

Product Delivery Report for K&C Phase 3

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Projects

“Wetlands”

- 1a. Mapping rice agriculture with Landsat & PALSAR in Monsoon Asia; NASA LCLUC (2010-2013)
- 1b. Quantifying rice land use change and intensity between 2000 and 2010 using PALSAR, Landsat, & MODIS in Monsoon Asia; NASA LCLUC (2012-2015)
2. Mapping rice habitat in USA in support of MRV carbon tools; USDA CIG (2012-2017)
3. Mapping high latitude wetland dynamics and GHG emissions; NASA TE & NSF MSB (2011-2018)

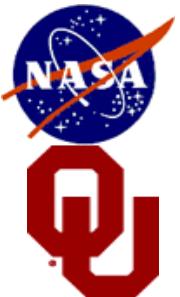
Projects

“Forests”

1. Mapping industrial forest plantations in tropical monsoon Asia;
NASA LCLUC (2014-2018)

2. Developing SAR to support MRV and carbon estimates under India
Forest Partnership for Land Use Science; USAID (2013-2016)

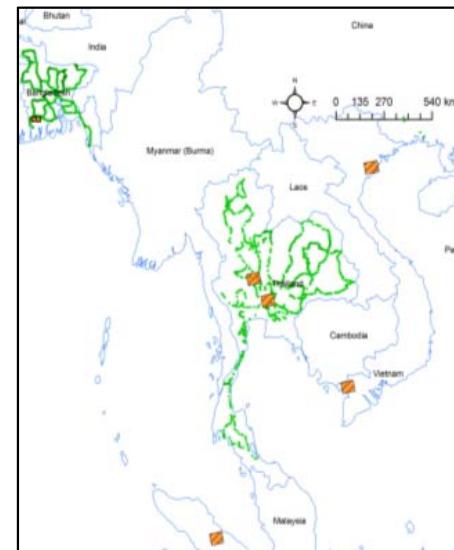
3. Operationalizing SAR forest structure metrics for monitoring
disturbance; USDA (2014-2017)

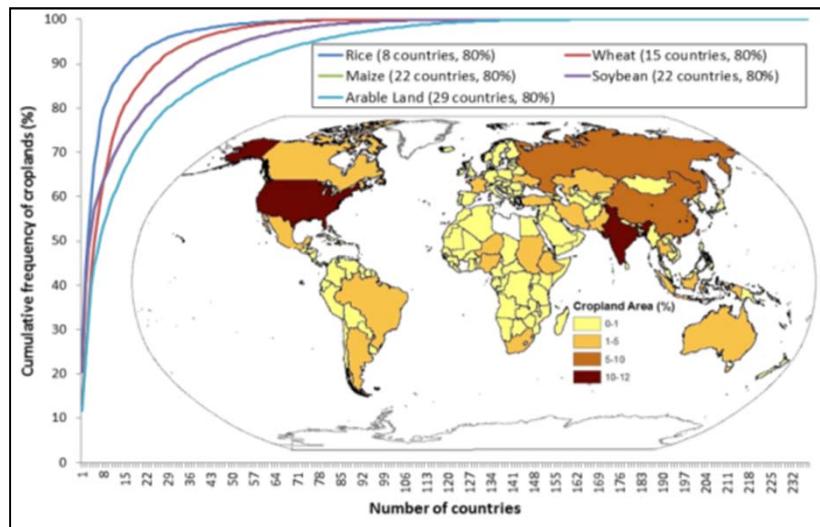


Developing ground truth & citizen scientists for cal /val

- Global Geo-Referenced Field-Photo Library; eomf.ou.edu/photos
- >700 registered users and archives 50,000+ field photos
- Shared with JAXA K&C and science community

The screenshot shows the EOM website interface. At the top, there's a banner for "Earth Observation and Modeling" and "University of Oklahoma". Below the banner, the main navigation menu includes Home, About Us, Dataset, Photo, Visualization, Models, iCarbon, GeoHealth, GIS Day, Workshop, and Account. A sub-menu for "Global Geo-Referenced Field Photo Library" is open, showing search options for coordinates, date, metadata, and region, along with a keyword search bar and a "Submit" button. Below the search controls is a map of the world with numerous orange dots representing photo locations. Labels for countries like India, China, and others are visible. At the bottom of the map, there are four thumbnail images of fields and a legend indicating crop types: Paddy Rice, Croplands, and others. Below the thumbnails are links to "View MODIS time series data" for each category.





Where is agriculture and rice?

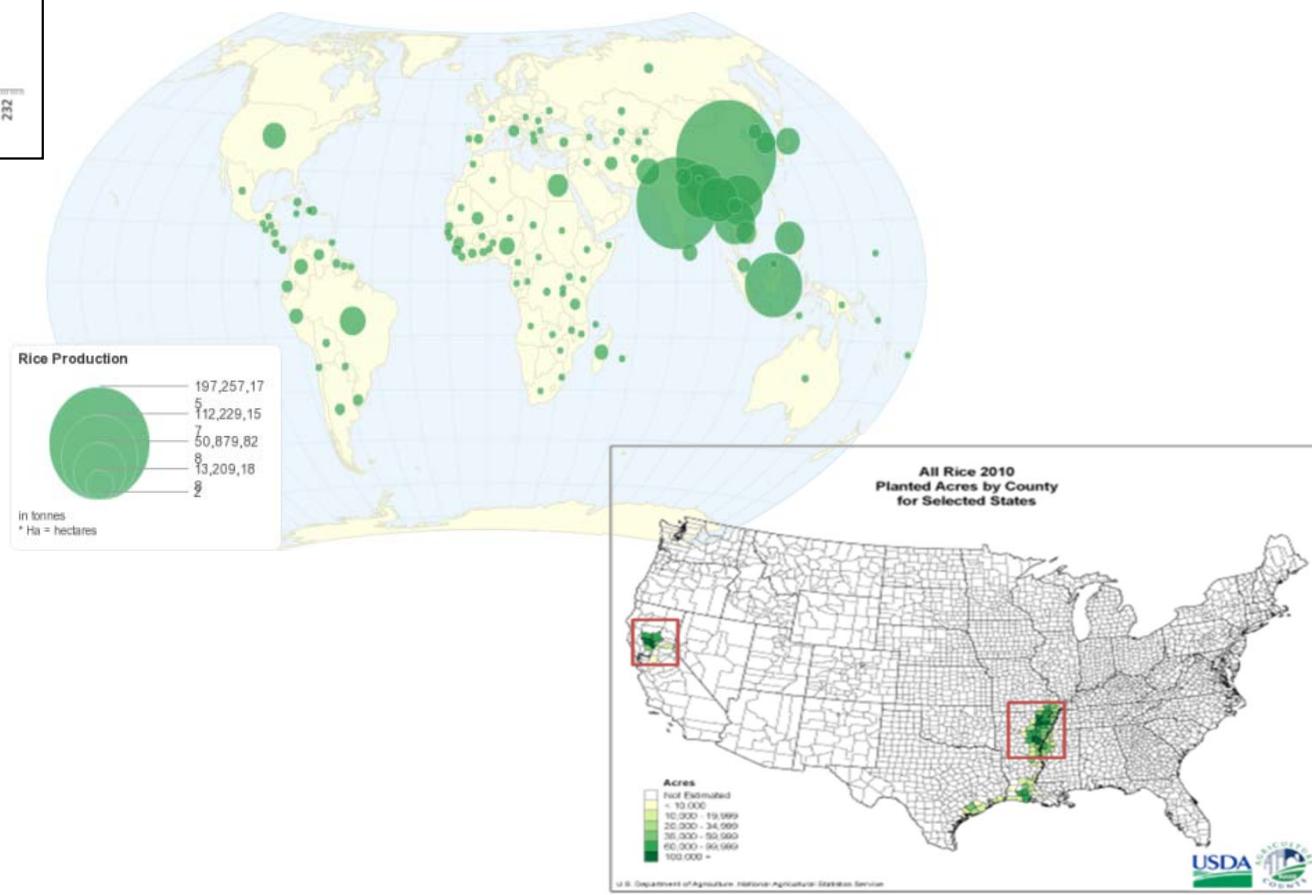
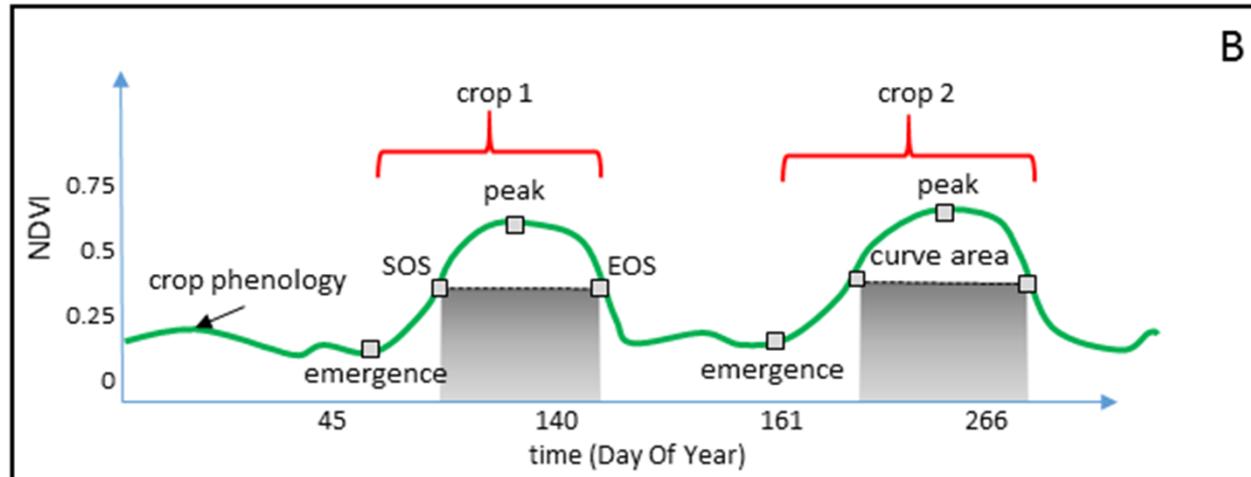
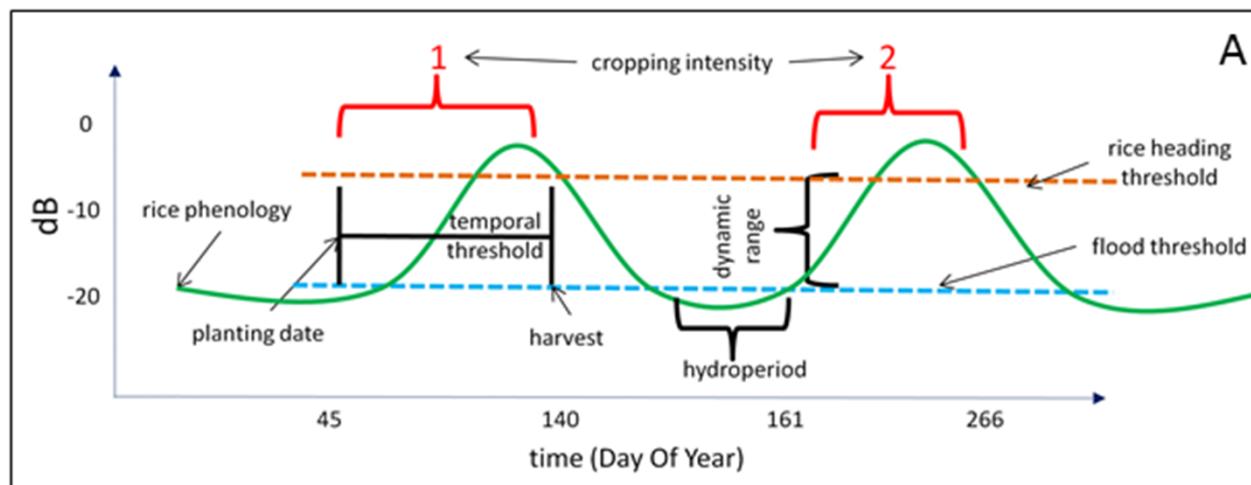


