



bushfire&natural
HAZARDSCRC



Australian
National
University

2014 AIRBORNE CAMPAIGN AT THE ACT

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An Australian Government Initiative



THANK YOU!



ACT
Government



Suzanne, Phil, Kathyn, Browyn,
Carly, Luke, Cleo, Brydie, Yiging,
Geoff, Adrian, Michelle, Arantxa,
Jim, Eva, Lars, Ludo, Kara, Mick,
Tom, Juan Pablo.

OBJECTIVE OF THE CAMPAING

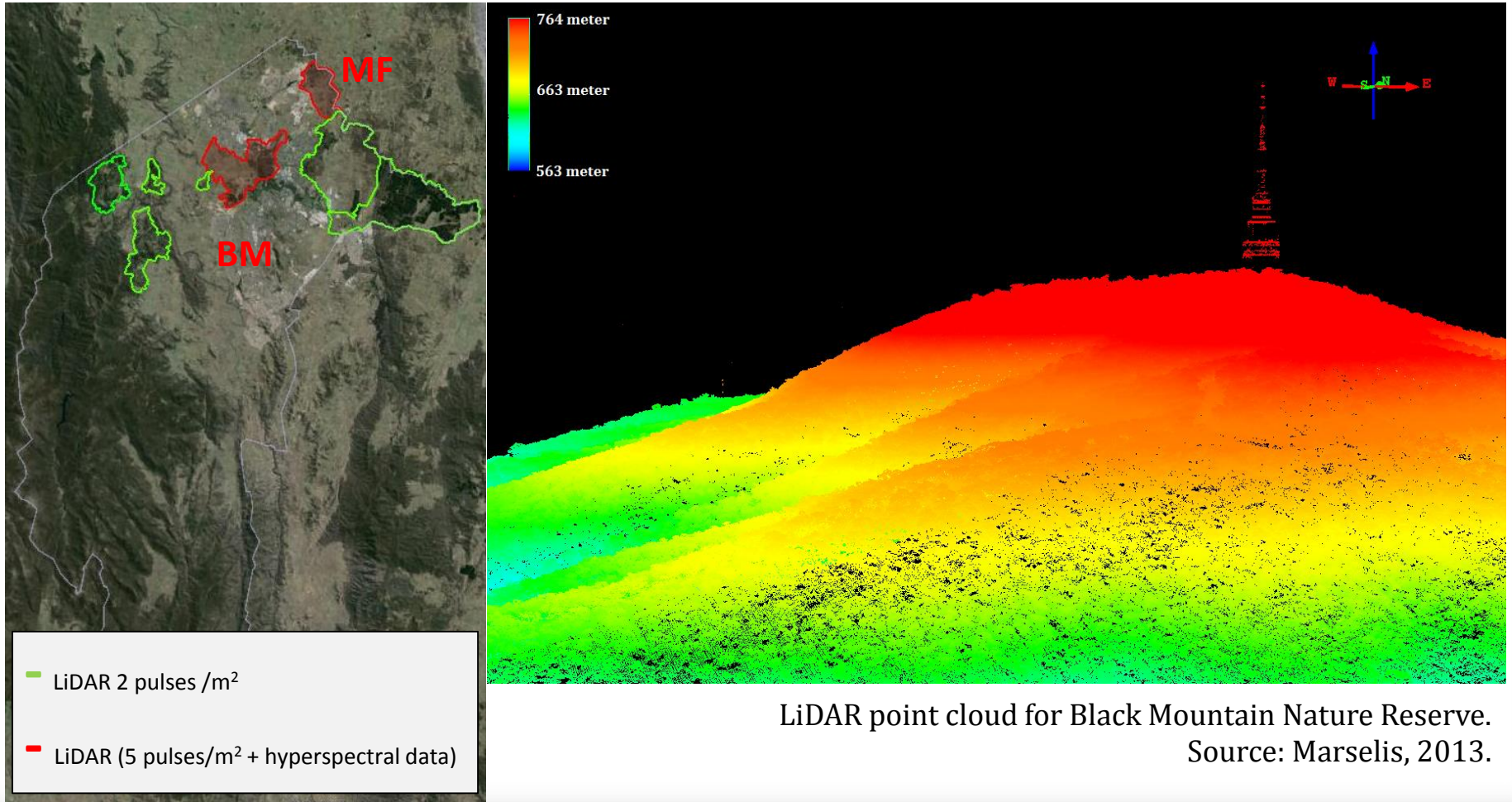
Enable delivery of novel outcomes to help build a next-generation disaster monitoring systems.

