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Improved predictions of severe weather to reduce community impact

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Australian Government
Bureau of Meteorology

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Project Team

- Jeff Kepert
  - Team and project leader, tropical cyclones, fire weather, numerical weather prediction
- Kevin Tory
  - Tropical cyclones, fire weather, severe thunderstorms
- Robert Fawcett
  - Fire weather, heat waves, high-resolution modelling, climate, statistics
- Will Thurston
  - Fire weather, boundary-layers and turbulence, tropical cyclones

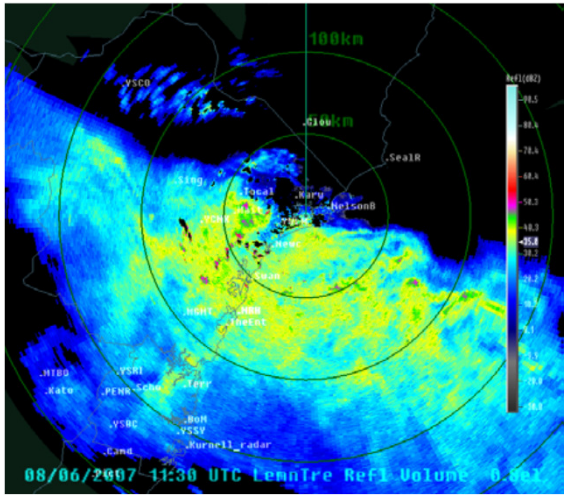
- Noel Davidson (tropical cyclones, numerical weather prediction)
- Harald Richter (severe thunderstorms, tornadoes)
- Alan Wain (fire weather, smoke dispersion)
- Graham Mills (emeritus, fire weather, mid-latitude meteorology)

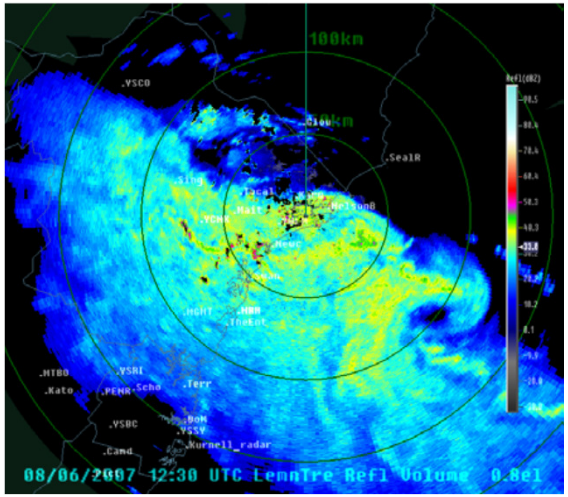
Problem Statement

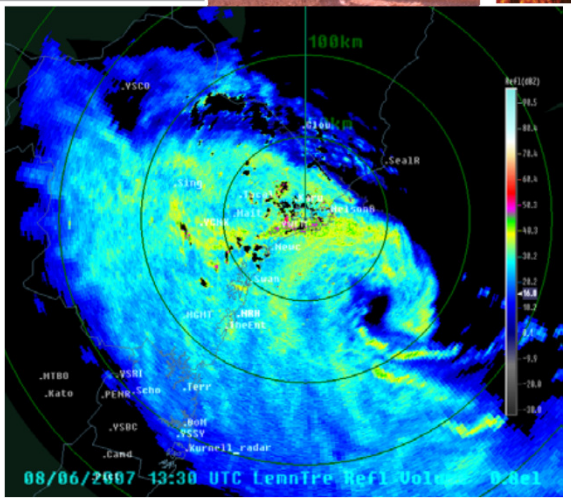
The project will use high-resolution modelling, together with the full range of meteorological data, to **better understand and predict meteorological natural hazards**, including fire weather, tropical cyclones, severe thunderstorms, and east coast lows.

