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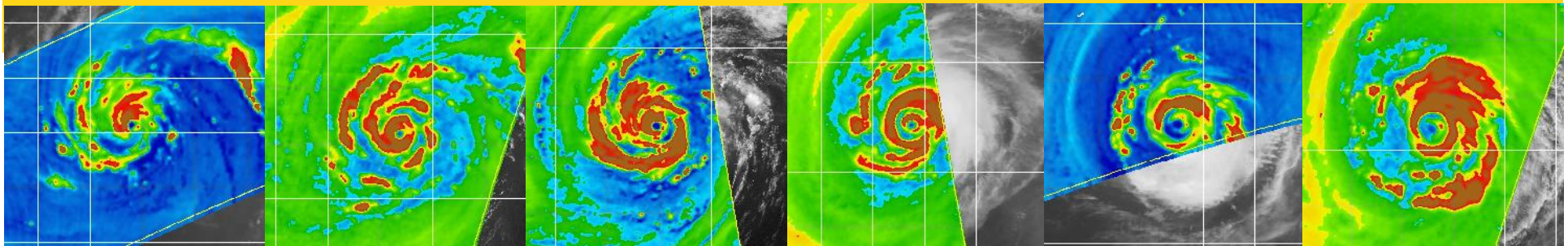
Australian Government
Bureau of Meteorology

IMPROVED PREDICTIONS OF SEVERE WEATHER TO REDUCE COMMUNITY IMPACT

Research Advisory Forum, Oct 2017

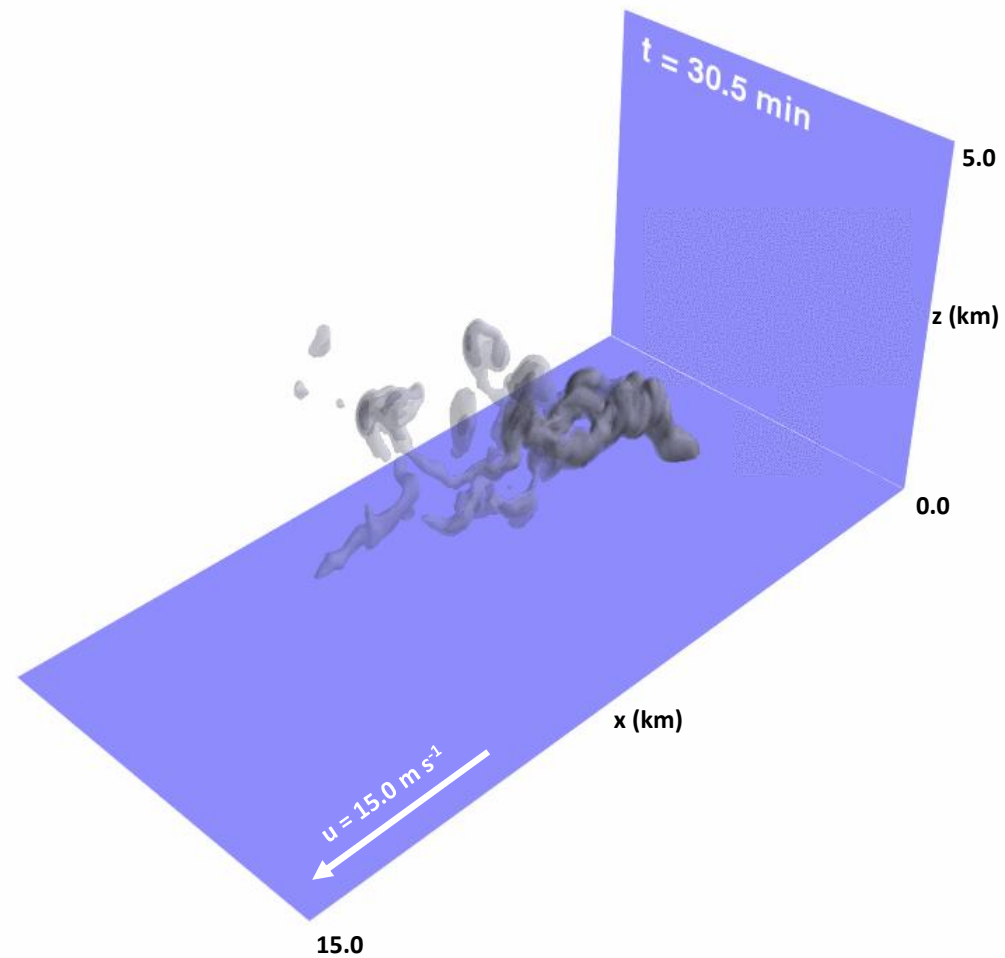
Jeff Kepert, Kevin Tory, Dragana Zovko Rajak and Will Thurston

