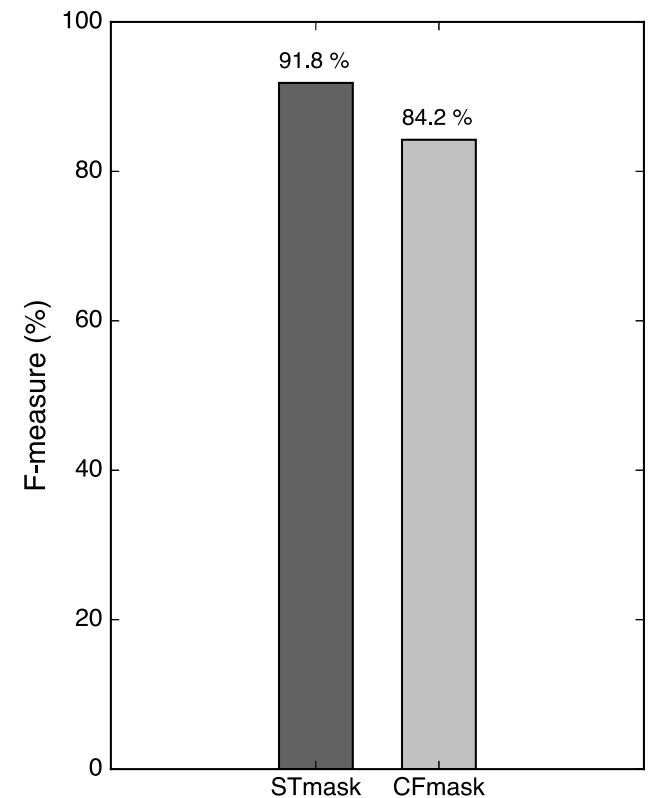
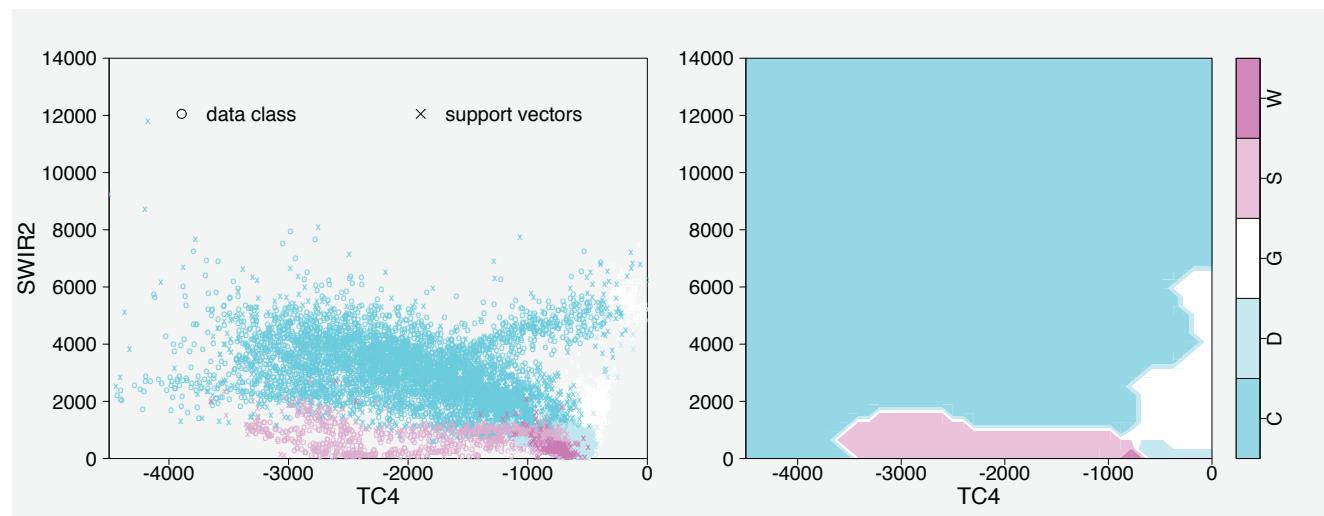


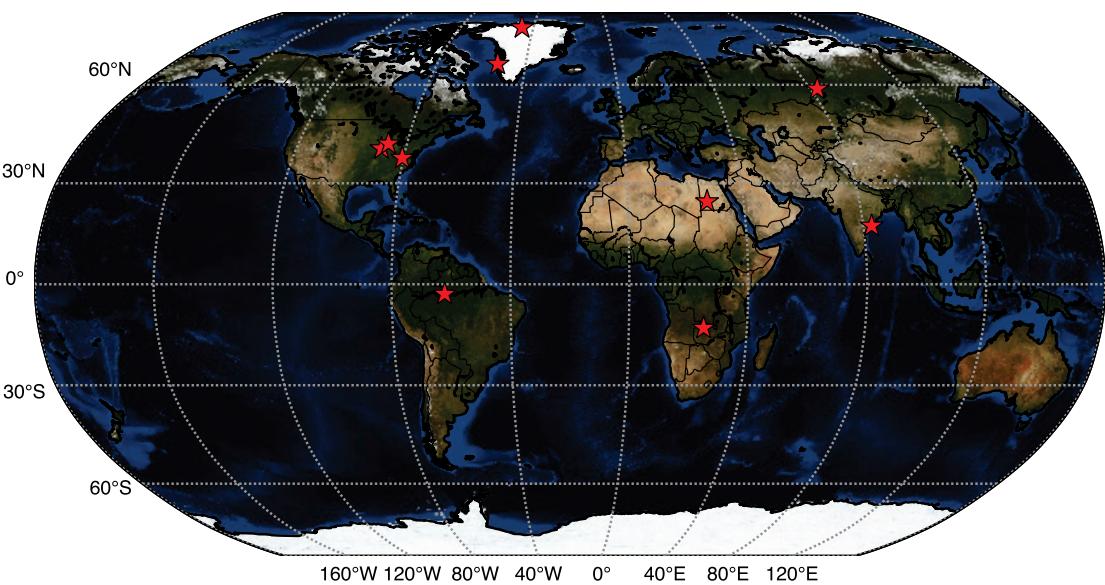
Growth, Removals, and Management Intensity (and miscellaneous addenda)