Table 2: Top Rice Producing Countries	
	Harvested Areas (000s ha) (source:IRRI)
INDIA	43000
CHINA	30300
INDONESIA	12150
BANGLADESH	11650
THAILAND	10837
Vietnam	7820
MYANMAR	6350
PHILIPPINES	4692
CAMBODIA	2950
PAKISTAN	2700
BRAZIL	2420
NIGERIA	2250
JAPAN	1581
NEPAL	1560
MADAGASCAR	1340
SRI LANKA	1135
UNITED STATES	1084
TANZANIA	950
LAOS	860
KOREA REP	849

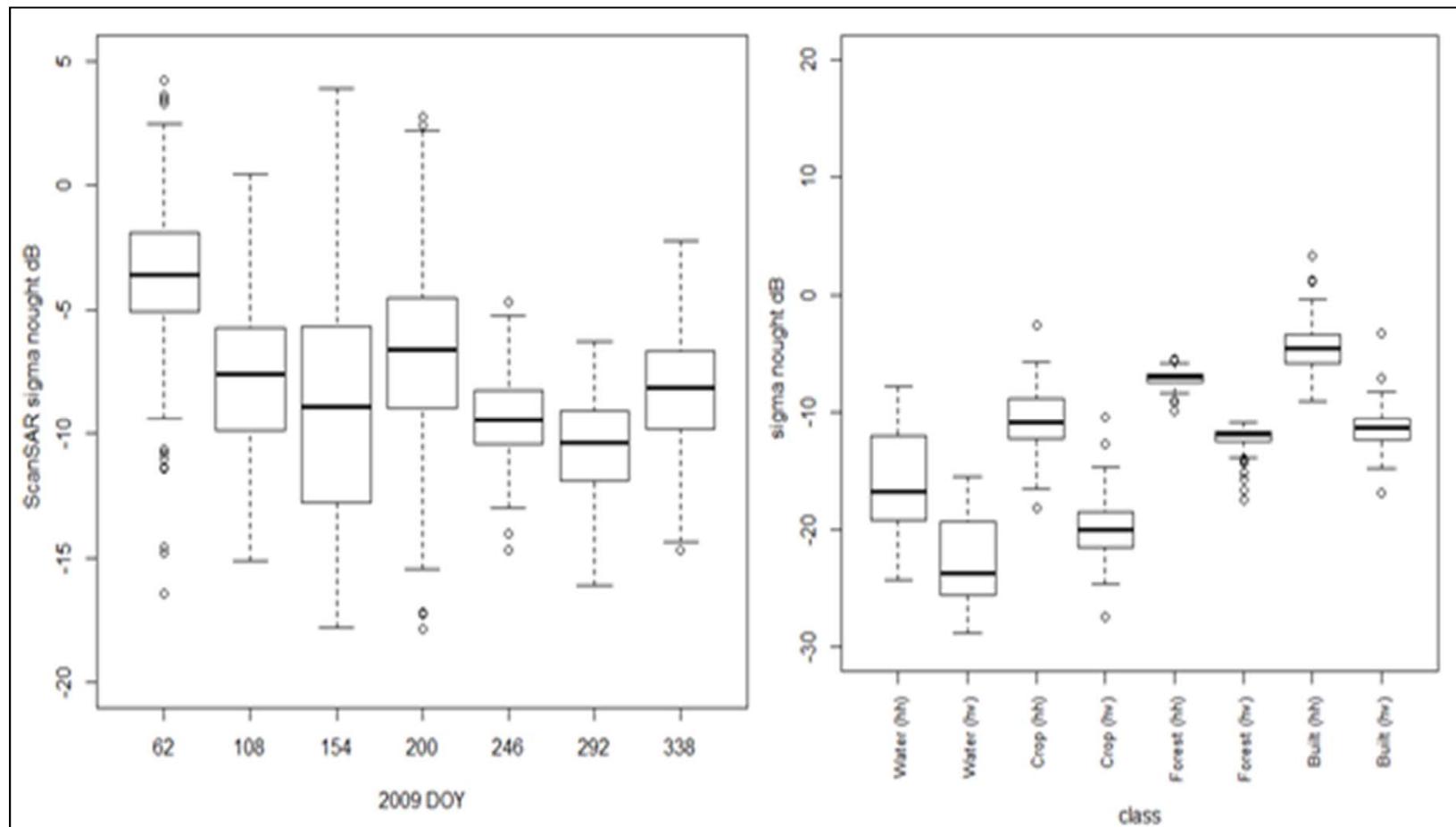
Mapping rice & LCLUC in Monsoon Asia

NASA: Oklahoma University, AGS