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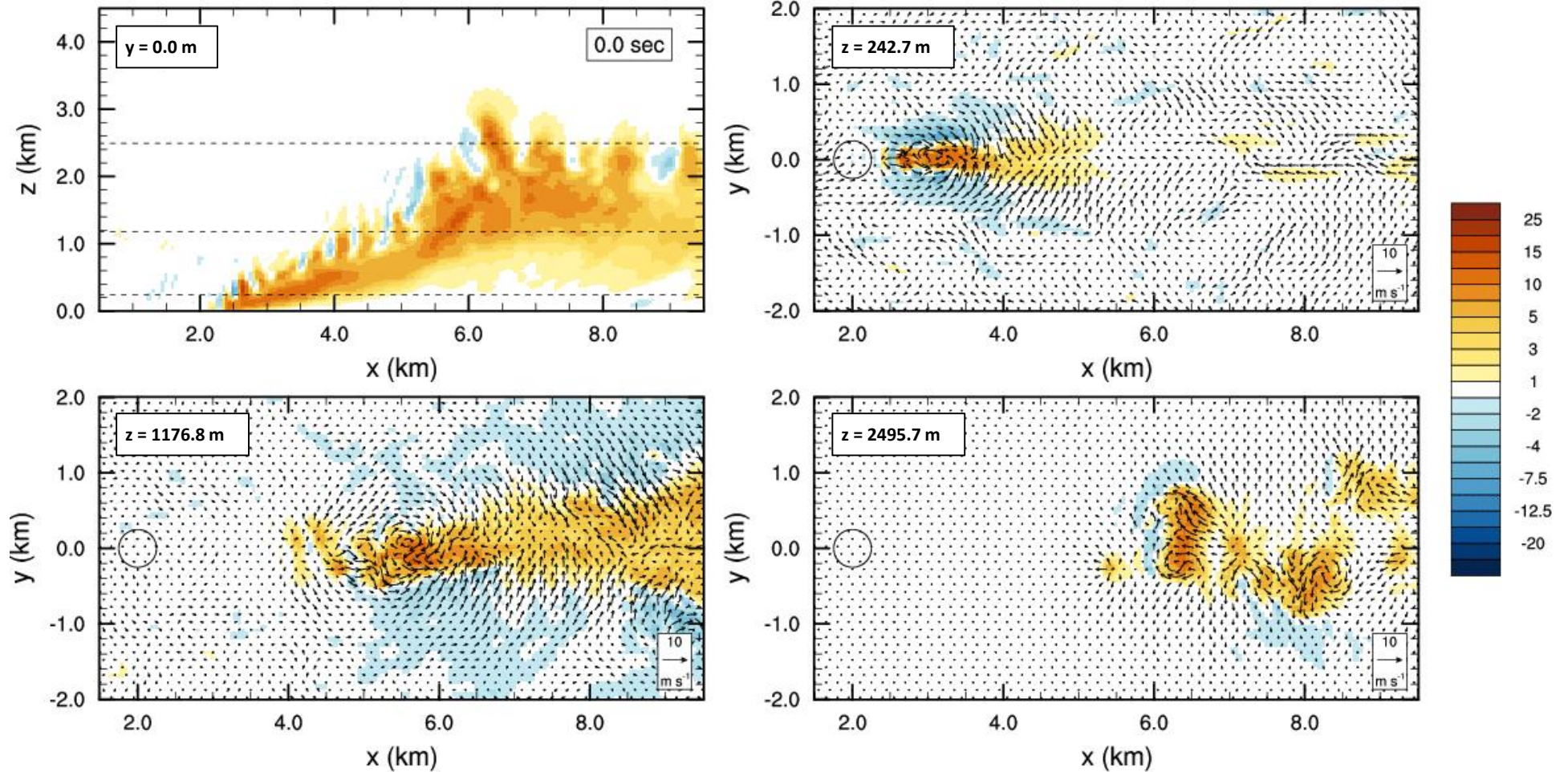