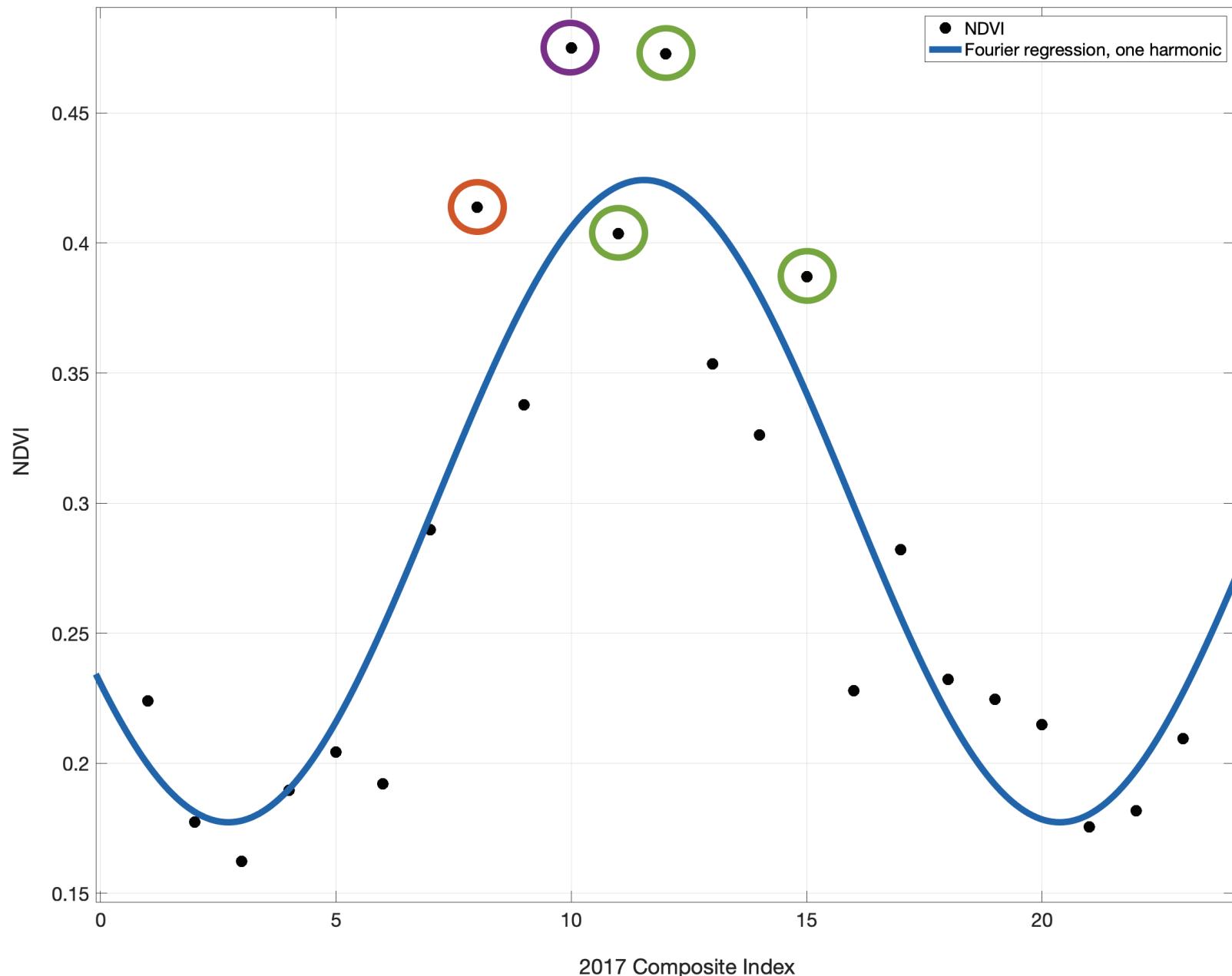
Randolph H. Wynne, Valerie A. Thomas
Stacie Bender, Evan Brooks, John Coulston, Jill Derwin, Ranjith Gopalakrishnan,
Corey Green, David Harding, Pratik Joshi, Jon Ranson, Karen Schleeweis,
Matthew Sumnall, Quinn Thomas, Zhiqiang Yang

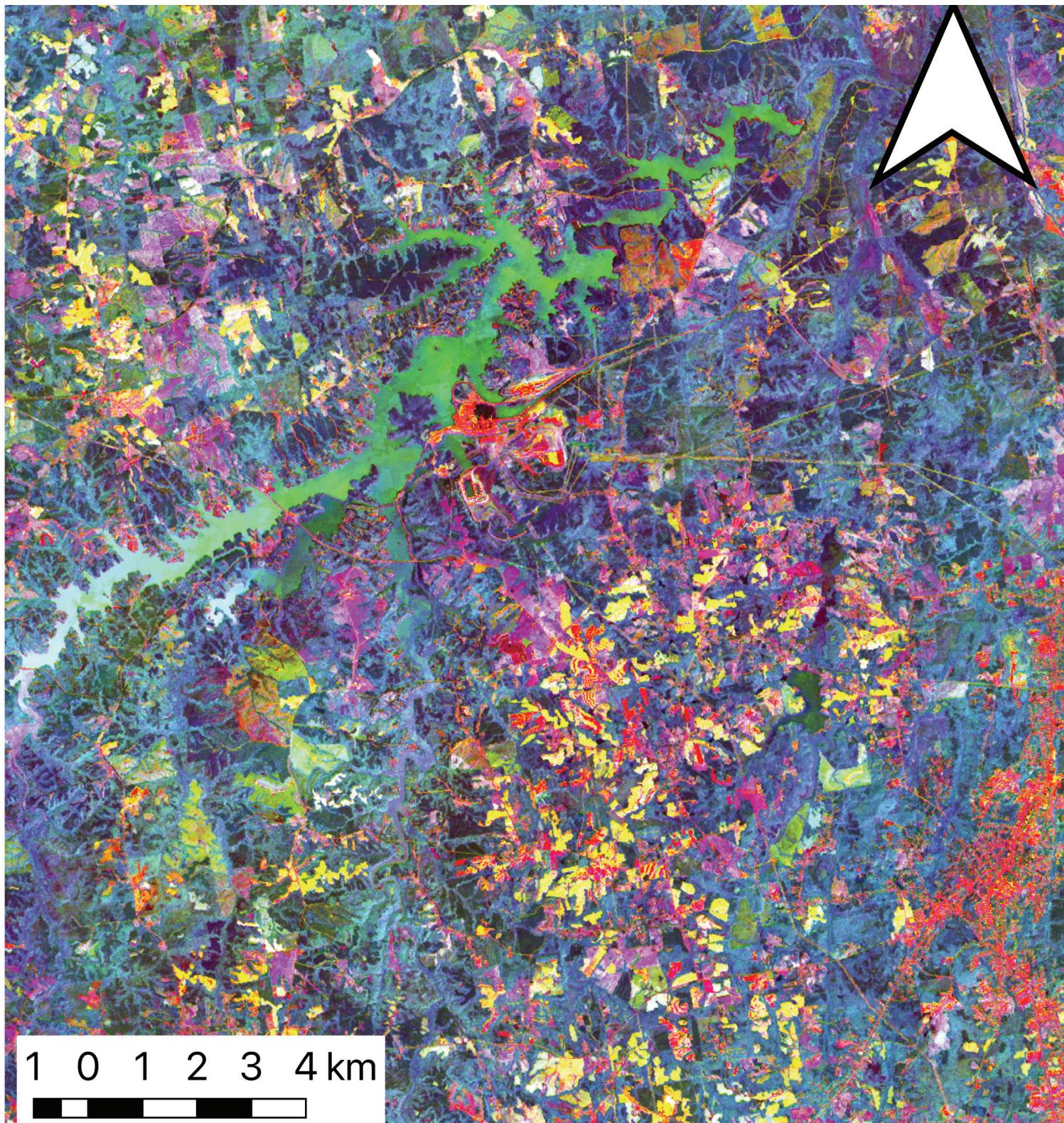
**Presented at USFS-NASA Joint Applications Workshop
Salt Lake City, May 1, 2019**

