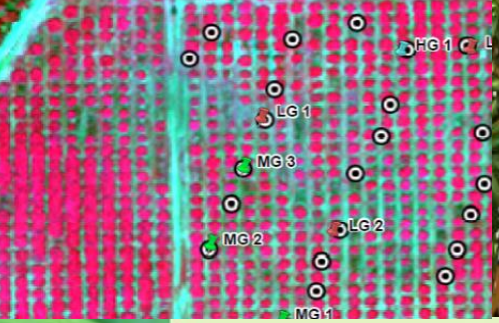
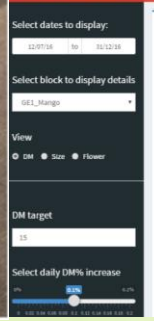






Multiscale monitoring

Mila Bristow NT DPIR Kerry Walsh, CQUni

- Andrew Robson & team, UNE
- James Underwood & team, Uni Syd

AMIA, May 2017

Available technologies:

- Satellite – remote sensing
- Satellite – geo-positioning
- LiDAR
- Machine vision
- Fruit DM assessment
- Cloud computing

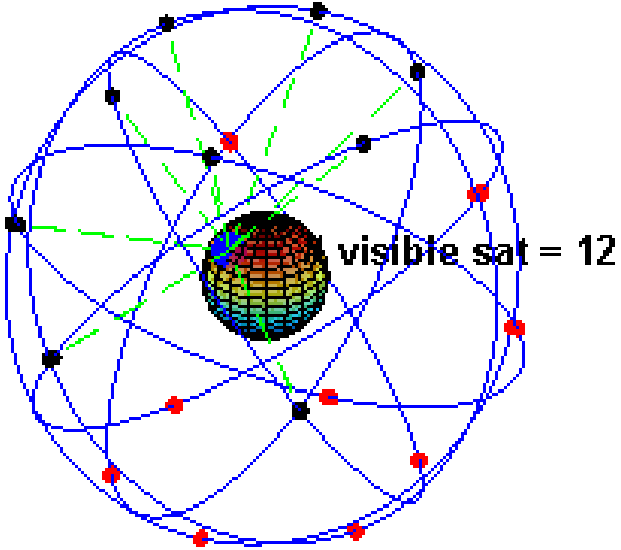
→ Improved farm management ?
→ Automated activity ?

Satellite imaging - UNE

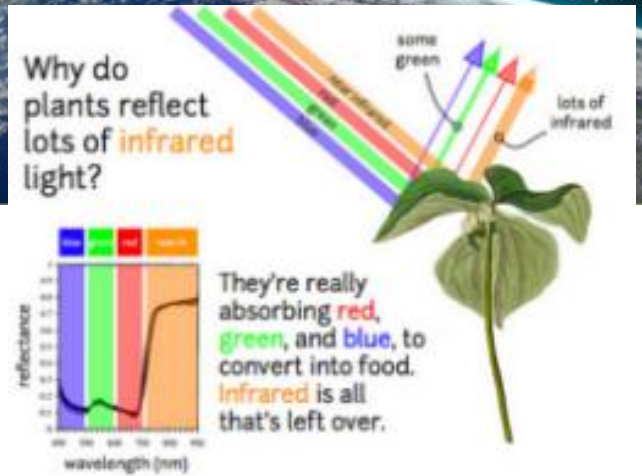
- used in yield monitoring of sugar cane

une
University of New England

GNSS
Global coverage by 20-30 medium Earth orbit satellites
Orbital inclination sof >50° and orbit time of ca 12 h at 20,000 km



