

# A multi sensor approach to improving forest classification in Myanmar

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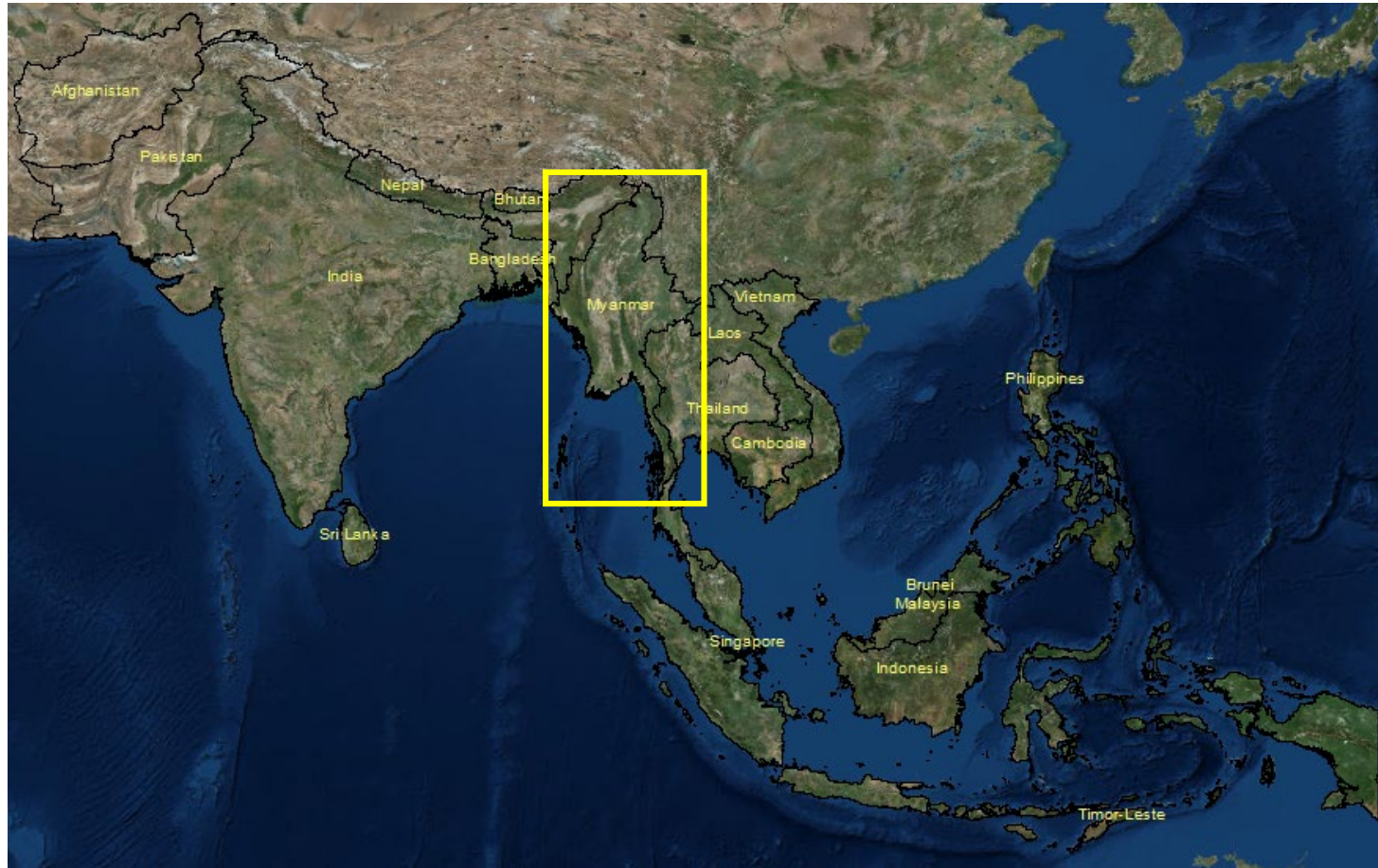
Land Use/Cover Changes, Environment and Emissions in  
South/Southeast Asia Meeting