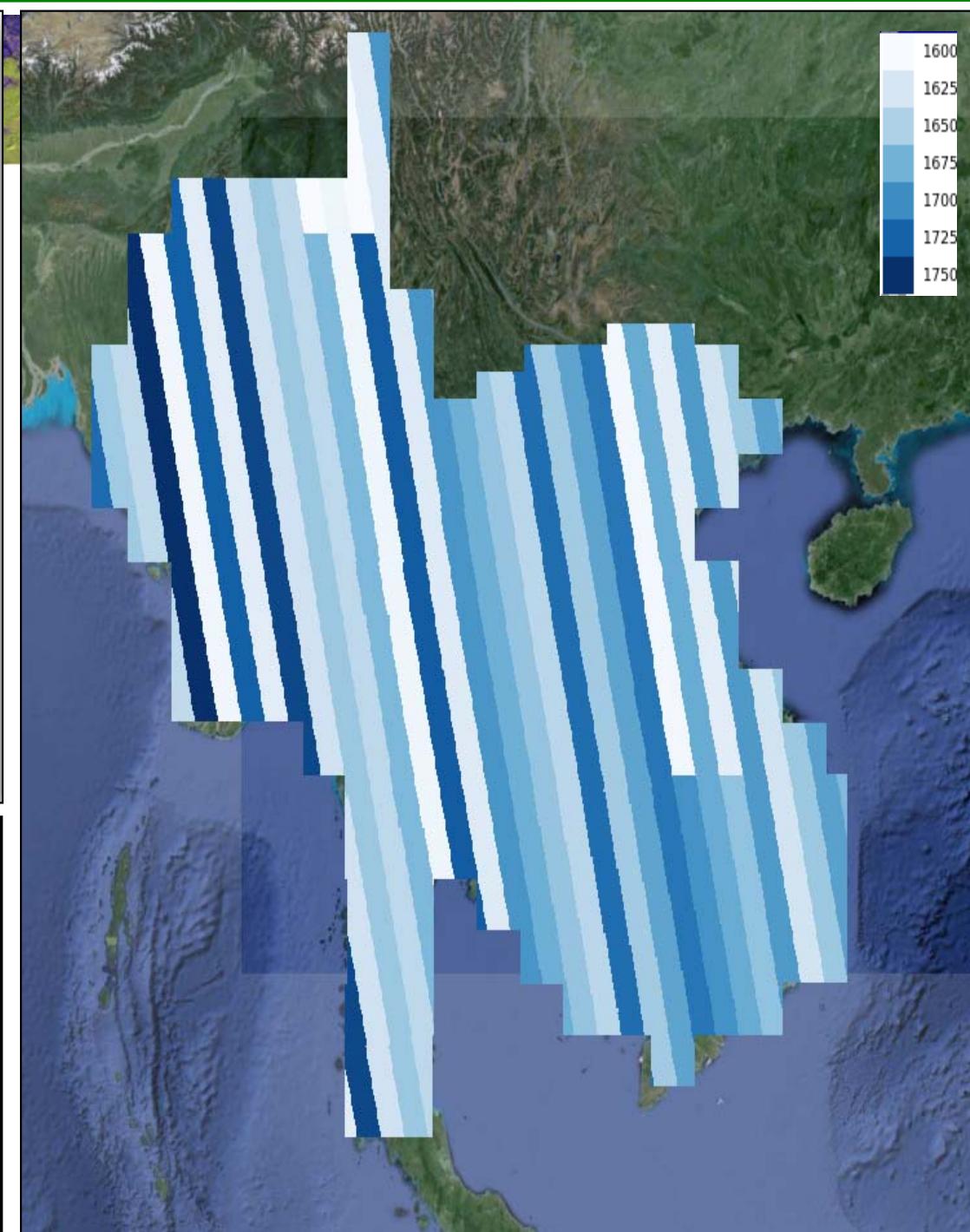
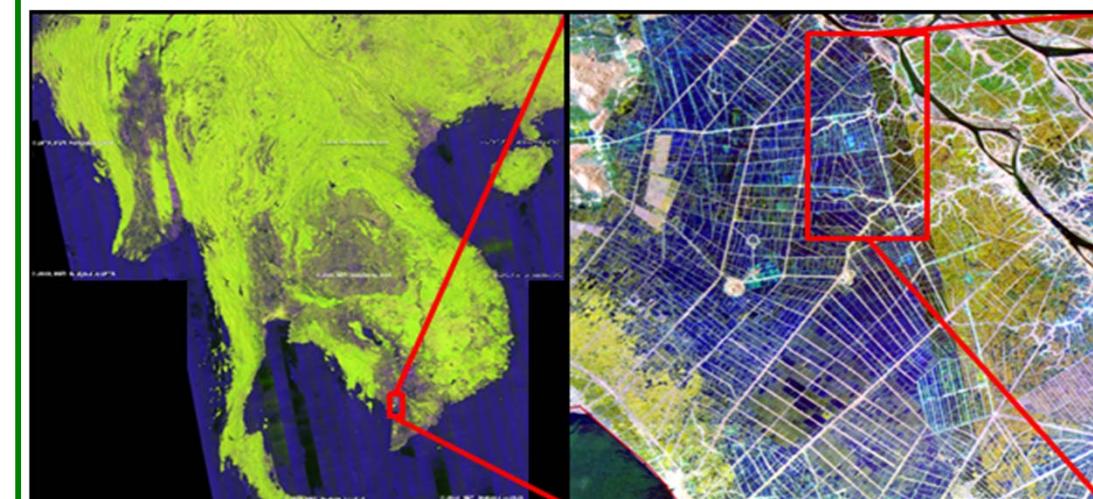
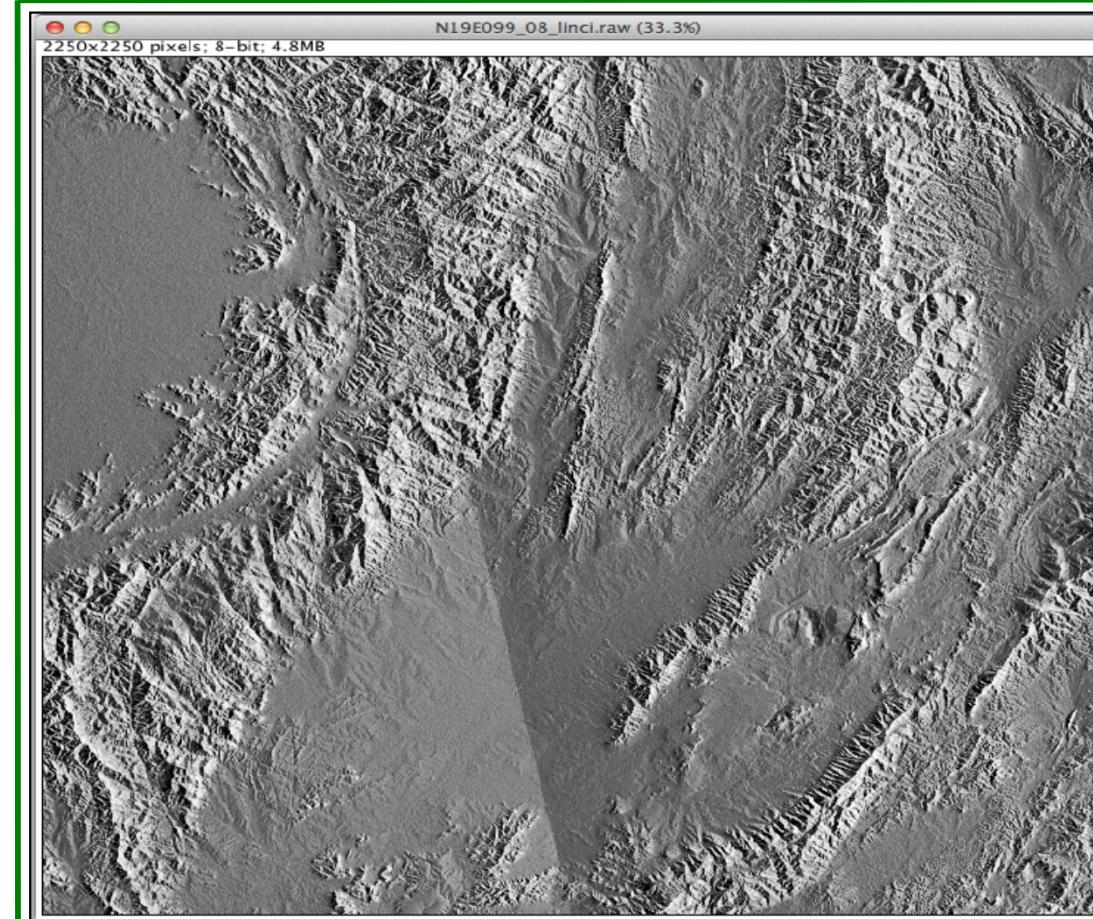


Mapping rice & LCLUC in Monsoon Asia

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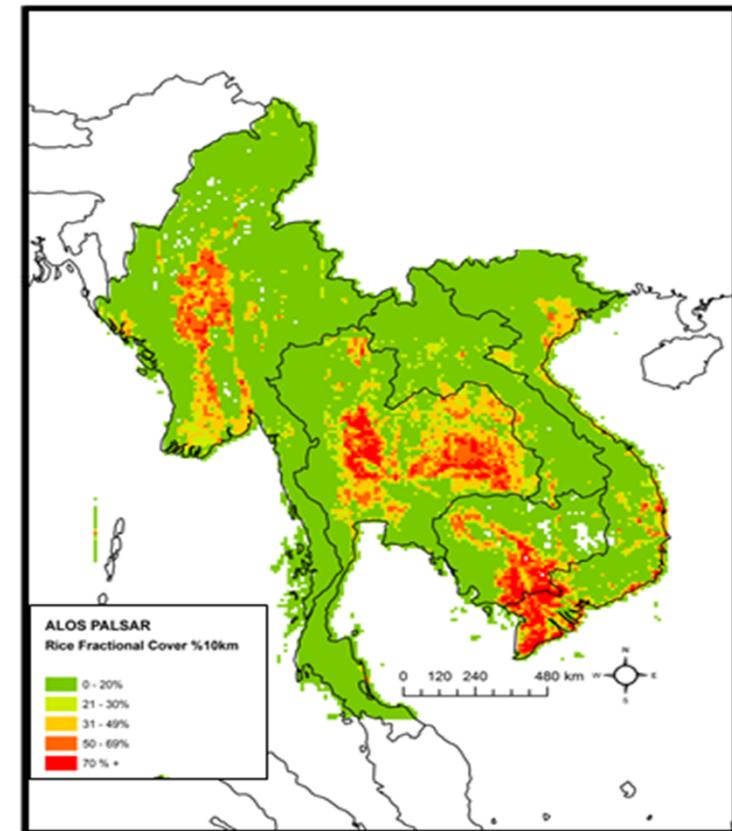
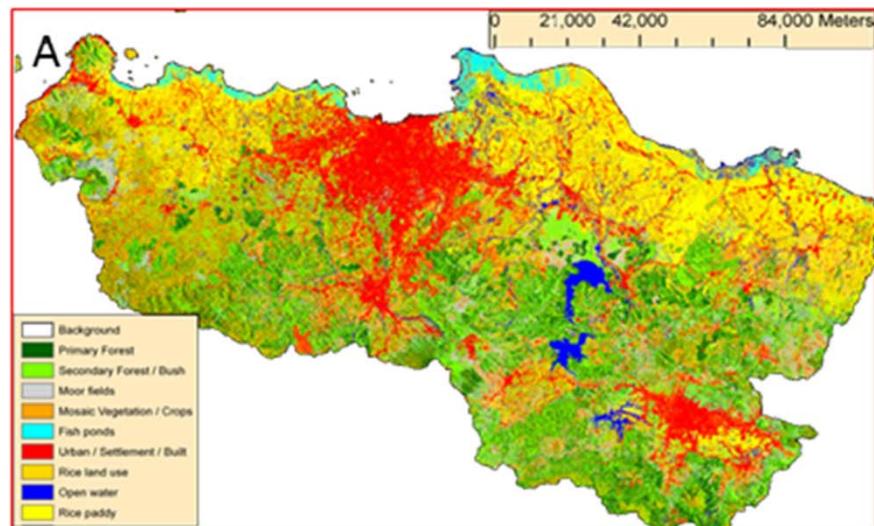
Box and whisker plots illustrating ScanSAR (HH) rice phenology for coastal paddies in Karawang (left) and Mosaic HH and HV sigma nought backscatter for broad land cover