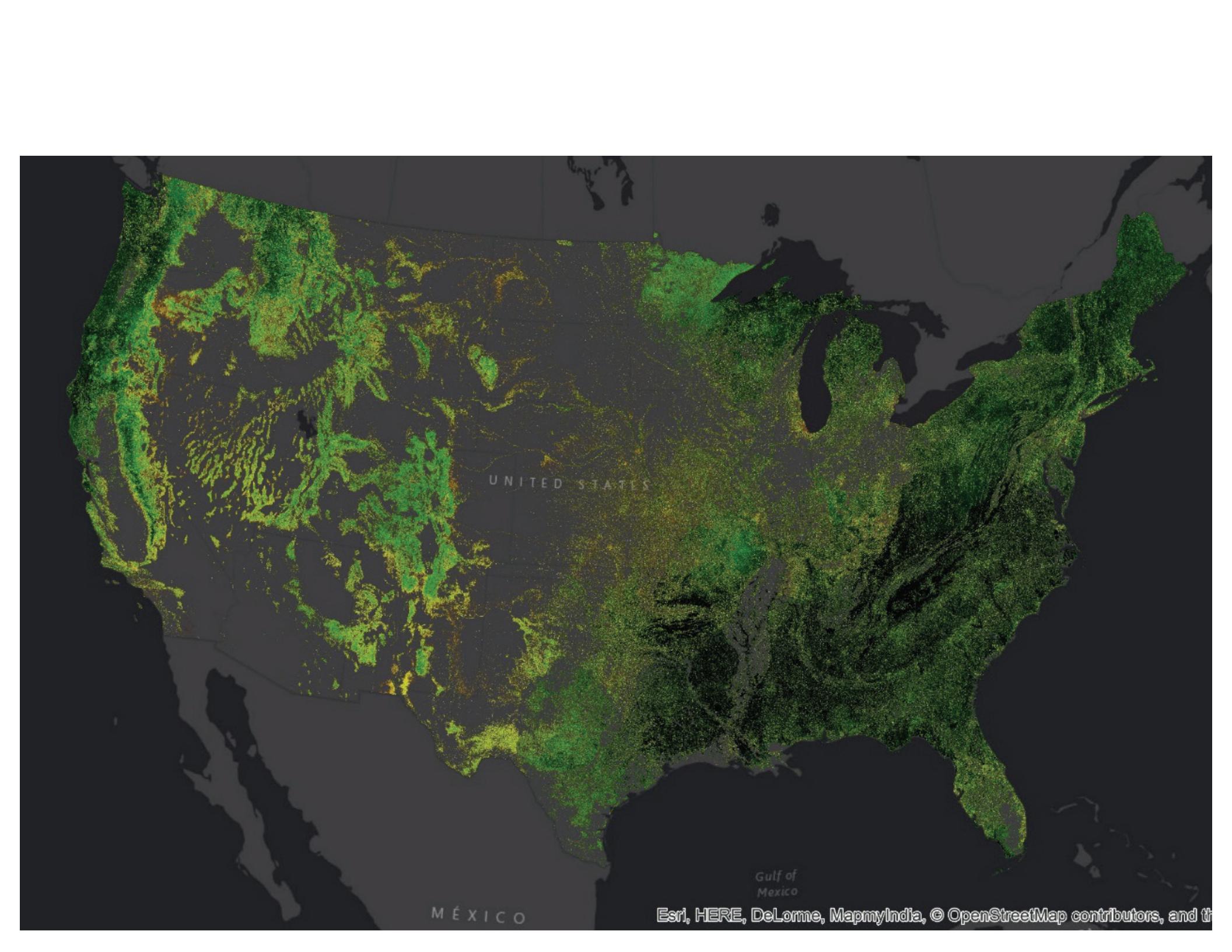


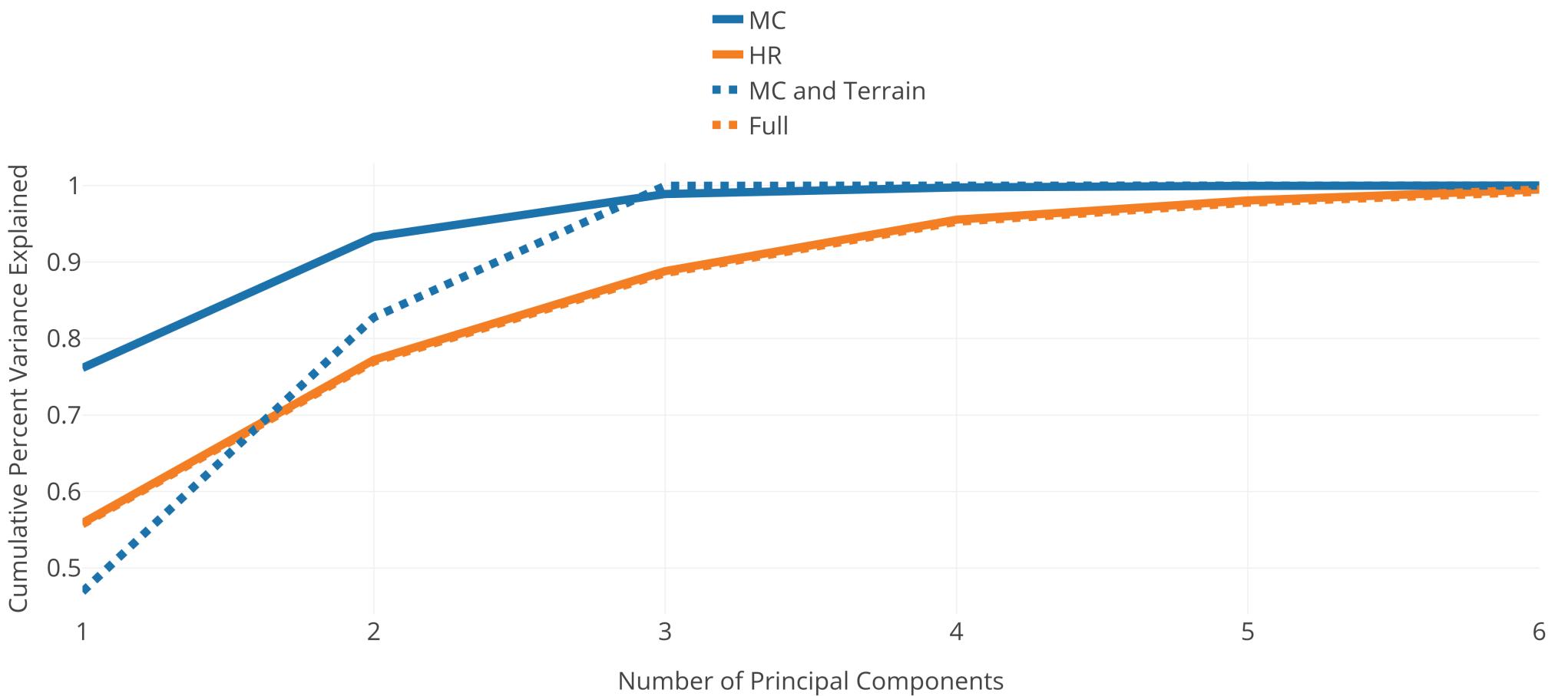
**Joshi et al. STmask
cloud detection
outperforms CFmask
in 7 of 10 tested biomes
(no thermal band needed)**









