

Forest Biomass Estimation, Australia

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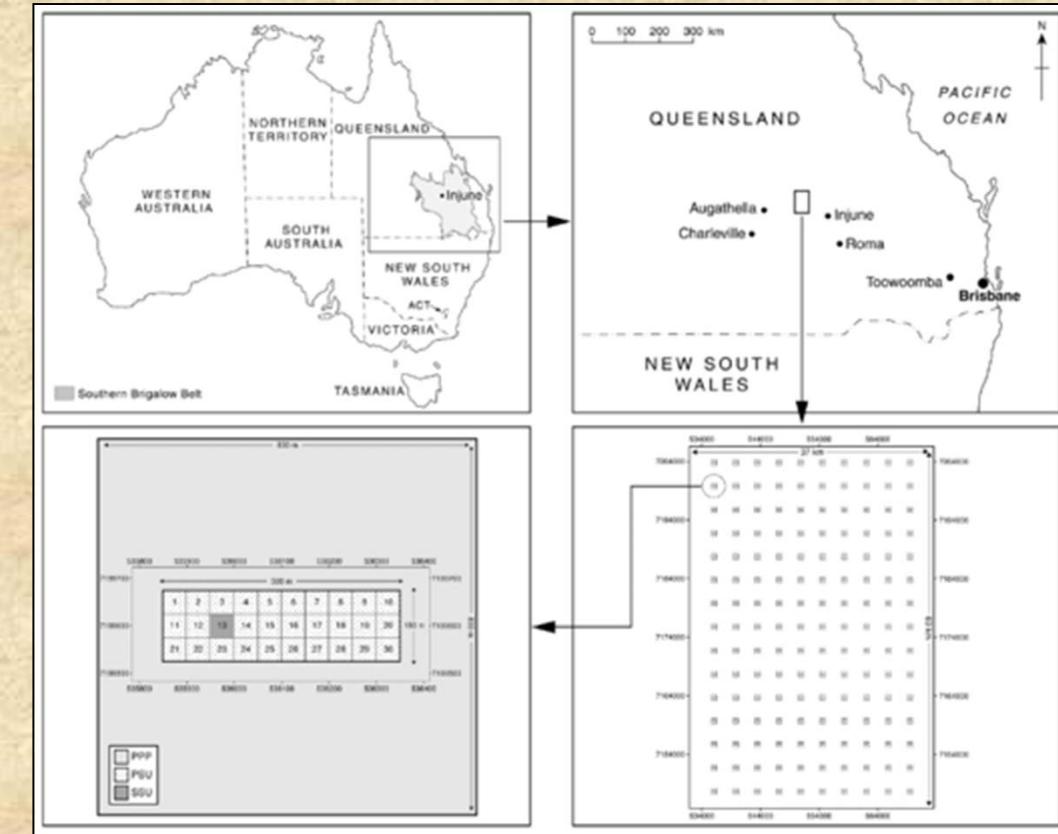
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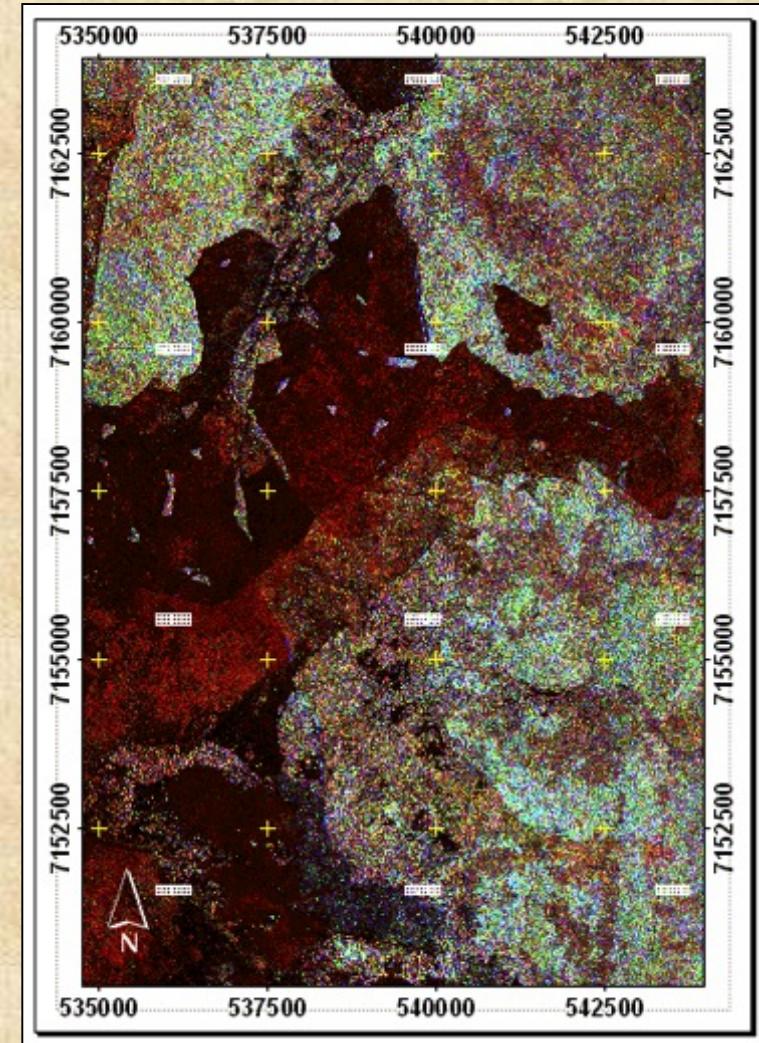
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The Injune Landscape Collaborative Project, Queensland, Australia

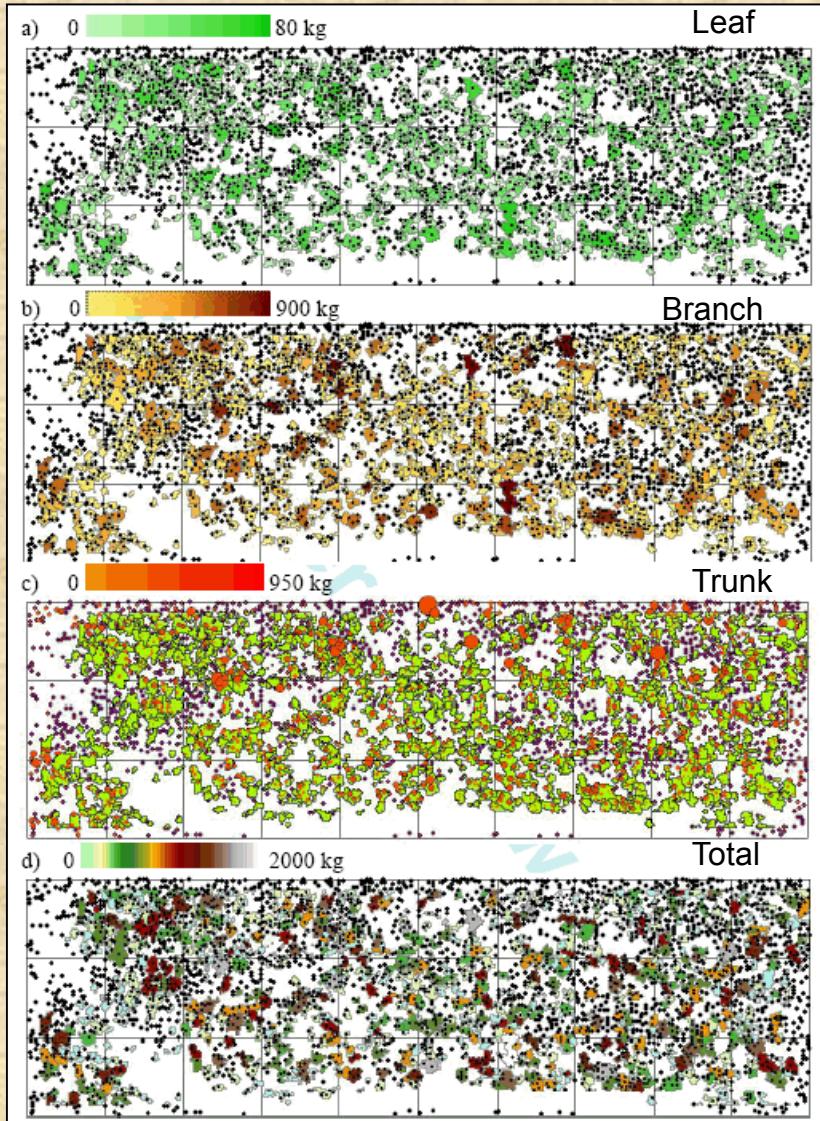
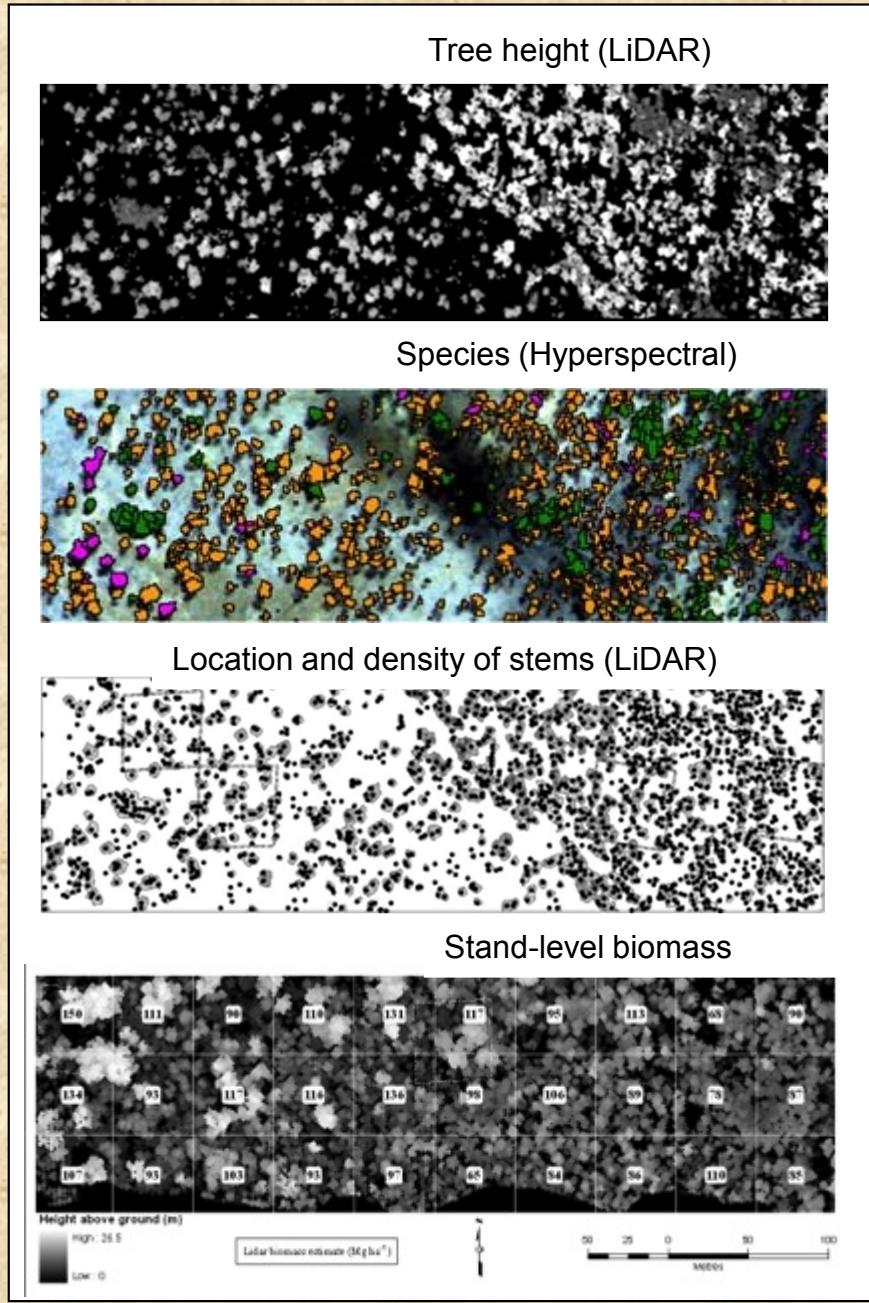


