Coupled fire-atmosphere modelling project

Research advisory forum / **2018**

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Australian Government
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Business Cooperative Research Centres Programme

Project objective

Develop and test an Australian coupled fire-atmosphere modelling system, linked to the Australian Numerical Weather Prediction (NWP) operational framework and embedded in Bureau forecasting capability

Coupled fire-atmosphere models

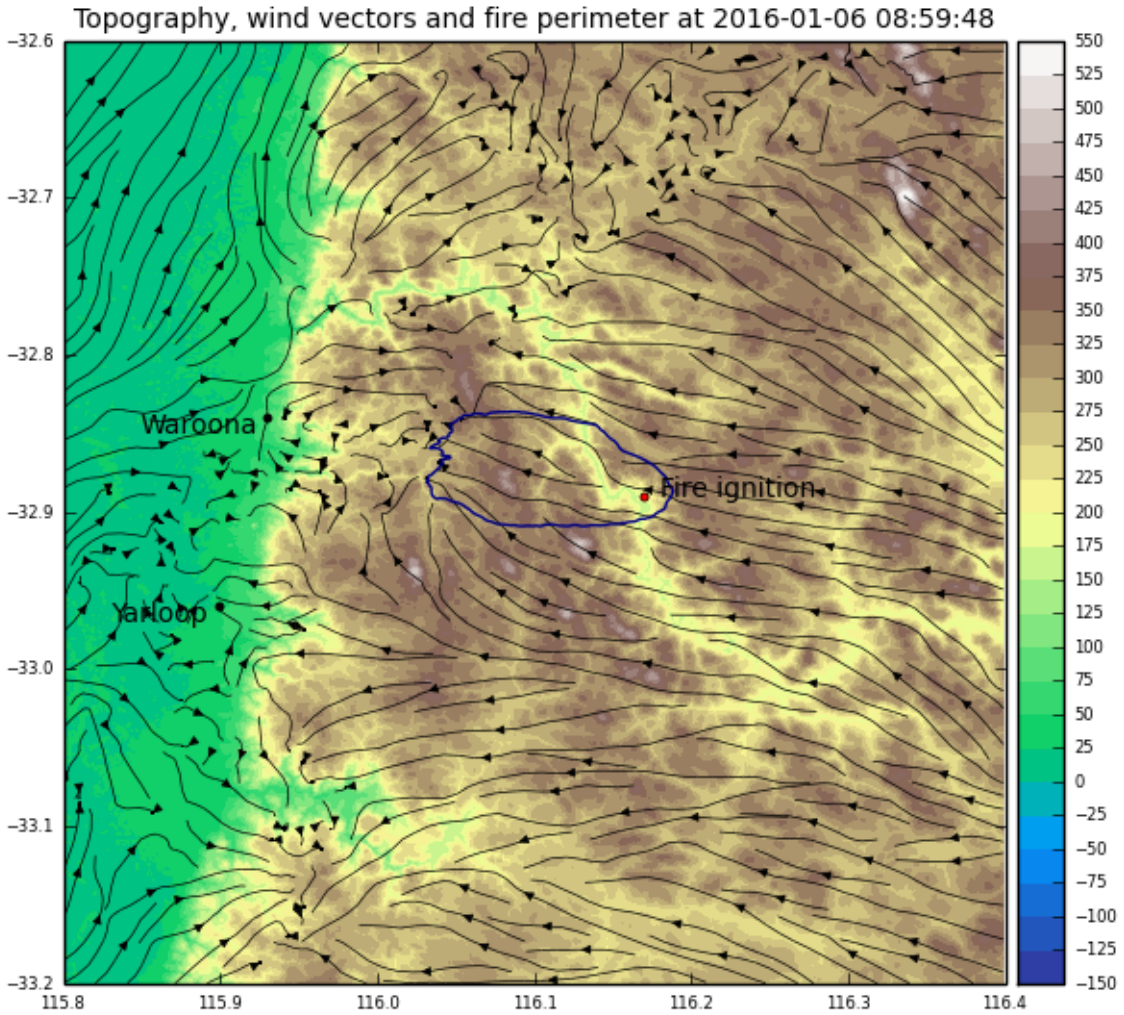
- Empirical or dynamical models (mesh between scales)
- WRF-Fire operational in Colorado, USA
- Coupled fire-atmosphere models have an important role