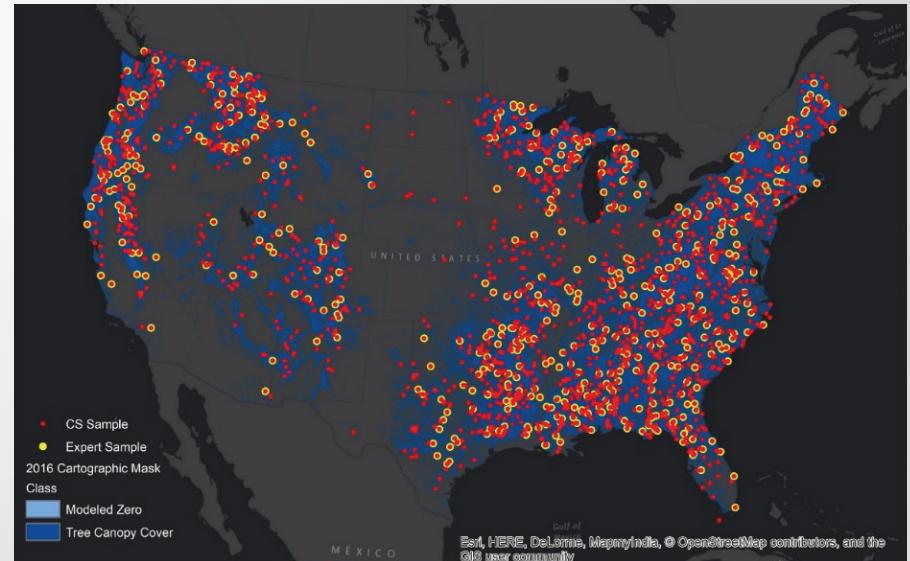
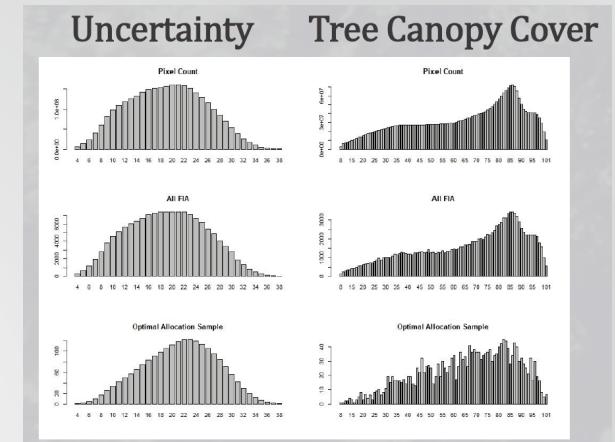


	MC B	MC G	MC R	MC NDVI	a_0 NDVI	a_0 SWIR1	a_0 SWIR2
TCC	-0.64	-0.64	-0.66	0.61	0.74	-0.68	-0.70
MC B		0.96	0.96	-0.69	-0.74	0.67	0.76
MC G			0.96	-0.57	-0.71	0.73	0.79
MC R				-0.68	-0.74	0.73	0.80
MC NDVI					0.78	-0.32	-0.44
a_0 NDVI						-0.66	-0.75
a_0 SWIR1							0.96

Table 5: Correlation matrix of seven-most important predictor variables and tree canopy cover. The three most important variables from the full random forests model for each region/time (Figure 9) are shown; there are only seven since the same predictor variables could be among the three most important across regions/times. Abbreviations: TCC, tree canopy cover; MC, median composite; B, blue; G, green; R, red; a_0 , harmonic regression constant; NDVI, normalized difference vegetation index; SWIR, shortwave infrared.

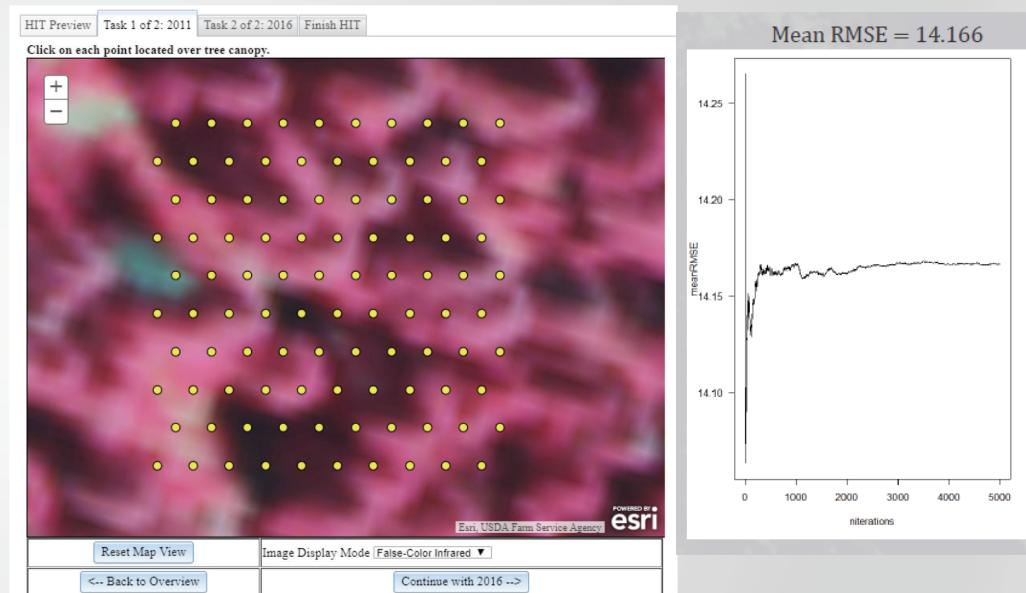
Continuous remote sensing variable sampling for accuracy assessment

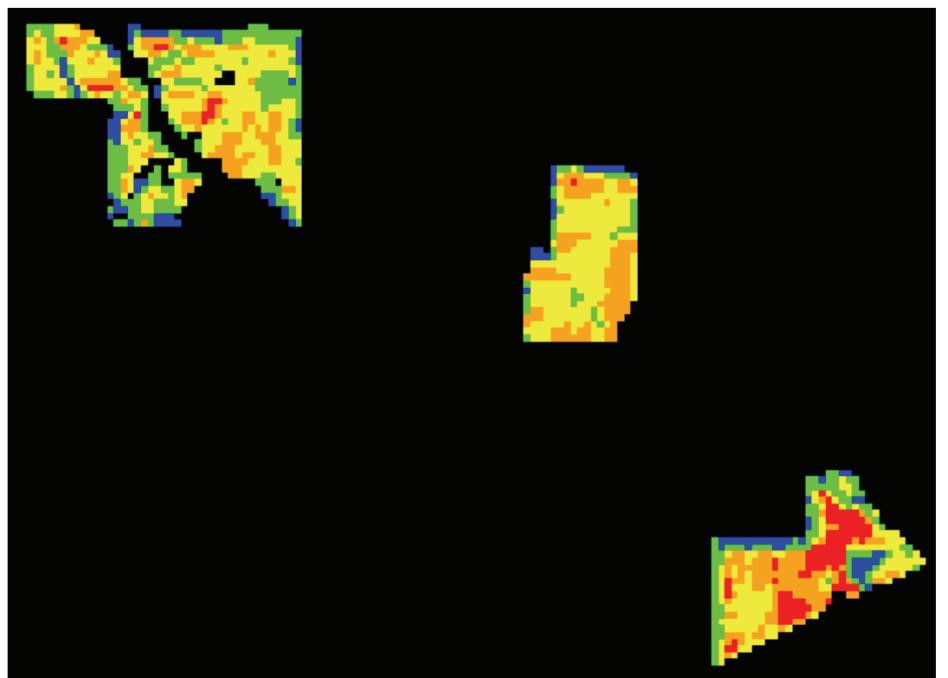
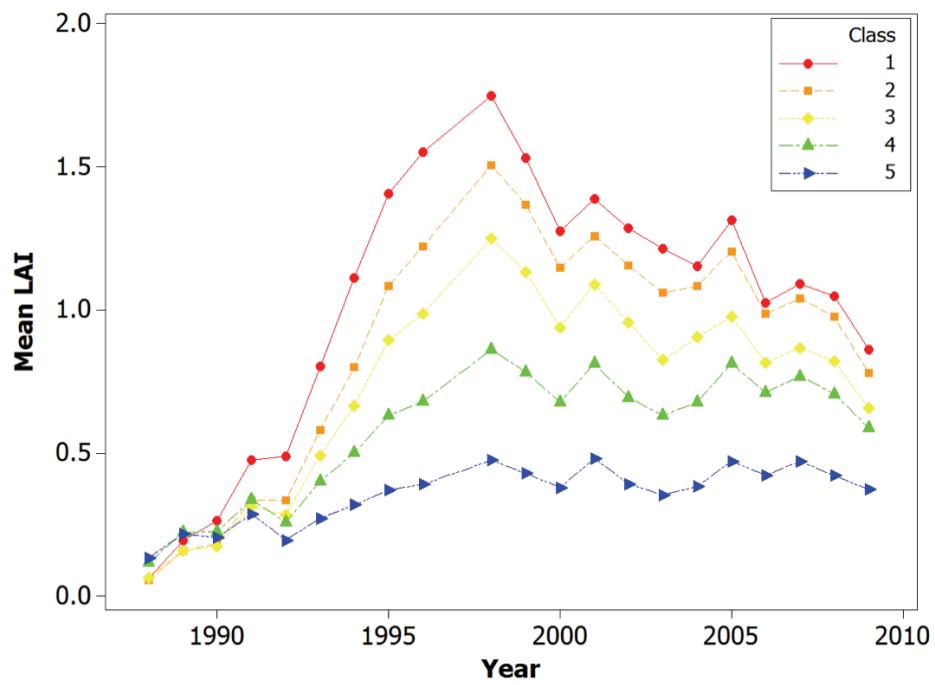
- Applications paper outlining statistically sound methods for the sampling of continuous variables estimated using remote sensing
- Presents case study using stratified random sampling method with optimal allocation based on model uncertainty