- a) Provide spatially explicit basis for monitoring on fuel dynamics (fuel moisture content (FMC), biomass and fuel structure)

- b) *Demonstration products to be ready for the next generation of hyperspectral sensors such as Hypsiri (2016) as well as next space-borne LiDAR (GEDI-2018), which will extend to the operational and wider-coverage capabilities of the methods developed in this project*

AIRBORNE LIDAR DATA COLLECTION

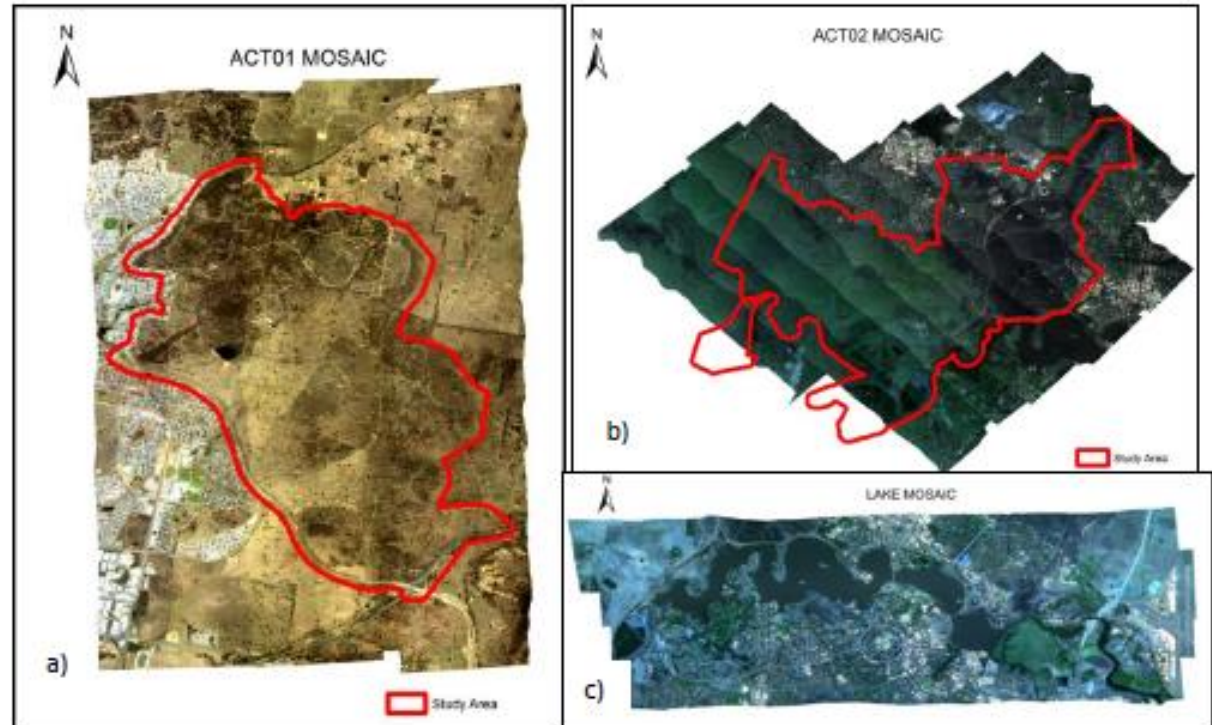
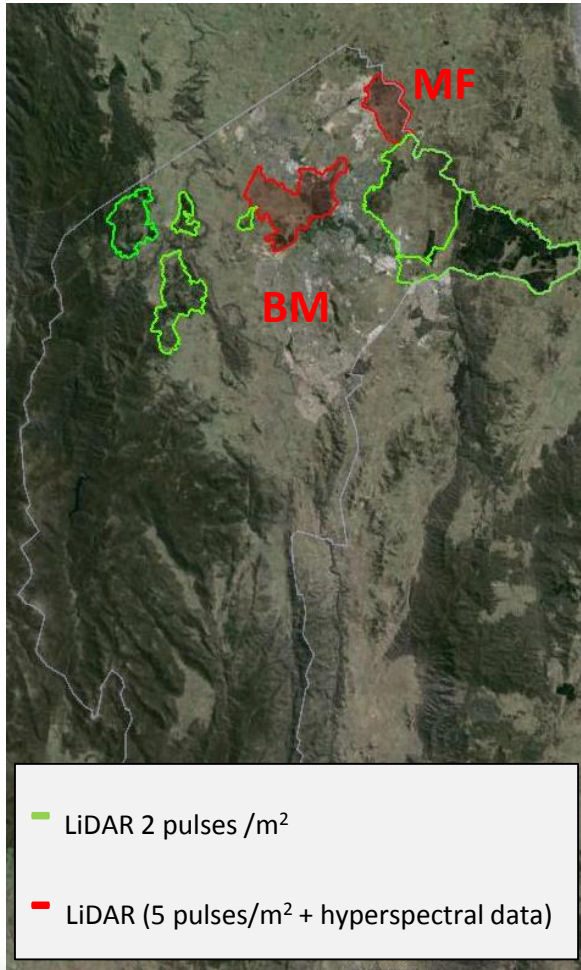
10-12-2013 (Furgo)



LiDAR point cloud for Black Mountain Nature Reserve.
Source: Marselis, 2013.