http://en.wikipedia.org/wiki/Global_Positioning_System

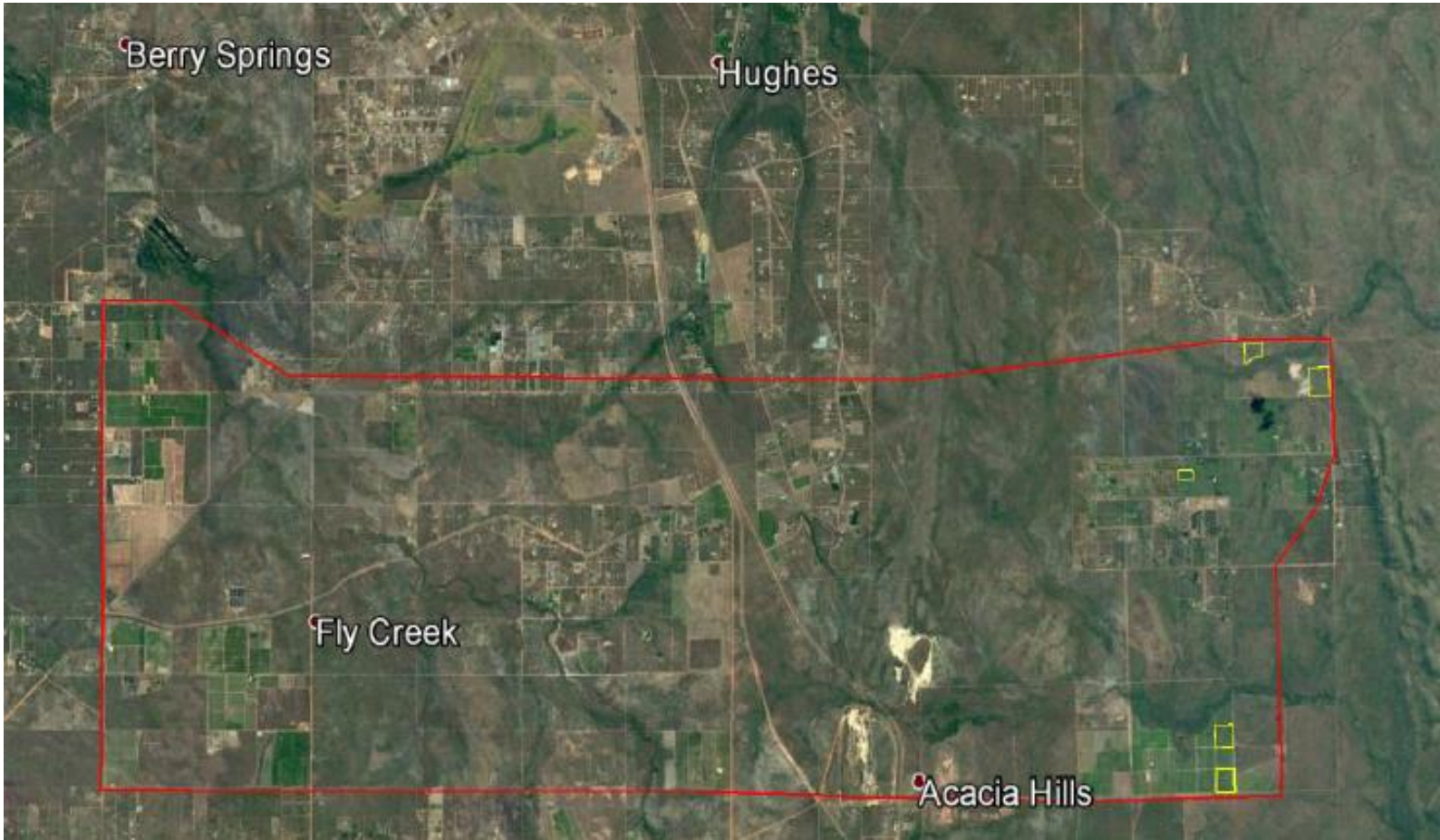


30 cm resolution
18 bands
1 d revisit time

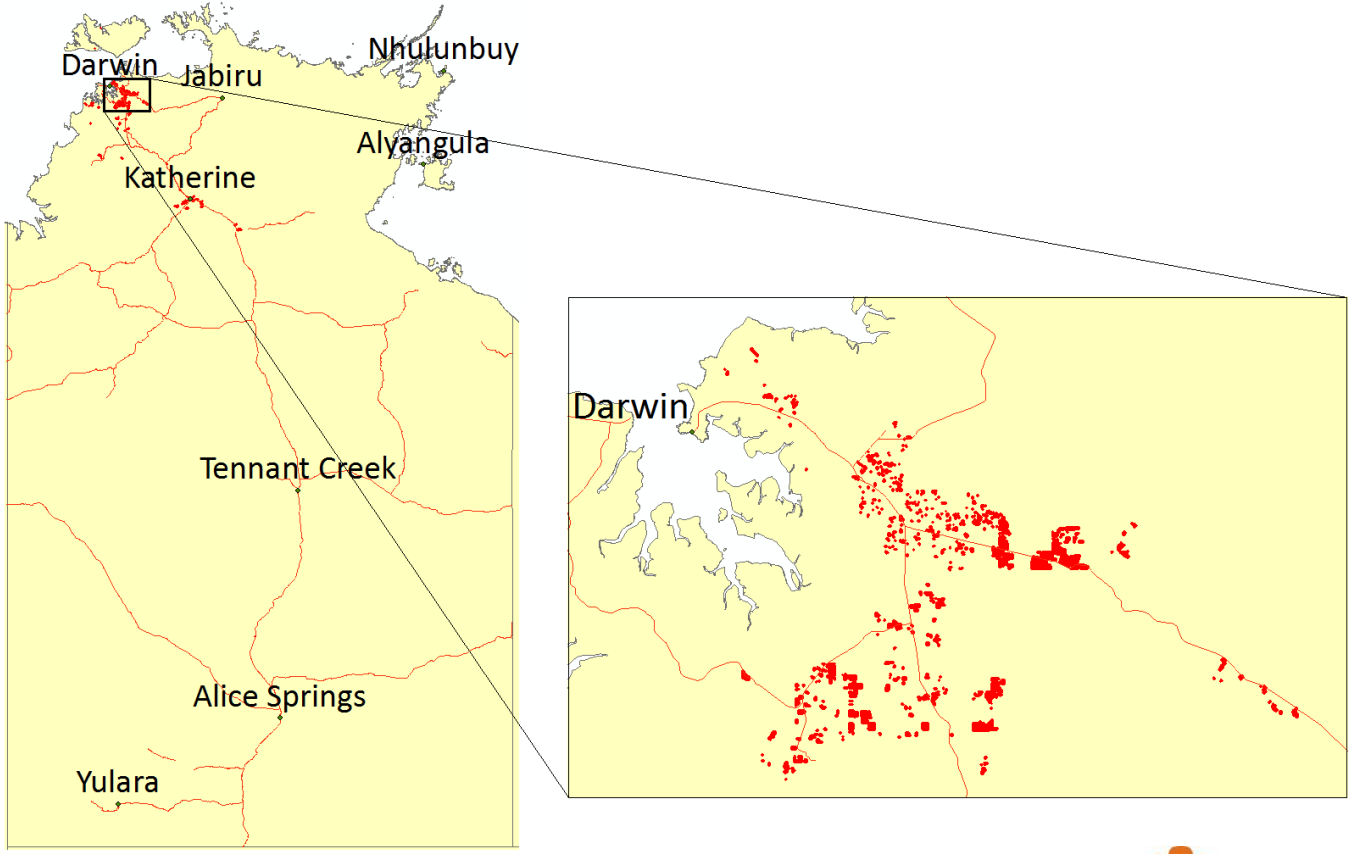
World View 3

Area of ~100 km^2 for approx. $4000.

