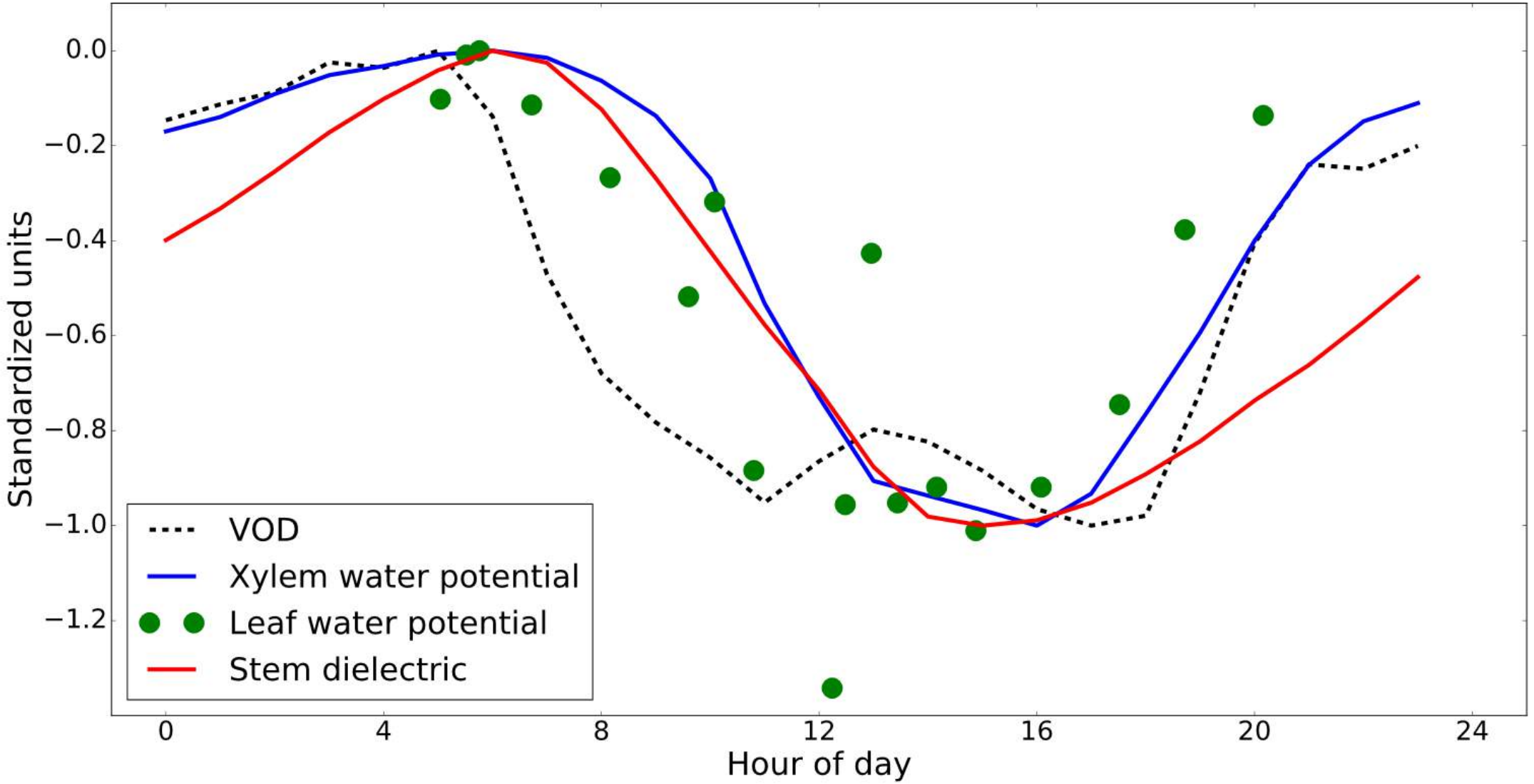
Nataniel Holtzman

Stanford University

Poster Location #23

In a stand of red oak, L-band vegetation optical depth (VOD) has a similar average diurnal cycle to plant water potential.



See poster # 23 for more!