- Supporting statewide to national characterisation, mapping and monitoring of woody vegetation
 - At multiple scales using multi-sensor data
 - Algorithm and method development (e.g., retrieval of biomass, structure, species composition and change)
- Understanding ecosystem response to human-induced and natural change
 - Tree to landscape



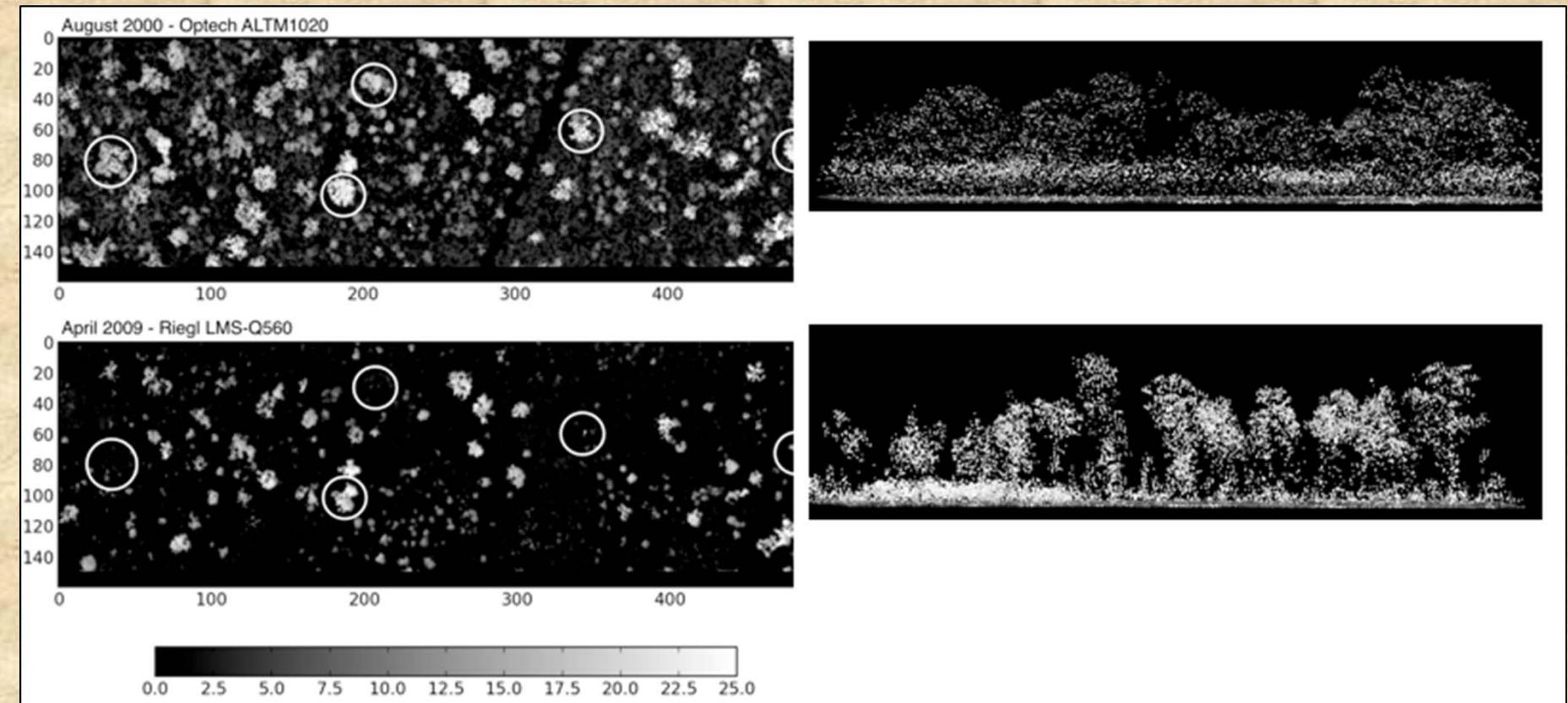
AIRSAR C, L and P-band

Tree to Stand Level Products



Integration of LiDAR and CASI

Tree mortality and loss of understorey through fire: Comparison of 2000 and 2009 LiDAR



Ground truth data for estimating AGB

Biomass library - 1139 sites (2781 plots)