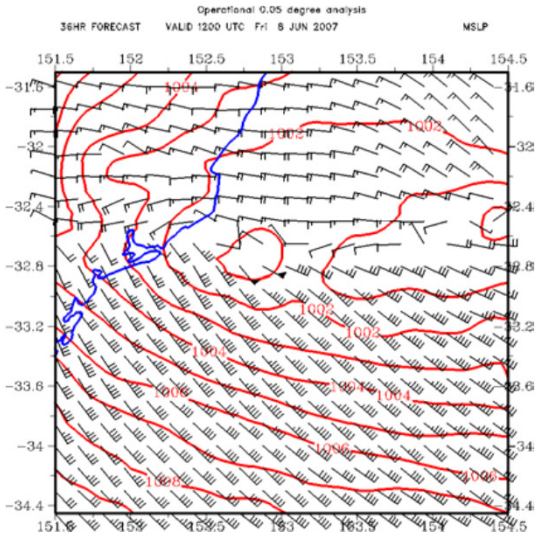
The outcomes from the project will contribute to **reducing the impact and cost of these hazards** on people, infrastructure, the economy and the environment.

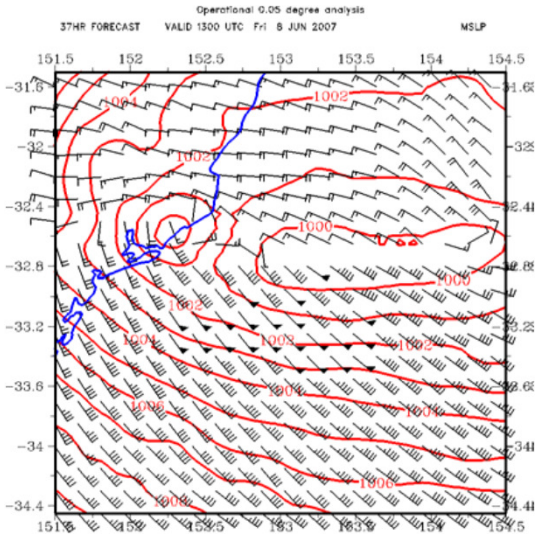
Objective 1: Small scales

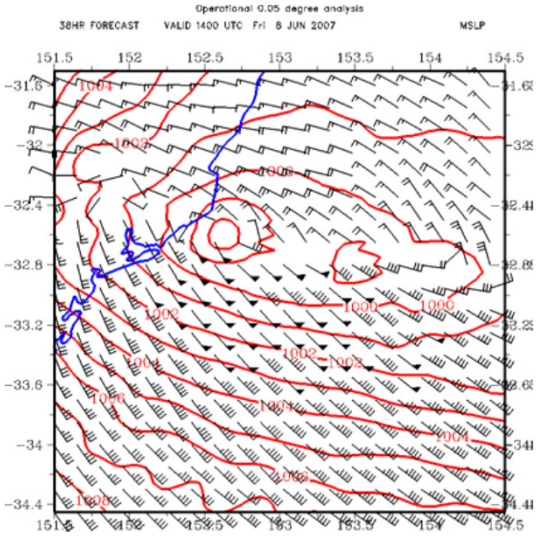












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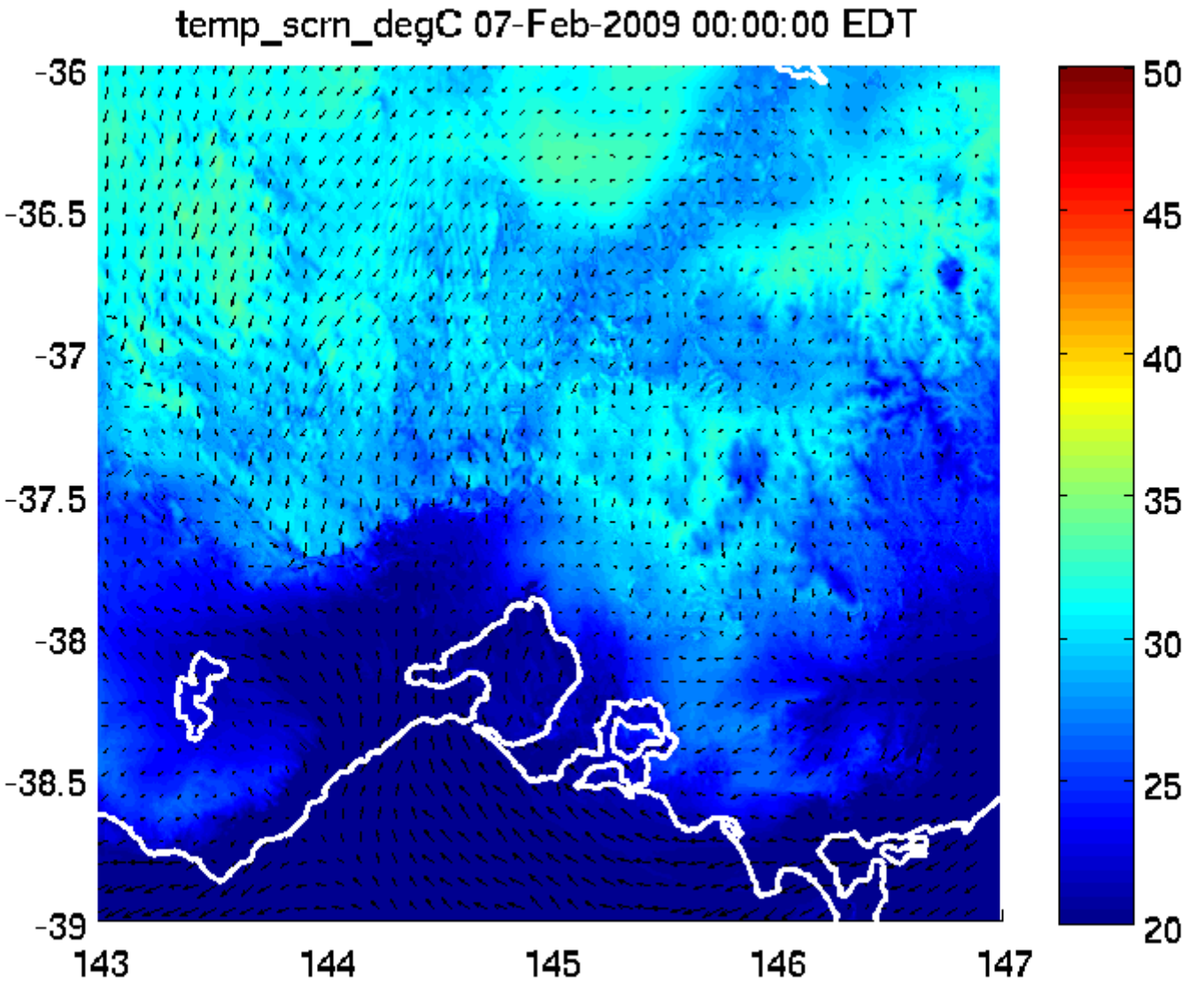