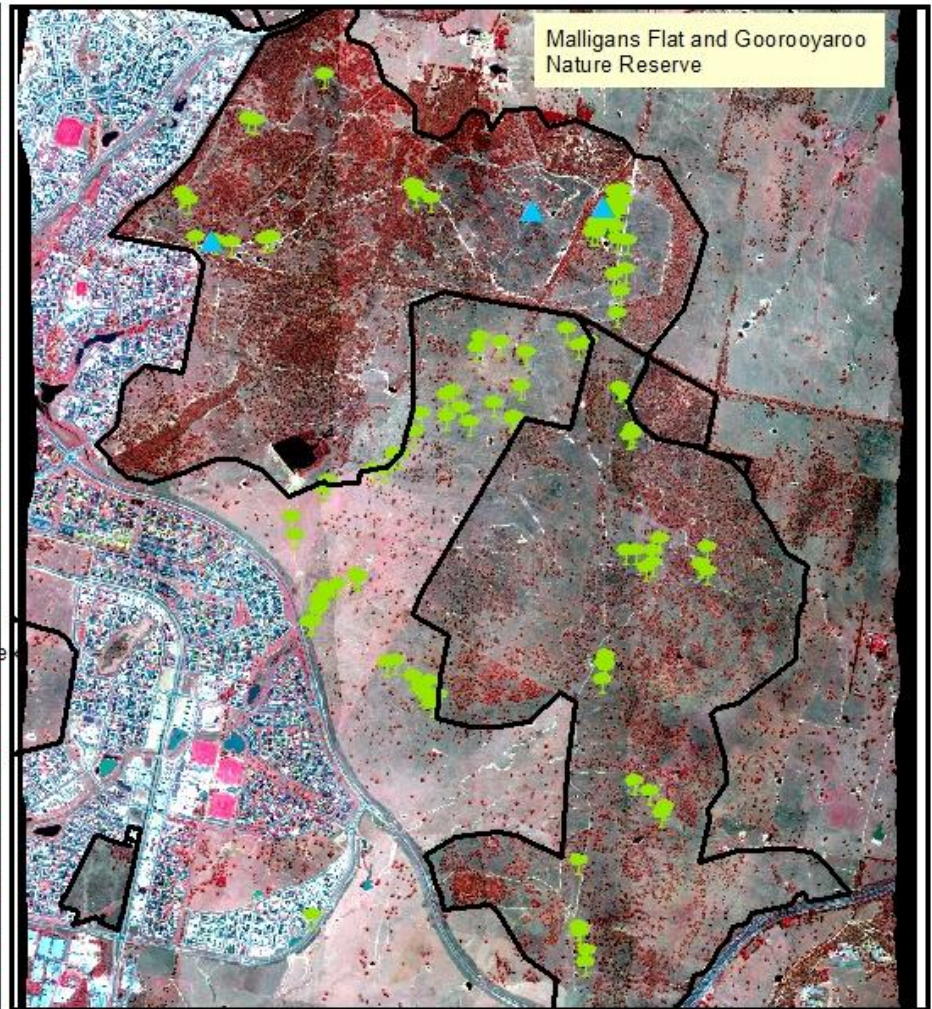
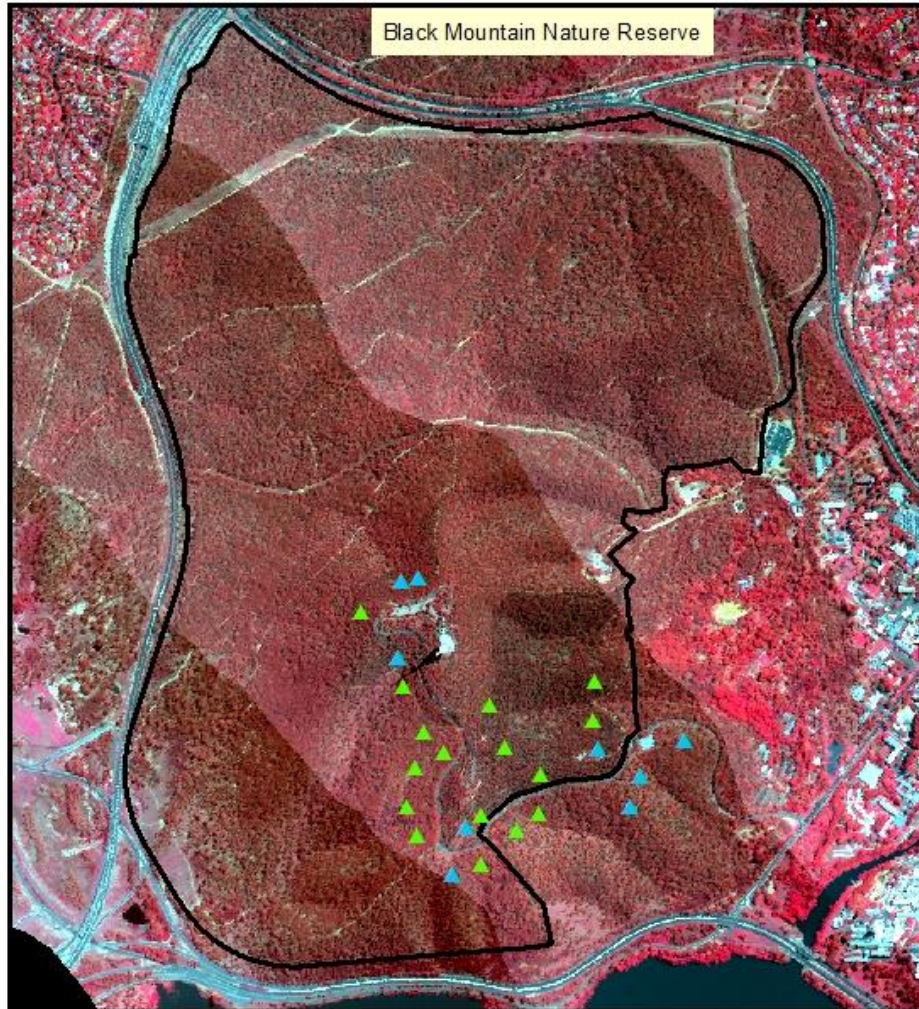
HYPERSENSPECTRAL DATA COLLECTION

