PROJECT A4 DISASTER LANDSCAPE ATTRIBUTION: THERMAL ANOMALY AND HAZARD MAPPING

Simon Jones[1], Karin Reinke[1], Luke Wallace[1], Bryan Hally[1], Chathura Wickramasinghe[1]

[1] School of Science, RMIT University, Victoria

THIS PROJECT AIMS TO ATTRIBUTE FIRE LANDSCAPES USING THE LATEST REMOTE SENSING TECHNOLOGY. THIS INCLUDES USING THE LATEST SATELLITE BASED SENSORS TO DESCRIBE ACTIVE FIRE AND 3D REMOTE SENSING TECHNOLOGIES TO MAP FUEL HAZARD AND SEVERITY. THIS POSTER DETAILS RECENT PROGRESS MADE IN DEVELOPING FIELD METHODS TO ASSESS FUEL HAZARD AND FIRE SEVERITY USING REMOTE SENSING TOOLS.

RESEARCH OBJECTIVES

The objective of this research is to develop remote sensing methods capable of assessing fire fuel hazard and fire severity. These methods should;

- Provide quantitative information describing fuel hazard;
- Produce repeatable results between observers; and
- Be accessible, in terms of cost, time and expertise to observers with no remote sensing background.

FUELS3D

The Fuels3D app (Figure 1) has been developed to allow land managers to collect quantified information on fuel hazard using a smartphone.

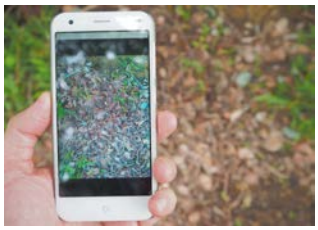

Figure 1. The Fuels3D app in use.

Fuel hazard from images

Fuels3D utilizes images captured on a smartphone and computer vision algorithms to provide a 3D point cloud representation of the fuels structure (Figure 2). From this representation metrics such as volume, height and connectivity are extracted.

Figure 2. Fuels3D data captured prior to and following a prescribed burn.

Figure 2. a) pre and b) post - burn orthophoto (generated at 2 mm resolution) generated from fuels3D data capture.

HIGHLIGHTS

Fuels3D provides low cost fuel hazard mapping

Fuels3D produces high quality quantitative structural and spatial metrics

Fuels3D provides information that can be easily embedded in existing assessment protocols

App deployment and testing

A workshop was held in December 2015 to provide project end-users with a pre-alpha release of Fuels3D for testing. Following on, approximately 100 Fuels 3D calibration samples were collected in grassland and dry sclerophyll environments. Volume extracted from the point clouds shows strong correlated to destructively sampled fuel load in grassland ($r^2 > 0.6$) and forested ($r^2 > 0.8$) environments.

Testing of the Fuels3D app is ongoing in these fuel types. The trials will be extended to other fire prone environments as identified by project end users in the near future.

PRESCRIBED BURN EFFICACY

The same technology used to map fuel hazard has also been deployed for mapping prescribed burning activities. Fuels3D data were collected pre and post burn in a dry sclerophyll forest. The point clouds produced provided highly detailed information describing the fuel structure at both time points.

From this data the efficacy of the burn was quantitatively described using metrics such as total burnt area and change in fuel height. In the example plot shown in Figures 2 and 3, Fuels3D outputs suggest 66 % of the fuel covered area has been burnt and fuel load has reduced by 1.24 t/ha (Table 1).

Table 1. Representative fuel metrics extracted from the Fuels3D representation of the example 18 m^2 plot shown in Figures 2 and 3.

Metric	Pre-burn	Post-burn
Fuel cover	98%	34%
Fuel height	19 cm	6 cm
Fuel Load (t/ha)	2.26 t/ha	1.02t/ha

The Country Fire Authority (CFA) has collaborated with RMIT with interest in improving the assessment of grassland fuel load; a vital input into grassland fire danger index calculations. The Fuels3D App has potential to be an accurate and user-friendly data-collection tool for CFA's network of grassland observers.

- Danielle Wright - CFA