18 spectral data bands



Digital mapping of NT orchards and preparing growers for new sensor technologies

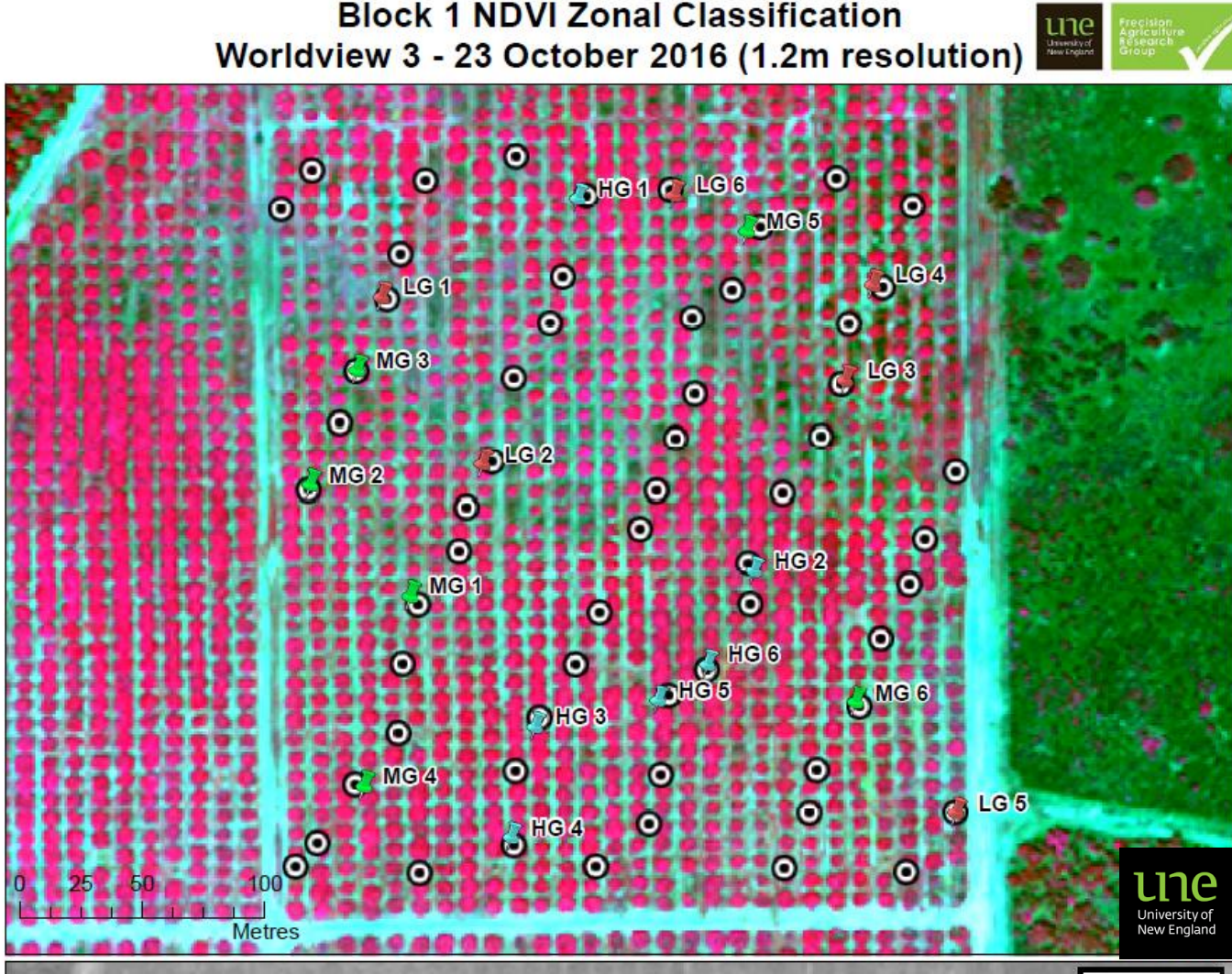


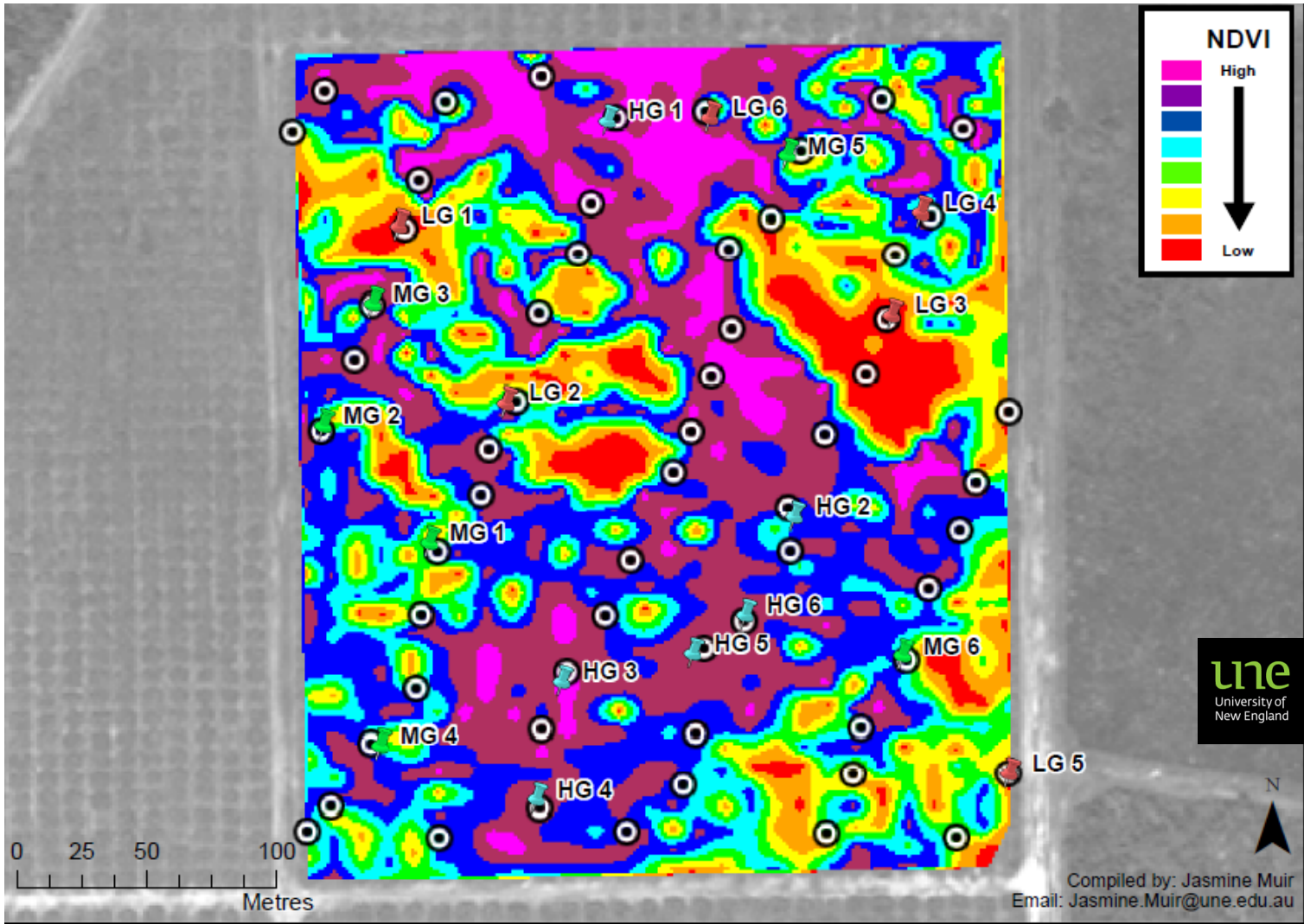
NORTHERN TERRITORY GOVERNMENT

a satellite image of a mango field

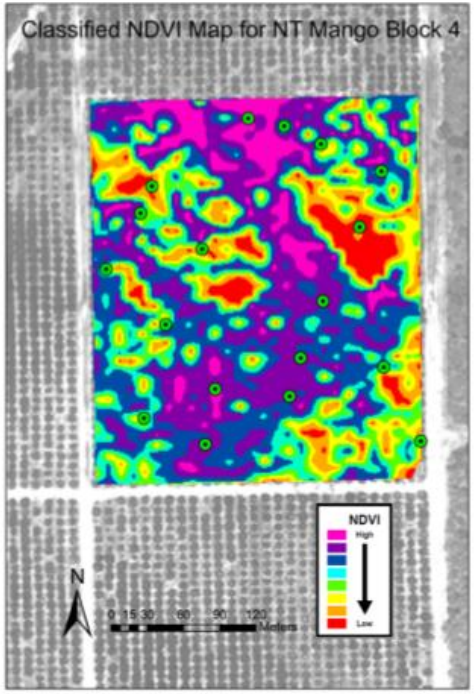
- crown size, tree vigour, tree history

NDVI (vegetation health)




NDVI
High
Low
HG 1
LG 6
MG 5
LG 4
LG 1
MG 3
LG 3
LG 2
MG 2
HG 2
MG 1
HG 6
HG 5
MG 6