- 1) First flight (MF-Lake Burley Griffin): 25-02-2014 (Hyvista-Hymap)
- 2) Second flight: 10-03-2014 (Hyvista-Hymap)



128 bands across the reflective solar wavelength region of 0.45 – 2.5 μm


GROUND TROTHING-FIELD PLOTS



Legend

- ▲ Field Plots
- ▲ Zebedee&DWEL
- 🌳 Individual Trees

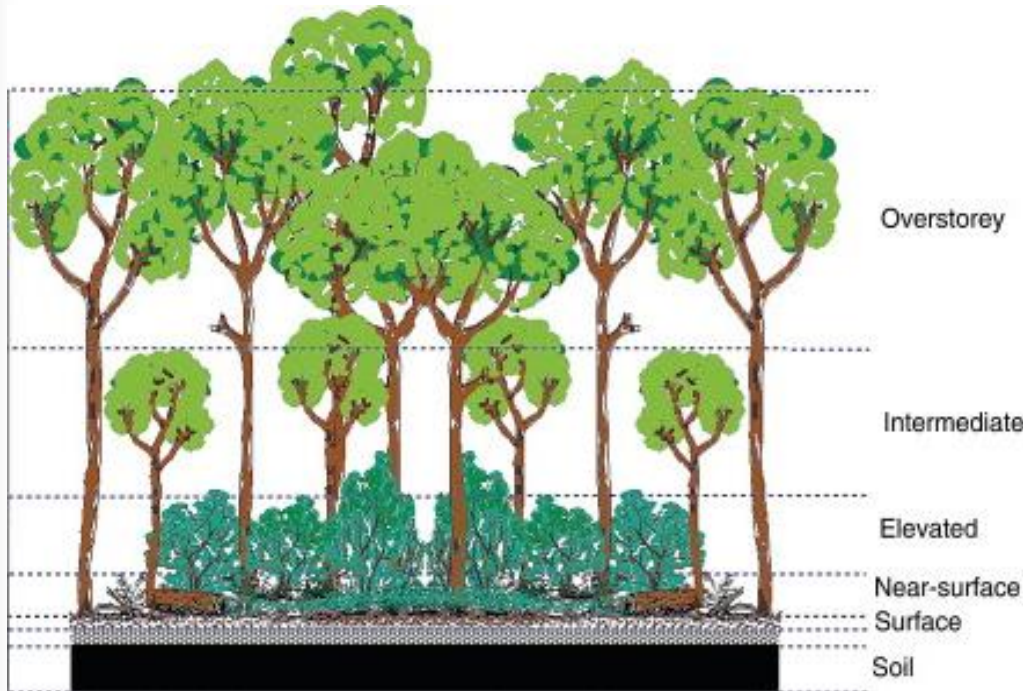
0 0.5 1 km



N



GROUND TRUTHING

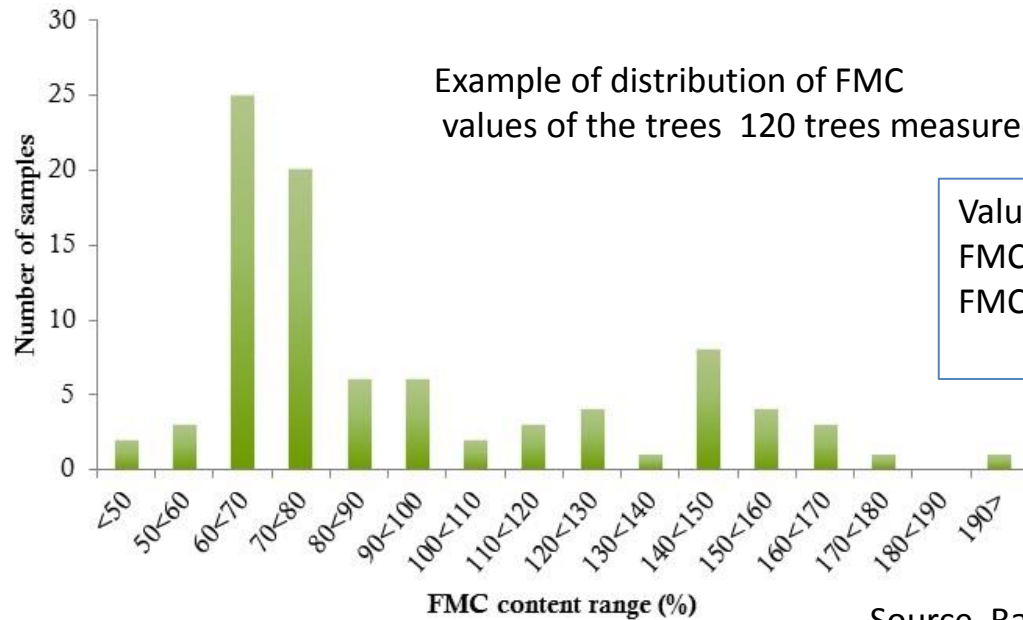


- Fuel structure of different layers:
 - Overstorey: height, base height, crown dimensions, DBH, distance and bearing, bark type, specie.
 - Intermediate, Elevated, Near surface and Surface: Separation, width, height, base high, dominant specie