Brigalow Forest Regrowth



Open Callitris Forest



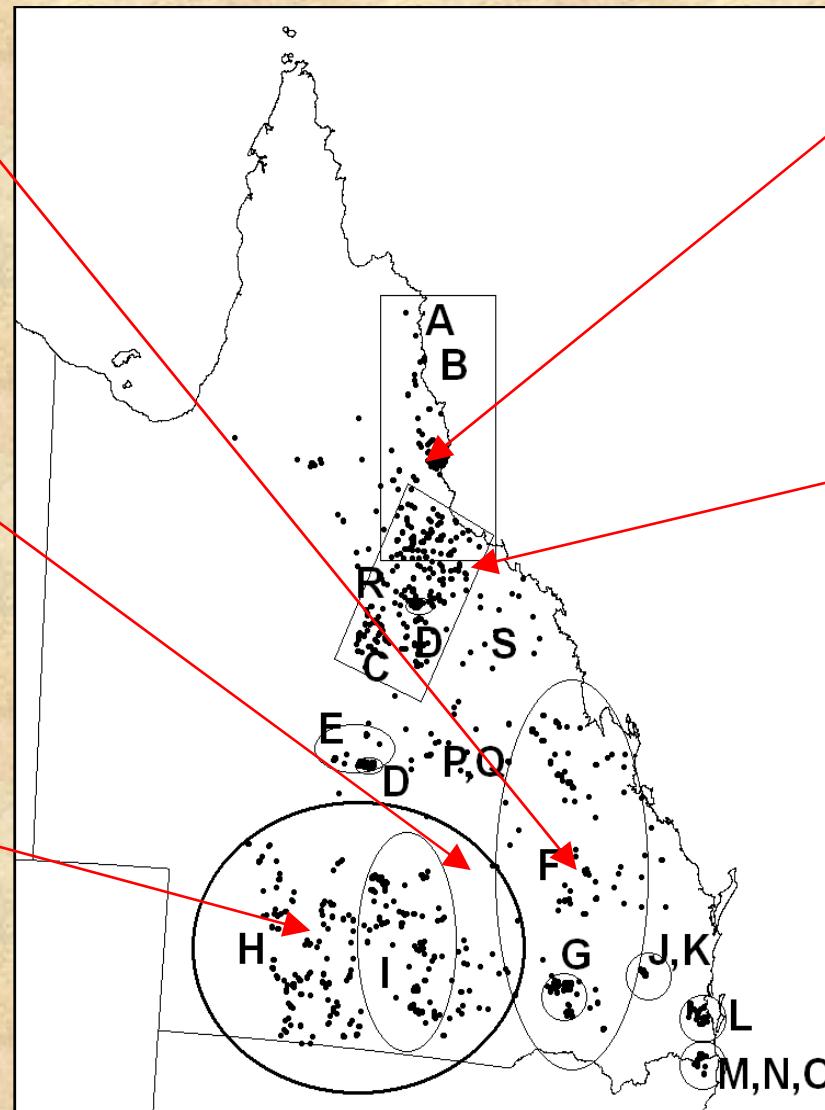
Low Acacia Woodland



Tall Closed Rainforest

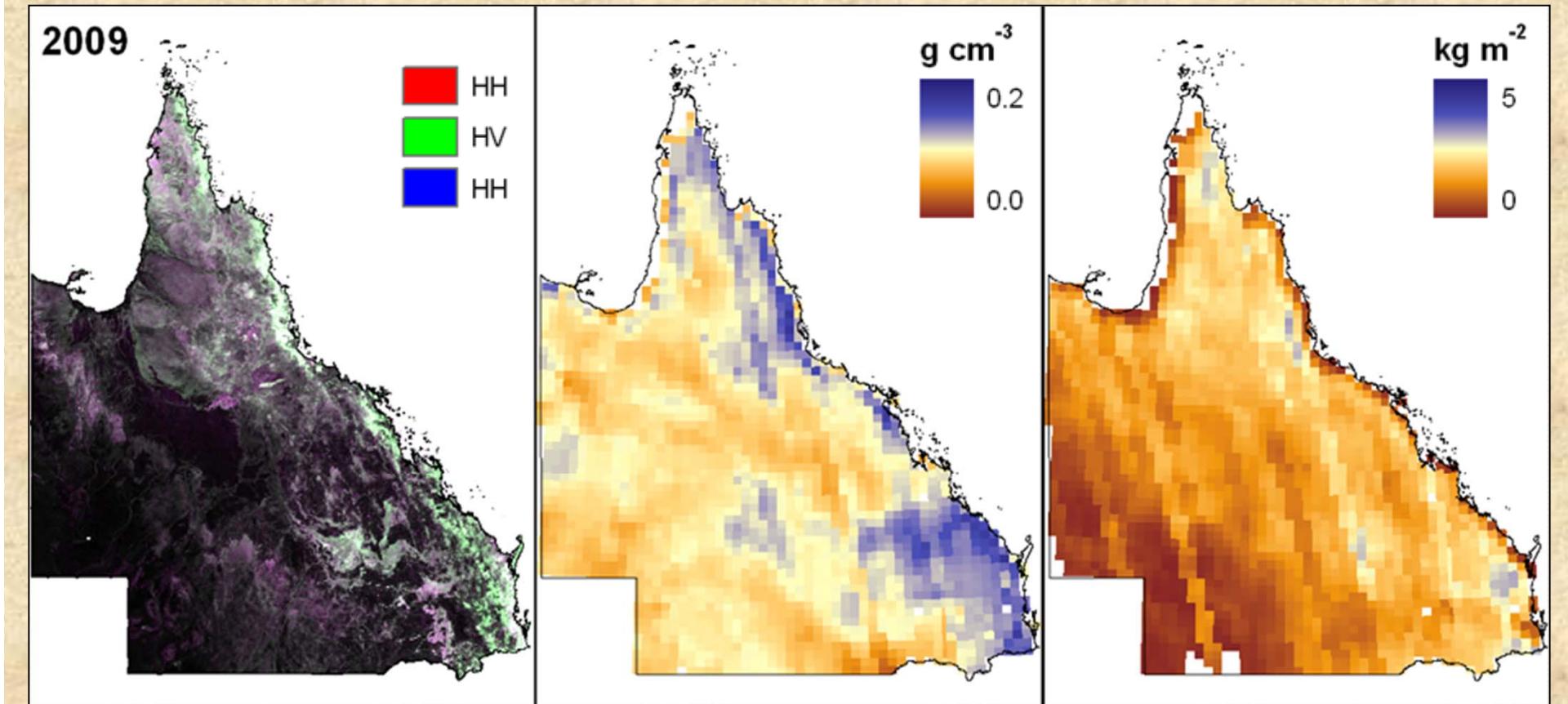


Eucalypt Woodland

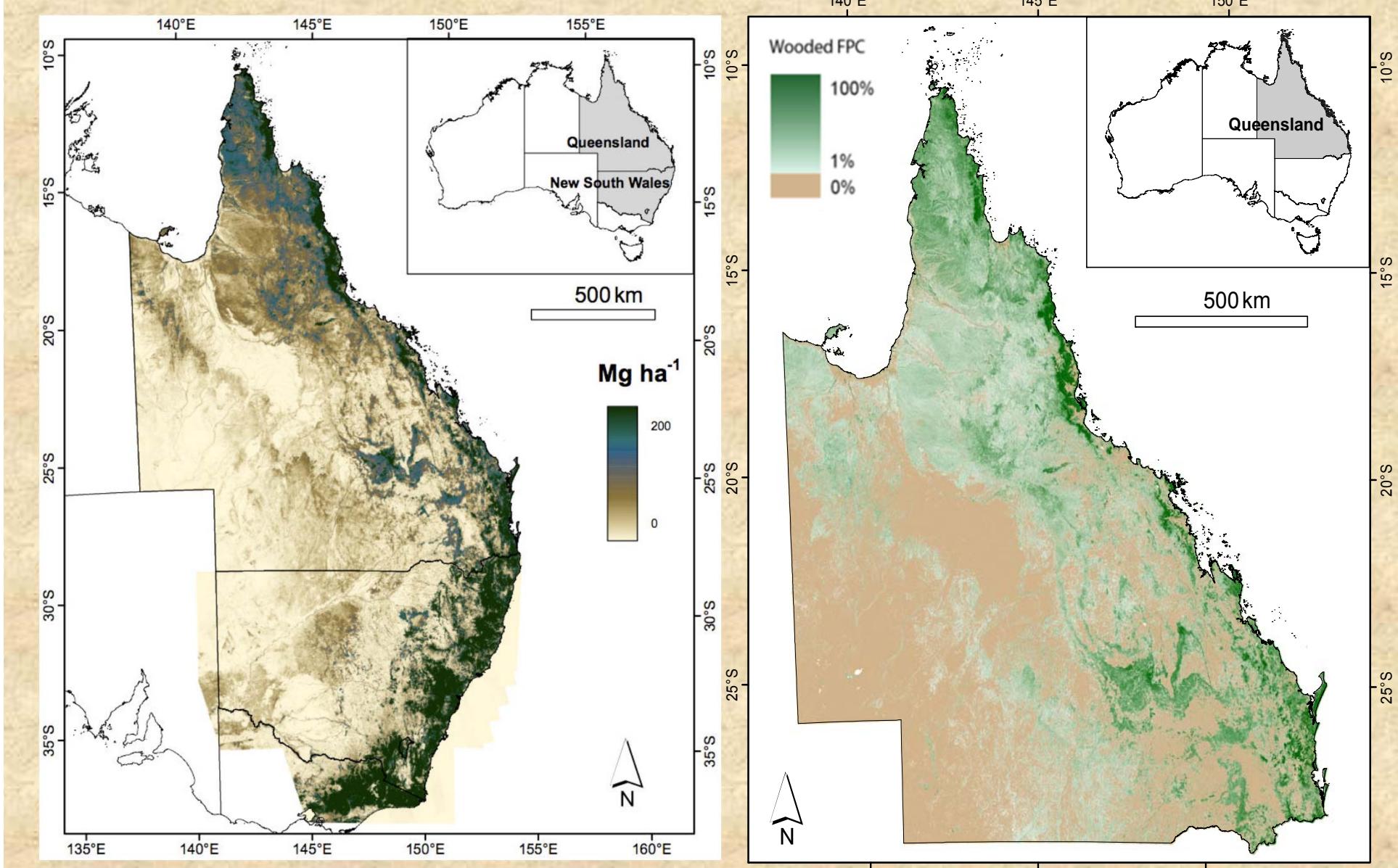


Generation of image mosaics

- Annual mosaics from 2007 to 2009
 - Used strip dates captured under driest conditions
 - Mosaic for 2010 compromised by wet conditions



Retrieval of AGB – ALOS PALSAR and beyond

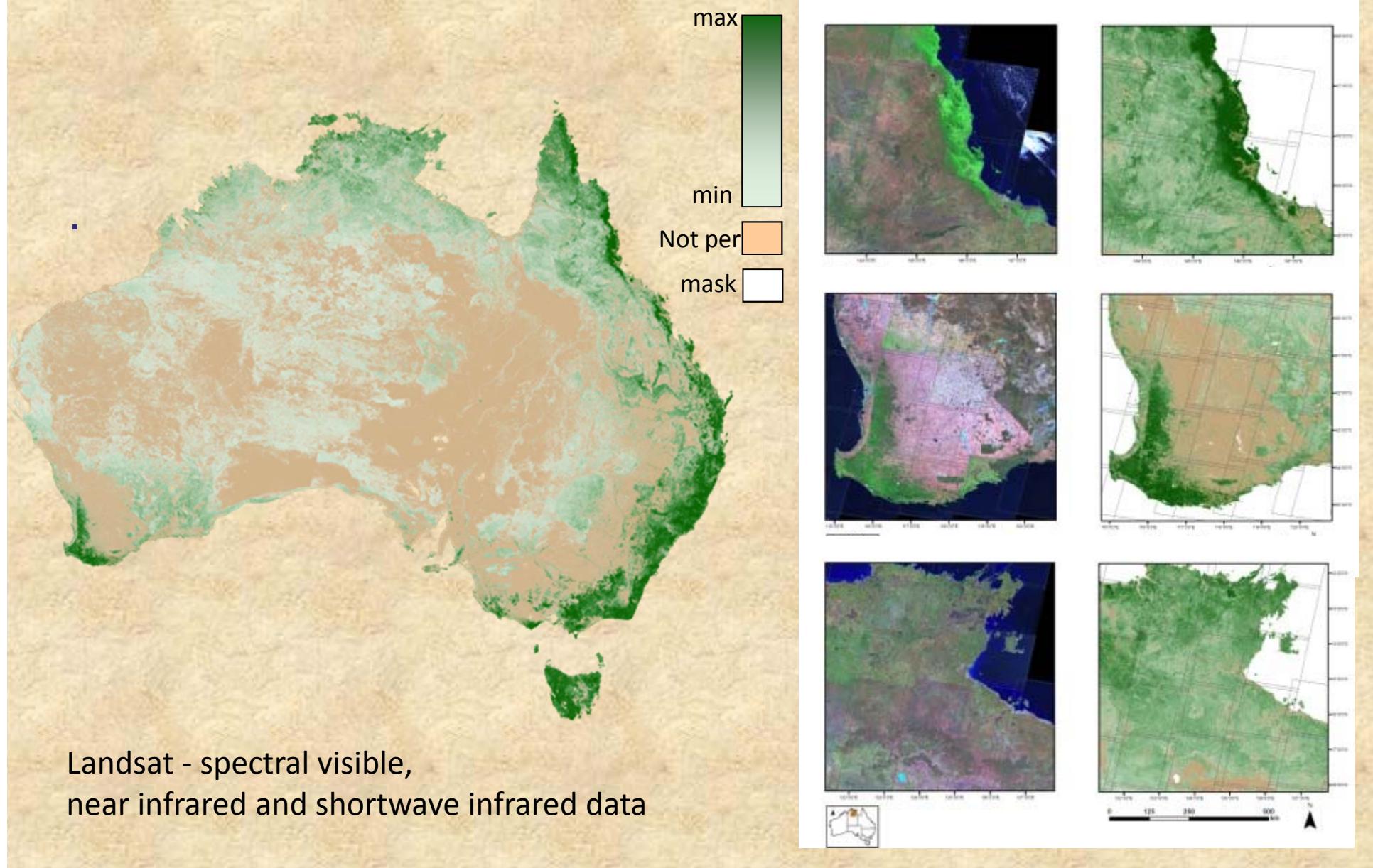


Above Ground Biomass, 50 m, 2009 (dry mosaic)