HG 3
MG 4
LG 5
HG 4
0
25
50
100
Metres
N
une
University of New England
Compiled by: Jasmine Muir
Email: Jasmine.Muir@une.edu.au

remote sensing: a tool for mangos?

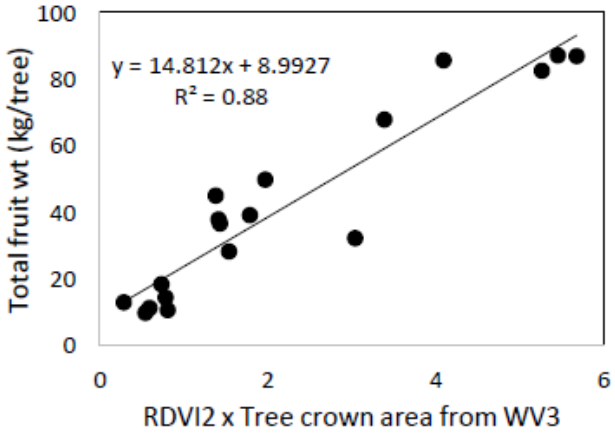


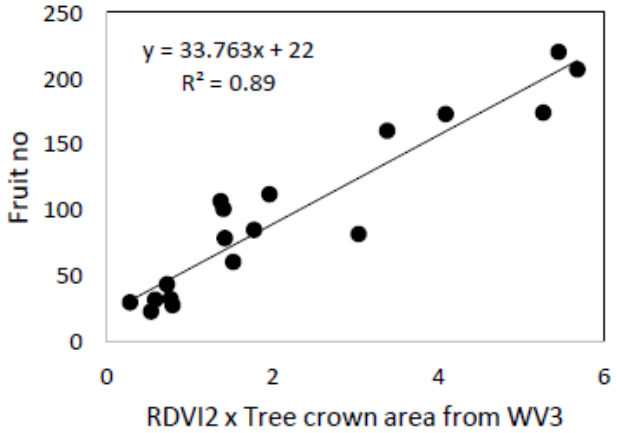
NORTHERN TERRITORY GOVERNMENT

Yield predictions with WVIII

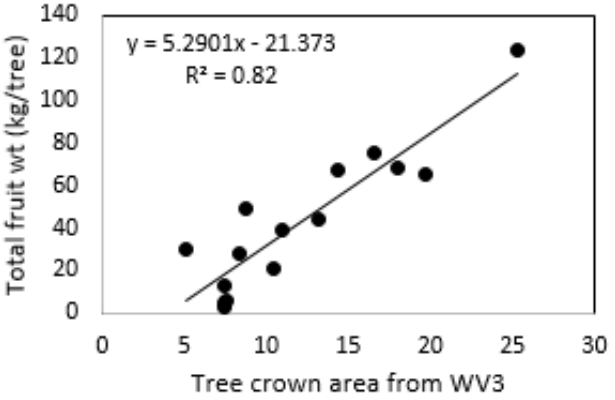
Using NDVI and canopy crown area combined (or by themselves) can relate to yield of individual trees.