Black Saturday, surface air temperature and wind

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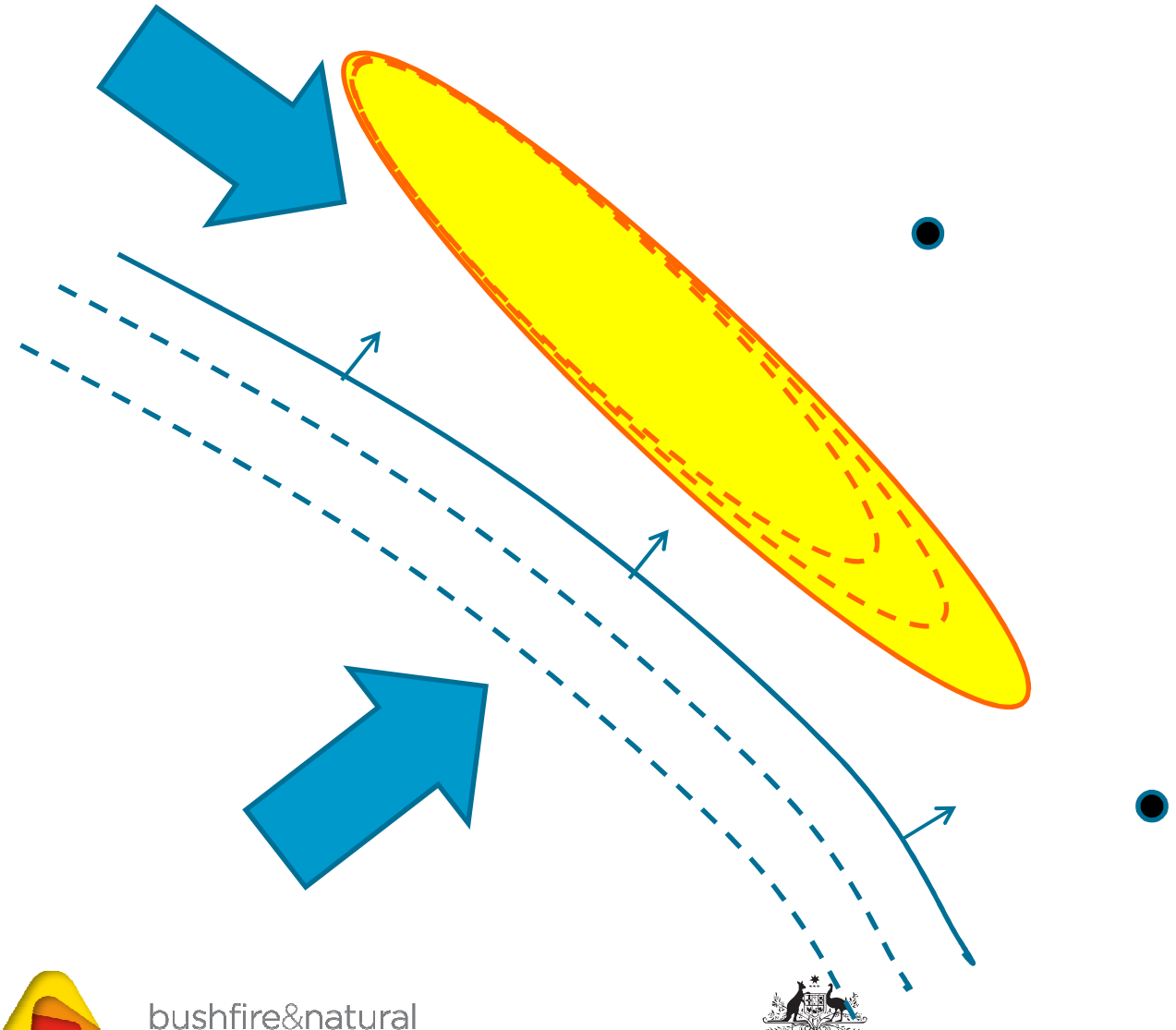
Objective 2: Quantifying uncertainty