- Fuel hazard assessment following Gould et al (2007b) and Hines et al (2010)

GROUND TRUTHING



- Fuel moisture content for all the different layers: canopy, elevated, near surface, surface



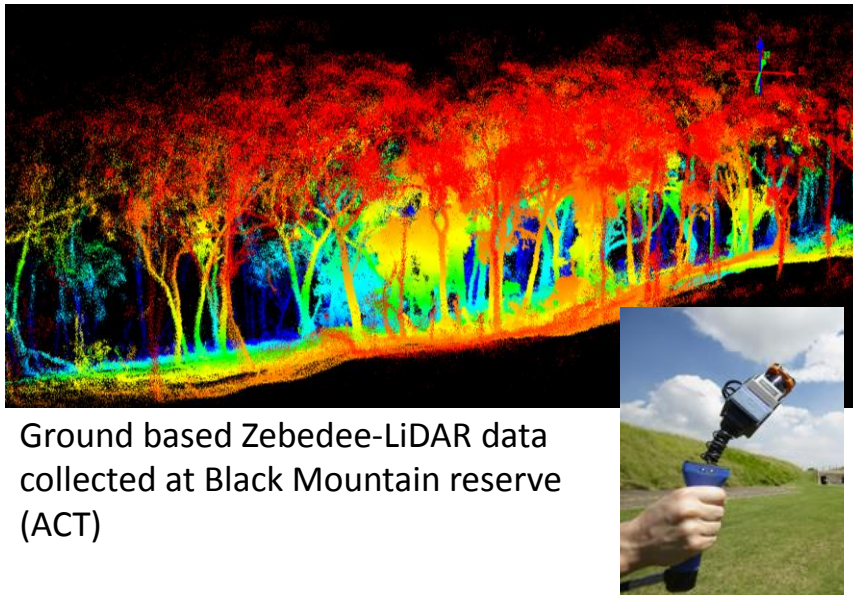
Values for BM
 $FMC_{\text{mean}} = 79\%$
 $FMC_{\text{Stdev}} = 6.55\%$

Source, Rachael 2014

GROUND BASED LIDAR

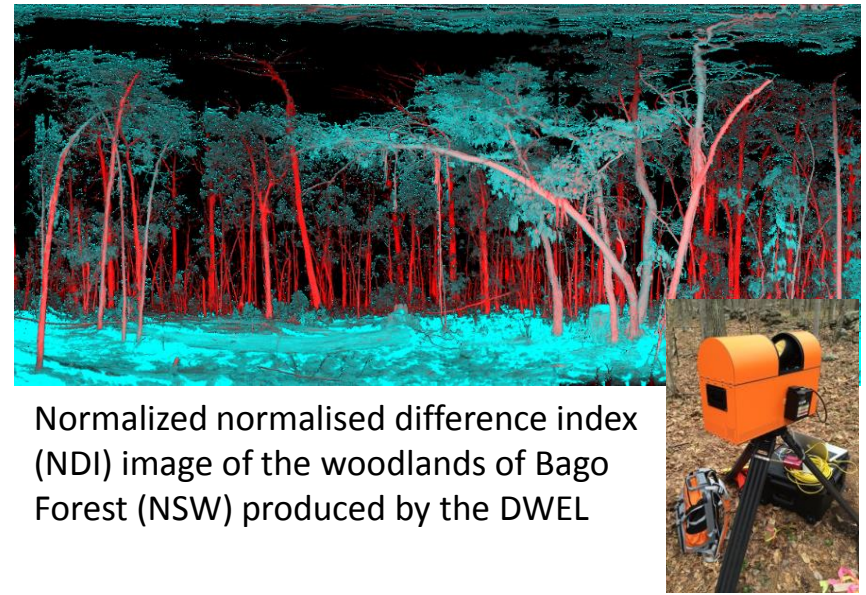
- Provides **high resolution, reliable understory information** useful to validate and/or complement airborne data
- Taken in 9 plots at BM and 3 plots in MF