Johor Bahru, Malaysia

24 July, 2019

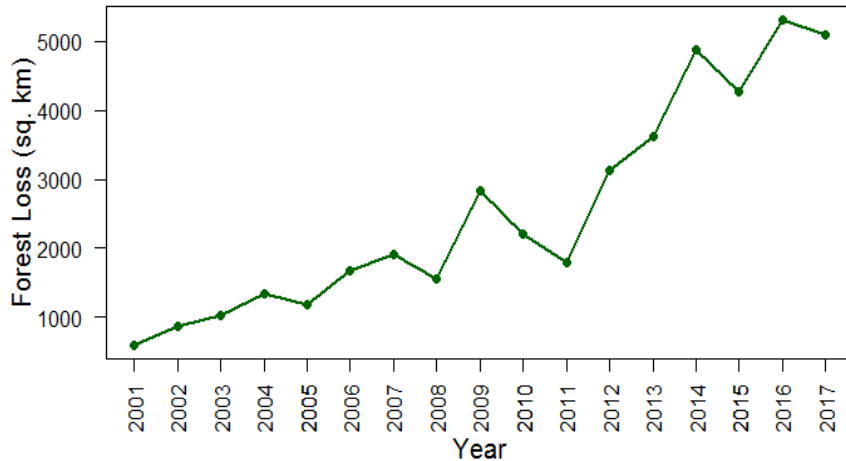


# Myanmar

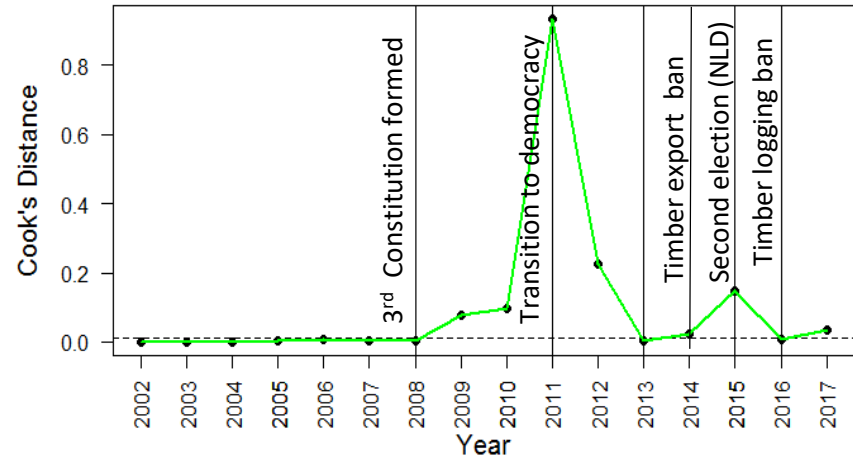


# Status of Myanmar's Forest Cover

Myanmar Forest Loss

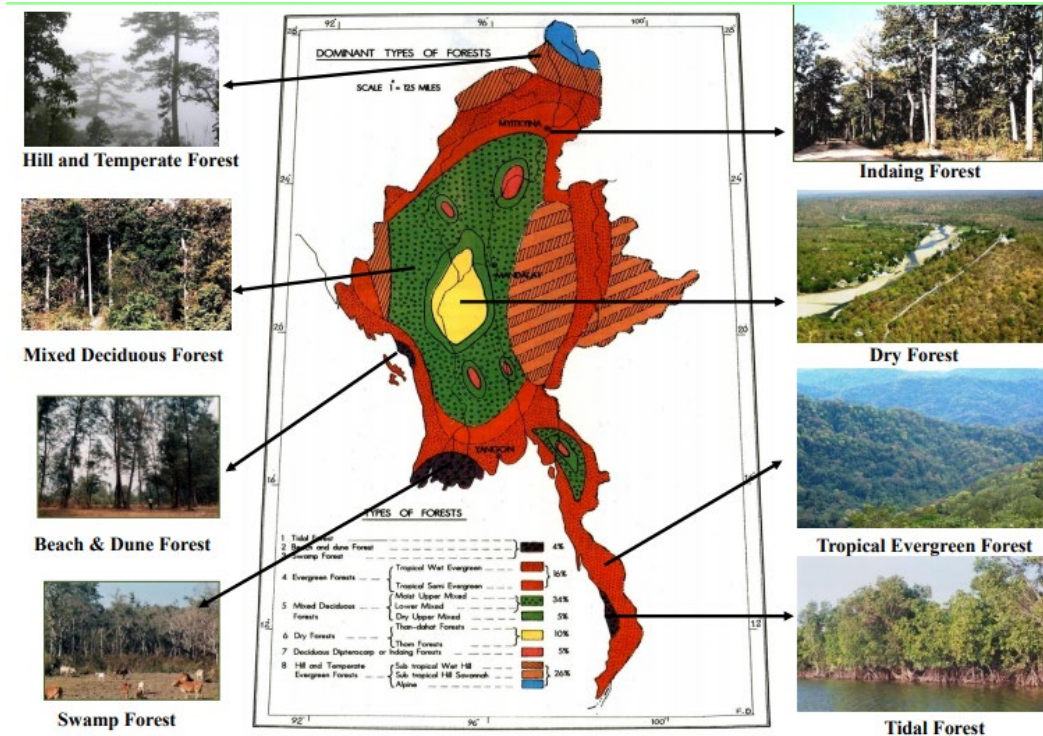


Myanmar Forest Loss

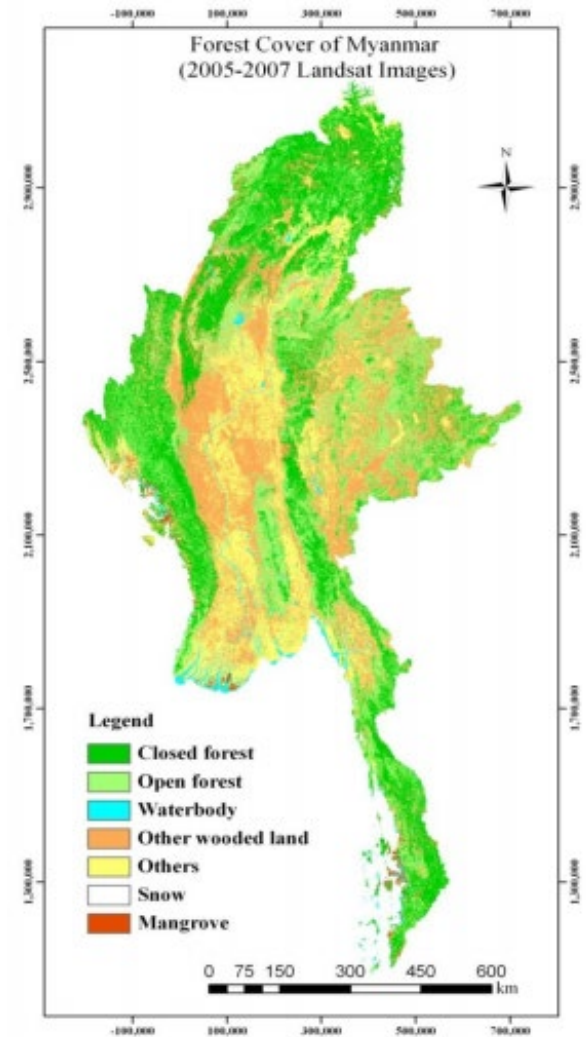


- Trends forest loss coincided with political transition and policy implementation.
- Shift in drivers of forest loss from commercial agriculture to infrastructure development (Biswas et al. in review).
- Protected areas are effective in forest conservation (Biswas et al., 2015).