Crowdsourced validation of the 2011 and 2016 NLCD Tree Canopy Cover products

- Validation of a national-scale TCC product using crowd sourced observations
- 9 crowd interpretations at 2000 plots across the US
- 3 expert interpreters interpreting 500 plots
- Resample the data 5000 times to randomly generate scenarios where different contributors interpret different plots





Temporal signatures obtained via ISODATA clustering of annual LAI trajectories from pine stands established in 1988. Colors on left correspond to map of clusters on right.

Improving the precision of dynamic forest parameter estimates using Landsat

Evan B. Brooks ^a✉, John W. Coulston ^b, Randolph H. Wynne ^a, Valerie A. Thomas ^a

Show more

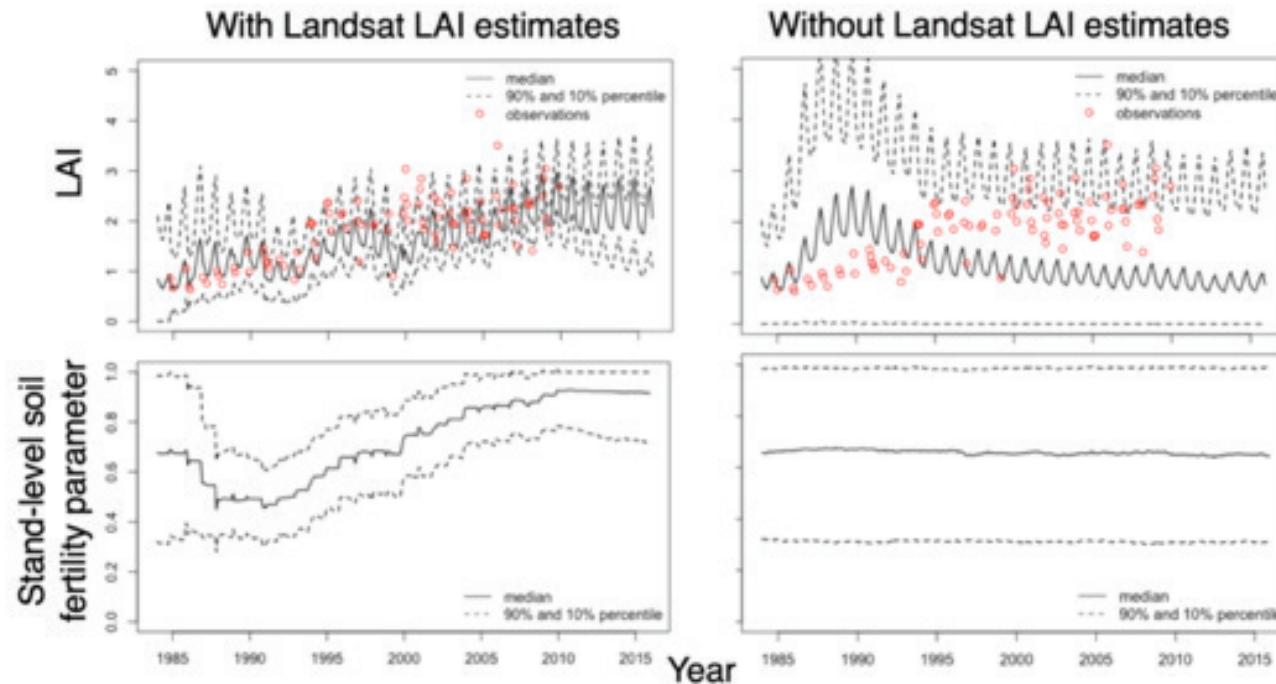
<https://doi.org/10.1016/j.rse.2016.03.017>

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Article

Landsat 8 Based Leaf Area Index Estimation in Loblolly Pine Plantations

Christine E. Blinn ¹  , Matthew N. House ¹  , Randolph H. Wynne ^{1,*}  , Valerie A. Thomas ¹  , Thomas R. Fox ²  and Matthew Sumnall ¹ 