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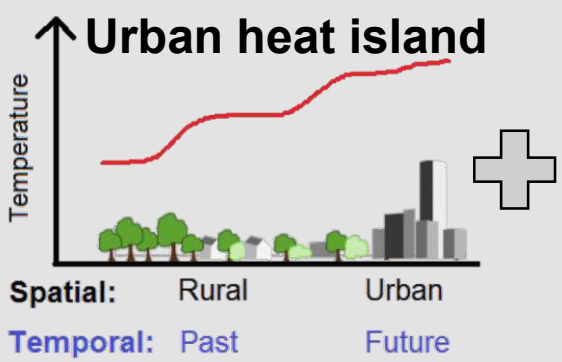
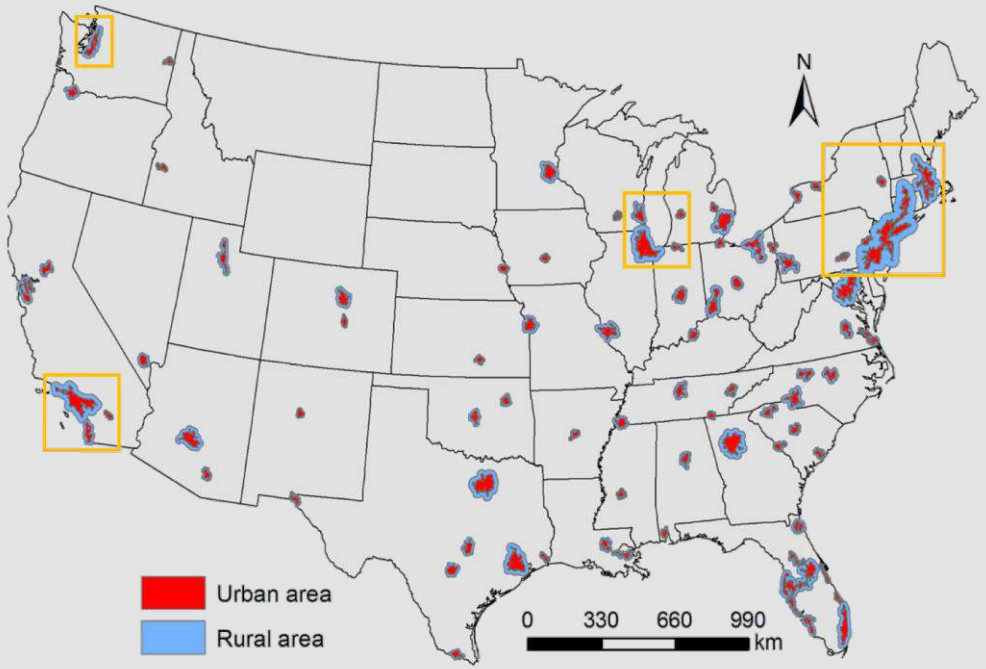
Lin Meng