# Forest Types in Myanmar



Stamp/Kress Classification



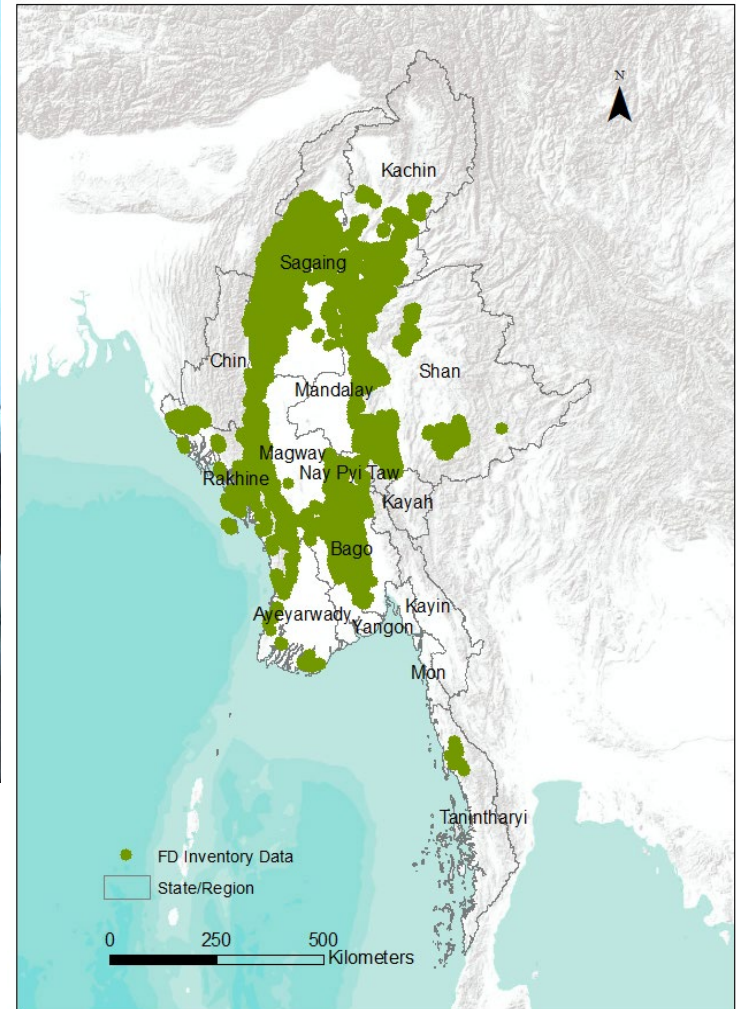
FAO Classification

# Forest Inventory Data

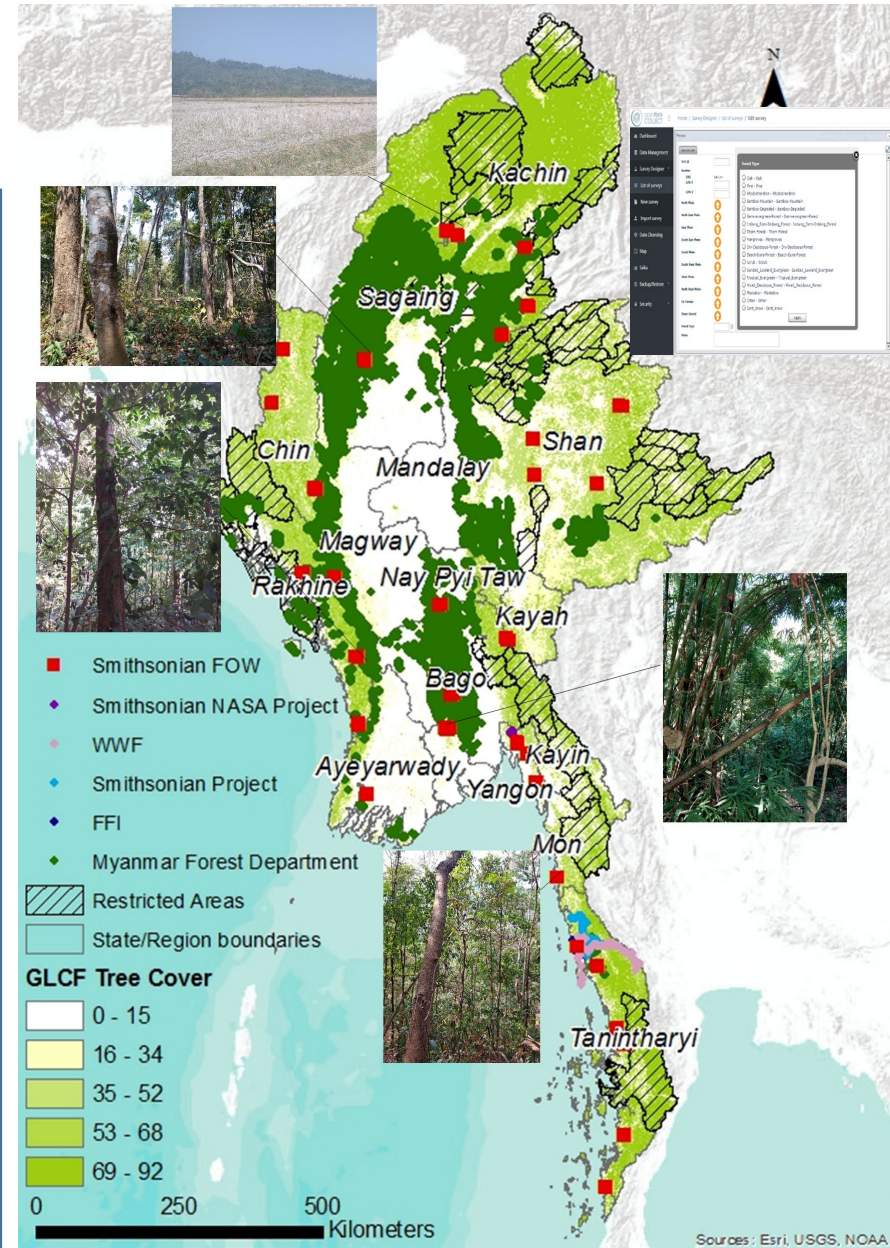
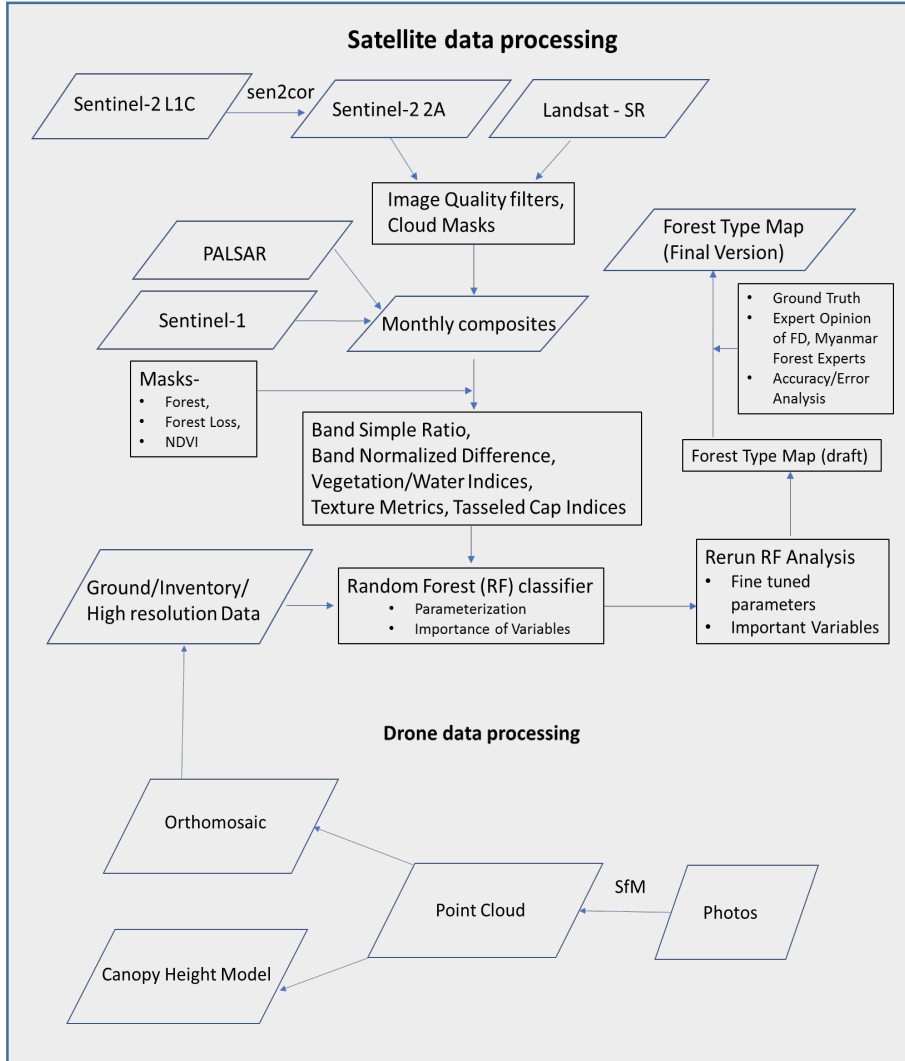