➤ **Zebedee** (CSIRO)



Ground based Zebedee-LiDAR data collected at Black Mountain reserve (ACT)

➤ **DWEL** (CSIRO-Boston uni)



Normalized normalised difference index (NDI) image of the woodlands of Bago Forest (NSW) produced by the DWEL

FMC RETRIEVAL FROM SIMULATION MODELS

Input parameters
(FMC)

Simulation models

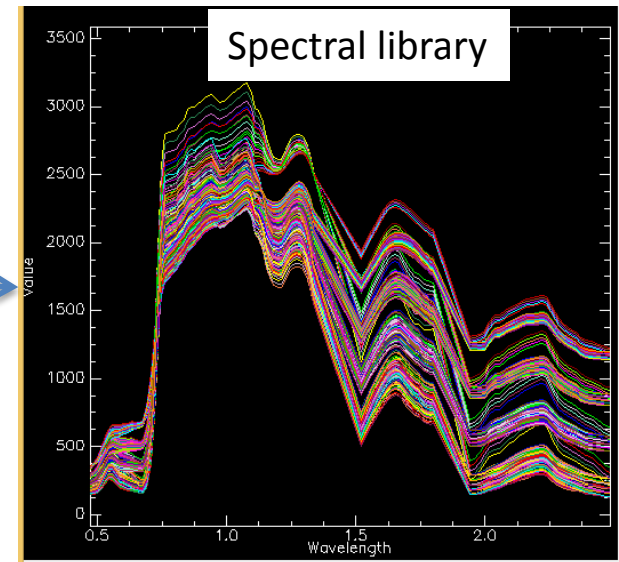