Iowa State University

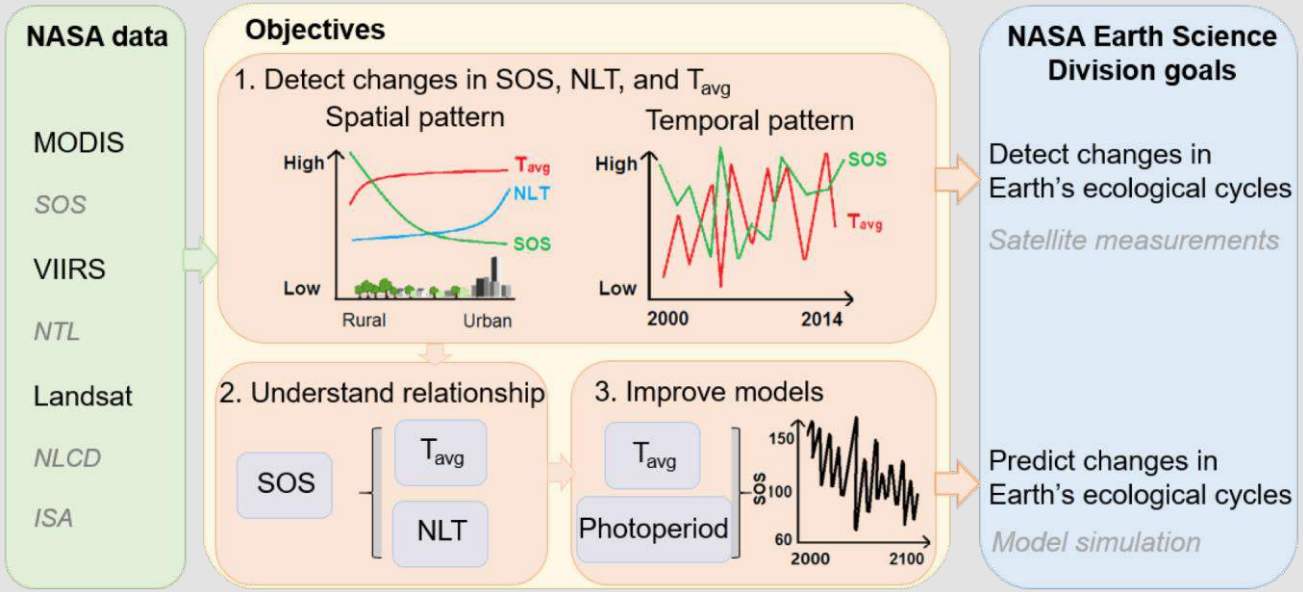
Poster Location #43

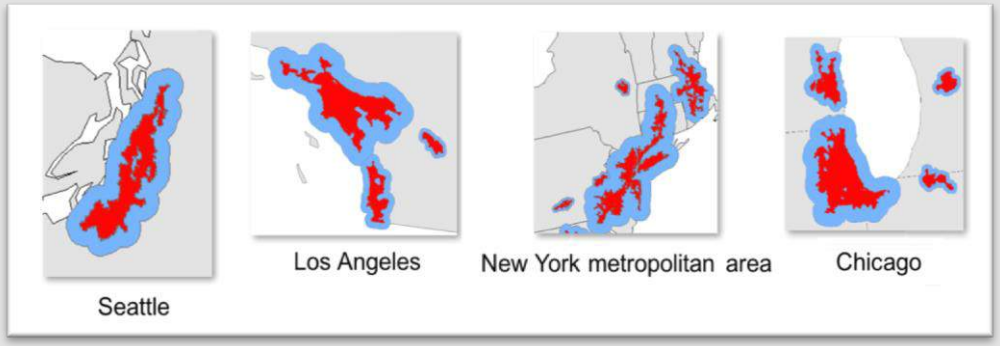
How do trees know when to leaf out in a warmer and brighter city?





To disentangle the effects of nighttime light and temperature on phenology





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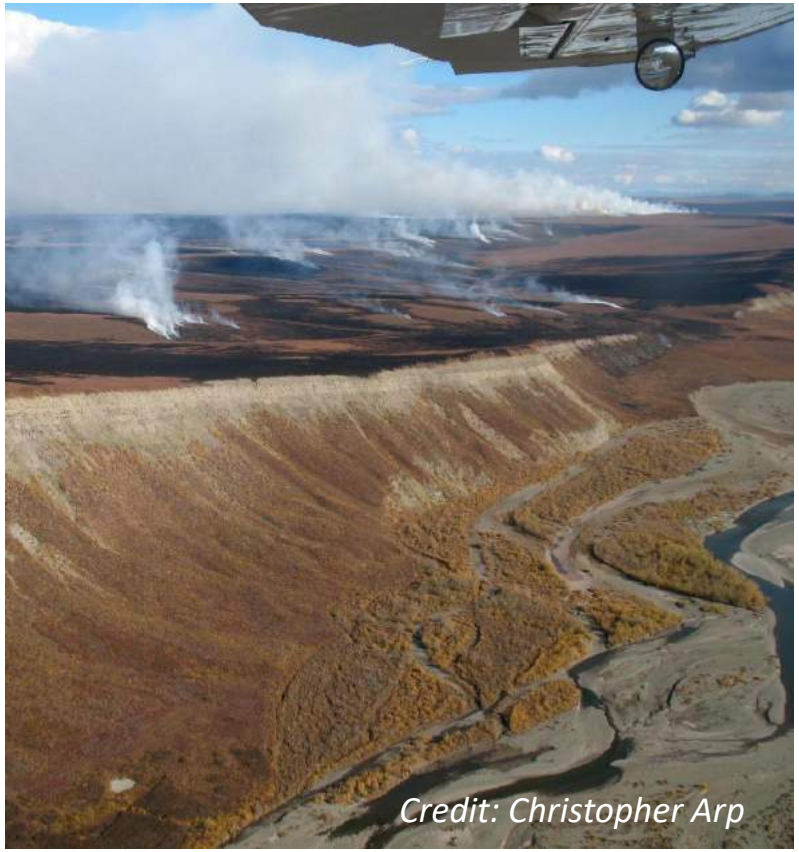
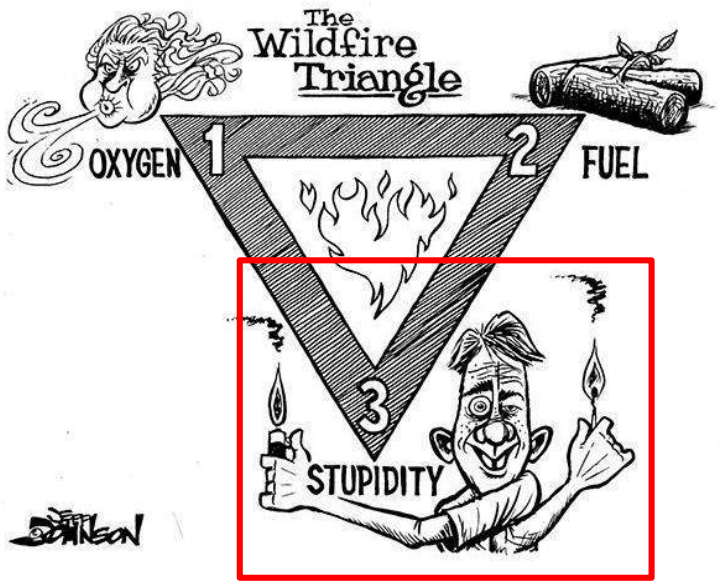
Jiaying He

