FIRE SEVERITY MAPPING IN AUSTRALIA'S TROPICAL SAVANNAS:
CALIBRATION OF THE ALGORITHM

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Background

Fire severity mapping was undertaken initially as part of a Bushfire CRC funded PhD Project from 2007 to 2010.

Operational implementation, of the models developed in the PhD research, was further funded by the Bushfire CRC for 2011-2013.

The North Australia Fire Information (NAFI) web site (www.firenorth.org.au) exists to provide fire managers in the extremely fire prone tropical savannas with timely information regarding the location, weather and history of fire for every point across the nearly 2 million square kilometres in north Australia. As well as extensive burnt area mapping, the fire information can be further enhanced by the inclusion of a fire severity map product.

Results

The first year of the Fire Severity mapping project was devoted to the collection of ground information describing the habitat type and fire severity at over 8,000 sites. This information was then used to **CALIBRATE** an algorithm to apply to satellite imagery through correlation analysis.

Reflectance change images were created using a previously created Burnt Area mapping algorithm. The Burnt Area mapping algorithm looks at change in the amount of reflected light at every point, where if a certain level of change occurs in at least 3 successive images then it is determined to be burnt. The reflectance change image is then created by calculating the difference in the amount of light reflected before and after the "burnt" point is detected.

The value of reflectance change is correlated with the ground information to create a model of fire severity for all "burnt" points in the burnt area map. This model is applied to all burnt pixels to describe the fire severity of all burnt areas.

Future

The 2012 fire season (April to November) has been dedicated to **VALIDATION** of the model through the collection of a separate and independent set of points. This will be reported on in early 2013.
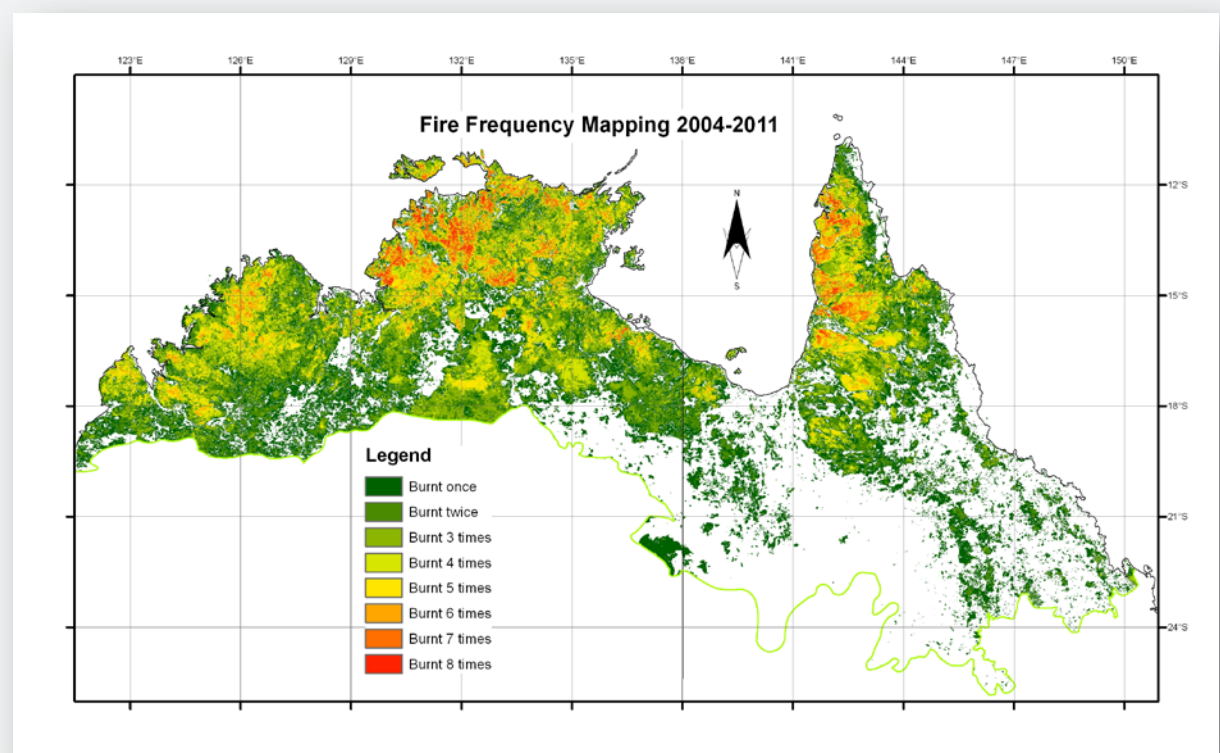