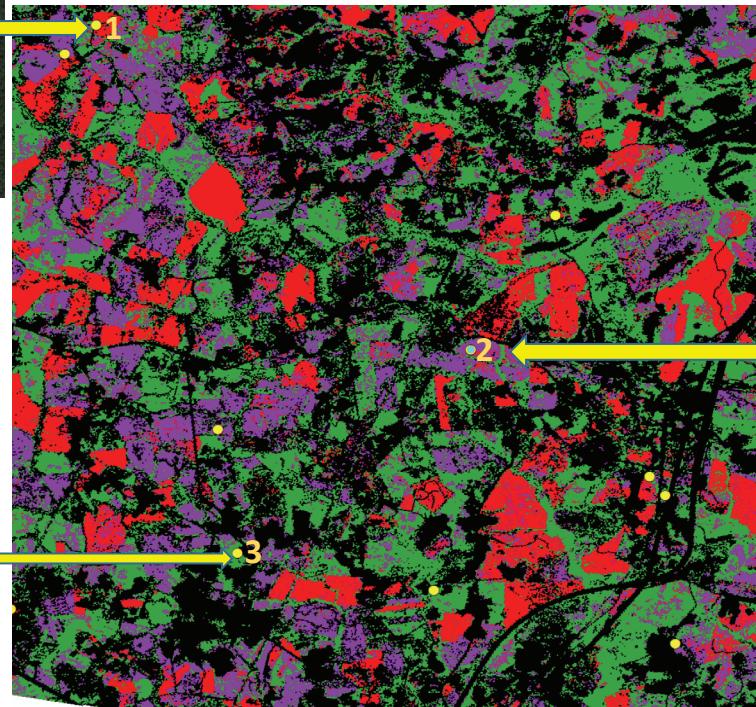
Modeling by R.Q. Thomas and students

Detecting Removals and Management Intensity via Thins

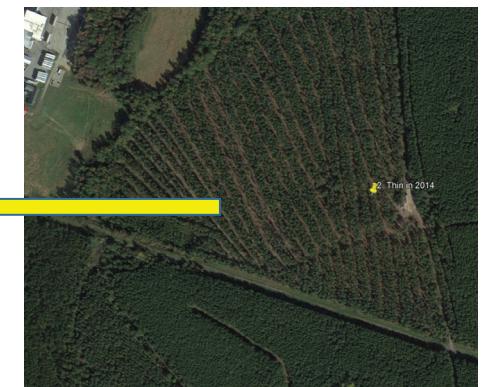
Clear Cut in 2014



Persistent Pine



2014 Thin



Overall Accuracy 86%

**HR variables: Constant, Sine, Cosine, R2, RMSE for Pan
R2, RMSE for NDVI 2014-16**

Hansen variables: loss year, tree cover, gain

Survey Unit Total Removals in 2007 and 2009 Based On Full Set Of Panels

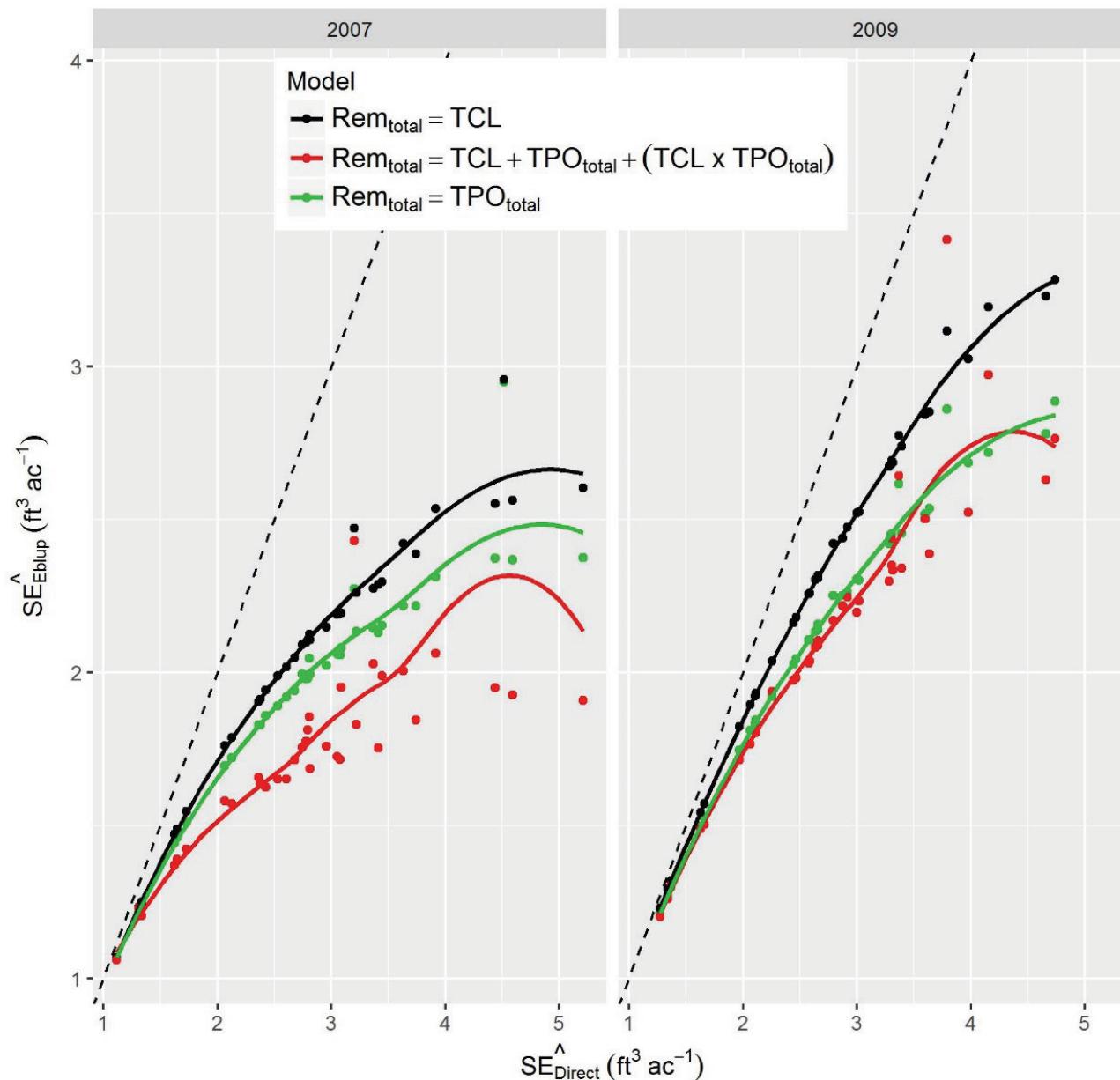


Figure 5. Major steps involved in the generation of the site index map.