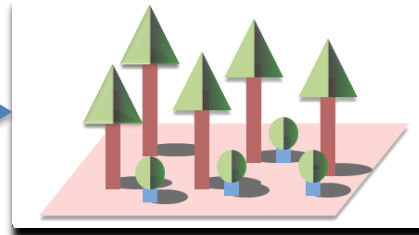
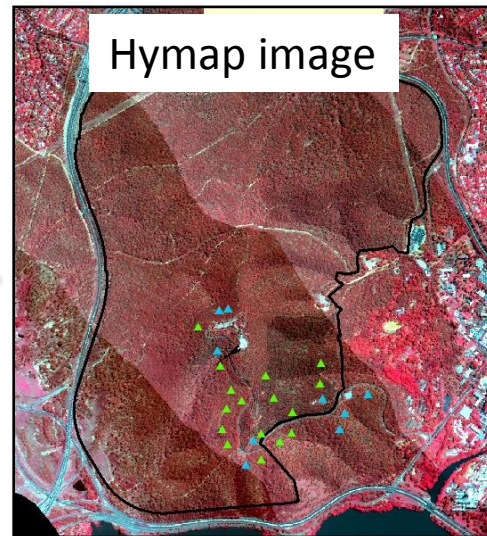
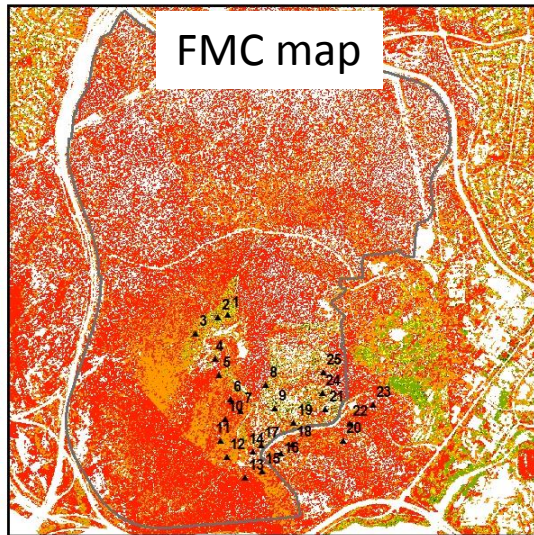
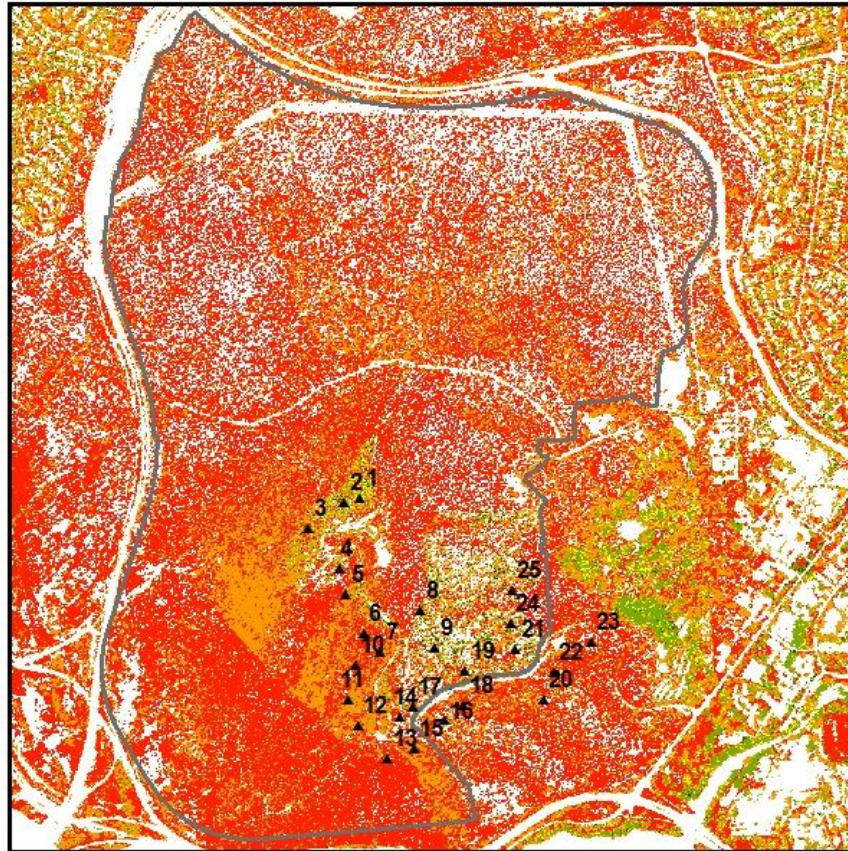
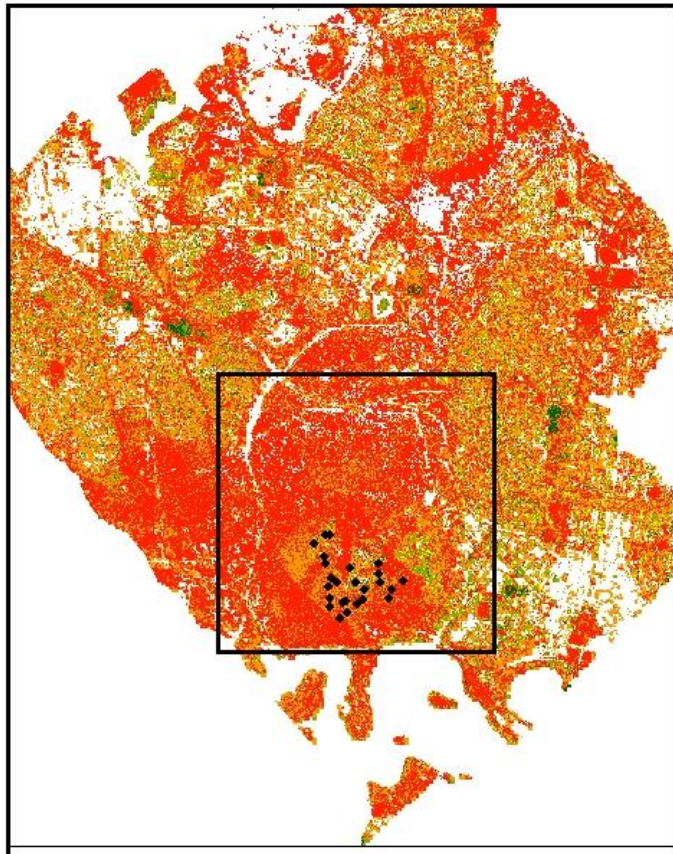


Image classification



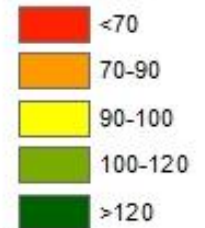
HYMAP FOR FUEL MOISTURE CONTENT ESTIMATION



Legend

▲ Field Plots

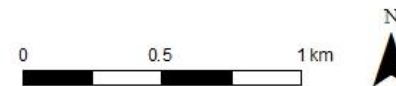
FMC (%)