Technical and application challenges

Mapping rice & LCLUC in Monsoon Asia

NASA: Oklahoma University, AGS

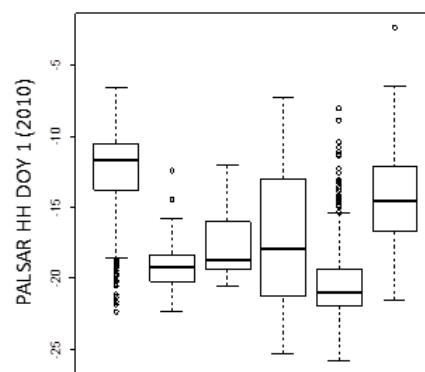
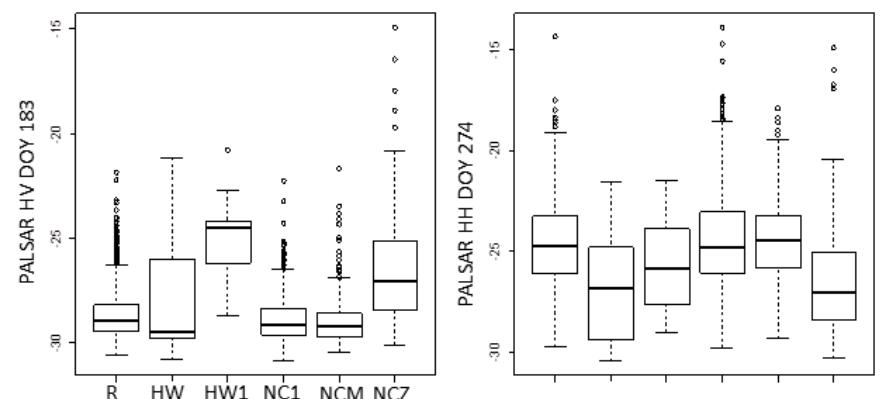
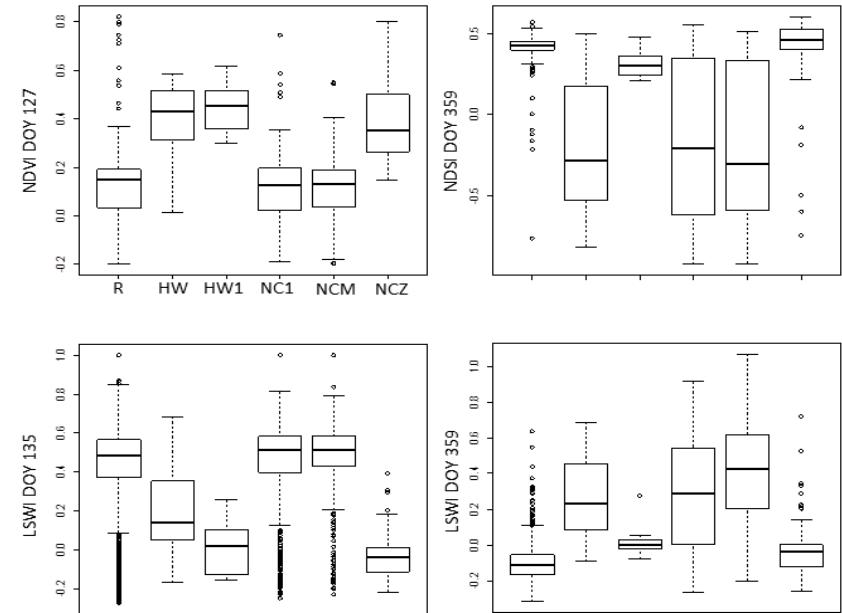


- A.) Map of LULC in West Java generated from multitemporal FBS/D PALSAR (n=48)
- B.) Rice extent across Java (scaled to percent of 10km cell for visualization) derived from Mosaics and ScanSAR
- C.) Rice extent across Indochina (% 10km cell for visualization) derived from Mosaics and ScanSAR

Mapping rice habitat in USA

USDA CIG

R	Rice crop field
WF	Rice crop field that underwent Winter Flood
SP	Rice crop Seeding Practice (wet versus dry)
NF	Rice fields that do not receive irrigation applications (Not Flooded)
NC1	Non-Crop with 1 irrigation; field with water deliveries in fall after harvest and/or winter. Primarily used to decompose straw and typically planted following spring
NCM	Rice field with No-Crop with irrigation with Maintenance applications
HW	Rice fields that farmers designate as wildlife habitat and apply for water
HW1	Habitat Wetland; 1 irrigation application in winter
NCZ	Rice field with No-Crop remains Fallow with no irrigation



Mapping rice habitat in USA

USDA CIG

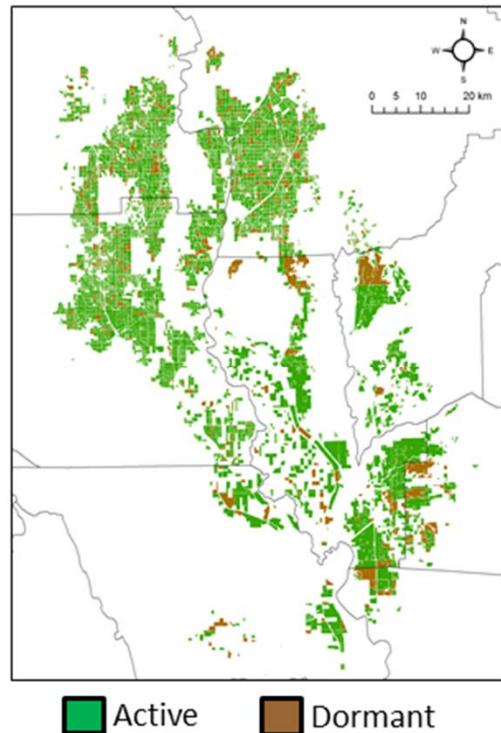
Reference	Predicted	
	WF	NF
WF	2545	98
NF	200	2647
Overall Accuracy	94.57	
95% CI	93.94-95.16	
P-value	<0.0001	
Kappa	89.14	
Class	Acres	%
WF	222,810.4	48.8%
NF	233,398.8	51.2%

Category	Hectares	%
Rice Crop	198,432	89
Dry Seeded	12,937	7
Winter Flood	90,168	49
Wet Seeded	185,494	93
NC1	7,063	3
NCM	3,341	2
NCZ	4,674	2
HW	3,508	2
HW1	6,016	3

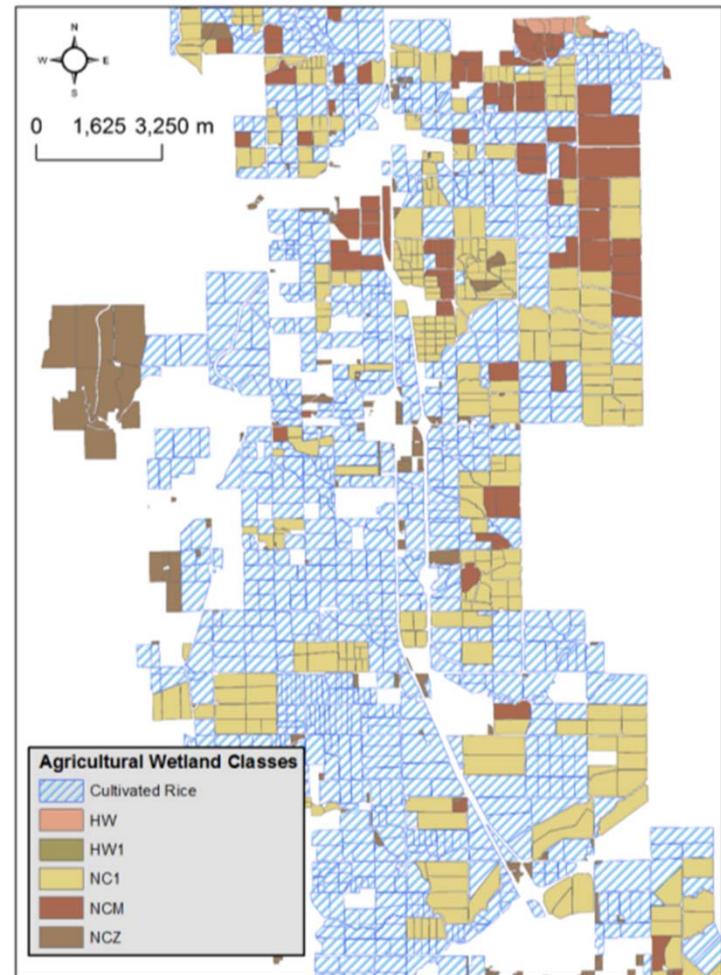
	Rice and Wetland Habitat Class Combinations					Ave
	HW, HW1, NC1, NCM, NCZ	HW, HW1	HW1, NCM	NC1, NCM	NC1, NCM, NCZ	
Remote Sensing Inputs						
PALSAR FBS Strips	0.49	0.76	0.75	0.76	0.62	0.68
PALSAR FBD Strips	0.53	0.77	0.76	0.77	0.69	0.70
Landsat Reflectance & TIR	0.66	0.86	0.86	0.86	0.83	0.81
Landsat Indices	0.62	0.83	0.83	0.83	0.80	0.78
Landsat Tasseled Cap	0.64	0.84	0.84	0.84	0.79	0.79
PALSAR FBD & Landsat Bands	0.70	0.89	0.88	0.88	0.86	0.84
Principal Components 1234	0.58	0.74	0.74	0.74	0.72	0.70

Mapping rice habitat in USA

USDA CIG



Actively farmed rice paddies and winter flood maps for rice fields across the Sacramento Valley, CA, USA.