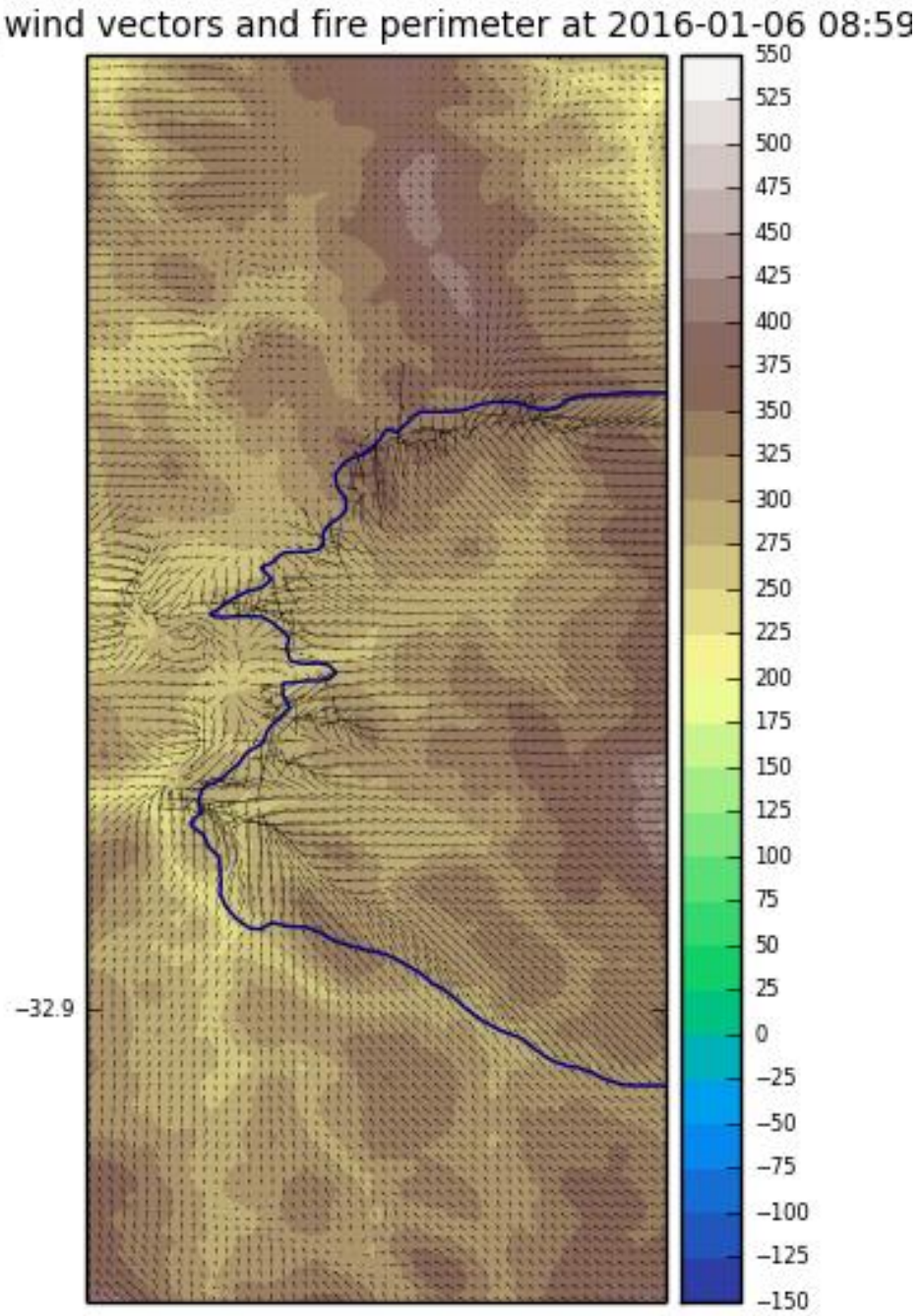
ACCESS-Fire

Australian **C**ommunity **C**limate and **E**arth **S**ystem **S**imulator

Operational and research system for weather and climate time scales

Waroona fire with CSIRO forest at 100m resolution





Research findings

Initial results are very promising; showing that the model captures the dynamical interactions and complex fire spread near terrain.

In the next 12 months, the project will continue work on the case studies of the Waroona and Sir Ivan fires.

The results contribute to the body of evidence demonstrating the need to incorporate dynamic interactions in order to anticipate fire behaviour.

The simulations present evidence that is being shared with operational teams to educate and inform some of the risks that fire-interactions produce on fire grounds.

Progress on the project shows that considerable further and ongoing development is required before coupled models can be applied to operations in a robust manner.

White paper

Project deliverable 'Lessons learned from coupled fire-atmosphere research and implications for operational fire forecasting' is in progress

Co-authors Mika Peace, John Bally and Jay Charney (US Forest Service).

The paper will:

1. Summarise the coupled models currently in use internationally
2. Outline potential options for operational prediction; short term and longer term

The options are likely to include:

1. Inclusion of findings from simulations into ingredients-based operational tools
2. Development of modelling frameworks that are not fully coupled, but capture key processes
3. Longer term options for fully coupled operational models.

We intend to circulate drafts with End Users and key Stakeholders and welcome contribution and input.
An abstract will be submitted to the Sydney Fire and Fuels conference.

Utilisation

The project team continues to engage strongly with the operational fire community; fire managers, fire forecasters, embedded meteorologists and FBANS.

Engagement activities:

- Presentations to operational groups
- 'Hazard Note'
- AFAC webinar, now with 400+ views
- Proposed project to develop operational tools that identify environments conducive to downslope winds (in progress)
- Community forums including radio interviews, science talks and school visits.

What is feasible and what is blue-sky?

Feasible – learning from the results of coupled simulations in a research setting and translating the findings into lessons to identify environmental ingredients that present heightened risk on a fire ground.

Blue-sky – running coupled models in real time to support operational decisions. It will happen (in 10, 30 or 50 years?) but will require considerable investment, verification and multidisciplinary teams in order to create a robust modelling framework.