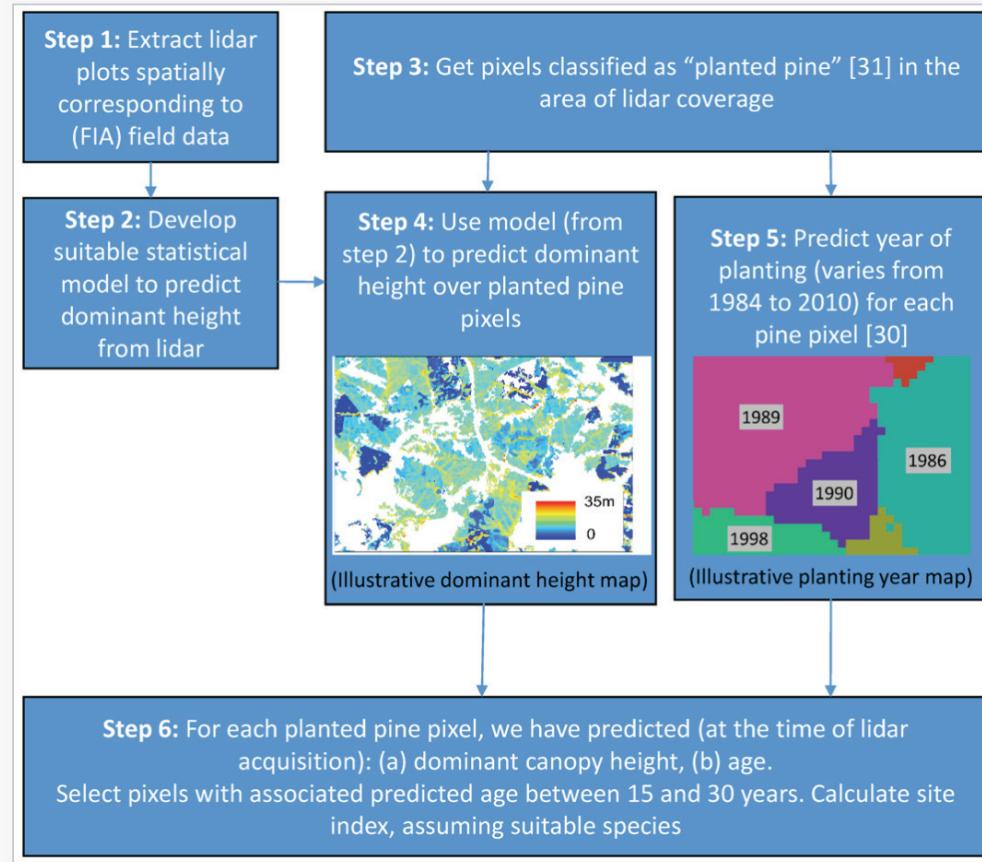
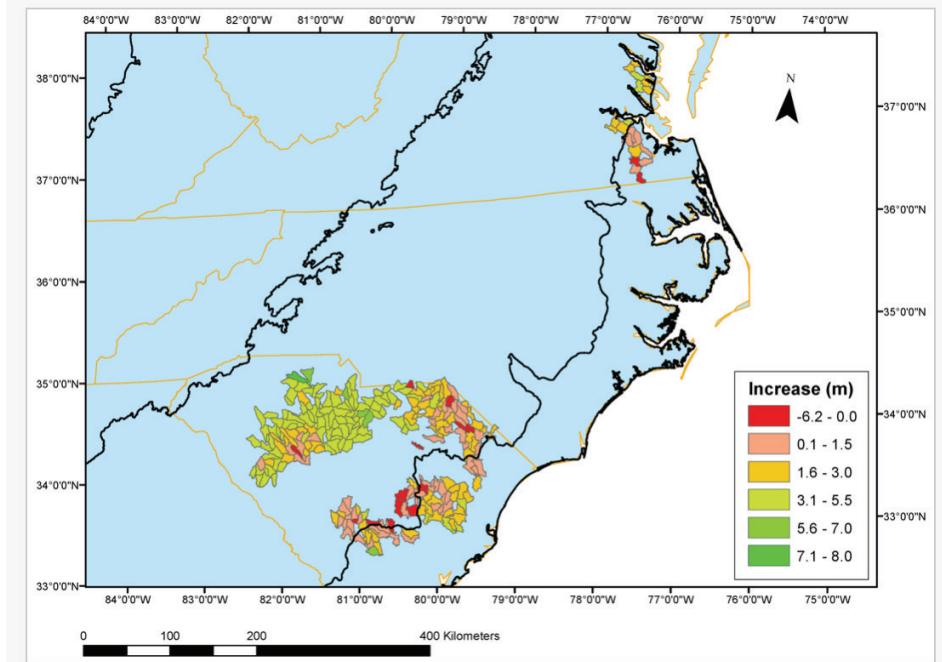
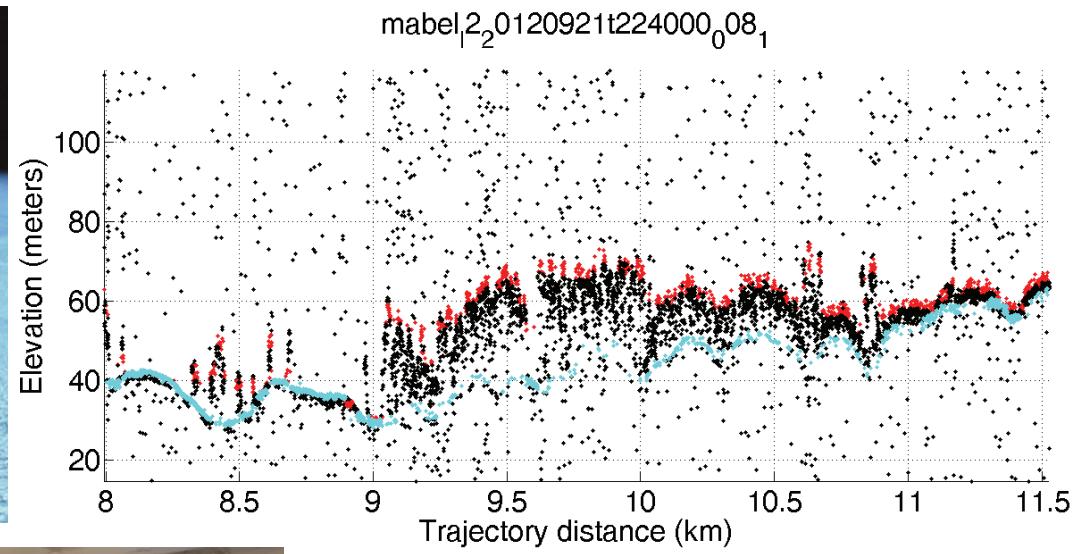
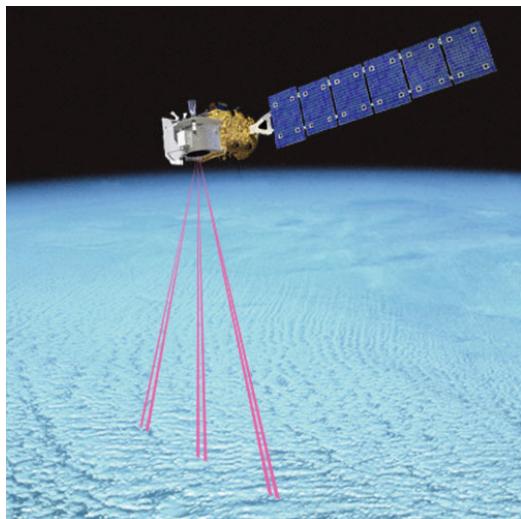


Figure 12. The average site index difference (between lidar-based and historical SSURGO estimates) for stands that fall in the hydrological unit is shown. Only hydrological units with at least 4.5 ha of surveyed forest stand area (50 pixels) are considered. The thick black lines here demarcate ecoregions (EPA level 2 ecoregions as per Omernik 1987 [44]), see text for more details.

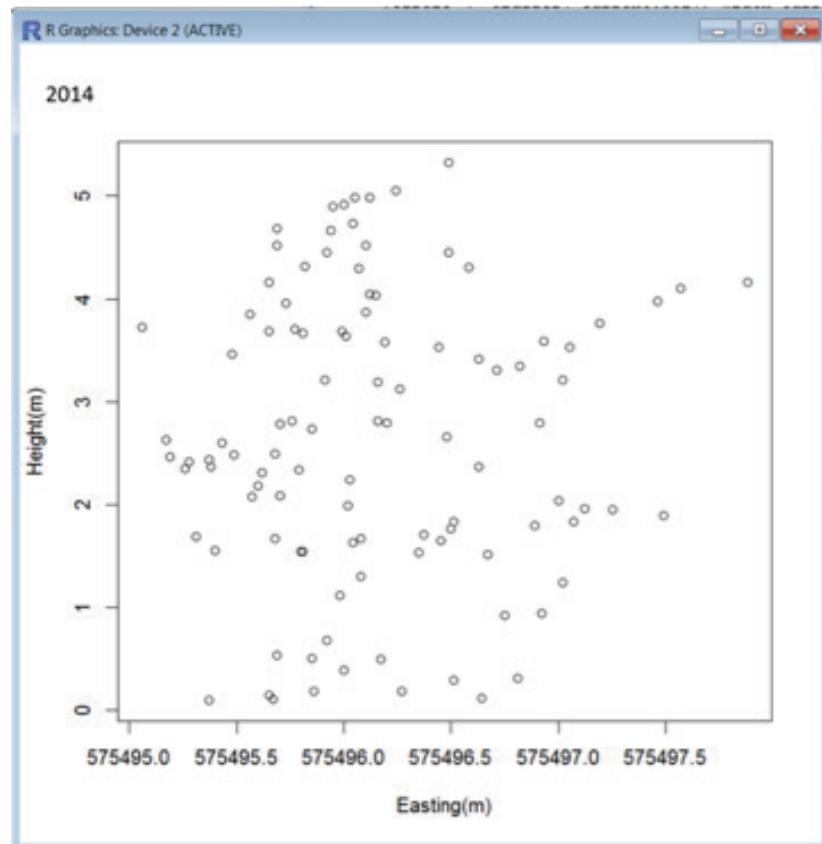


Gopalakrishnan et al. 2019

**Site index calculated using Landsat and all available small footprint ALS data
Compared to historical site index
Large productivity gains in recent decades**