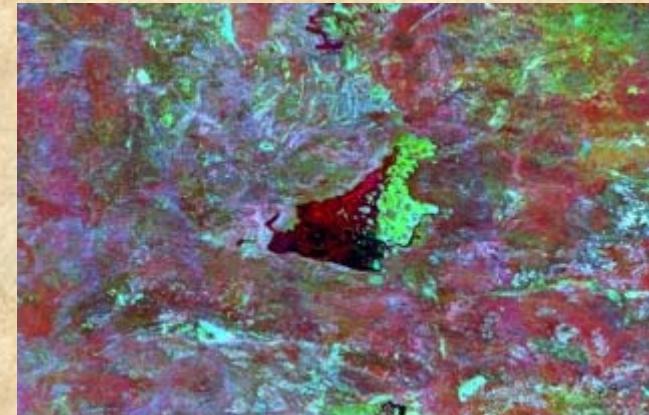
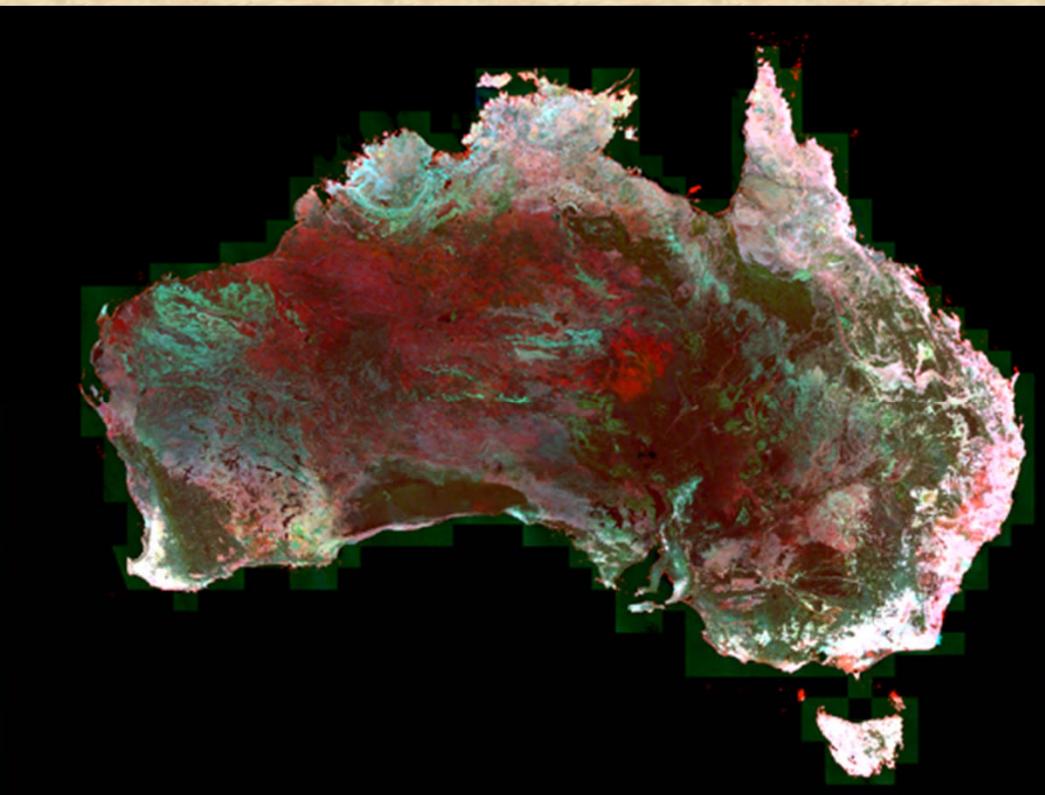
Landsat-derived FPC (25 m)

Persistent Green Fraction, Australia

Landsat-derived

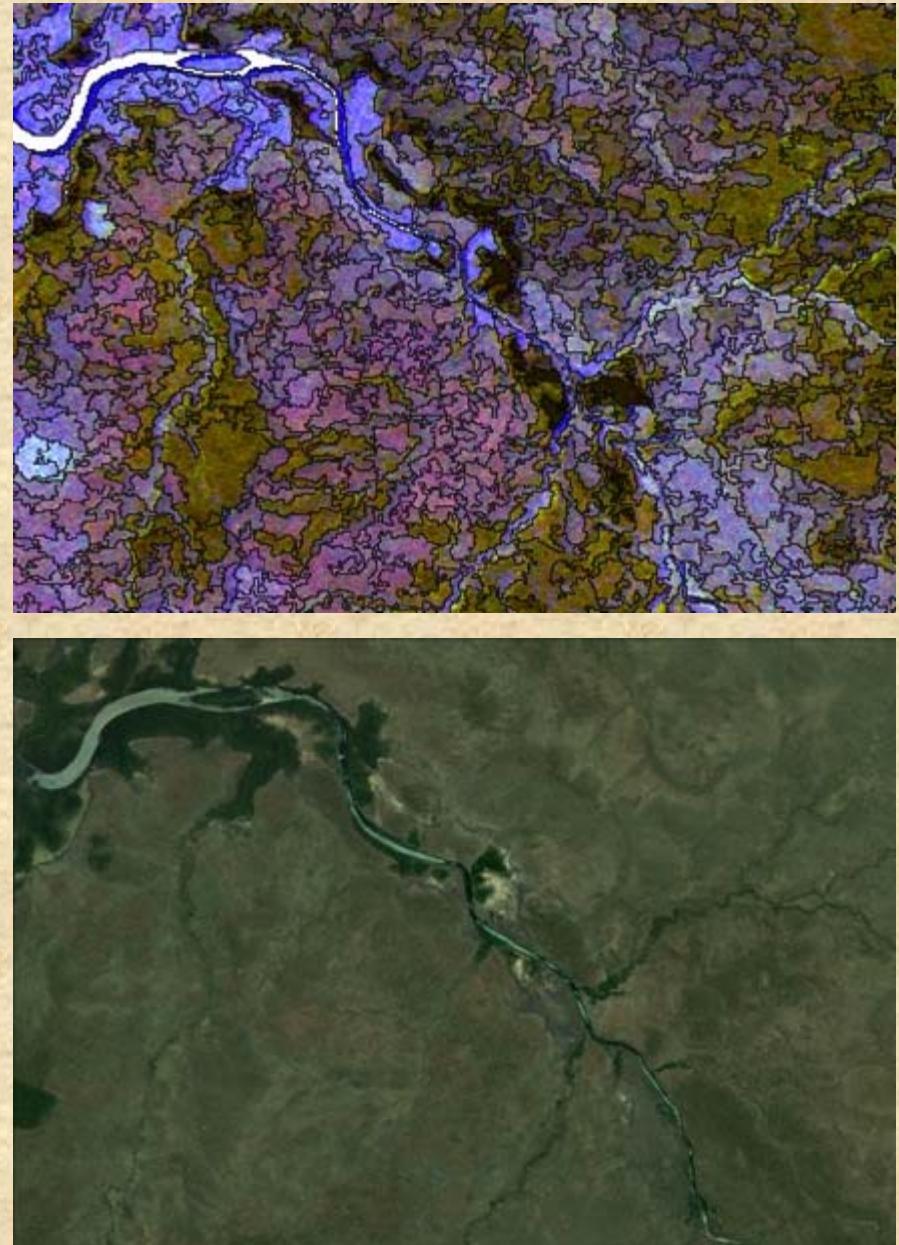
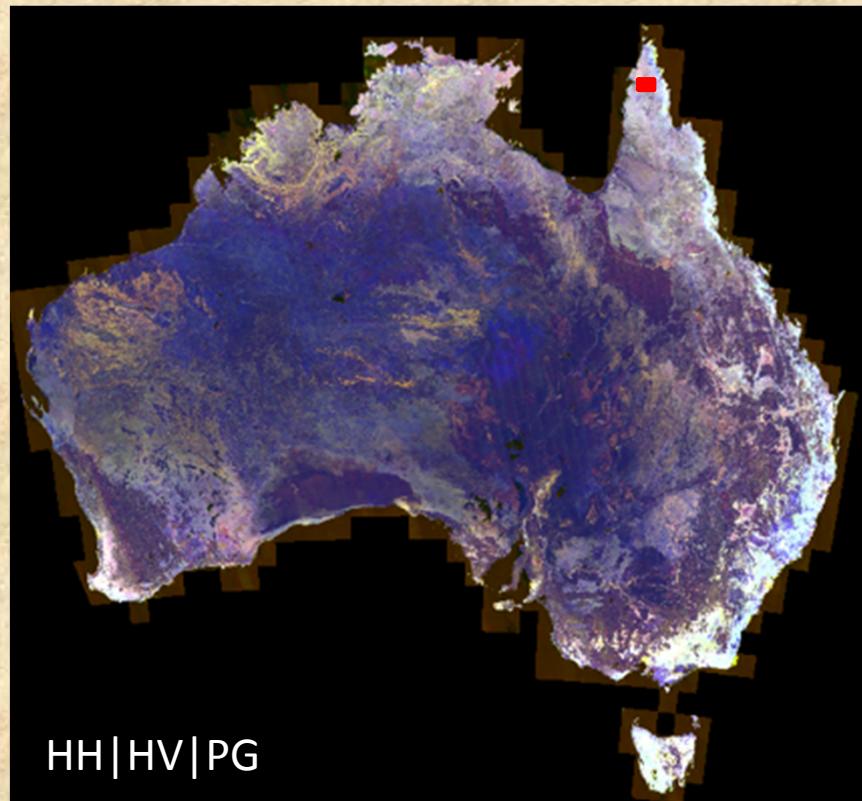