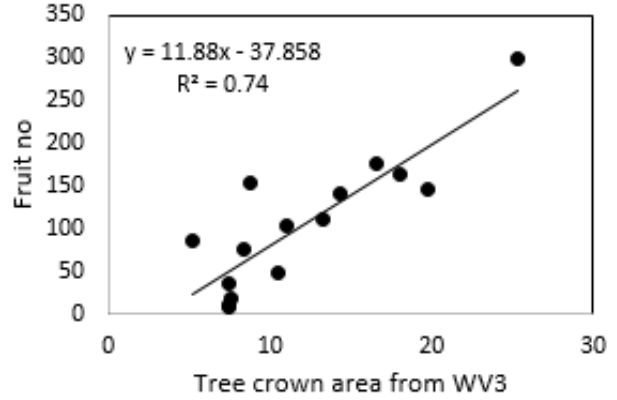
NT MANGO BLOCK 1





QLD MANGO BLOCK 1

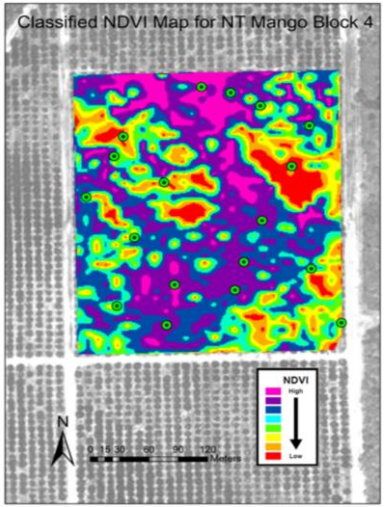


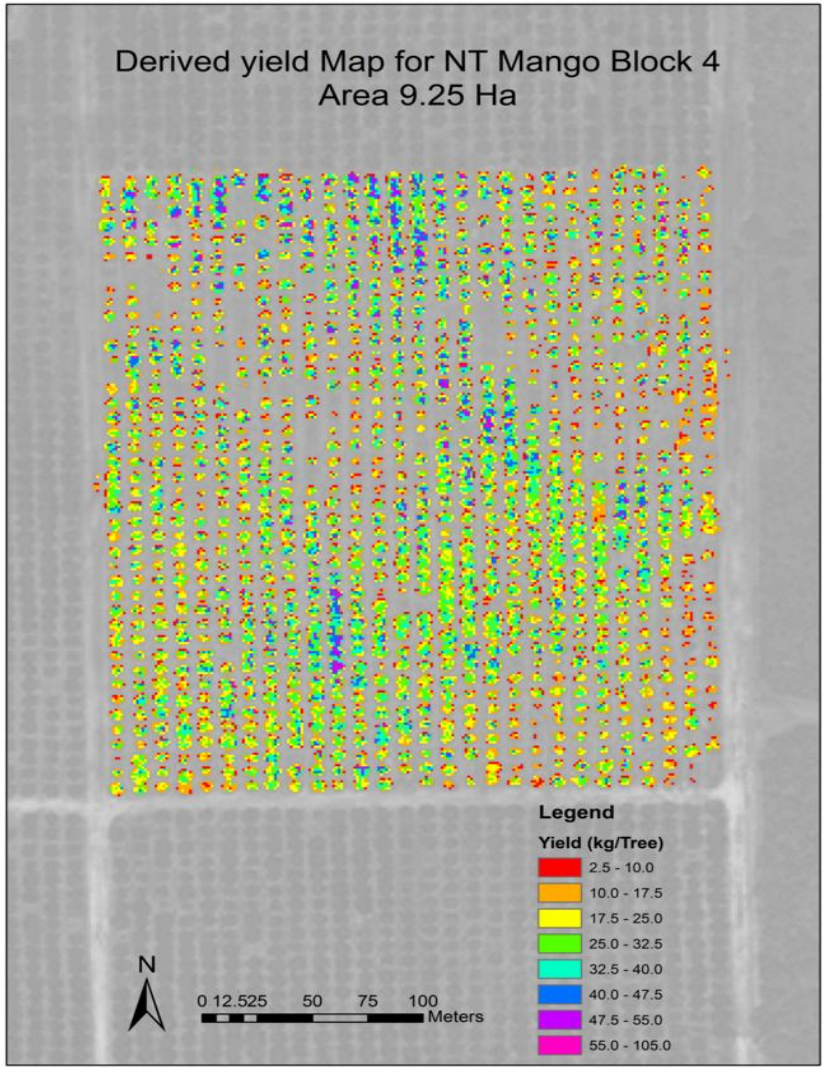


University of New England

NORTHERN TERRITORY GOVERNMENT

remote sensing: a tool for mangos?

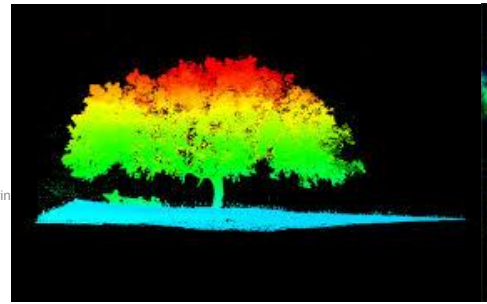


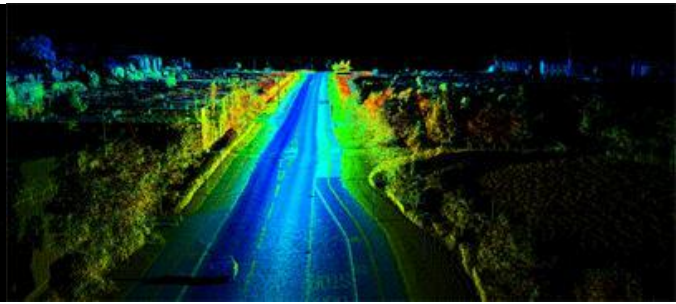


NORTHERN TERRITORY GOVERNMENT

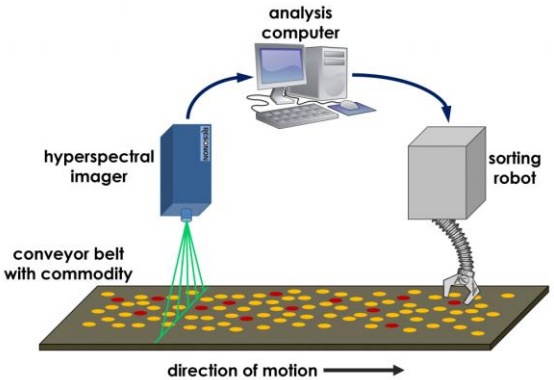
LiDAR

http://www.positionpartners.com.au/news/topcon/topcons-ip-s2-allows-fast-and-accurate-precision-mapping-and-surveyin