## Summary of Inventory data obtained from FD

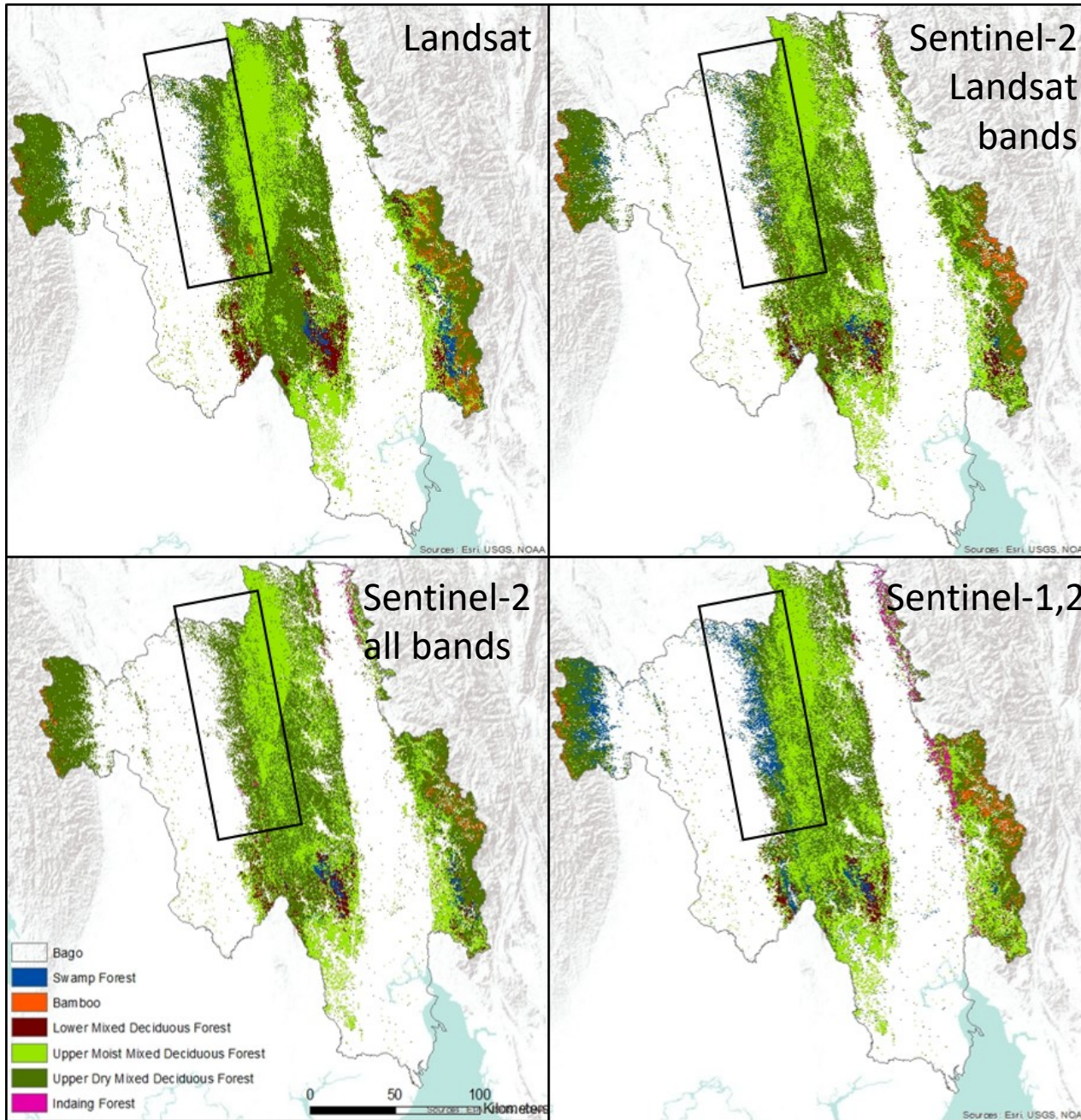
- Forest type and Location
- 12,565 points
- 17 forest types
- 10 States/Regions