SIMULATED FIRE PLUME, 56 KM/HR WIND



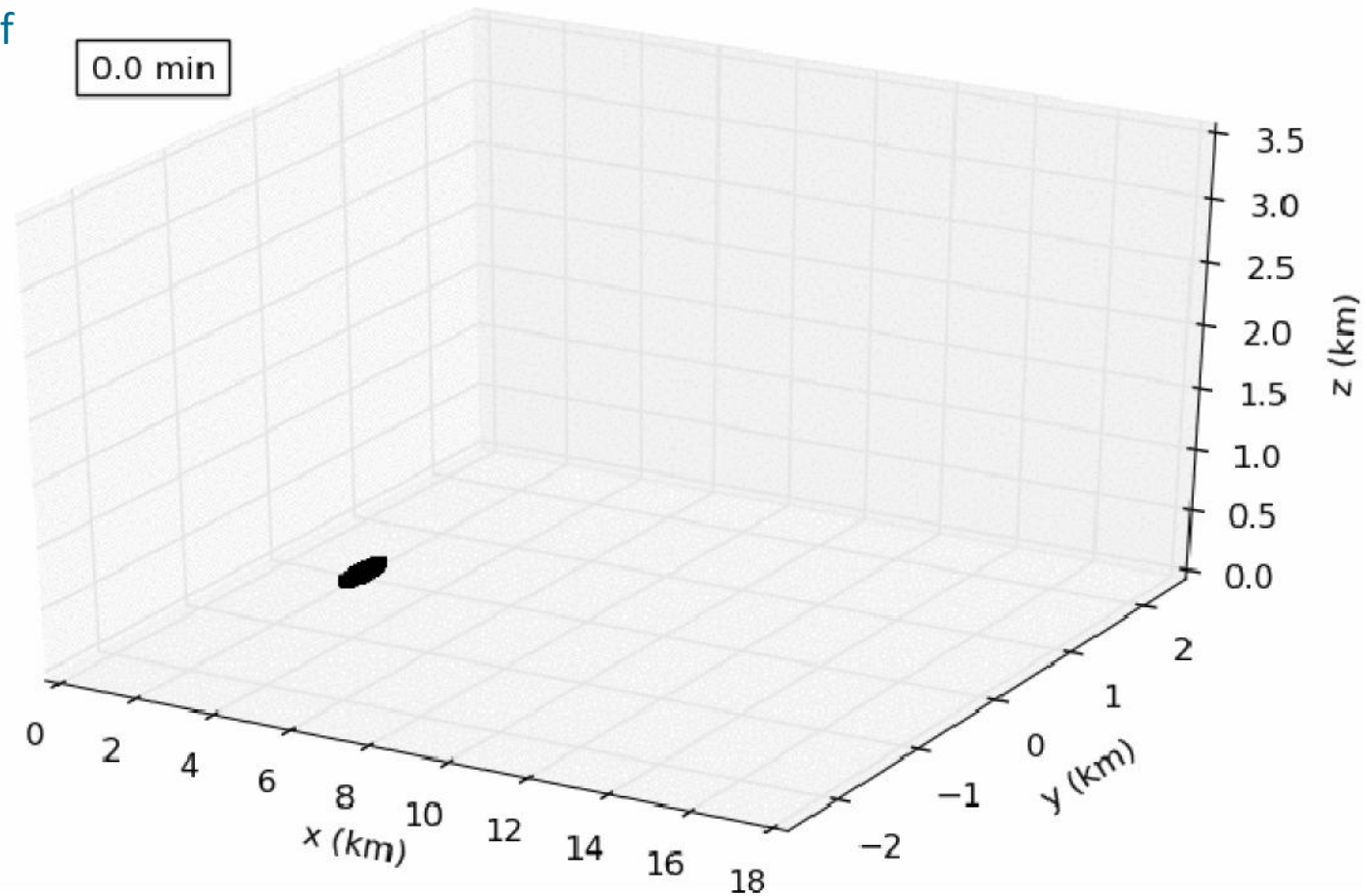
WINDS IN AND NEAR THE SMOKE COLUMN