Machine vision

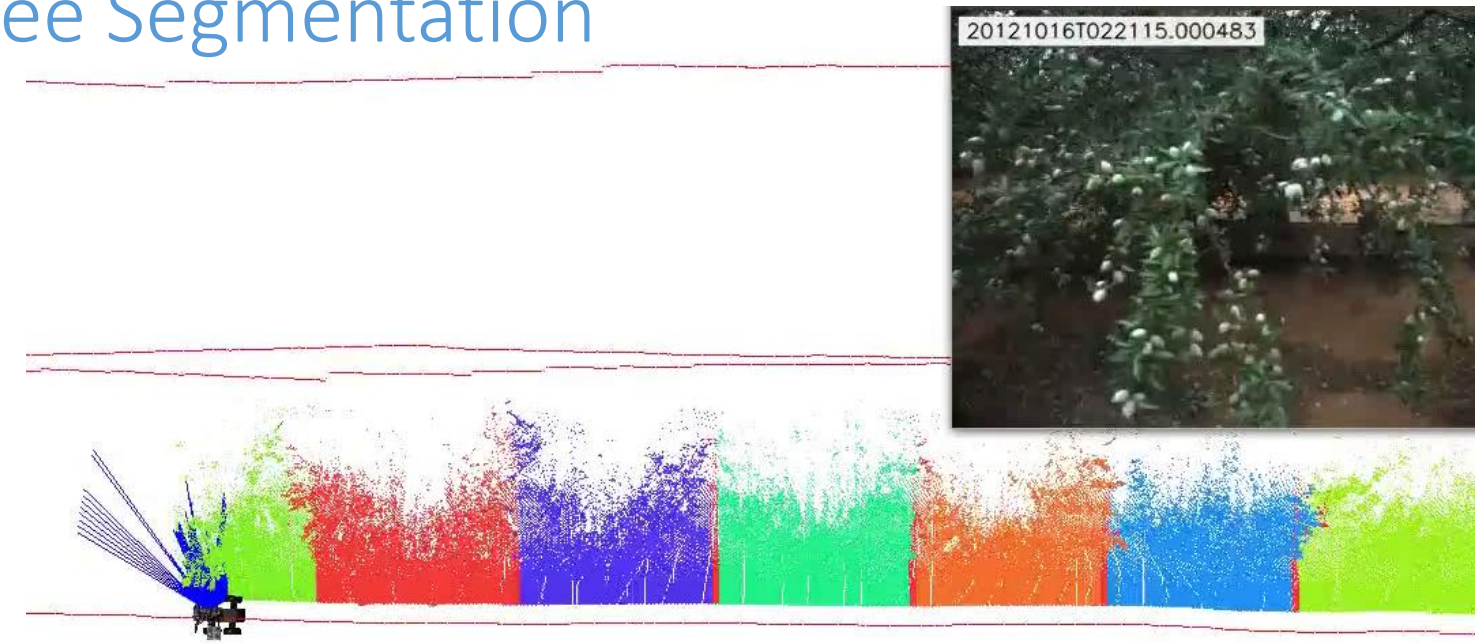


Intelligent Information Systems for Tree Crops

James Underwood

The Australian Centre for Field Robotics

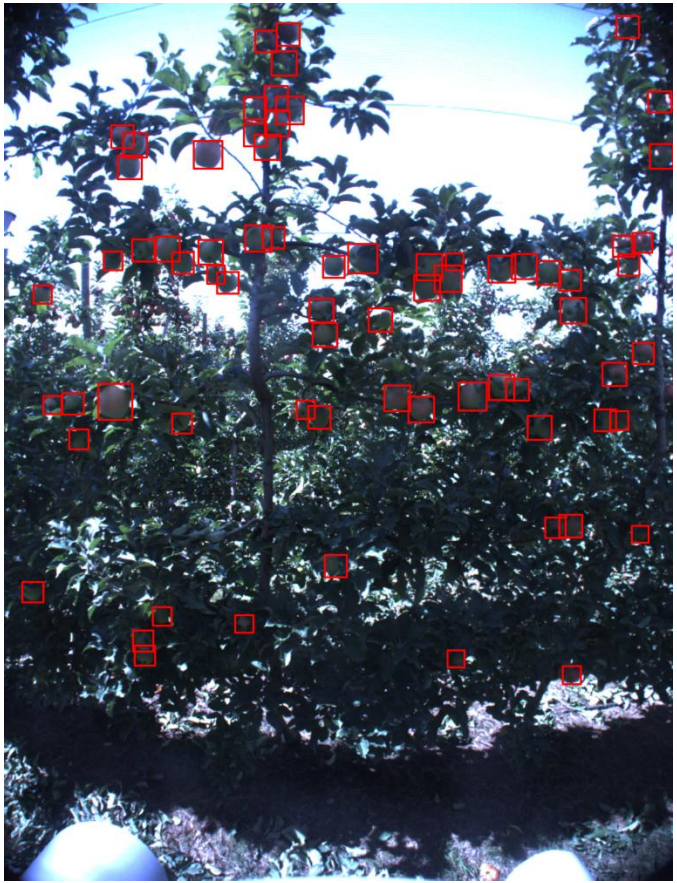
Tree Segmentation



Fruit Detection

Almonds

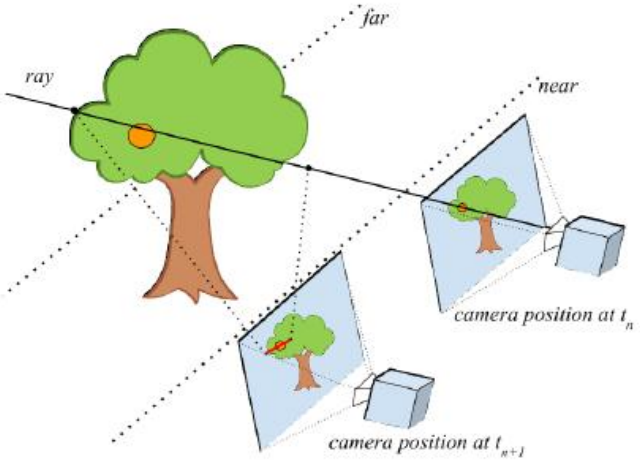
Mangos



Apples

THE UNIVERSITY OF SYDNEY

Locating every piece of fruit