# Workflow



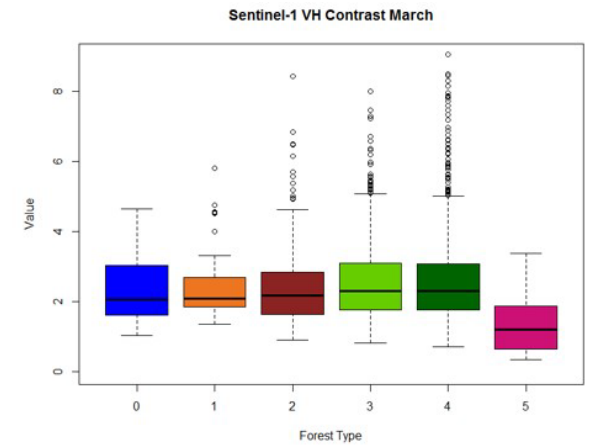
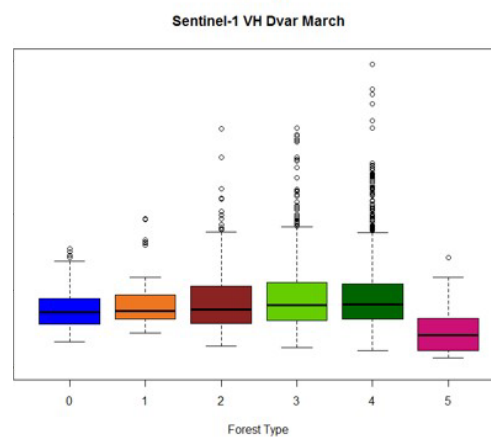
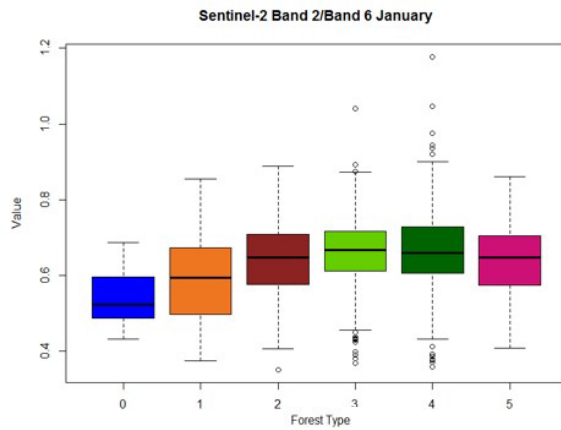
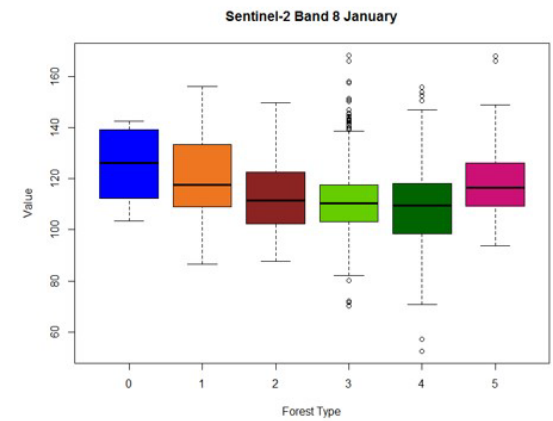
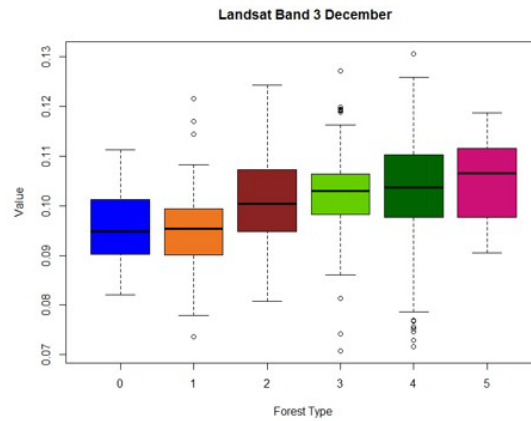
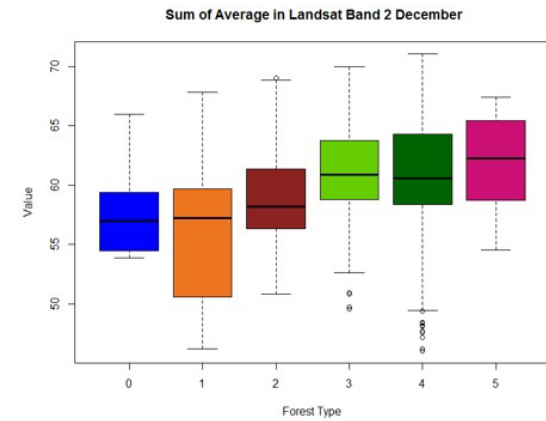
# Bago Forest Types



## Major Forest Types

- |   |                                     |
|---|-------------------------------------|
| 1 | Lower Mixed Deciduous Forests       |
| 2 | Upper Moist Mixed Deciduous Forests |
| 3 | Upper Dry Mixed Deciduous Forests   |
| 4 | Bamboo                              |
| 5 | Indaing Lowland Forests             |
| 6 | Swamp Forests                       |

# Selected Metrics/Bands Used

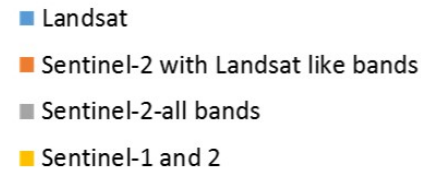
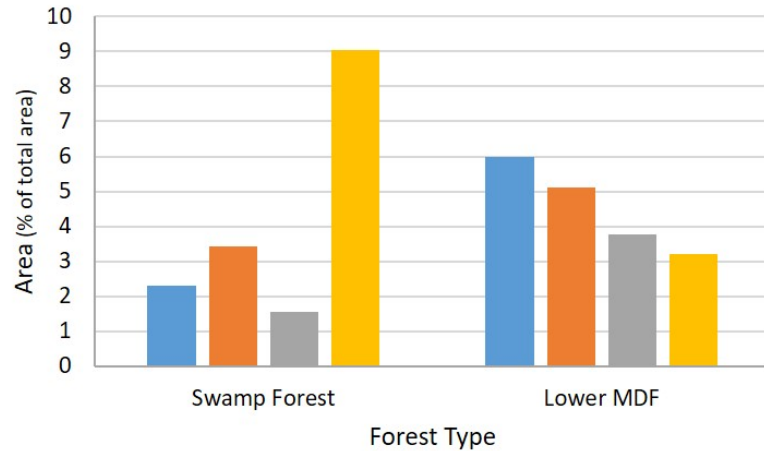
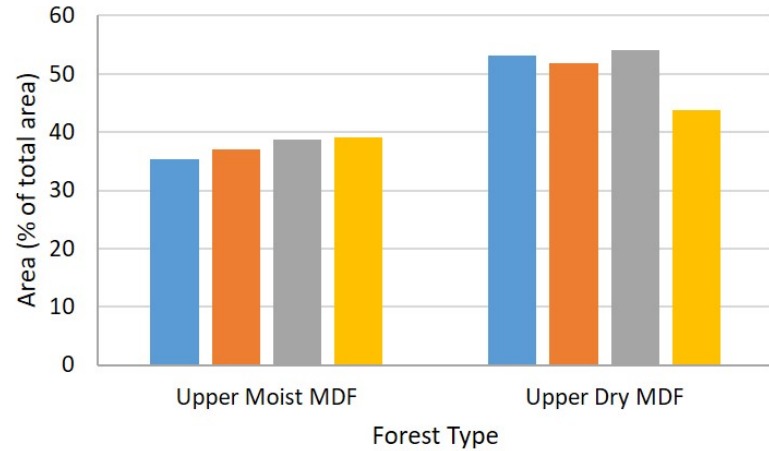
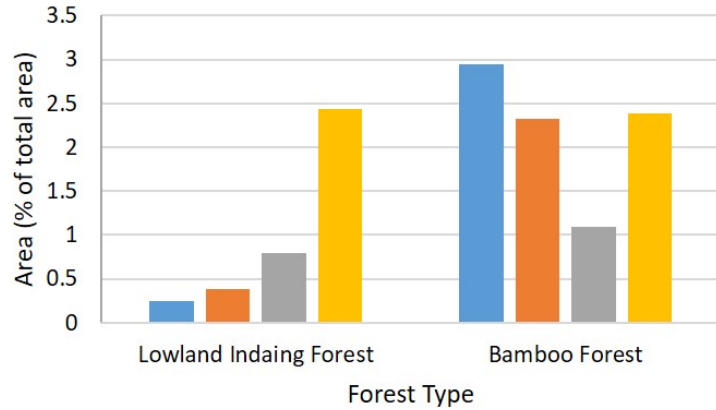