Potential for Ecosystem Classification

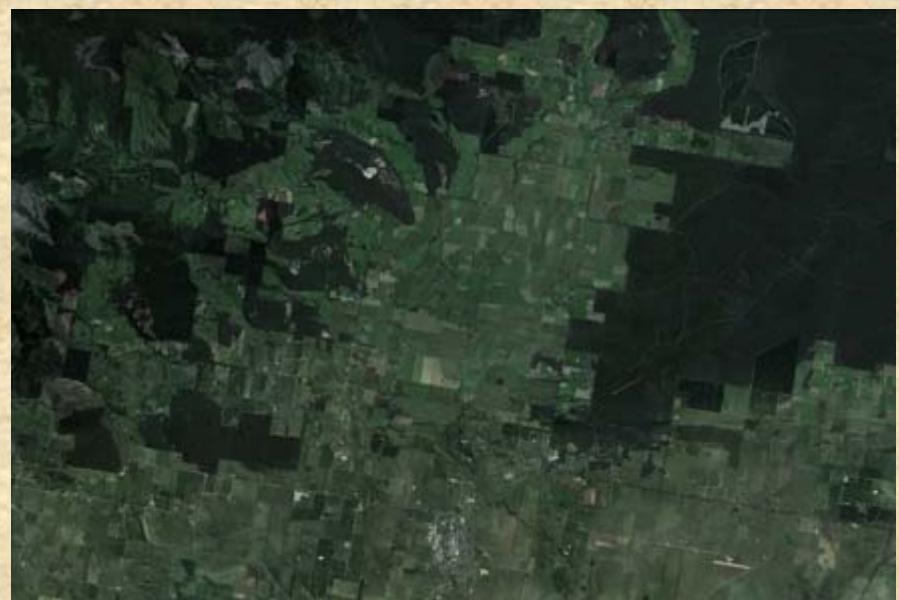
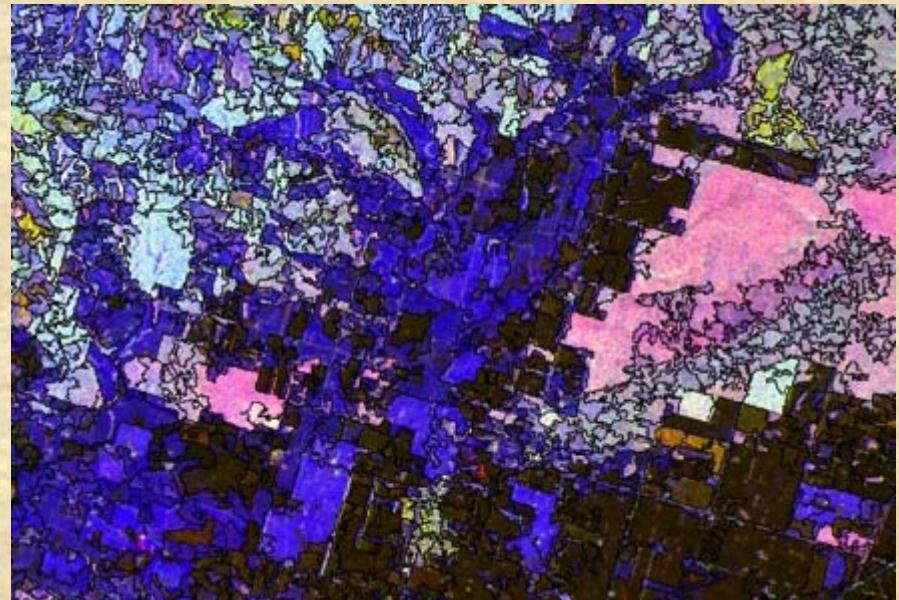
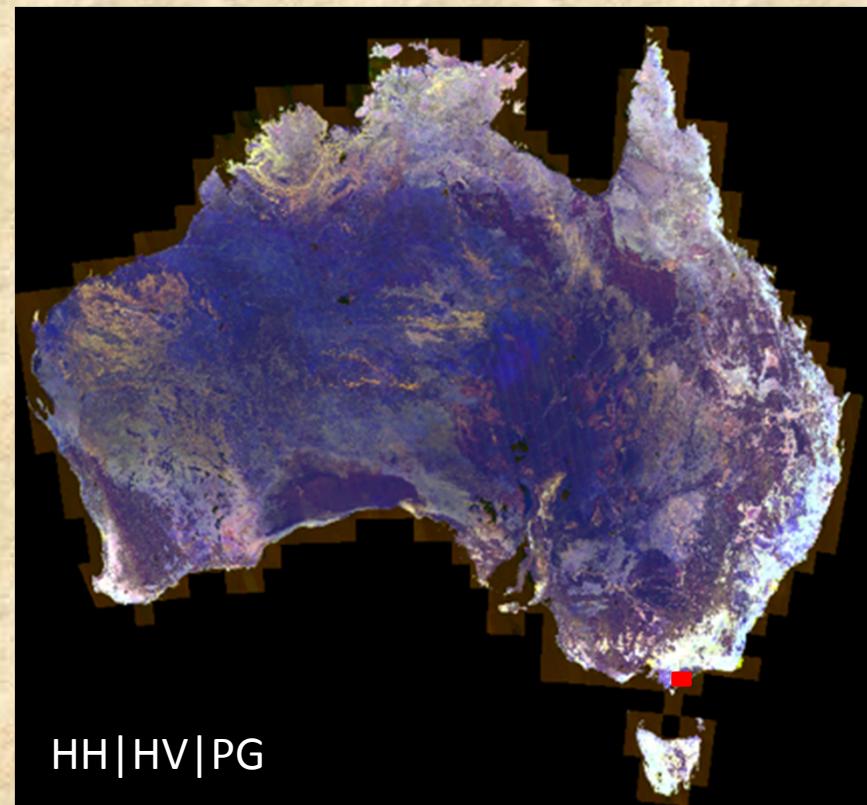