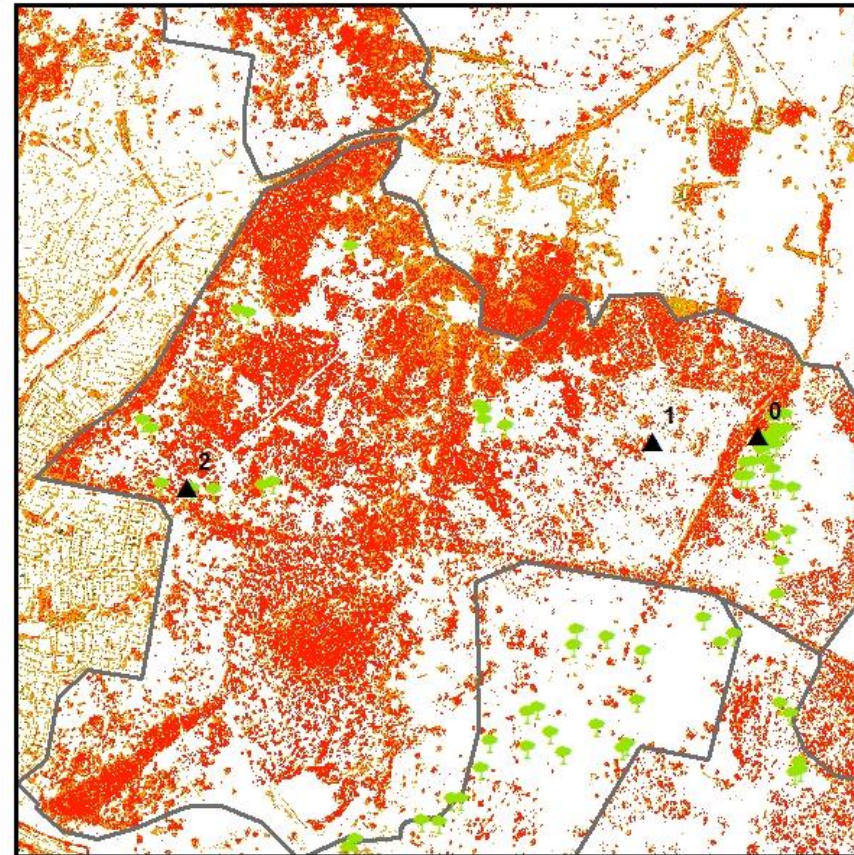
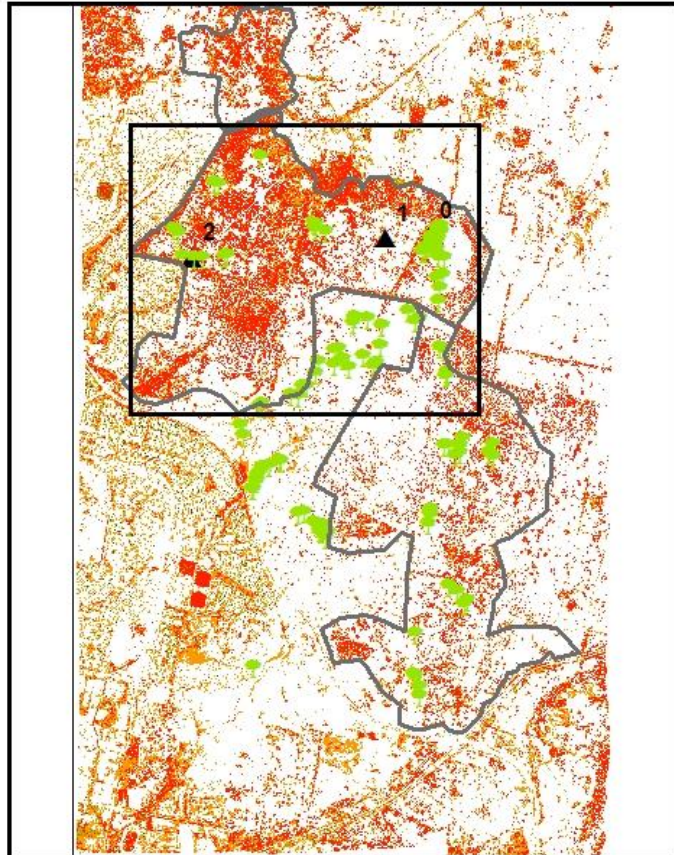
Observed
 $FMC_{\text{mean}} = 79\%$
 $FMC_{\text{Stdev}} = 6.55\%$

Modeled
 $FMC_{\text{mean}} = 87\%$
 $FMC_{\text{Stdev}} = 18\%$

RMSE=27% All plots / 23% No burnt plots



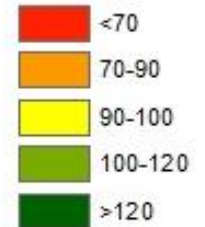
HYMAP FOR FUEL MOISTURE CONTENT ESTIMATION



Legend

▲ Field Plots

FMC (%)



0 0.75 1.5 km



THANK YOU

FIRE BEHAVIOUR MODELLING EXERCISE