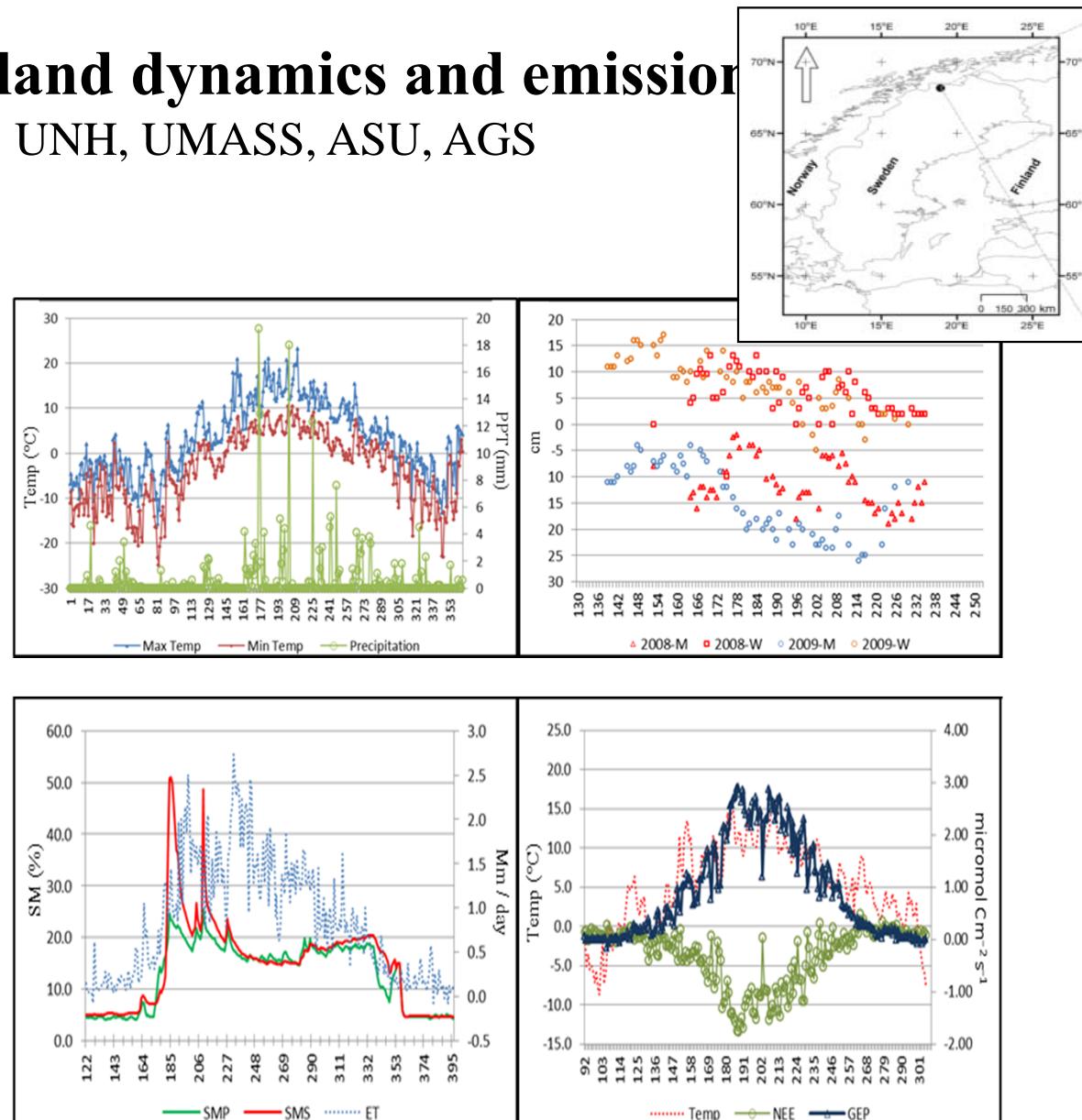


Zoomed in area of Sacramento valley USA showing classified agricultural wetland classes using multitemporal PALSAR strips.

Mapping high latitude wetland dynamics and emissions

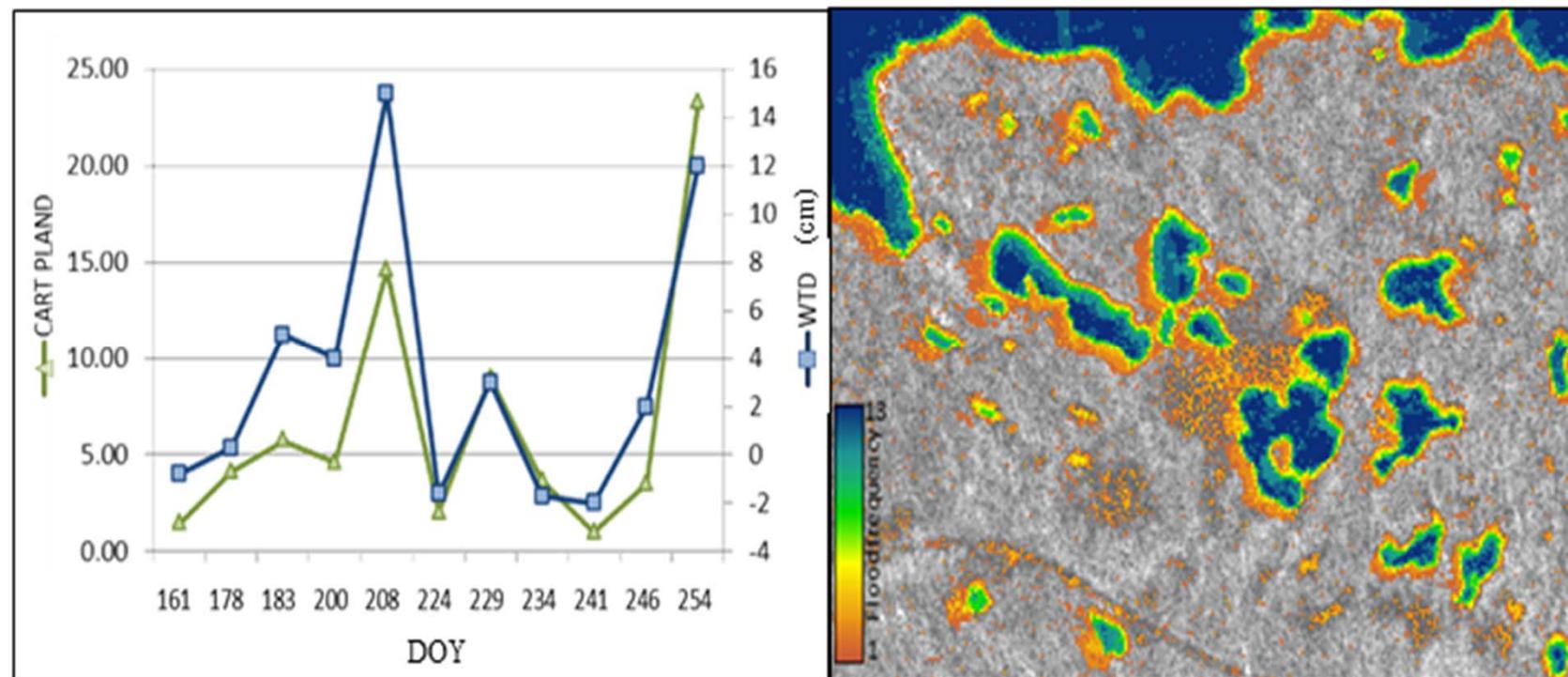
NASA TE & NSF MSB: UNH, UMASS, ASU, AGS

Platform	Date	DOY	Mode	θ
PALSAR	5/31/2007	151	Q	21.5
PALSAR	6/10/2006	161	S	41.5
PALSAR	6/27/2006	178	S	41.5
PALSAR	7/2/2007	183	D	34.3
PALSAR	7/19/2007	200	D	34.3
PALSAR	7/27/2010	208	D	34.3
PALSAR	8/12/2006	224	D	41.5
PALSAR	8/17/2007	229	D	34.3
PALSAR	8/22/2009	234	D	34.3
PALSAR	8/29/2006	241	D	41.5
PALSAR	9/3/2007	246	D	34.3
PALSAR	9/11/2010	254	D	34.3
PALSAR	9/27/2006	270	S	41.5
LiDAR	8/7/2009	219	-	
Sweden DEM	-	-	-	