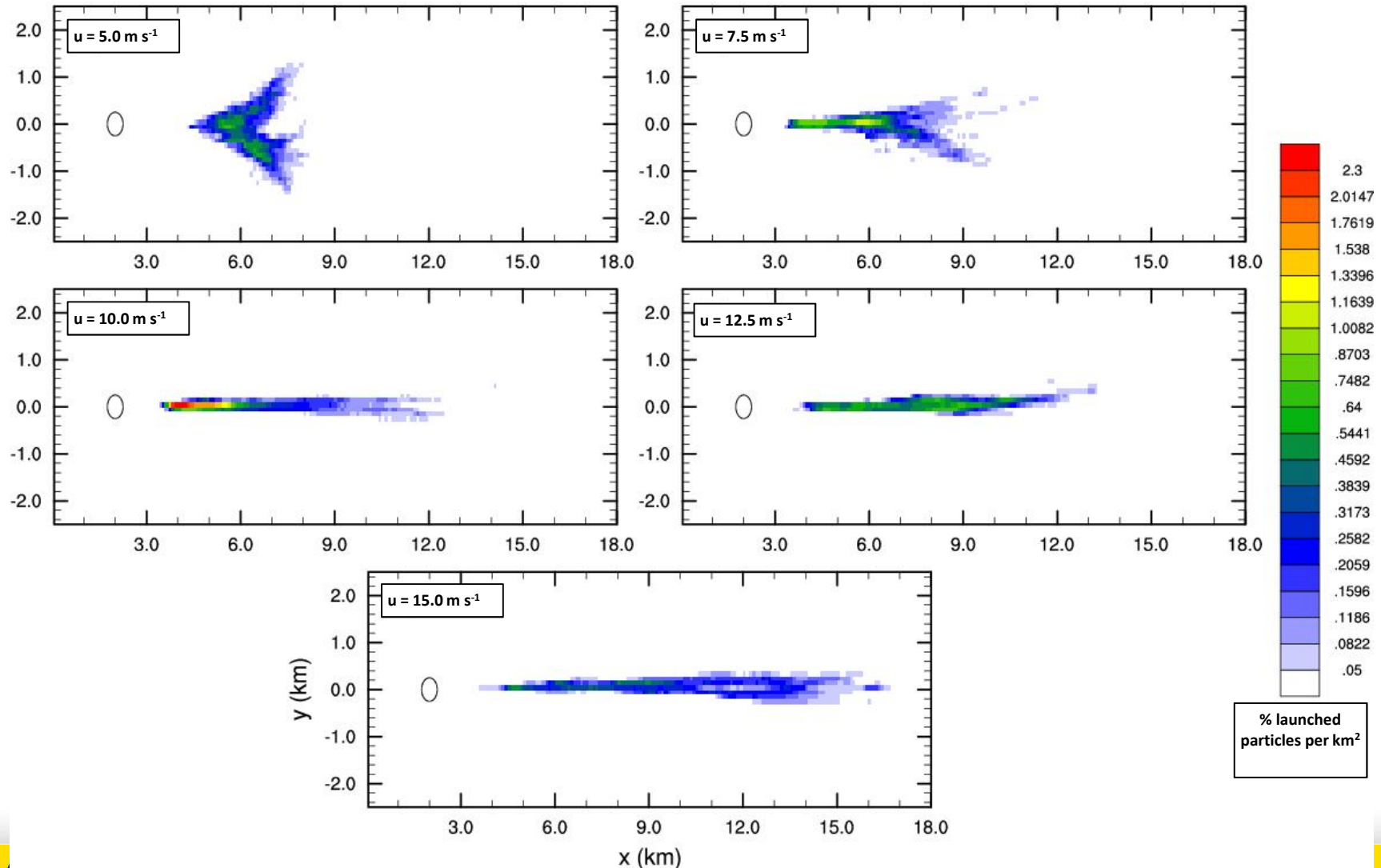
FIREBRAND TRANSPORT – 56 KM/HR WIND

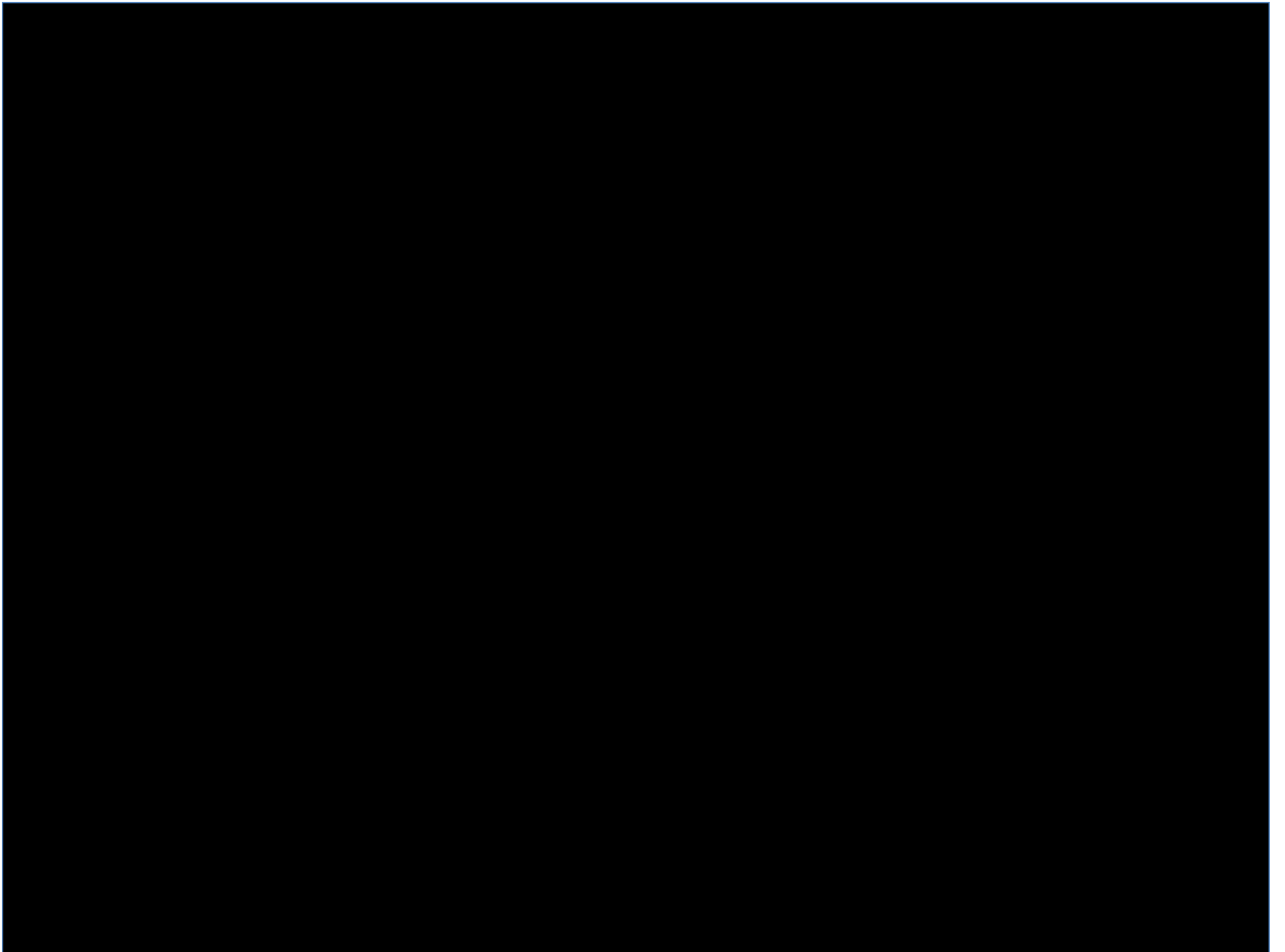
Studied the path of nearly 1.5 million embers (only 1% are shown here)

Almost 33% travel more than 1 km in this case



WHERE DO THE EMBERS END UP?