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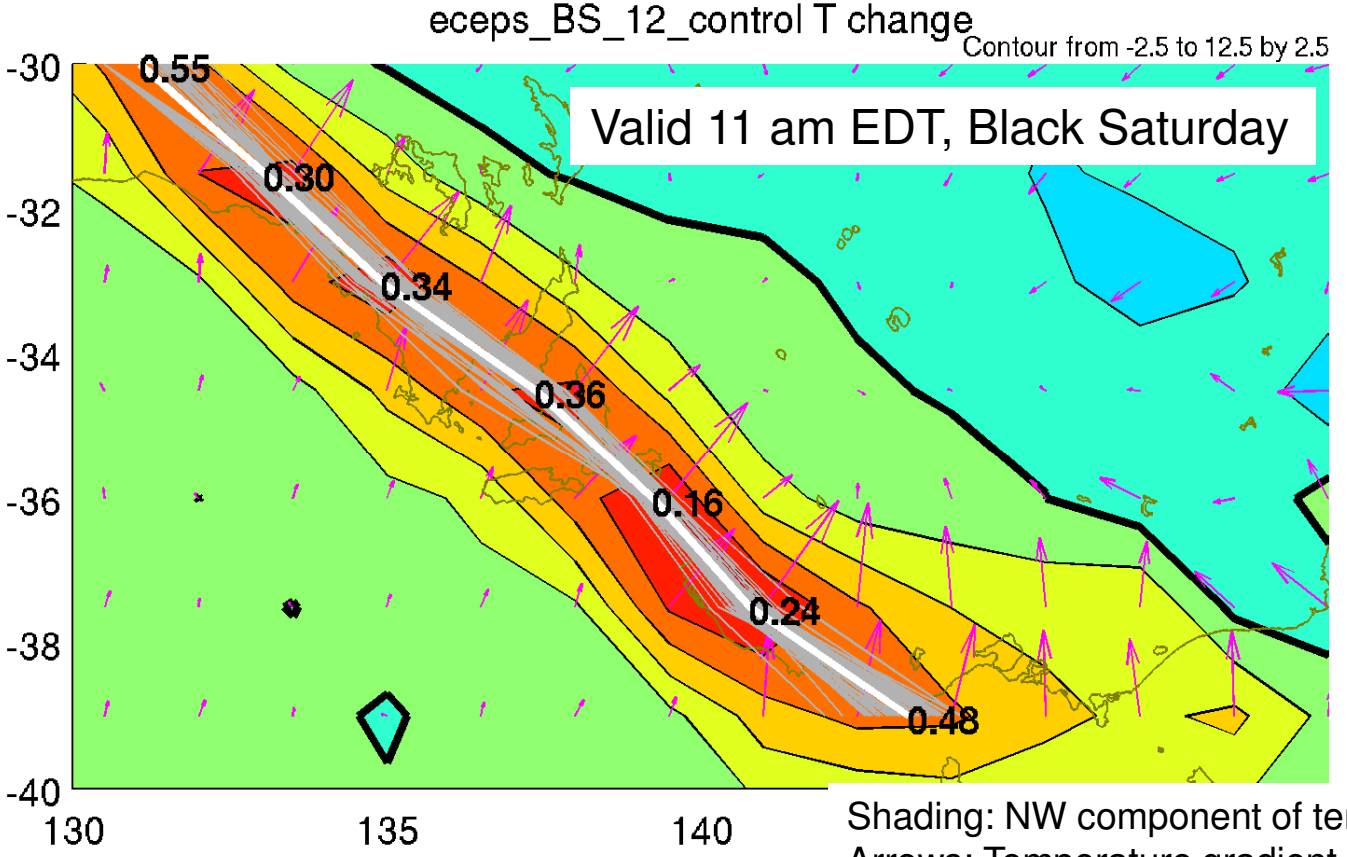

Shading: NW component of temperature gradient
Arrows: Temperature gradient
Grey lines: front position in ensemble
White line: front position in control
Numbers: standard deviation of front position