# Areal Estimates (km<sup>2</sup> and %)

	Swamp Forest	Bamboo Forest	Lower MDF	Upper Moist MDF	Upper Dry MDF	Lowland Indaing Forest
Landsat	381.17	486.46	992.59	5849.77	8797.72	42.04
	(2.30)	(2.94)	(6.00)	(35.35)	(53.16)	(0.25)
Sentinel-2 with Landsat like bands	575.04	390.04	854.10	6182.29	8665.27	65.23
	(3.44)	(2.33)	(5.11)	(36.95)	(51.79)	(0.39)
Sentinel-2-all bands	261.34	182.12	629.32	6485.40	9040.27	133.51
	(1.56)	(1.09)	(3.76)	(38.76)	(54.00)	(0.80)
Sentinel-1 and 2	1513.86	399.58	536.25	6551.12	7322.96	408.28
	(9.05)	(2.39)	(3.20)	(39.15)	(43.77)	(2.44)

# Forest Type Estimates by sensors

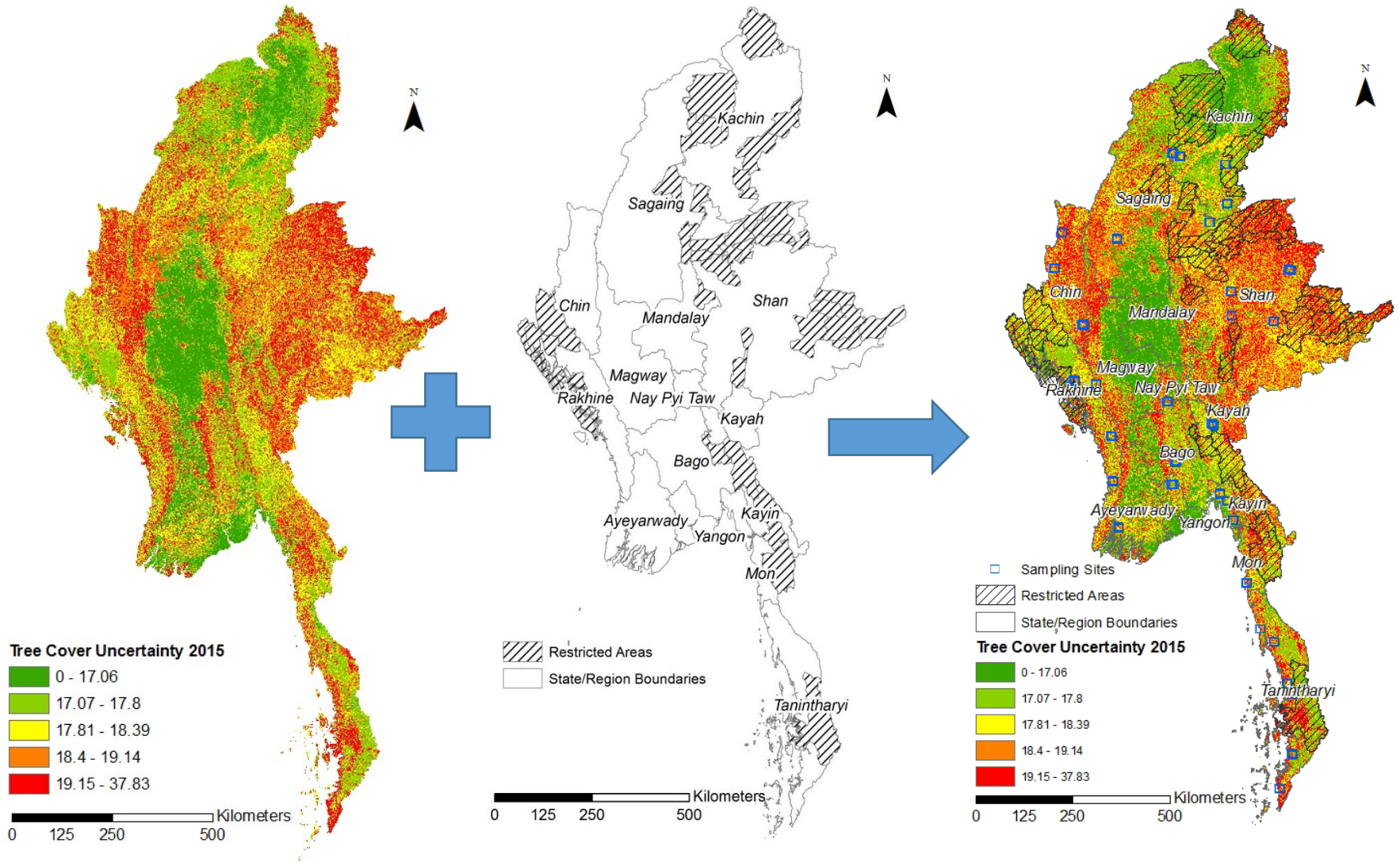


# Model Accuracy

Model	Resolution	Accuracy
Landsat	30m	81.5%
Sentinel-2 with Landsat like bands	20m	86.8%
Sentinel-2-all bands	20m	88.03%
Sentinel-1 and 2	20m	87.62%