National Segmentation

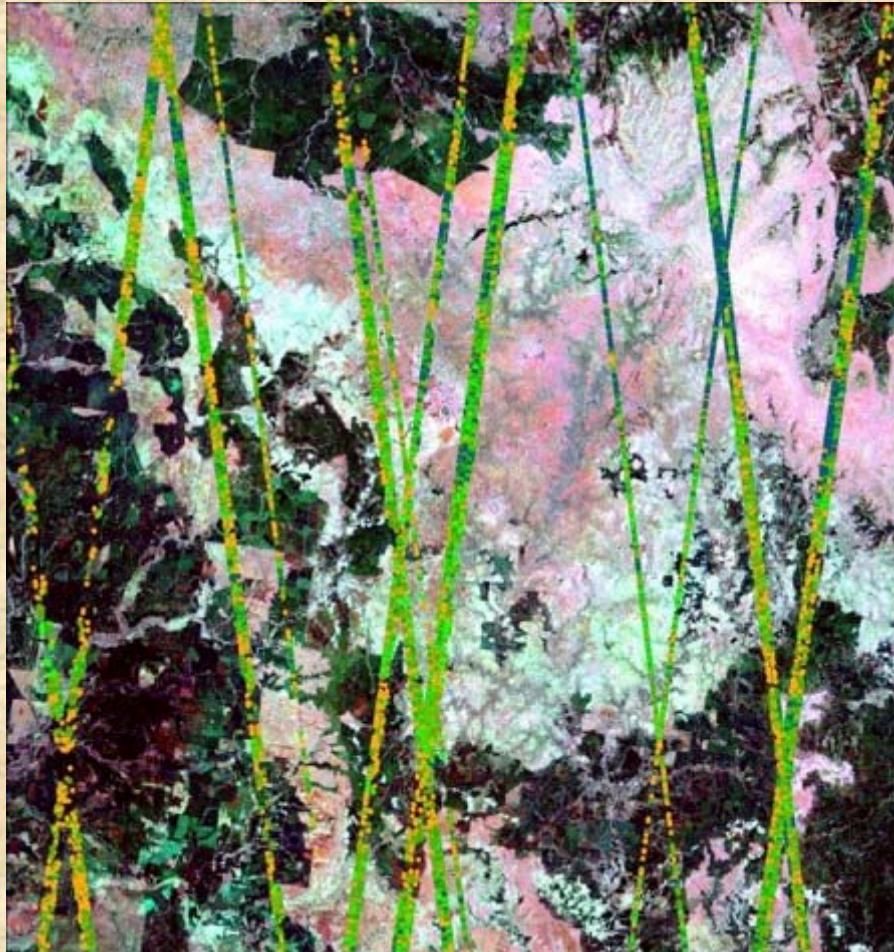
Northern Qld



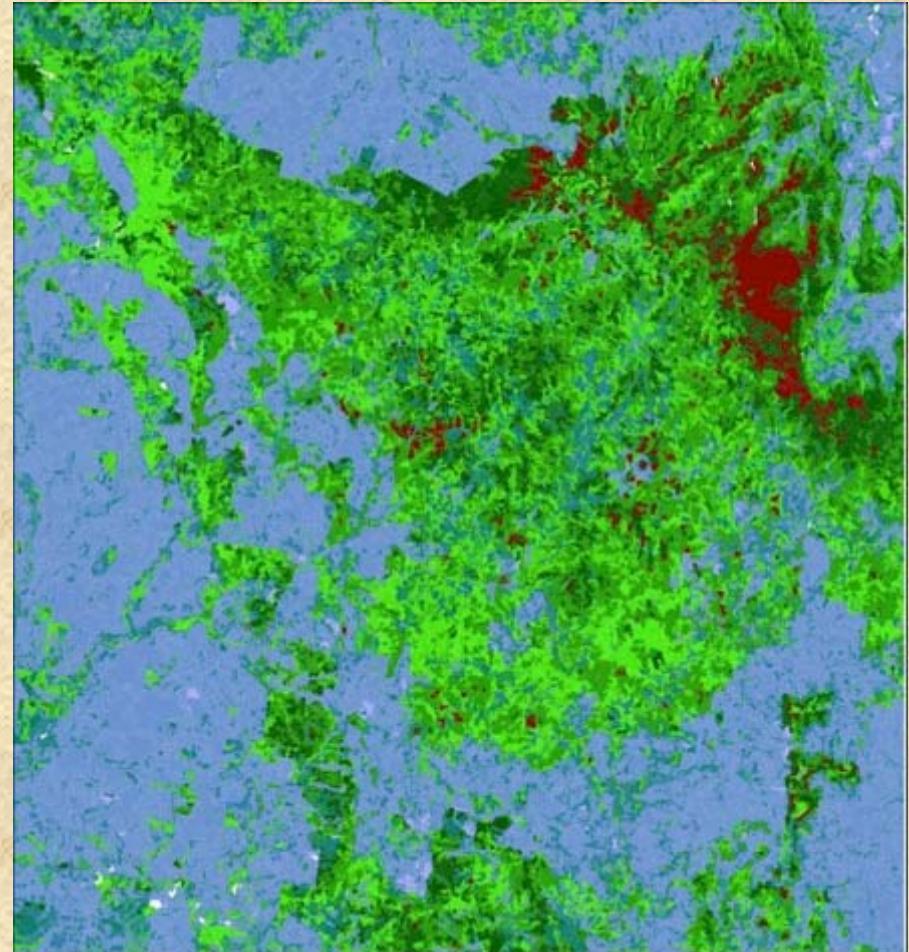
National Segmentation Southern Vic



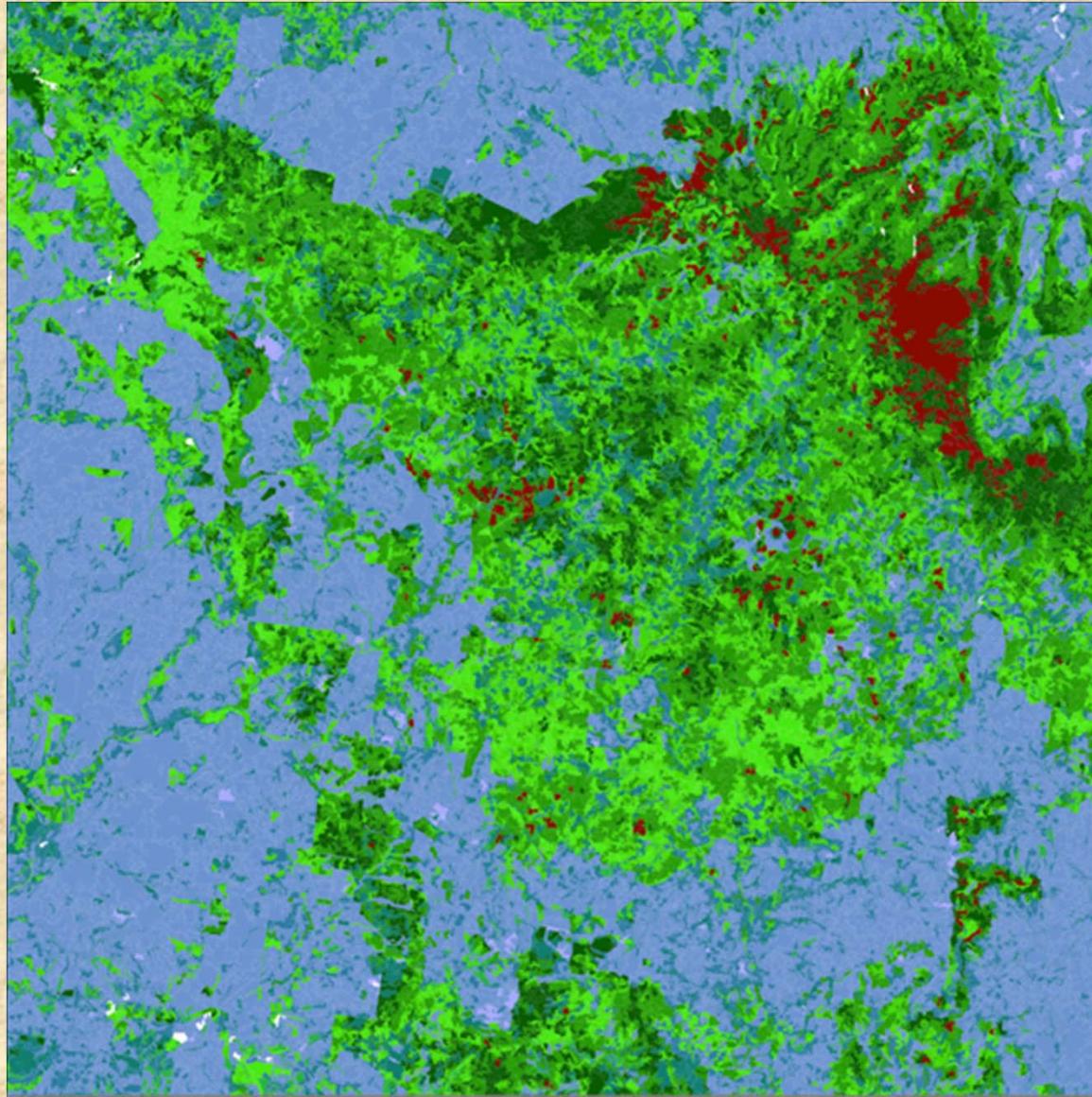
Forest Structure



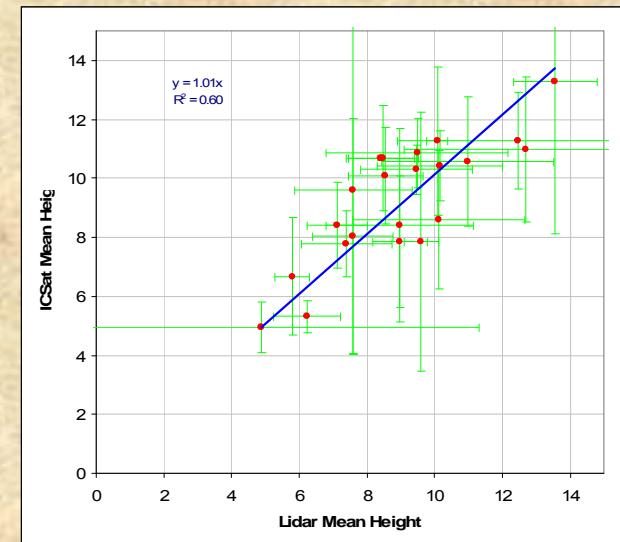
ICESat GLAS/
Segmentation of L-band and
Landsat FPC



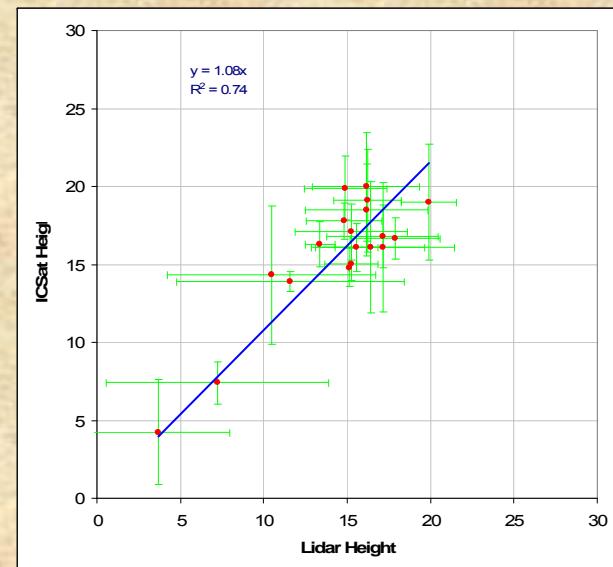
Forest Stand Height



ICESat-derived height map

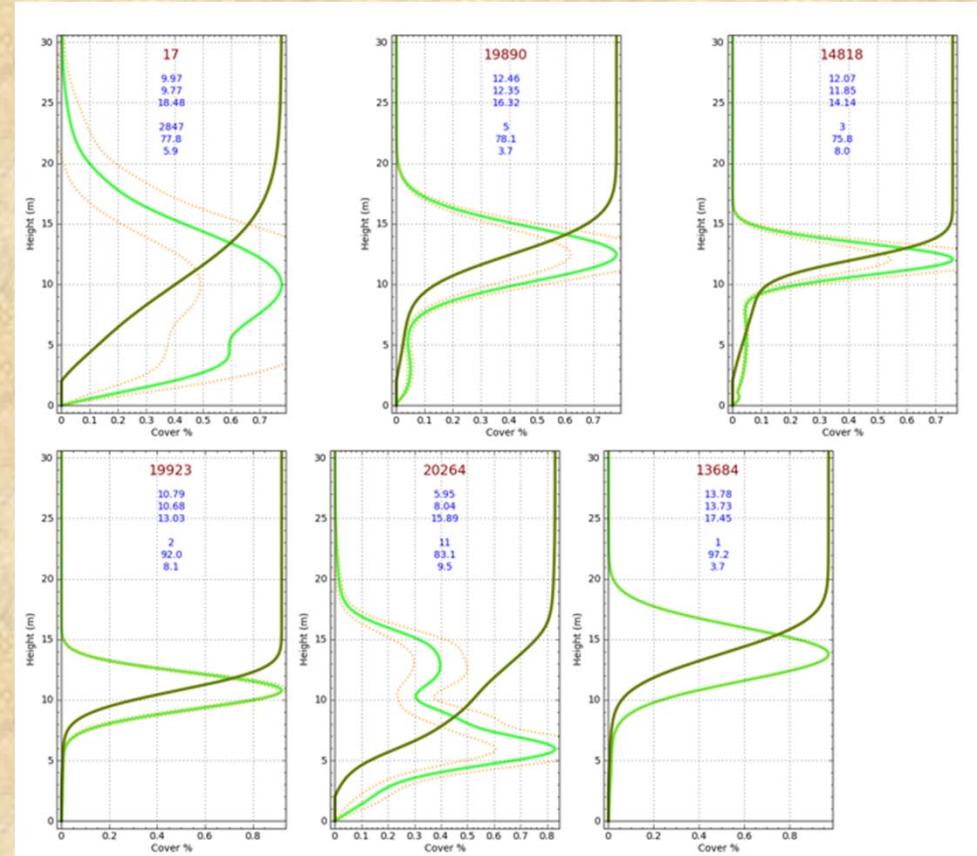
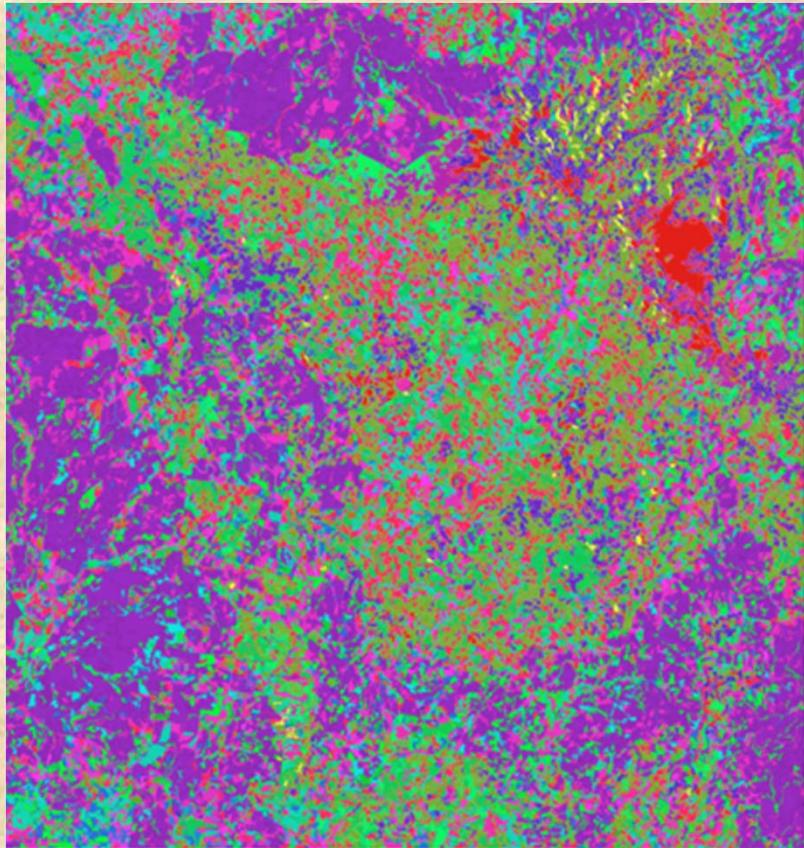