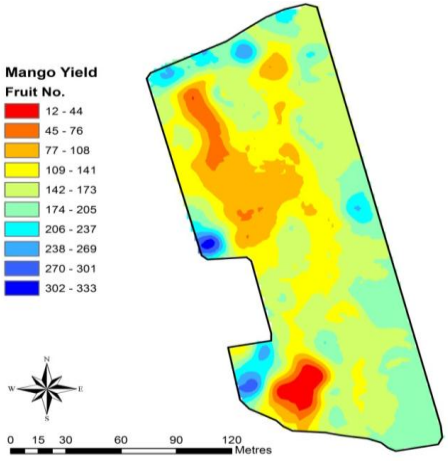


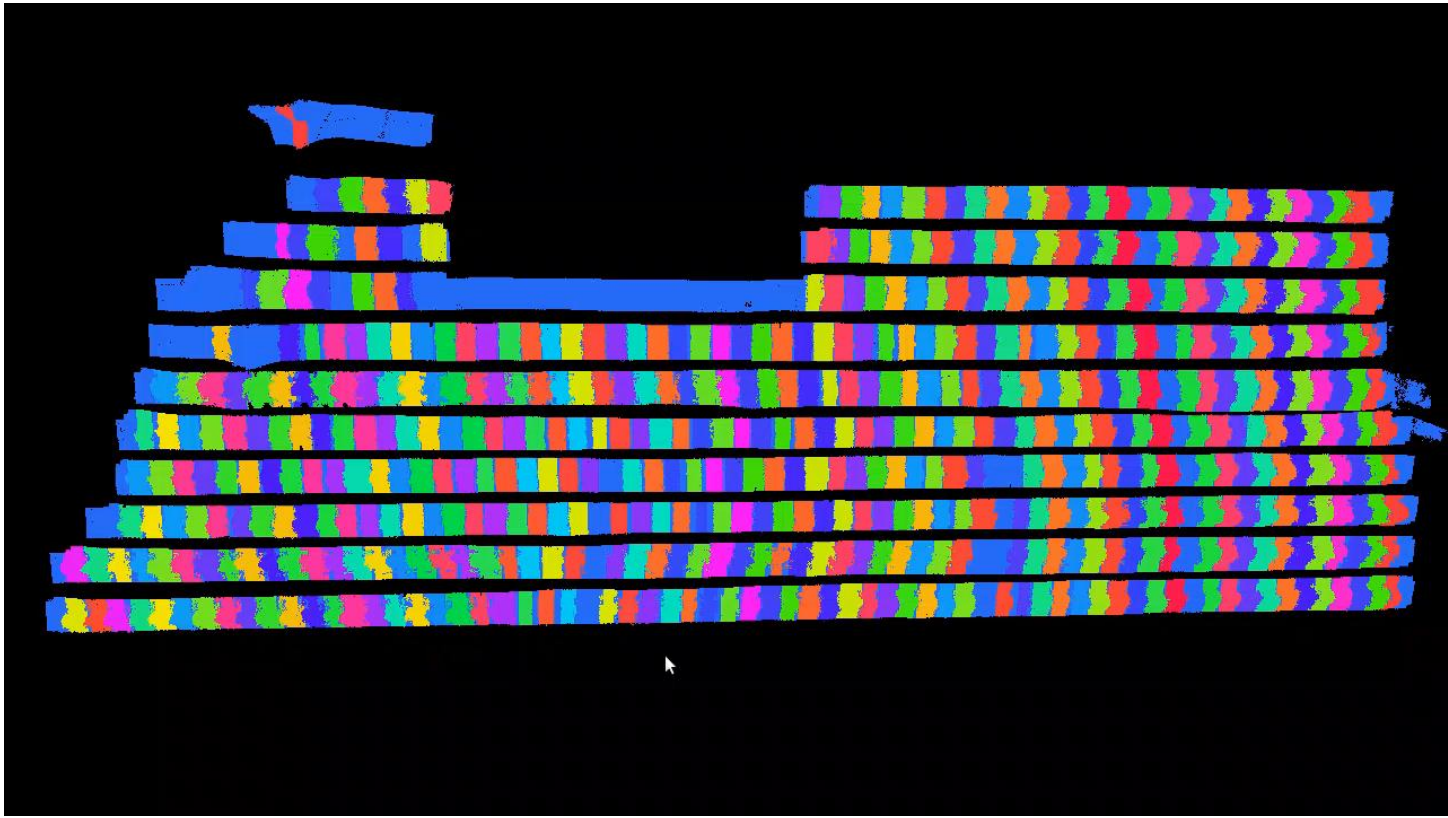
THE UNIVERSITY OF SYDNEY

This project is supported by the Australian Centre for Field Robotics at The University of Sydney with funding from the Australian Government Department of Agriculture and Water Resources as part of its Rural R&D for Profit programme