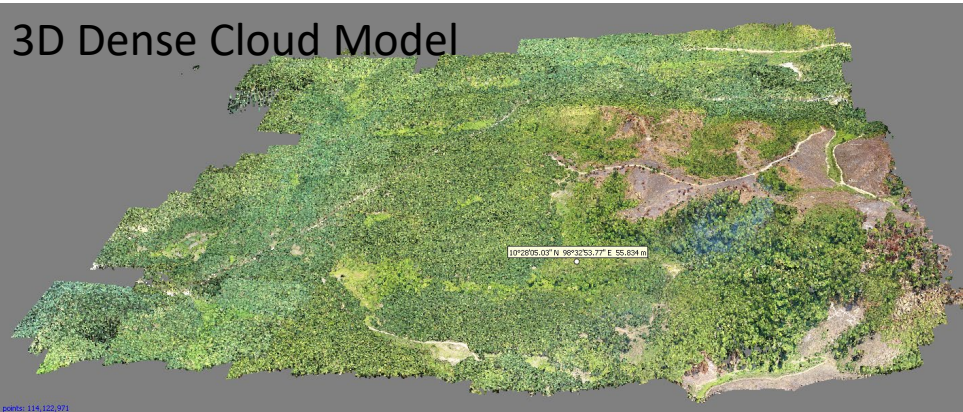
# Landsat Percent Tree Cover Validation

# Drone Data Collection Strategy

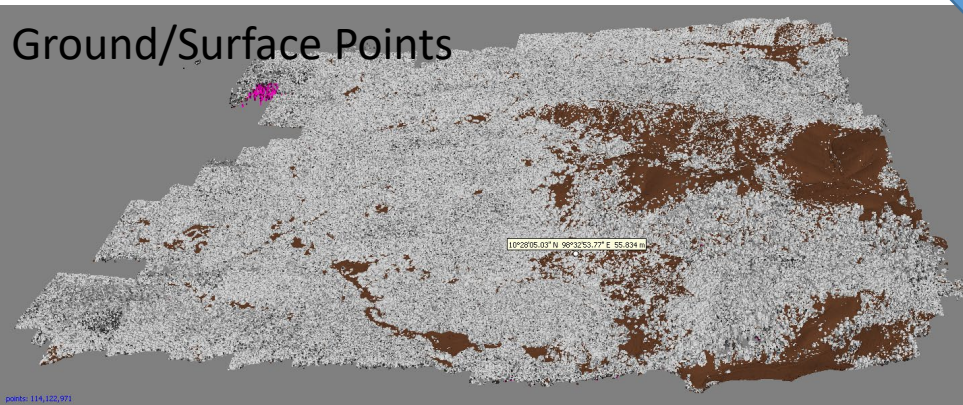


# Drone Data Processing Steps

3D Dense Cloud Model

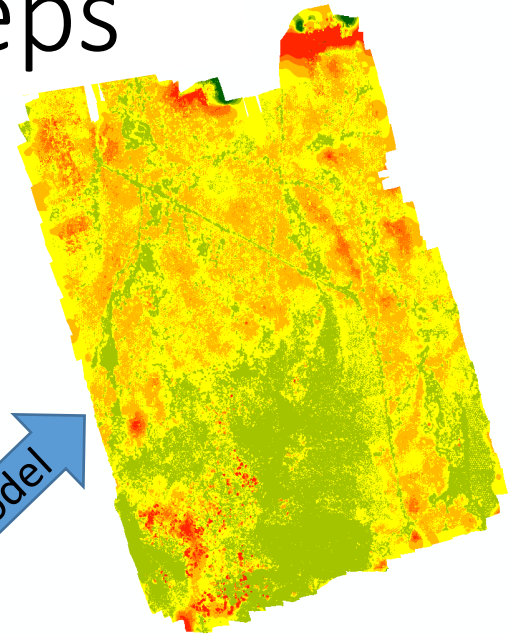


Ground/Surface Points



CHM

- 69.32778931 - -10.64945798
- 10.64945797 - -3.935427507
- 3.935427506 - 0.3
- 0.3 - 9.492633434
- 9.492633435 - 16.2066639
- 16.20666391 - 22.92069438
- 22.92069439 - 90.666008

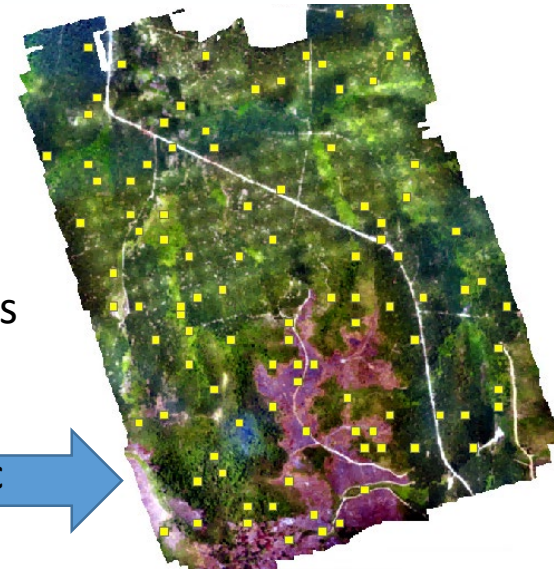


Canopy Height Model

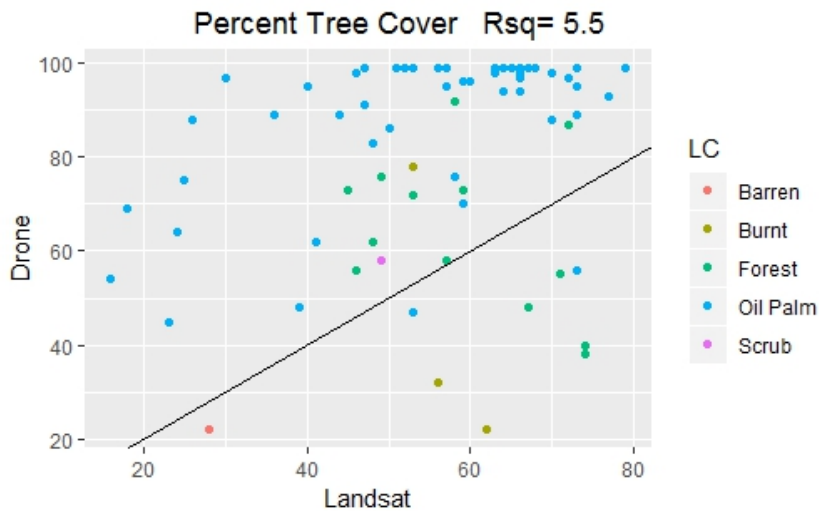
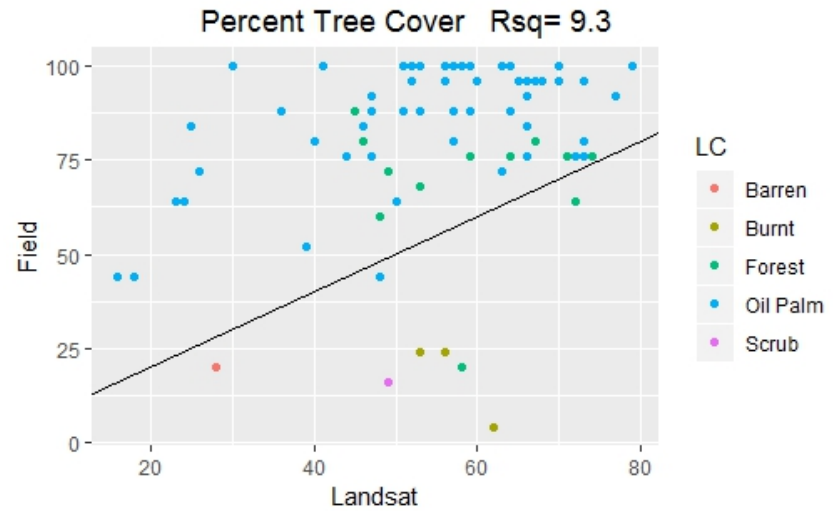
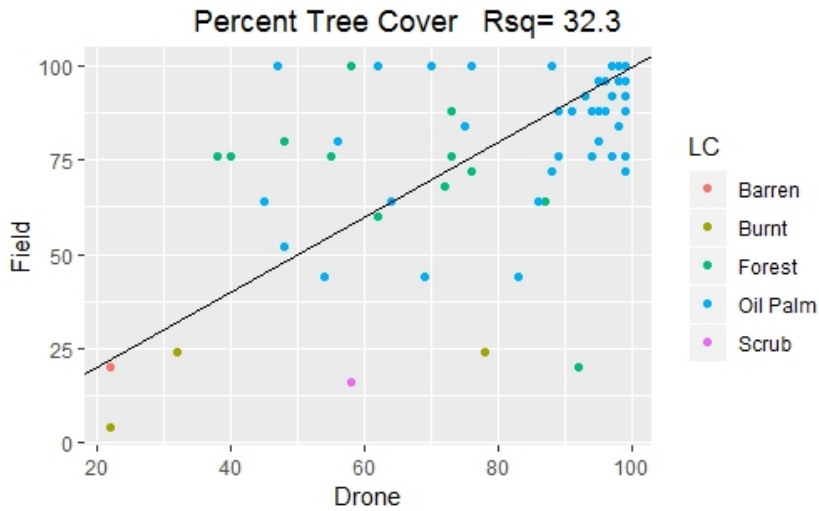