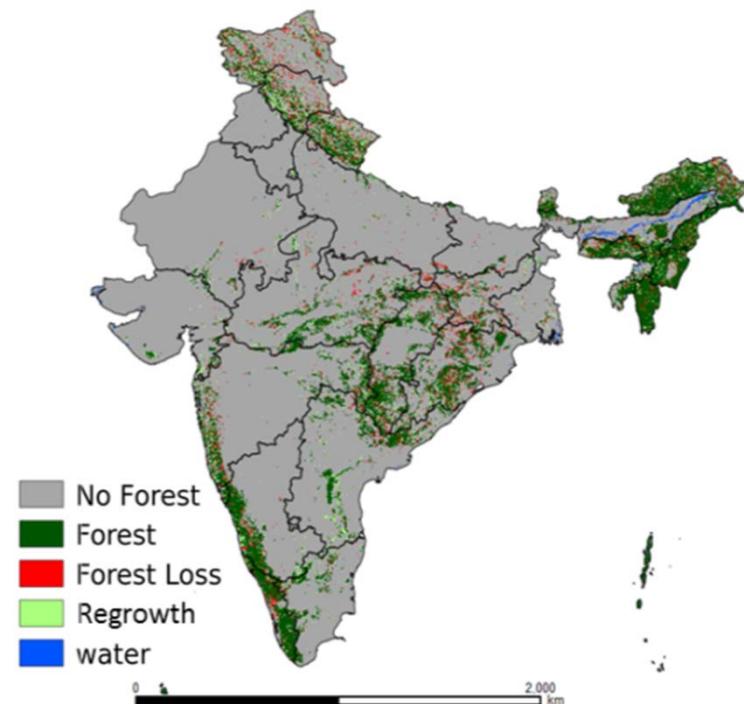
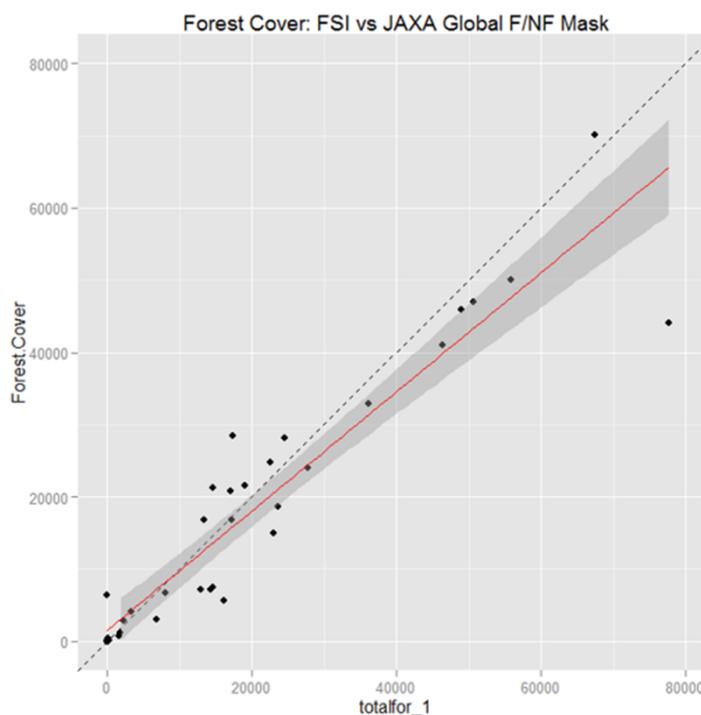
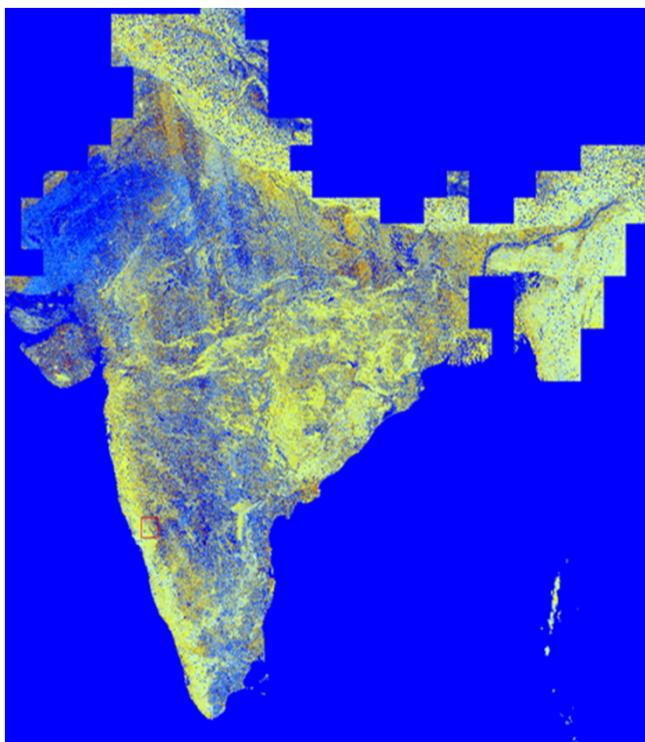
Mapping high latitude wetland dynamics and emissions

NASA TE & NSF MSB: UNH, UMASS, ASU, AGS



Mapping forests using ALOS PALSAR for REDD+

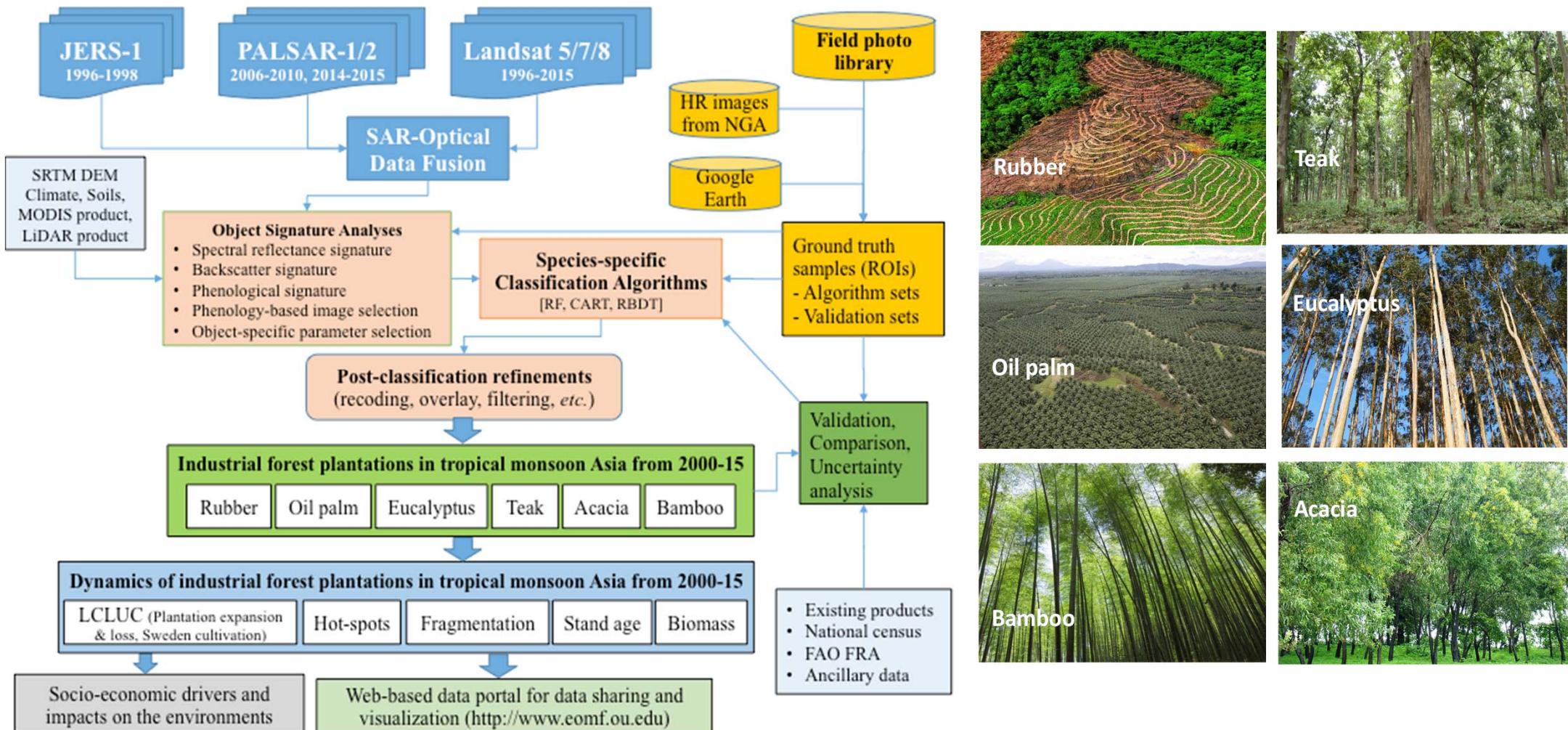
USAID: AGS, MSU, Tetra Tech, Iora



JAXA 2010 Forest v Non-Forest Mask compared to India at the state level ($n=34$) had strong correlation (Multiple R-squared: 0.8819, Adjusted R-squared: 0.8784, F-statistic: 246.5 on 1 and 33 DF, p-value: <<0.0001) with Madhya Pradesh and Arunachal Pradesh as notable outliers.

