

COUPLED FIRE-ATMOSPHERE MODELLING PROJECT ACCESS-Fire

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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 NWP operational framework, embedded in Bureau forecasting capability

PROJECT MOTIVATION

- Understand fire-atmosphere interactions
- Identify the ingredients leading to dynamic fire behaviour
- Address the limitations of surface-based, predictive approaches with linear assumptions

= Improved capability and accuracy for fire prediction



PRESENTATION OVERVIEW

- Waroona case study
- Implementation and outreach activities
- Progress with ACCESS-Fire



THE WAROONA FIRE CASE STUDY

- Detailed case study of the Waroona Fire (WA, January 2016)
- Accepted for publication JSHESS (Journal Southern Hemisphere Earth Systems Science)
- Collaboration : Mika Peace, Jeff Kepert, Brad Santos, Lachie McCaw, Neil Burrows and Robert Fawcett

THE WAROONA FIRE

- 2 x PyroCB events
- 2 x destructive evening ember showers
- Highest FDI does not coincide with Extreme Fire Behaviour



LESSONS FROM WAROONA (SLIDE 1)

Pyro-Cumulonimbus

- Downdrafts separated from updrafts and erratic outflows
- New lightning ignitions downwind
- Appears more likely with long firelines (energy release)





LESSONS FROM WAROONA (SLIDE 2)

Downslope winds

- Perth scarp and Adelaide gully winds (other locations?)
- Timing against normal diurnal cycle
- Turbulence with downslope winds conducive to ember showers



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LESSONS FROM WAROONA (SLIDE 3)

- 1. Timing of max FDI
 - Limited correlation with Extreme Fire Behaviour (same as other events)
 - Key meteorological ingredients were above the surface
- 2. Triggers or ingredients to EFB
 - Fuels plus winds plus topography plus instability



IMPLEMENTATION ACTIVITIES

PRESENTATIONS

- Perth 3x DPaWS , BoM , DFES
- CFS / DEWNR, BoM internal EWD
- AFAC (full room), CRC Showcase
- Accepted for CAWCR workshop, MODSIM, and AMOS
 OTHER ACTIVITIES
- BoM training activities and policy development
- Operational support
- Contribution to development of EWD Fire Ingredients
- ABC radio and print interviews
- Outreach Fire and STEM activities



ACCESS-FIRE MODEL

- Succession of IT problems overcome step by step
- ACCESS moved from UMUI to Rose-Cylc interface
- Nests in Rose-Cylc
- High resolution topography and data transformation
- Vertical levels
- Fire model "hooks" in new framework
- Model stability and memory

We now have a working nested model in Rose-Cylc at 400m resolution with fire running – how best to exploit this capability



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This is what the Rose-Cylc GUI looks like

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PLANNED ACTIVITIES 2017-2018

- Sir Ivan fire 2nd case study
- ACCESS-Fire Intensive effort towards coupled simulations
 of Waroona and Sir Ivan fires for analysis and write-up
- Ongoing engagement and implementation (Radio/Media/Conferences, AMOS, MODSIM ... USA and UK?)



QUESTIONS?

High resolution visible image of the Waroona fire from Himawari satellite at 1810 LT 6 January 2016.



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