Sampling Blocks

Orthomosaic

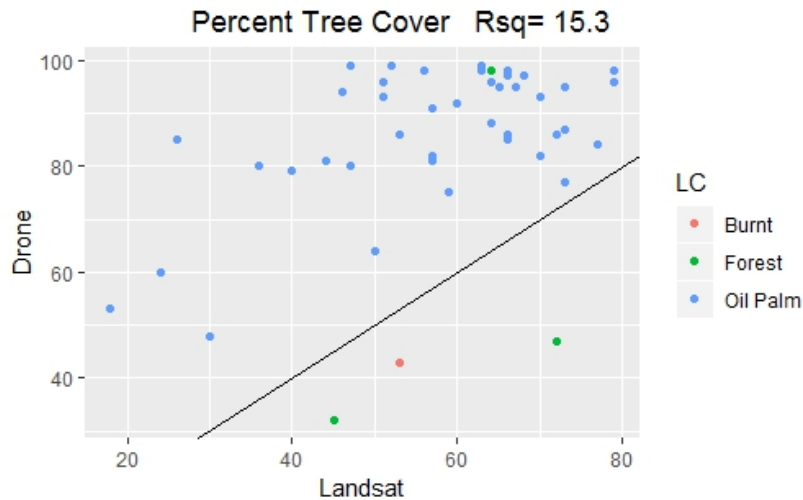
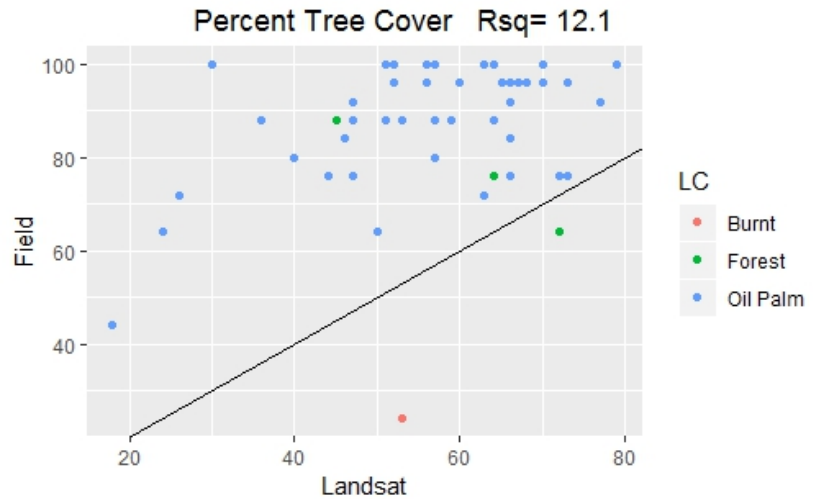
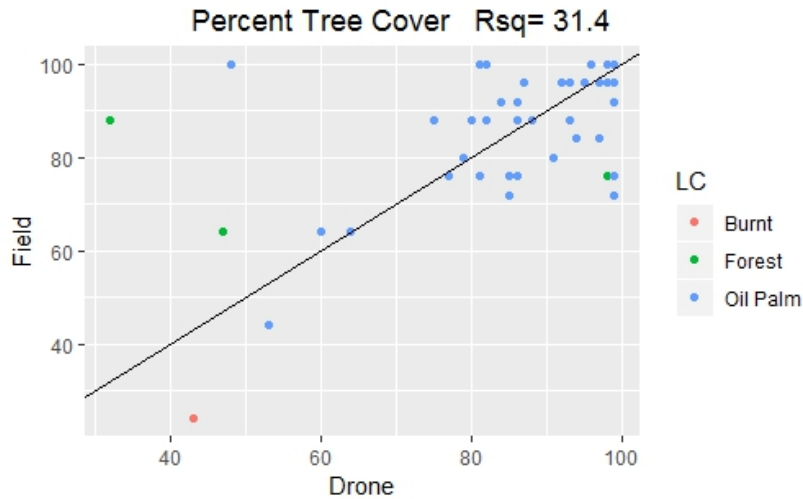


# Results- Canopy Height > 1m



Field	Value
FID	1170
Shape	Point
Id	5040
Zone_ID	5040
ORIG_FID	5039
R1_CHM_S1	26244
R1_CHM_pct	99
TC_2015	53
Run1_CHM	10

# Results- Canopy Height > 5m





# Next steps

- Forest Type Mapping
  - Increase training data
  - Algorithmic improvements
- Drone Validation
  - Improve the Canopy Height Model
  - Add more ground points manually
- Calibrate the Landsat model