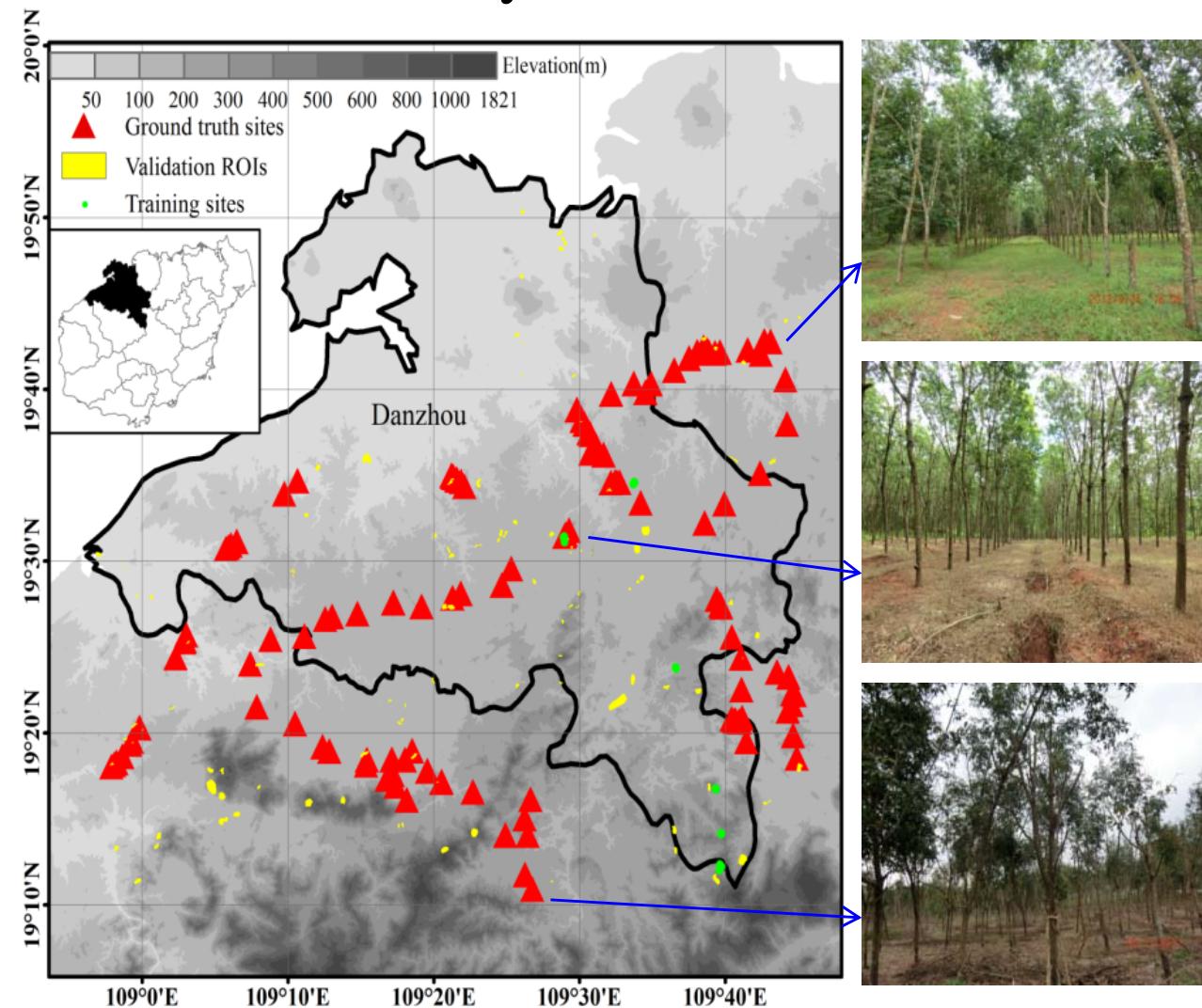
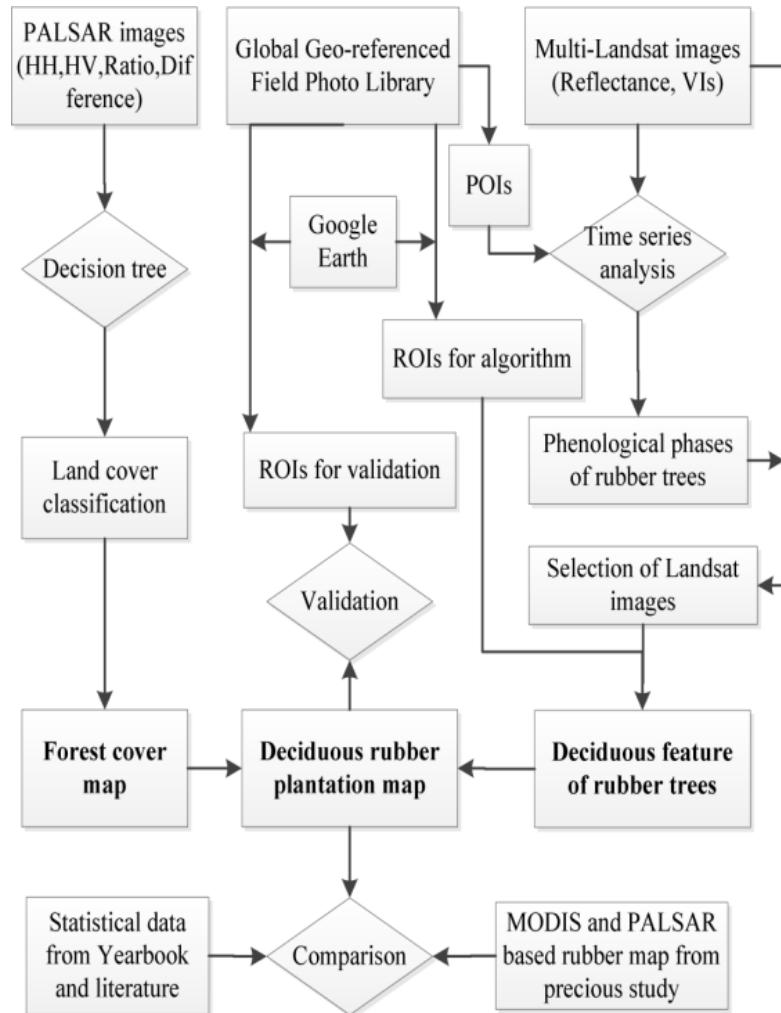
Mapping industrial forest plantations in tropical monsoon Asia

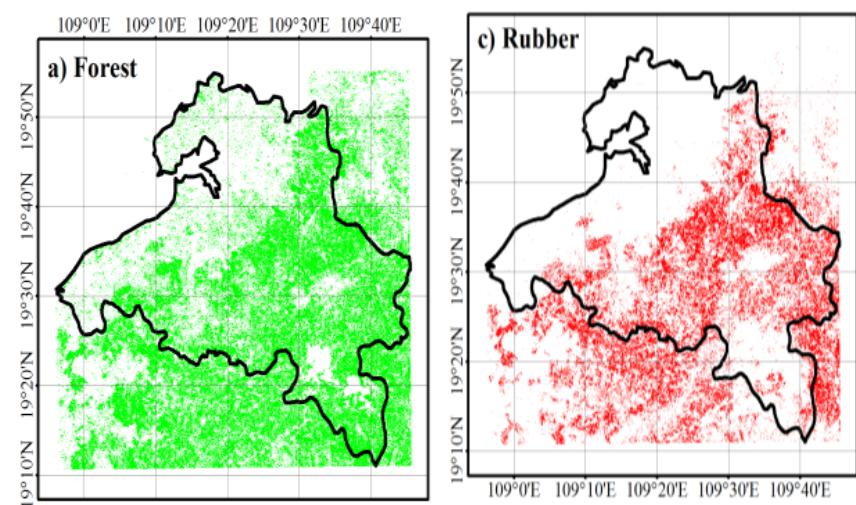
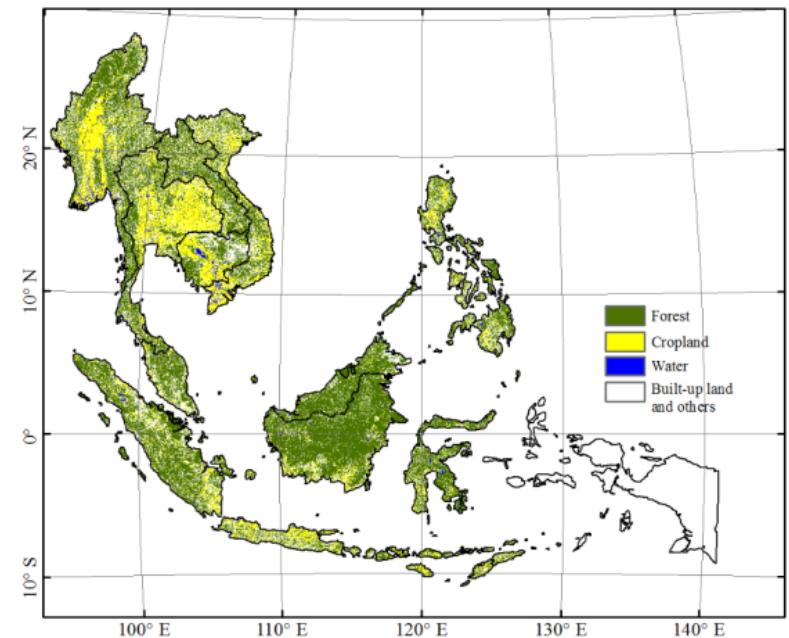
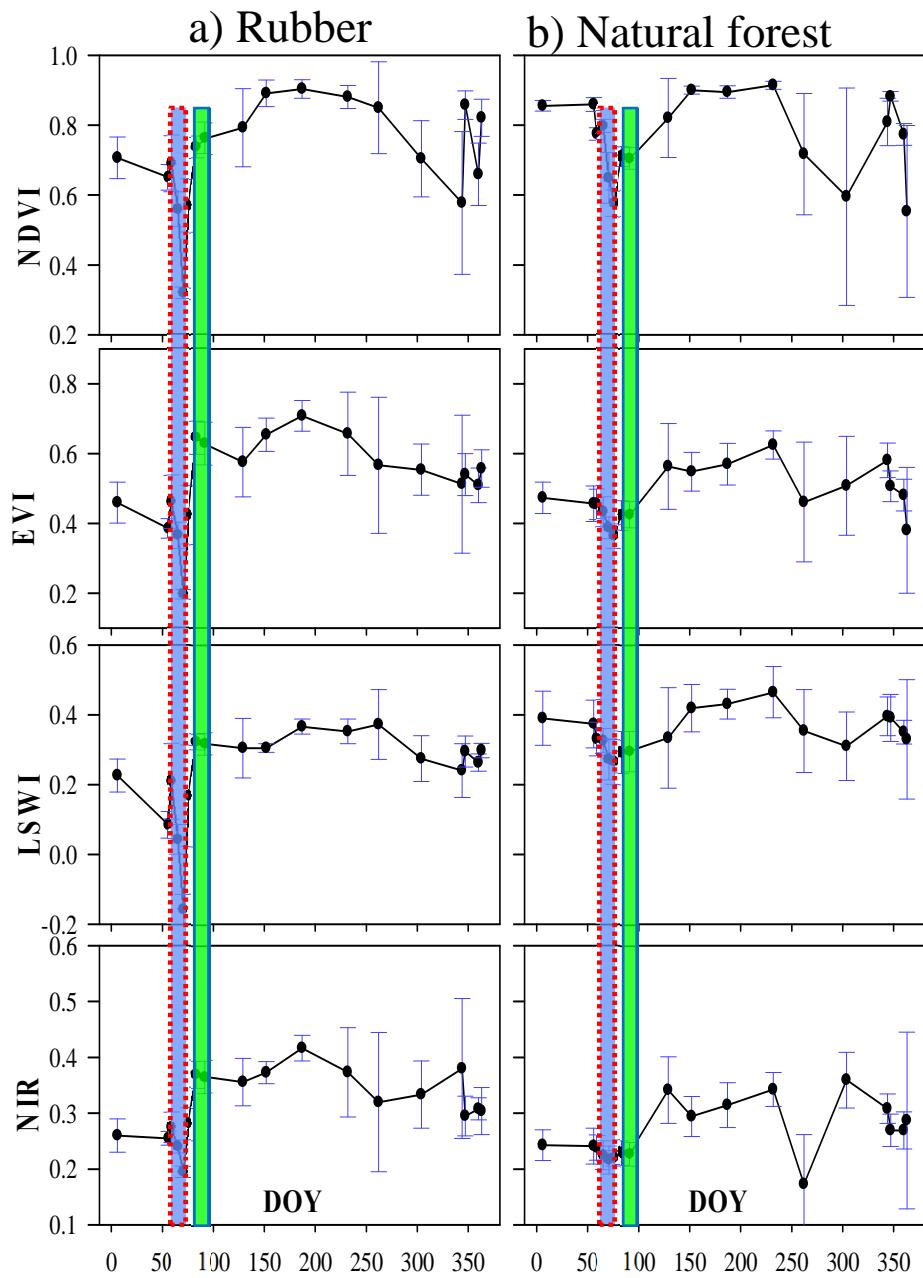
NASA: Oklahoma University, AGS



