

THERMAL REMOTE SENSING FOR WILDFIRE DETECTION AND MONITORING: IS IT FIT FOR PURPOSE?

Leversha, J.^{1,2}

¹ Geospatial and Mathematical Science, RMIT, Melbourne

² Supervisors: Reinke, K. & Jones, S.

USING THERMAL AND MID INFRARED MEASUREMENTS, THIS PHD AIMS TO ACCURATELY MAP THE AREA, TEMPERATURE AND CONFIGURATION OF ACTIVE FIRES ACROSS AUSTRALIA TO SUPPORT ENHANCED SURVEILLANCE AND MAPPING OF WILDFIRES AND PRESCRIBED BURNS.

BACKGROUND

Wildfires are widely considered an important ecological process. Wildfires have been studied using a variety of methods, field observation, laboratory experiments, and simulation through numerical modelling. Monitoring active fire is of high importance because it is shown that it is the phase of the fire that has the highest threat to life, and has a high risk to environmental, cultural, economic, political and social assets. The monitoring of active wildfires can aid fire-fighters and land management agencies to help reduce the risk involved.

RESEARCH QUESTIONS

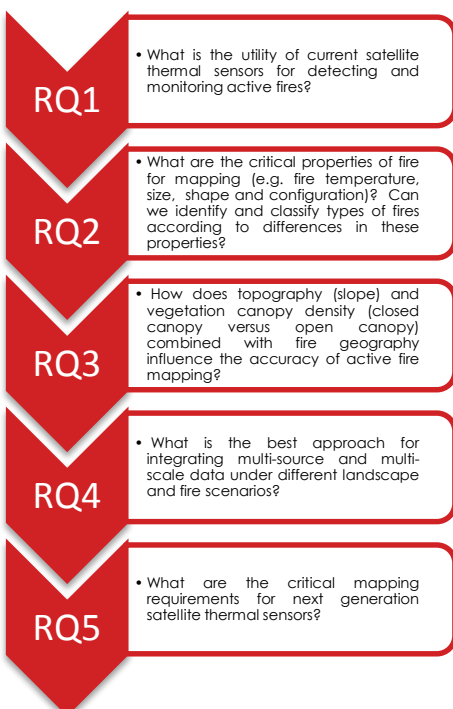


Figure 1: Research Questions

CURRENT RESEARCH ACTIVITIES

The project has developed key research activities for the first year (figure 2) in the aim to answer the research questions in figure 1 and contribute to project A4 of the Bushfire and Natural Hazards CRC.

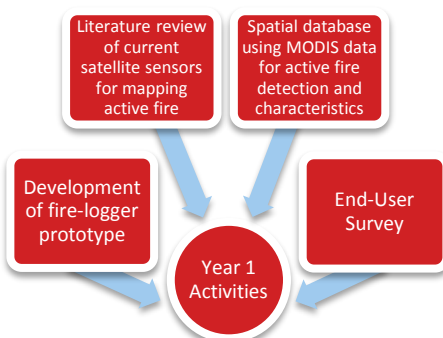


Figure 2: Current Research Activities

Literature review

A literature review has begun to look at current technology for mapping active fire and understanding fire geography and a database of past, current and on-the-horizon sensors has been compiled. This database will be used to assess spatial characteristics of active fires.

Fire geography spatial database

The next stages of this project will focus on developing a spatial data base containing historical MODIS data and aims to map and analyse the geography of active fires, particularly spatial extent and configuration. This database will help answer questions such as, what is the spatial configuration of active fires in peri-urban areas across Australia, and in terms of this is there a variation between cities?

End-User Survey

An End-User survey is currently being conducted to gain insight into how fire and land management agencies describe fire events and seek to identify critical information sources and their gaps. The results from this survey will be used when developing the spatial database and will be critical forming the questions that will be asked during the analysis.

Fire-logger prototype development

Development of in-situ sensor prototypes to measure temperature (figure 3) has been completed. Manufacture and deployment at a larger scale (n=30) will be undertaken during the coming months.

Pyrometers (n=100) will also be created to supplement the data from the fire-loggers. The data from the fire loggers and pyrometers aims to validate the temperature data provided by space and air borne sensors.



Figure 3: Fire-logger prototype

The fire logger operated correctly under test conditions (figure 4), with tests showing the logger remaining cool (~12°C) whilst temperatures of the fire exceeded 800°C.

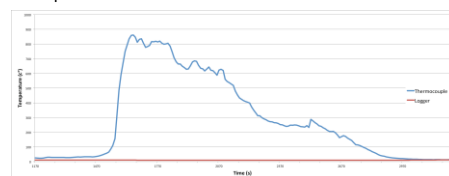


Figure 4: Fire-logger prototype testing

FOR FIRE AND LAND MANAGEMENT AGENCIES

This PhD project will provide new information regarding the spatial characteristics and geography of active fires. Good practice guidelines will describe the use and incorporation of multiple thermal sources into operational fire management. Case studies conducted with, and for end-user partners, will validate new information products (such as TET-1) in real world situations.

END USER STATEMENT

"This project will enhance our current operational approaches for the utilisation of thermal remote sensing for the monitoring of fire activity which will lead to will improvements in the mapping and analysis of active fire and aims to assist in building improved situational awareness for incident managers." – Adam Damen – Department of Environment and Primary Industries – Victoria, Australia.