bushfire&natural HAZARDSCRC

COUPLED FIRE-ATMOSPHERE MODELLING

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Australian Government
Bureau of Meteorology

WHAT IS COUPLED MODELLING?

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1) Fire behaviour model – weather is a passive input
2) Fire generates heat, moisture, turbulence – these affect the surrounding winds
3) In reality, the weather is not passive – it responds to the fire
4) Coupled modelling lets the energy released from the fire change the atmospheric flow

FIRE-ATMOSPHERE INTERACTION

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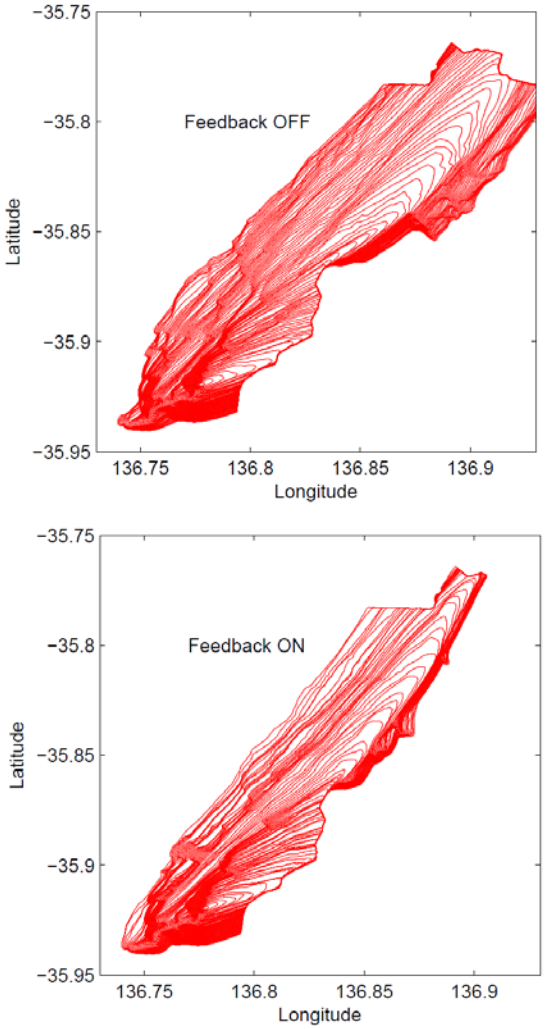
1) Elliptical shape
2) Interactions with topography
3) Vorticity-driven lateral spread
4) Entrainment of dry air
5) Altered spread (up or down)
6) Spotting and updrafts
7) Pyroconvection
8) Fire tornado



OBJECTIVES

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1) Based on Australian operational numerical weather prediction system
2) Better understand fire-atmosphere interaction (spread, intensification, blow-ups)
3) Better understand fire-generated winds (damage, ember transport)
4) First step to operations
5) Knowledge transfer
6) Explore computationally efficient methods

STRATEGY

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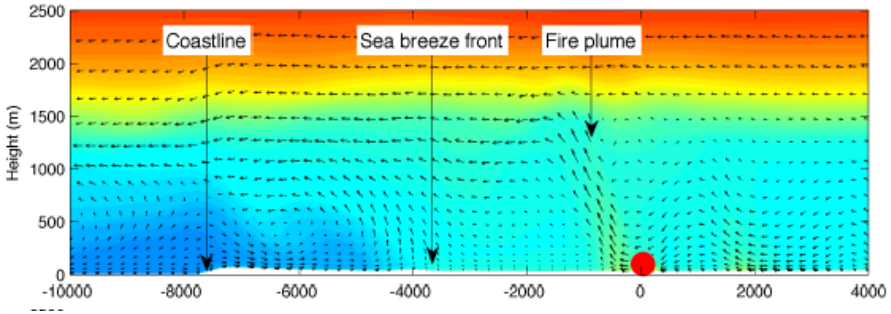
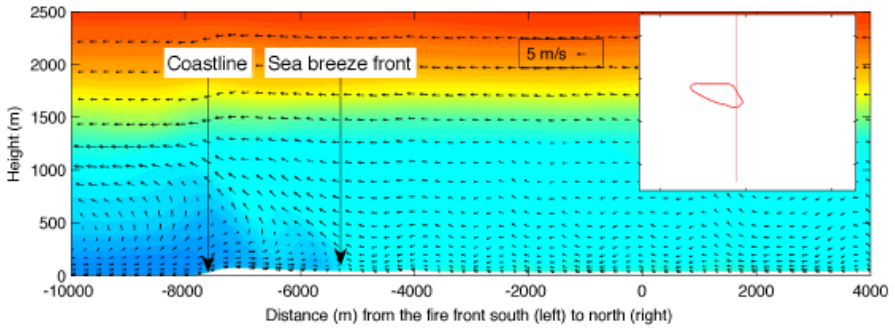
1) Couple ACCESS to fire-spread model
2) Australian fuel types and spread equations
3) Validate on suitable case studies
4) Investigate fire-atmosphere feedbacks
5) Collaborate
6) Explore possibility of intermediate-complexity coupled models



Feedback on



Feedback off

MODEL DEVELOPMENT

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1) Build on existing university work by Torvinen, Reeder, Lane
   a) Valuable collaboration, not re-invent the wheel
2) System to be part of JULES "trunk"
   a) More robust, international collaboration
3) Code extensions
   a) Spotting, other fuel/spread relationships, LEM
4) Benefits
   a) Less risk, more science/less IT, Australian resource, better interaction with unis, more easily maintained, international collaboration, spotting
5) Disadvantages
   a) Not as established as SFIRE, less benefit from previous experience with SFIRE

MAJOR DELIVERABLES

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1) Fire model coupled to ACCESS as part of official release
2) Case studies of significant events
3) Journal papers, reports, conferences
4) User interaction
5) Operational training
6) Practical implications

SUMMARY

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1) Feedback changes the fire
2) Need to couple
   a) Prediction, understanding
3) Extend: spotting, fuels
4) Practical implications
5) Intermediate coupling?
6) Case studies of significant events