Mapping industrial forest plantations in tropical monsoon Asia

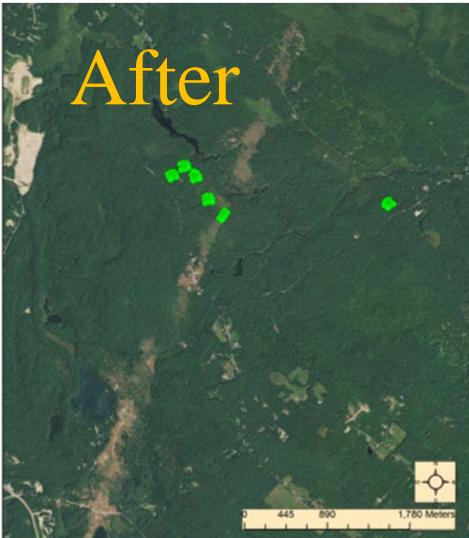
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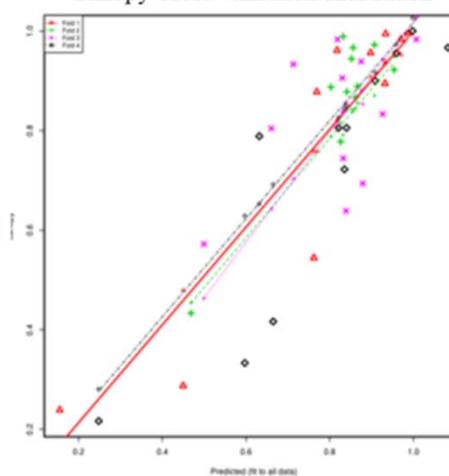
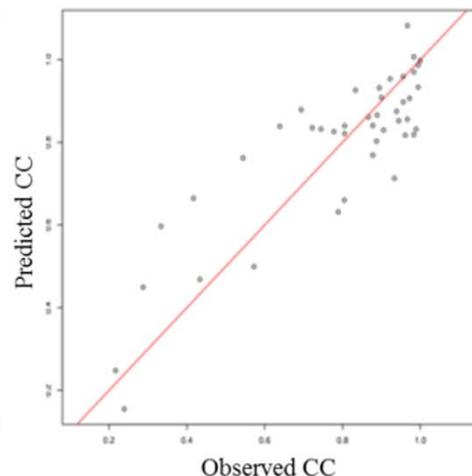
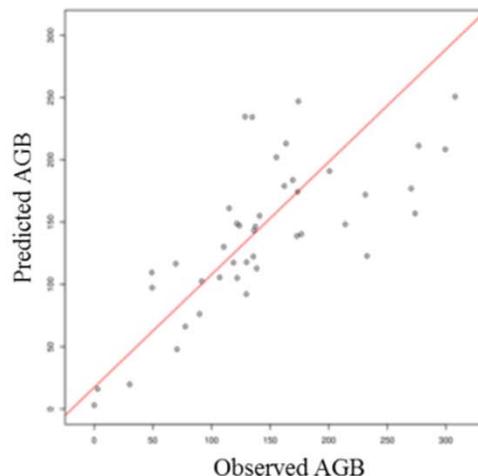
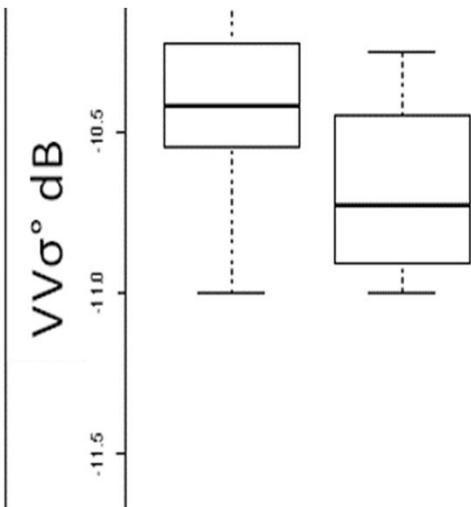
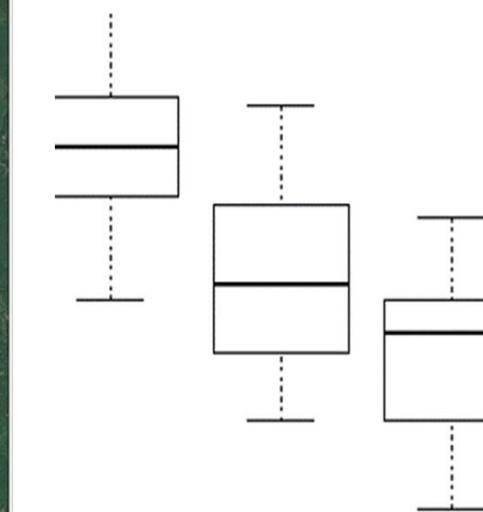


Mapping forests disturbance using ALOS PALSAR

USFS NSRC



Biomass



□ Total AGB loss in Carroll County from July 2008 tornado ~298,250 Mg

Deliverables – Papers and reports

1. Published (please provide PDF file)

- Several Project Reports
- IGARSS 2014 Quebec City
- *Papers in WEM, RS, JSTARS, CJRS, RSE*
- *Promoted K&C at workshops with USAID, NASA, GEOGLAM, USDA*

2. Submitted/in preparation

- *Mapping rice extent in Monsoon Asia using ALOS-1 PALSAR-1*
- *Assessing GHG emissions using SAR and DNDC*
- *Mapping agricultural crops in the USA with PALSAR and Landsat fusion*

Deliverables – Data sets and Thematic products (mosaics, classification maps etc.)

1. Completed and Delivered to JAXA

- *Geofield photos / ground truth*
- *Maps of rice (extent, hydroperiod, intensity) in pilot sites (Java; Poyang Lake, China; Thai Binh, Vietnam,...) and field data (surveys)*
- *Maps of rice and management practices in USA*

2. Completed, but not yet delivered (please deliver ASAP)

- *Monsoon Asia rice intensity, crop calendars & hydroperiod maps*
- *Pilot maps of industrial plantations (rubber case study)*
- *Northeast USA forest disturbance assessment maps & biometrics*

ALOS

K&C Initiative
An international science collaboration led by JAXA

Thanks to JAXA and the entire K&C team!

Excited for K&C Phase 4 and ALOS-2!