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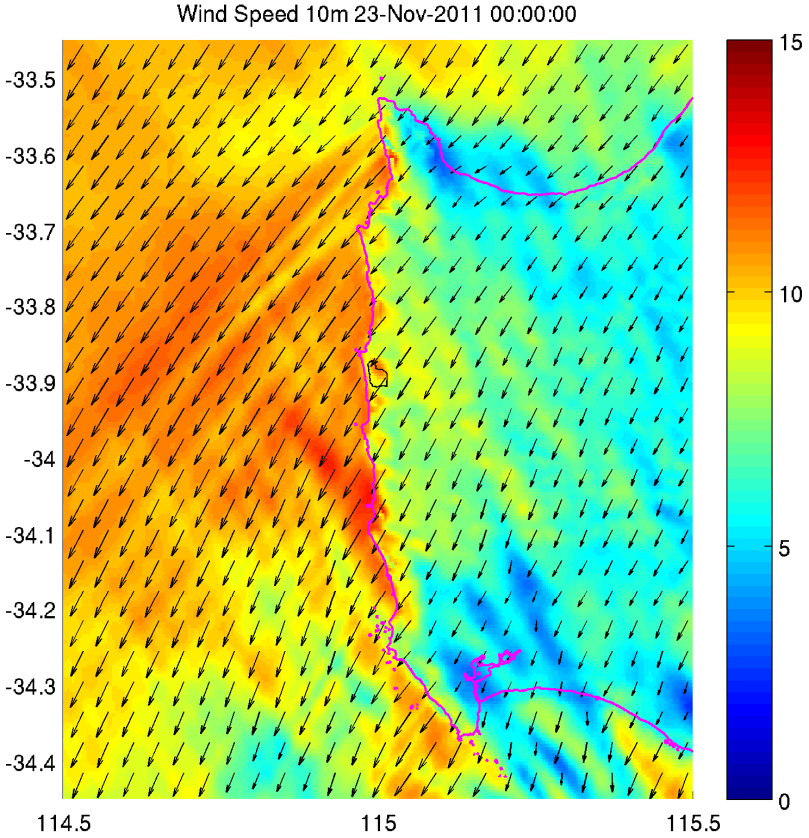
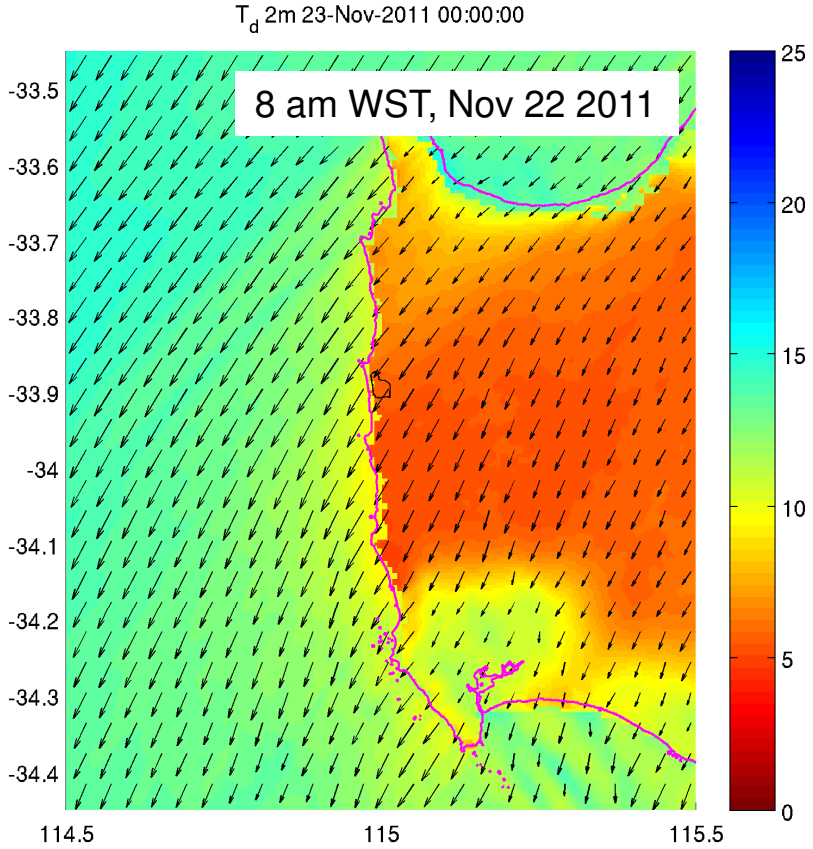
Objective 3: Scientific understanding





