COMMISSIONED RESEARCH

Key Topics:

- fire [1]
- fire weather [2]
- soil moisture [3]

2009 Black Saturday and other large fire events - moisture content project [4]
This project was commissioned and funded entirely by the Department of Environment, Land, Water and Planning, Victoria.

Project: detail Notabs

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Description

This project was commissioned and funded entirely by the Department of Environment, Land, Water and Planning, Victoria.

This project produced a new capacity to predict landscape to regional-scale fuel moisture dynamics and consequent effects on probability of ignitions and fires. This proposal links to a forthcoming Expression of Interest concerning ignitions and the development of large fires. To achieve this, a variety of differing research disciplines were extended and integrated. While fuel moisture plus weather factors, are postulated to play a pivotal role in governing the occurrence, spread and patterns of fire (Boer et al., 2008, Bradstock et al., 2009, McKenzie & Kennedy, 2012) the capacity for managers to monitor and predict moisture variations in time and space is limited. Empirical tests of the degree to which patterns of fuel moisture affect or control fire in heterogeneous landscapes are also limited, though new developments in remote sensing and spatial analysis provide a platform for development of a comprehensive understanding that can be applied to monitor and predict fire potential at close to real-time and regional scales (Caccamo et al., 2011, Caccamo et al., 2012a, Caccamo et al., 2012b). The project expanded this potential by providing insight into the degree to which fuel moisture states have governed major fires in the recent past along with strengthening the biophysical basis of the methodology.

The challenge of understanding fuel moisture dynamics and consequent effects on fire requires new approaches that have a firm biophysical basis and can be applied over large spatial and temporal scales using readily available data. Strengthening this biophysical basis is not only highly novel but, more importantly, it will greatly advance our mechanistic understanding of fuel moisture dynamics and will thus allow for stronger prediction capability. Remote-sensing must be a major component of the approach as it is the main source of spatially distributed information on key land surface attributes. Here, the proposed link with a biophysical approach, based on the examination of latent heat (i.e., evaporative) fluxes relative to total available energy, with remote sensing of canopy condition and landscape connectivity analyses will derive new insights into spatiotemporal moisture dynamics and to produce a monitoring and predictive capability for operational use in fire-prone landscapes.

Linked Projects

Landscape moisture modelling [14]

BUSHFIRE PREDICTIVE SERVICES [15]

Dr Stuart Matthews
New South Wales Rural Fire Service [16]

[16]

Probability of fire ignition and escalation [17]

BUSHFIRE PREDICTIVE SERVICES [15]

Prof John Hearne
RMIT University [18]

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Fire transitions across urban boundaries [19]

BUSHFIRE PREDICTIVE SERVICES [15]

Dr Andrew Sullivan
CSIRO [20]

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Bushfire climatology in Victoria [21]

BUSHFIRE PREDICTIVE SERVICES [15]

Dr Sarah Harris
Country Fire Authority [22]

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Severe fire behaviour - improving planning responses [23]

BUSHFIRE PREDICTIVE SERVICES [15]

A/Prof Kevin Tolhurst
University of Melbourne [11]

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Analysis of RapidEye imagery to map fire severity and ground truthing [24]

BUSHFIRE PREDICTIVE SERVICES [15]

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Smoke transportation and emissions modelling [25]

BUSHFIRE PREDICTIVE SERVICES [15]

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