

# Spectral Characterisation of Fire Severity in Tropical Savannas of northern Australia

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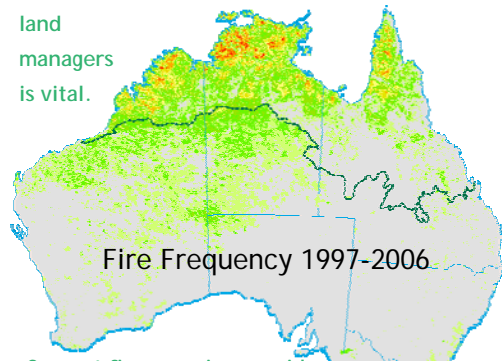
## Tropical Savannas

Tropical savanna grasslands and woodlands:



- globally constitute the largest annually recurring source of pyrogenic emissions;
- are the world's most heavily grazed biome and;
- cover 12% of the earth's landmass.

Australia's tropical savanna cover 25% of the Australian landmass and with over 90% of mean annual fires occurring in the north, information on fires that can assist



Current fire mapping provides land managers with the knowledge of the occurrence, extent, frequency and recurrence of fires

but can not provide information on the effect of various types of fire on landscapes.

## Fire Regime

Fire regime can be characterised by:

1. Fire extent;
2. Fire Frequency;
3. Fire Return Interval;
4. Fire Intensity.

The first three are currently and readily measurable from satellite image interpretation.

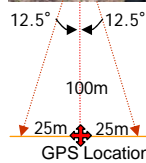
## Fire Severity

The 4th parameter, Fire Intensity, is a measure of the energy released ( $\text{kW m}^{-1}$ ) by fire. This is not directly measurable and it is more important to know the **EFFECT OF FIRE ON THE VEGETATION**. This is the key ecological & land management measure required, and is referred to as the **FIRE SEVERITY**.

## Methods

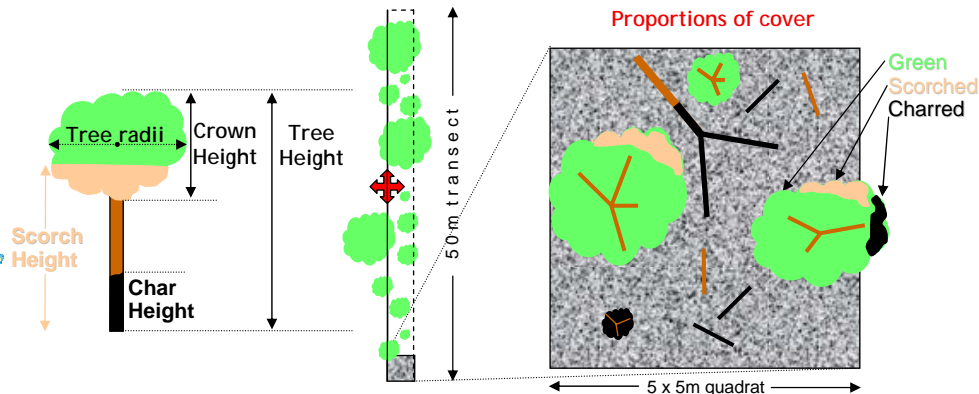


Initially, **REFLECTANCE SPECTRA** for patches of fire affected landscape ranging over the spectrum of fire severities, from **LOW** to **EXTREME**, are collected using a hand held spectrometer in a helicopter: Altitude above ground = 100m  
 → field of view = 50m

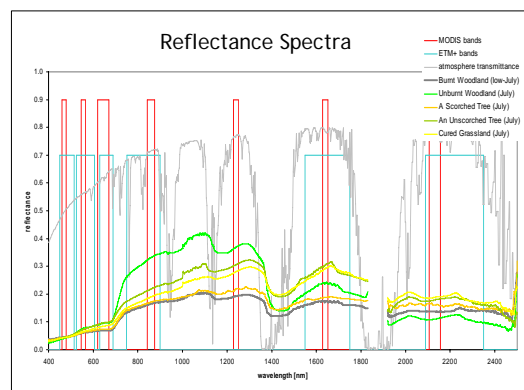


**GROUND MEASUREMENTS** are collected at the same GPS location describing stand structure and the proportions of cover of the various fire affected or unaffected components of the ecosystem.

## FLORISTIC/STRUCTURAL DATA



The ground data are the input to a **Radiative Transfer MODEL**, taking into account leaf area parameters, sun angle and stand structural information. A reflectance curve is the output.



The model is also invertible, allowing for a sensitivity analysis of the input parameters against the field measured spectra.

An **ALGORITHM** will then be derived from the range of spectra collected for various fire severities measured on the ground.