Comparison with ICESAT



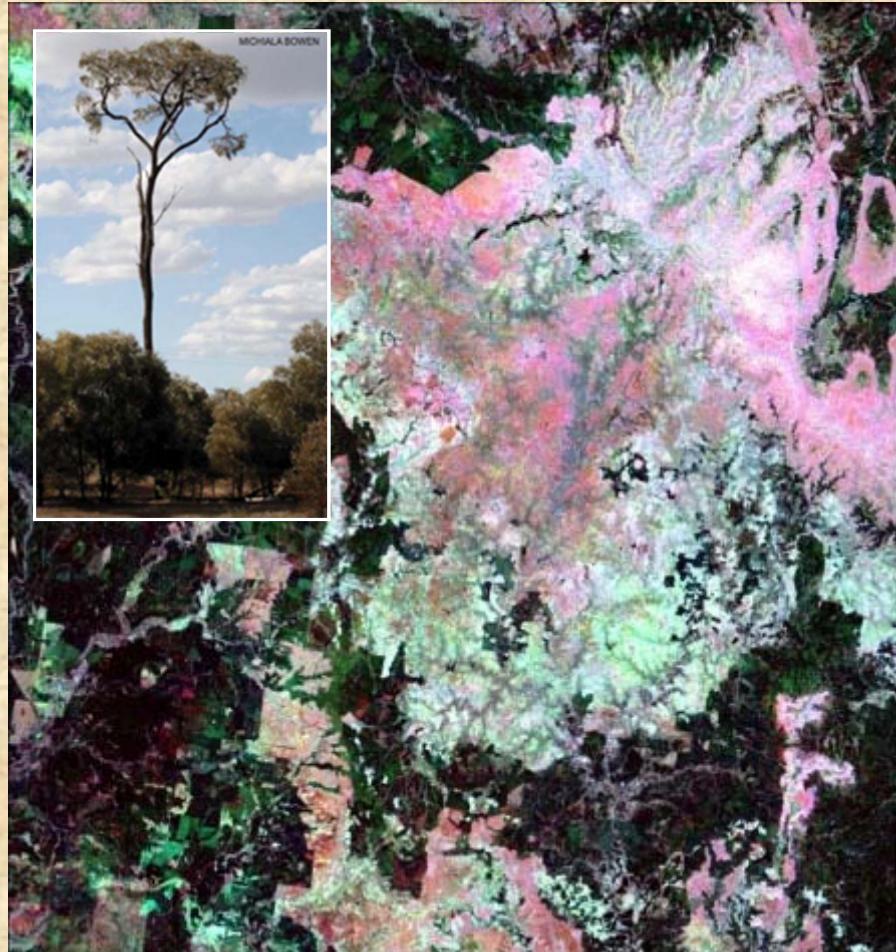
Comparison with airborne LiDAR

Structural Classification based on Landsat FPC, ALOS PALSAR L-band HH and HV and ICESat.



- Segmentation based on FPC and L-band HH/HV (40 classes)
- Similar vertical vegetation profiles for each class (e.g., 17)

Forest Growth Stage Mapping



Differentiation of early regrowth
and remnant forest

Landsat FPC and ALOS PALSAR
L-band HH and HV (RGB)