Figure 1. Fire frequency mapping of the tropical savannas, 2004-2011.
The mapping highlights the high frequency of occurrence of fires in north Australia generally.
Burnt areas are mapped using MODIS satellite-based imagery with 250m pixels.
The tropical savannas are delineated by the area of north Australia, north of the green line (~1.9 million km²).
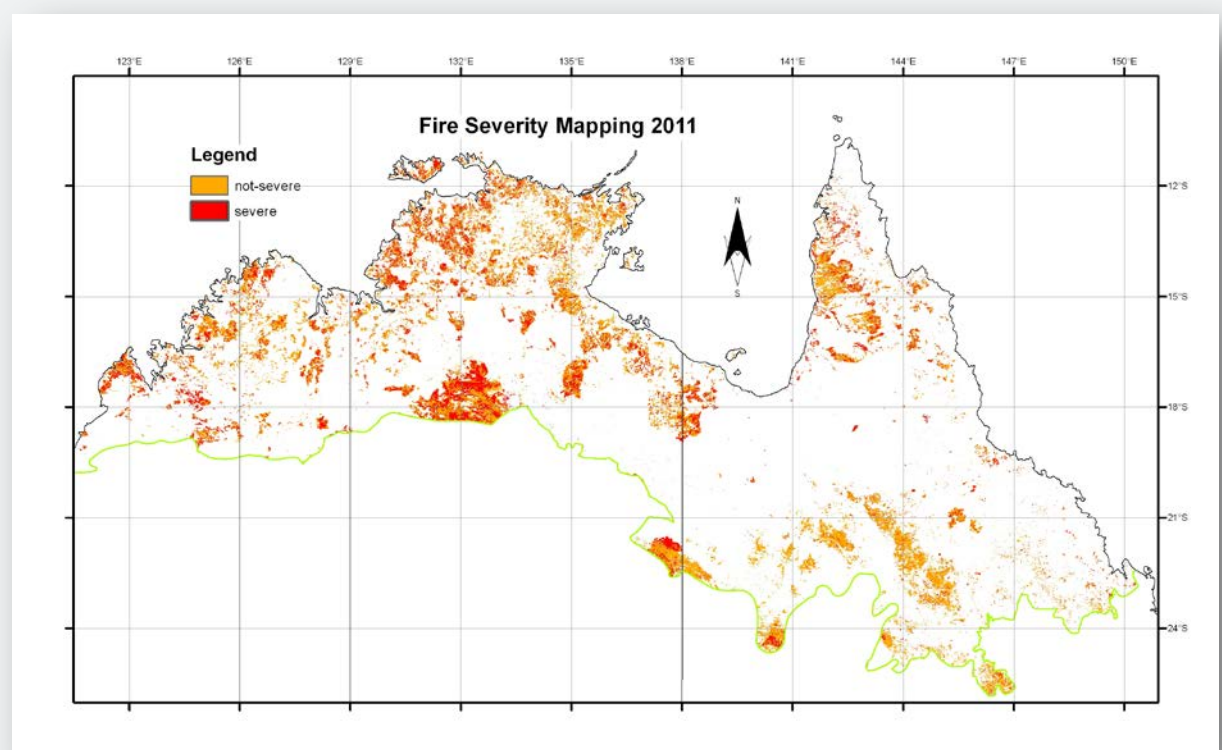

Figure 2. Fire severity mapping of the tropical savannas, 2011.
The fire severity is categorised as severe and not-severe,
and refers to whether or not the upper canopy was fire affected.
The fire severity model was developed by correlating extensive ground information with the
value of reflectance change of "burnt" pixels from MODIS satellite imagery.
The tropical savannas are delineated by the area of north Australia, north of the green line (~1.9 million km²).