- Fire escape was largely due to small scale weather

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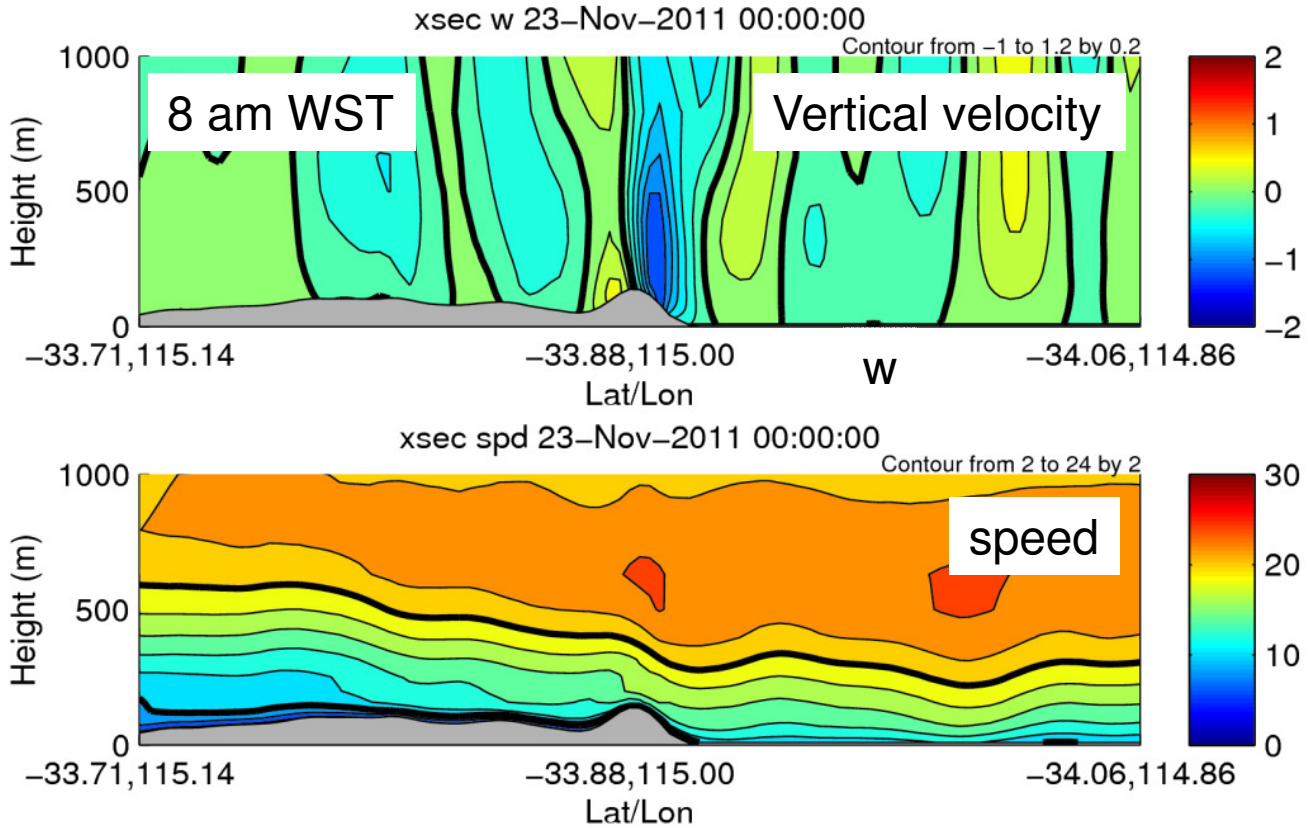

Cross-section through fire ground, along mean wind direction.

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Major Outcomes Expected

- Improved **scientific understanding** of severe weather phenomena relevant to Australia.
- Improved knowledge of **how to best predict** these phenomena, including model configuration and interpretation.
- Contribute to the **post-event analysis** and "**lessons learned**" of selected severe events that occur during the course of the project.
- Inform the development of **numerical weather prediction systems specifically for severe weather**.
- **Communicate** the above knowledge through seminars, conferences and publication in the peer-reviewed literature, to the scientific and operational communities.