University of Maryland

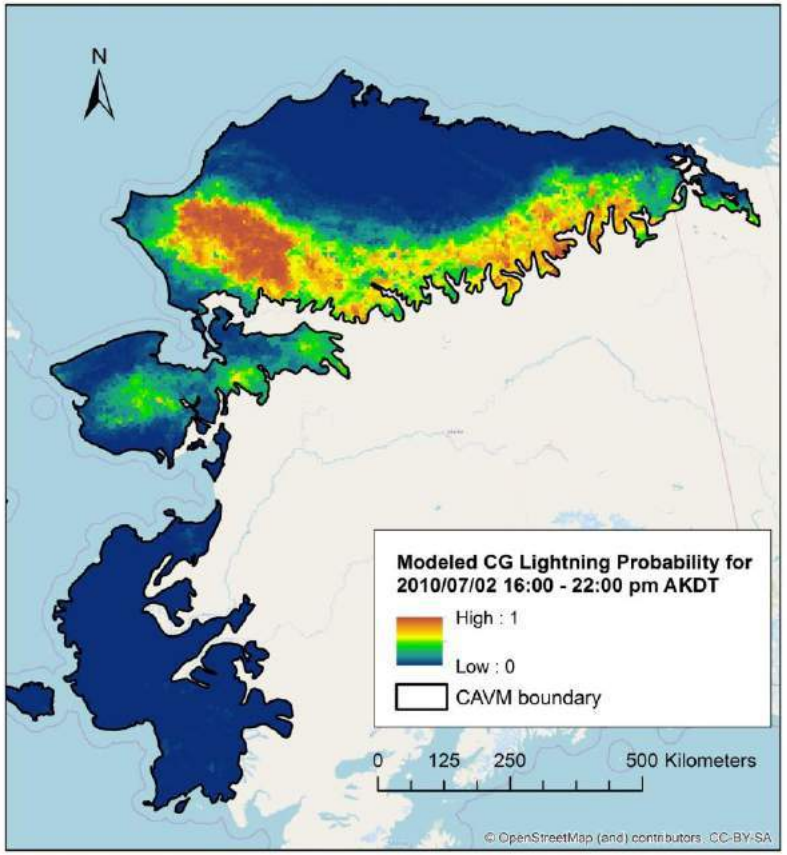
Poster Location #19

Poster #19. Modeling cloud-to-ground (CG) lightning distribution in Alaskan tundra with Weather Research and Forecast (WRF) model and machine learning algorithm





CG lightning for tundra



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Sarah Ludwig

Columbia University

Poster Location #35

Mapping dissolved CO_2 & CH_4 in the Yukon-Kuskokwim River Delta of Alaska:

How do wildfires and permafrost thaw affect inland aquatic GHG emissions?