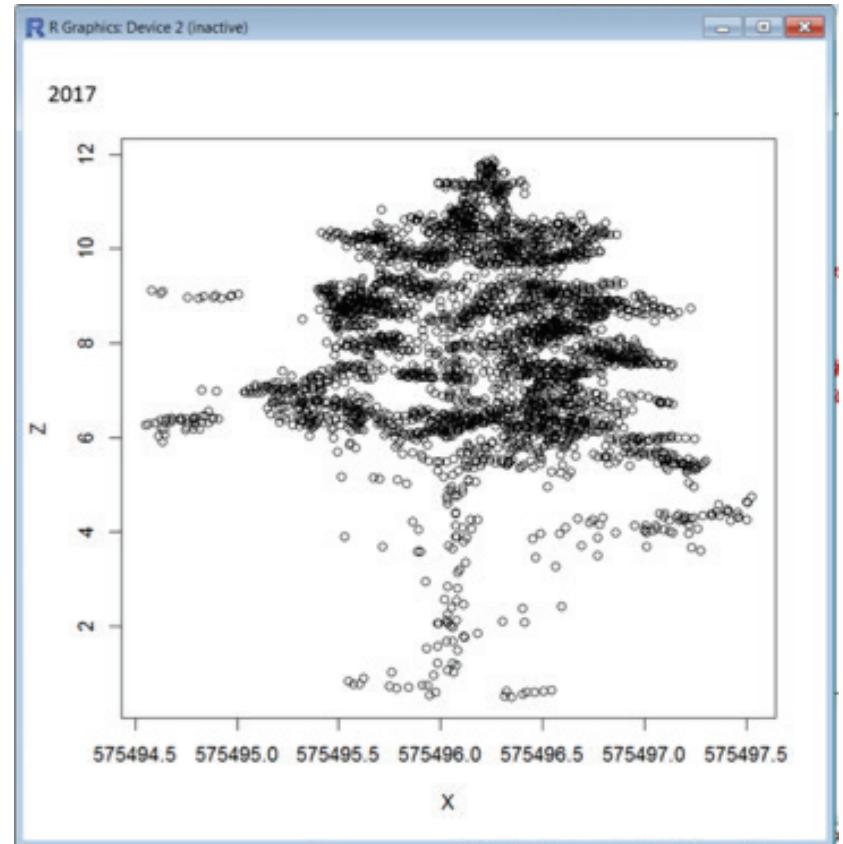


2014 vs. 2017 LiDAR data



3 years
of
growth

A blue arrow points from the 2014 plot towards the 2017 plot, indicating the progression of time and growth.



- conventional discrete return LiDAR;
- ~10 pulses per square meter;
- small trees in 2014: 4-9m tall and 2-5m wide

SAFE Mission Concept



Class D Mission:

- Launch spring 2024, 2 years ops.
- 2 buses, 2 instruments
- Orbit: ~705 km, 99 minute period, 98° sun synch, equator crossing times at 1000 and 1330

Possible synergisms with Landsat/Sentinel, SBG, EnMAP

PI: R. Wynne

Deputy: V. Thomas

Proj. Scientist: J. Ranson

Inst. Scientist: P. Dabney

Operational scenario

Launch into Landsat-like 10:00 and 1:30pm orbits

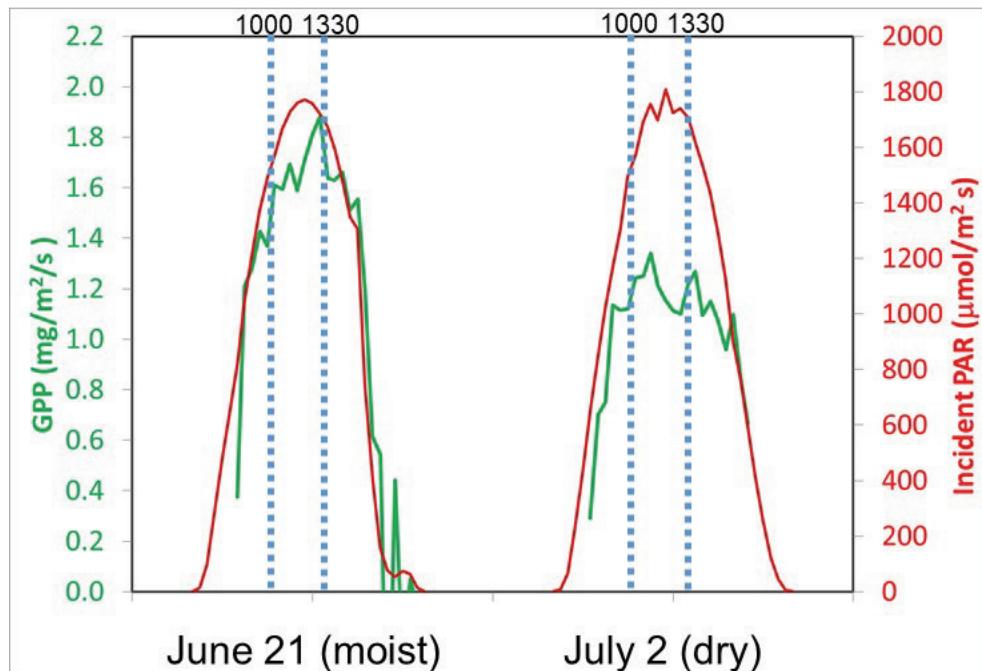
- 2 Years of science data
 - Tower flux site frequent repeat obs. of structure and function measurements
 - Function and hi-res pan coverage of global forest cover
 - Full suite of data and gridded science products
- Deorbit



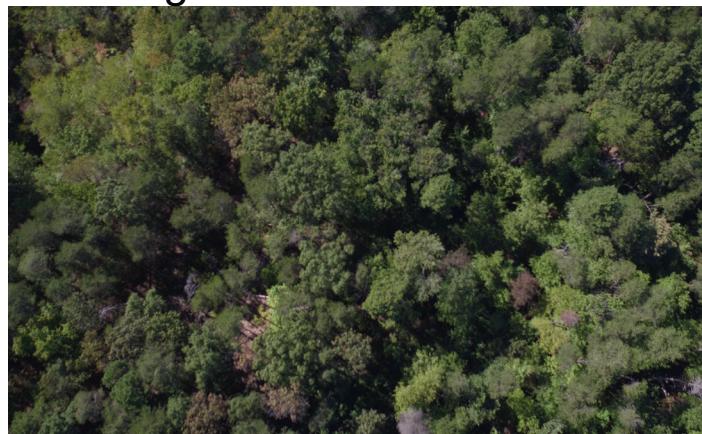
Time of Day and Shadows Impact Forest Productivity Measurements



Productivity Dynamics

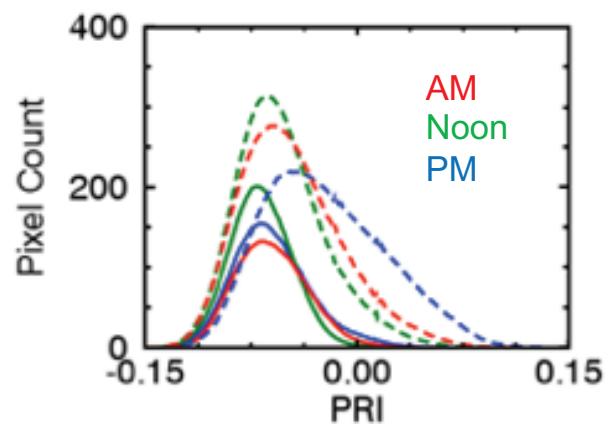


Senescent Deciduous Forest Stand



Photochemical Reflectance Index (PRI) provides a remotely sensed estimate of LUE and is sensitive to plant pigment contents

$$\text{PRI} = \frac{\rho_{531} - \rho_{570}}{\rho_{531} + \rho_{570}}$$



← Lower light use efficiency

Dashed = all pixels
 Solid = illuminated



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Science of Remote Sensing

Founding Editors:

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