Composites of Landsat FPC, L-band HH and HV



Early Regrowth

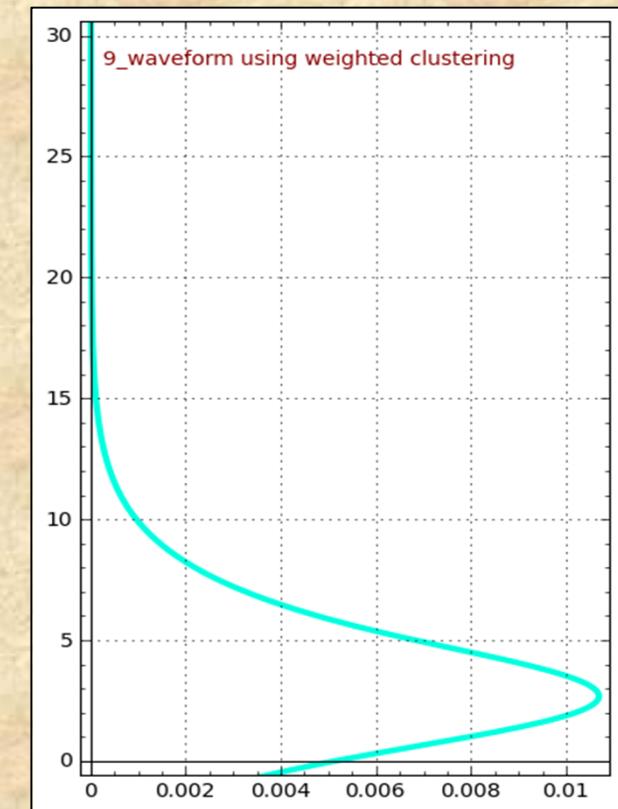


Recovery from fire

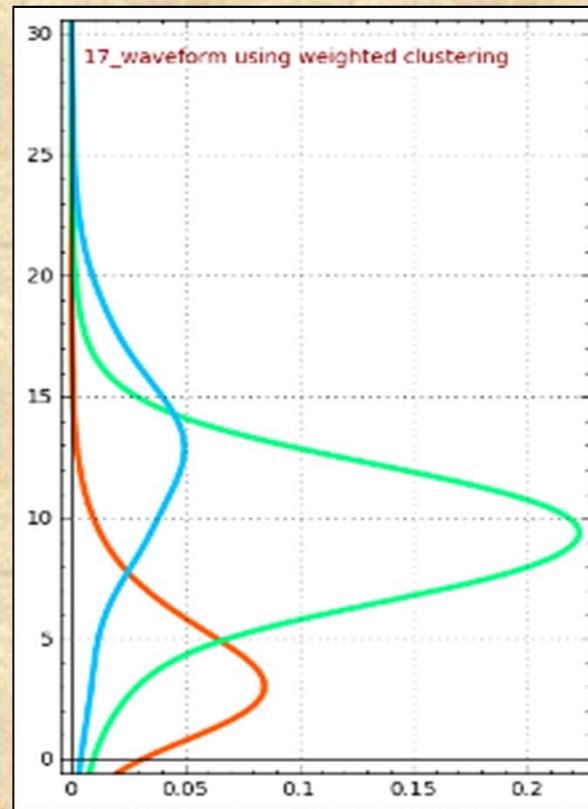


Mature pine

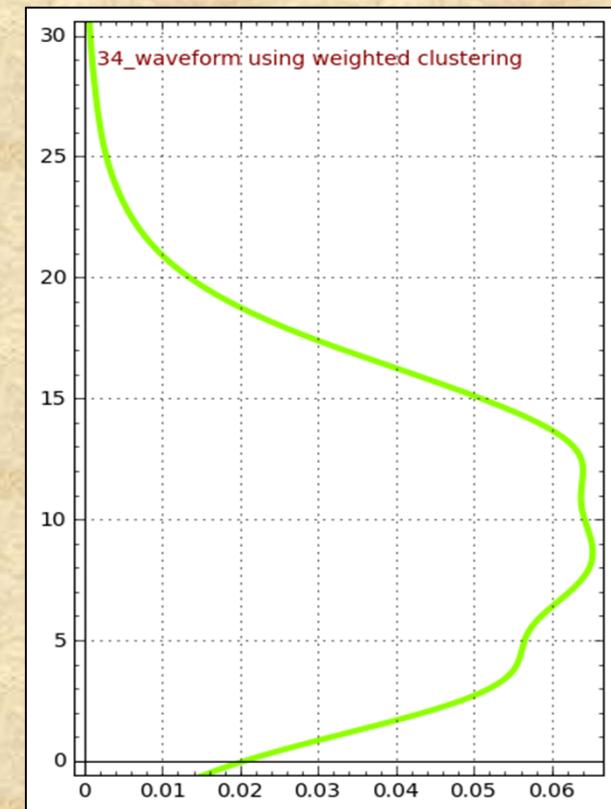
ICESAT Profiles, Injune



Early Regrowth

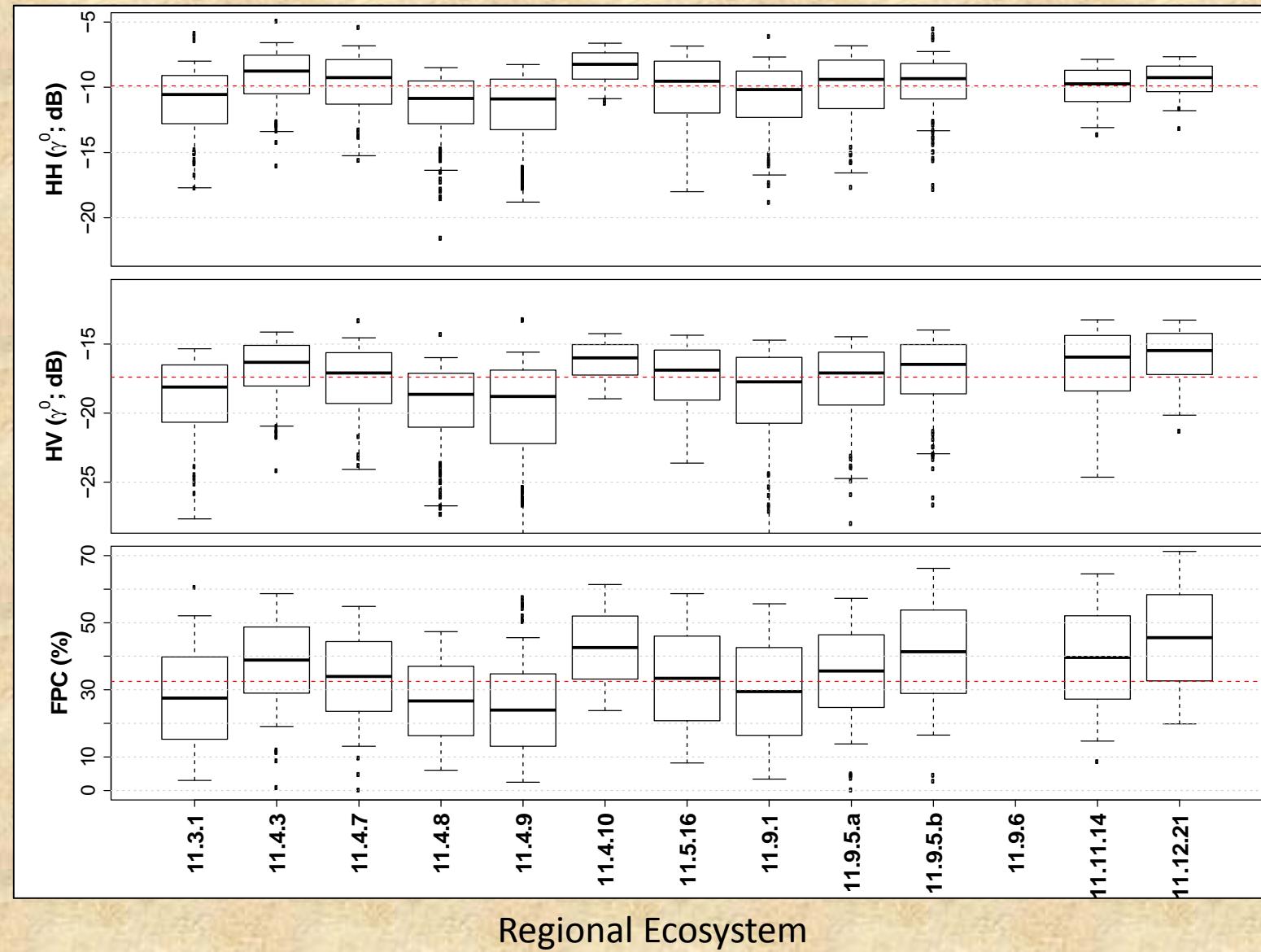


Recovery from fire

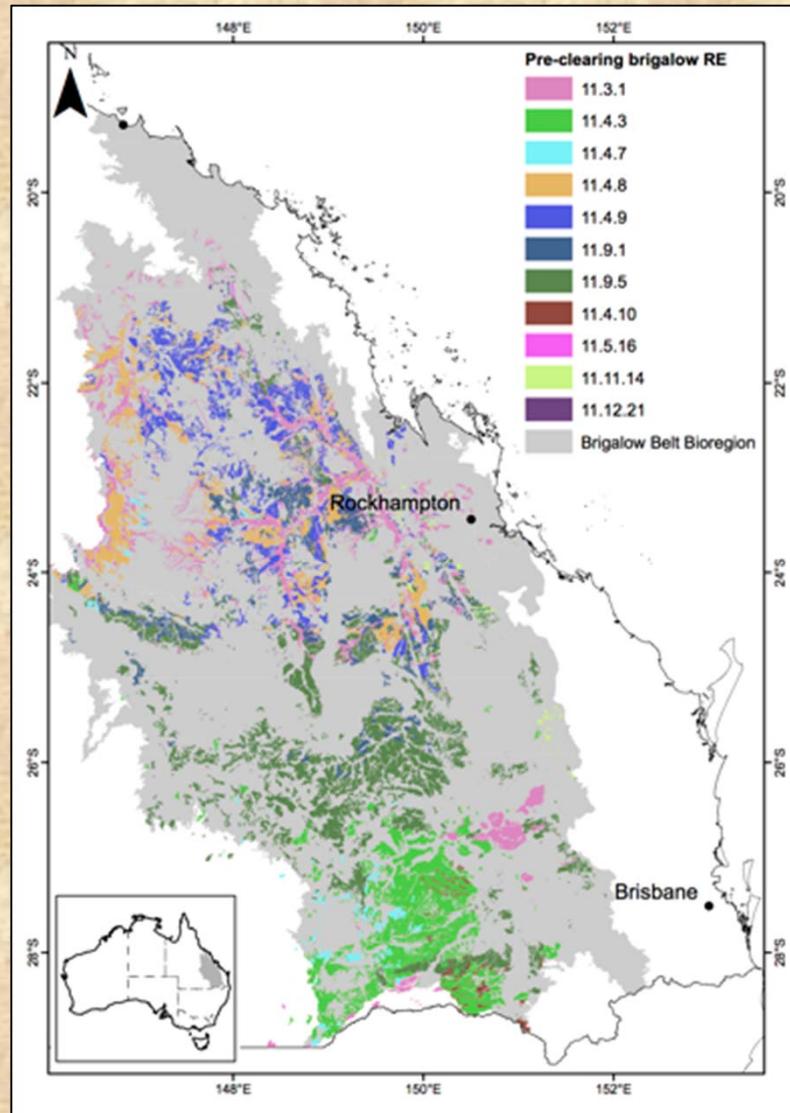


Mature pine

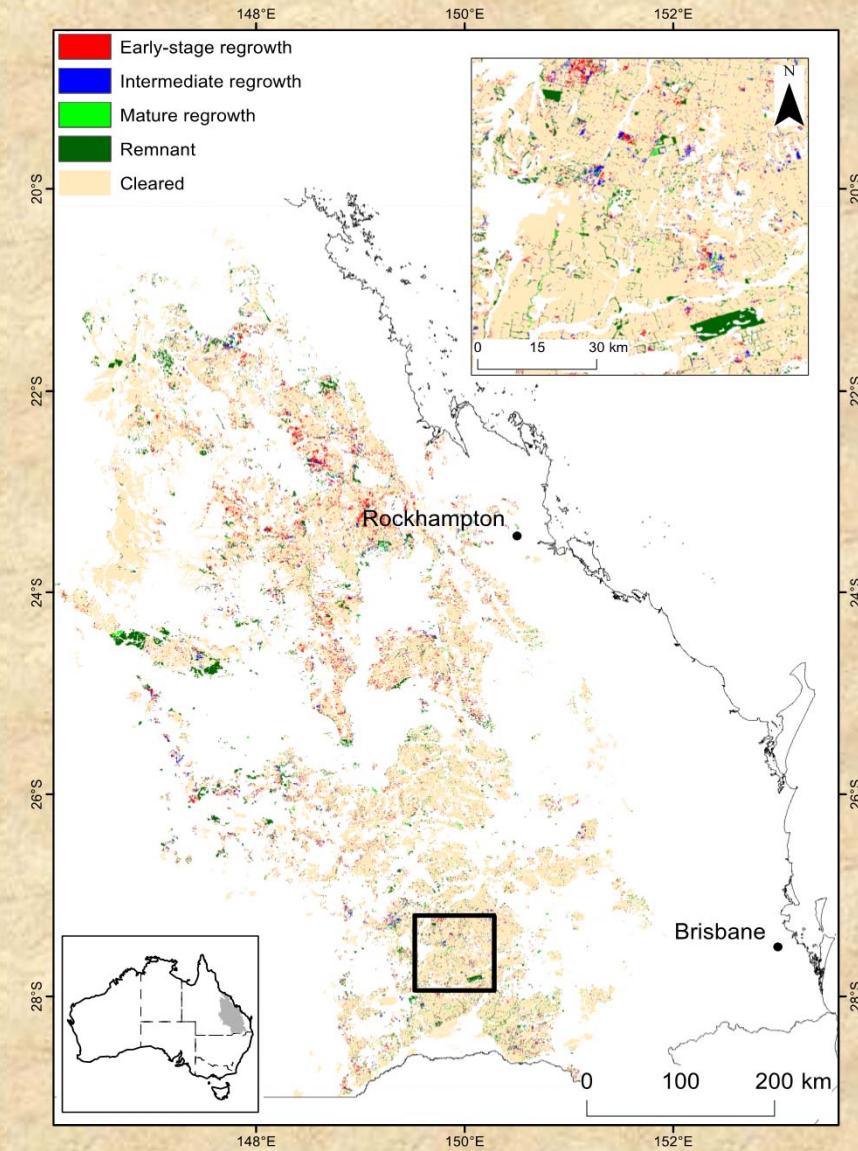
Characteristics of Remnant (undisturbed forest): Different Regional Ecosystems - Brigalow Belt Bioregion



Integration of ALOS PALSAR and Landsat-derived FPC Forest Growth Stage: Brigalow Belt Bioregion

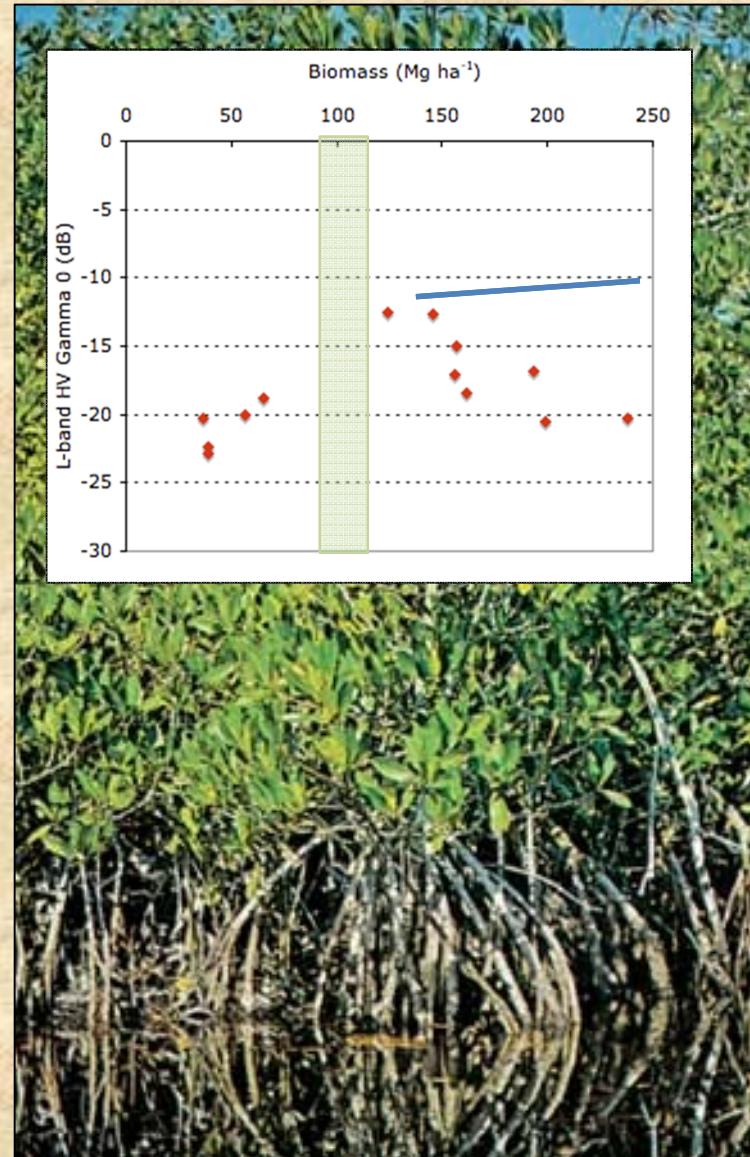


Regional Ecosystem Mapping



Growth stage map

Approach to classifying mangroves



- Define extent of mangroves
 - Existing data layers
 - Landsat FPC
 - Direct classification based on ALOS
- Separate 'low' from 'high' mangroves
 - SRTM, Tandem-X
 - Definition of height locally variable (e.g., 10 m)
- Separate high mangroves with/without prop root systems
- Assign all remaining objects to 'low mangroves'
- Assign biomass classes (e.g., using relationships with L-band HV; upward & downward trends)

Approach to Biomass Estimation

- ALOS PALSAR 25 m mosaics
- Integration with Landsat-derived Persistent Green Cover
 - Based on high density time-series of Landsat sensor data.
 - Facilitates detection of dead forest stands
- Segmentation using ALOS HH and HV and Landsat-derived Cover
- Extrapolation of vertical vegetation profiles (ICESAT)
- Combinations of all datasets to estimate biomass
 - Approach in development
 - Consideration to different forest types (mangroves, regrowth)
- Calibration/validation achieved through reference to ground-based estimates and LiDAR
 - Spatial maps of uncertainty and variability.
- Temporal ALOS PALSAR mosaics potentially used to refine biomass estimates as well as detecting change.
- Links with MODIS time-series
- Links to biodiversity/structure