Horticulture Innovation Australia

Mango Maps





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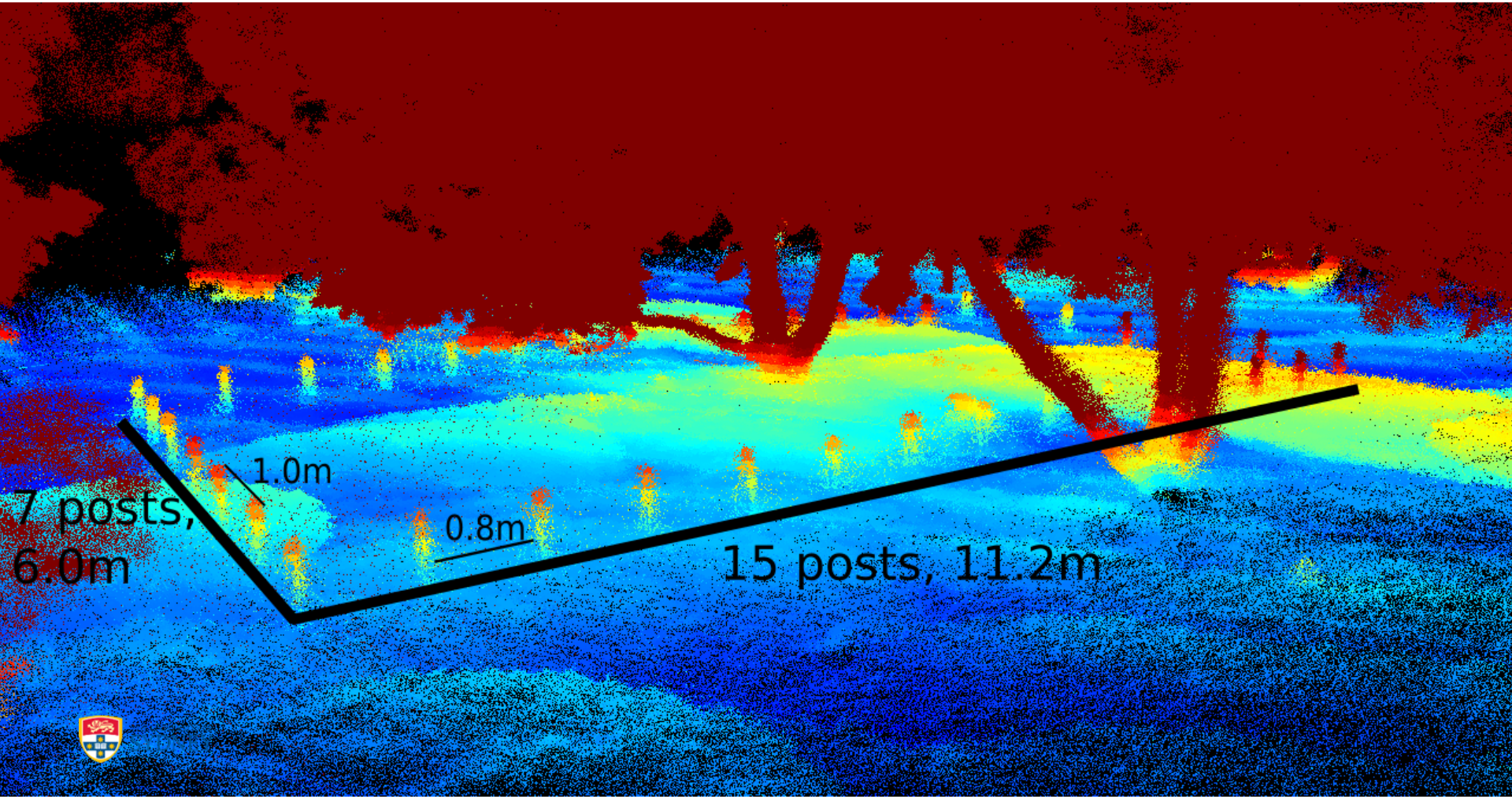
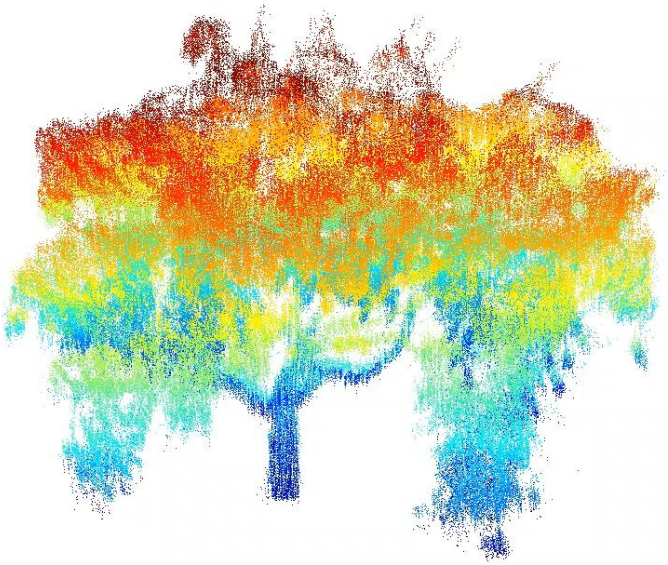
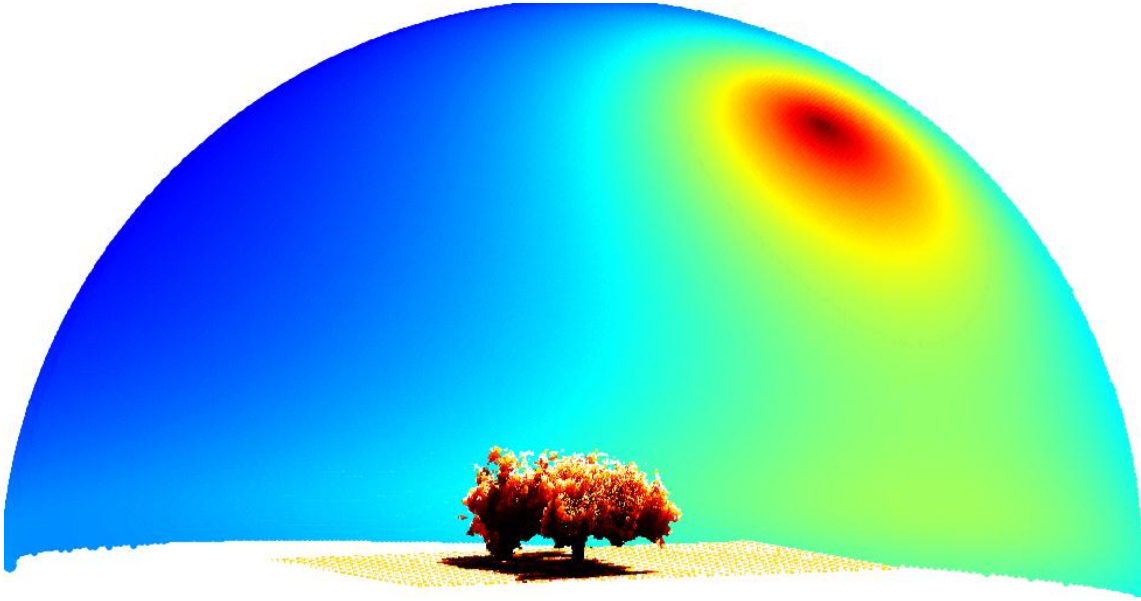

7 posts,
6.0m
1.0m
0.8m
15 posts, 11.2m

3D Light Interception Modelling





Fruit load estimation…

Method	**Estimate** (fruit/block)
Count of every 20th tree :	46,500 (22 trees counts in block of 446 trees) 32,000-57,000 (for 80% confidence require 198 trees sampled)
Satellite UNE	51,085
Machine vision USyd	
Multiview	52,579 (ca. +/- 4,000 2SD)
Dual view	58,468 (ca. +/- 6,000 2SD)
ACTUAL	**56,720**

Information gathering :

- Mapping the orchard environment – allows for autonomous activity
- Tree condition monitoring
- Fruit localisation : counting, yield maps
- Flower mapping : selective harvest
- Fruit DM assessment
- Data management/display

→ Improved farm management ?
→ Automated activity ?

Friday Shed A