Student Name: Yang Chen

Project Title: Modelling forest fuel hazard change over time using LiDAR technology

Commencement Date: August 2013

PHD PROGRESS REPORT 2015

In the last six months, I have led the field-work and post processing of understory fuel samples. The field work and its related data collection, including ground truthing data and terrestrial LiDAR data using both Zebedee and Rigel instruments have been completed. I am now primarily focusing on the criteria of data analysis. By analysing terrestrial LiDAR data for forest fuel structure measurements, I have developed a GIS-based procedure to automatically classify strata based forest fuel types (surface fuel, near-surface fuel, elevated fuel, tree trunks, and crowns) according to the LiDAR representation of forest fuel spatial distribution and arrangement. I tested this model using terrestrial LiDAR data acquisition from both Rigel and Zebedee, and also developed a toolbox for an Automatic forest inventory, strata based fuel classification, and fuel hazard assessment using the model accordingly.

Current studies using either mathematical topology models or voxel-based 3D reconstructions to detect tree stems based on terrestrial LiDAR technologies. They have not been extensively tested and evaluated for complex-structure forests with various tree species, and are also restricted by the scanning systems. This study proposes a novel GIS method for forest fuel strata classicisation in closed eucalypt forests, which can be applied to efficiently and objectively assess forest fuel hazards and to estimate inventory parameters for forest fuel management using various laser scanning systems (e.g. tripod-mounted devices and portable devices).

Further analysis should aim to validate and evaluate the LiDAR based method using the ground truthing data, and explore the relationships between LiDAR derived fuel hazard assessment and the ground data based for further study purposes