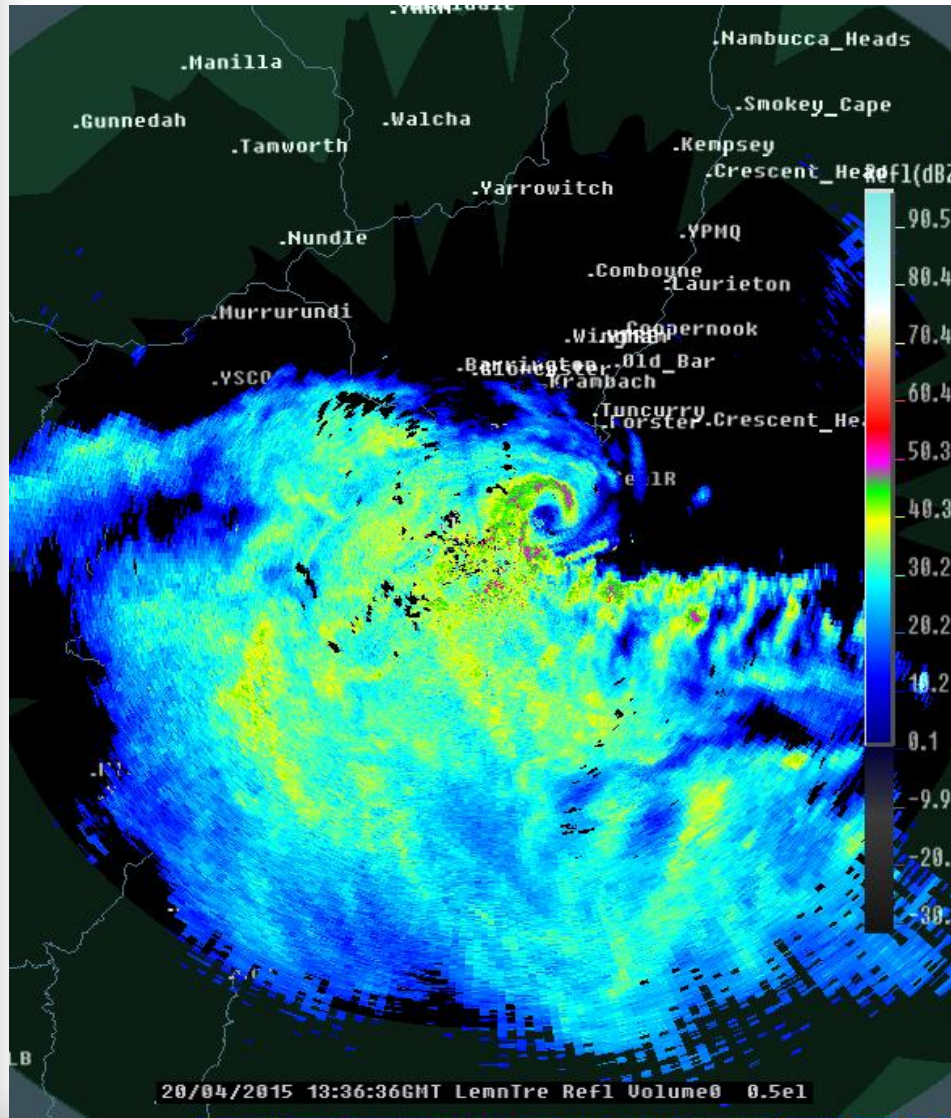
EAST COAST LOW

- 1) 20 – 23 April 2015
- 2) Intense low pressure systems that form close to NSW coast
- 3) Strong winds, heavy rain, major flooding, major waves and coastal erosion
- 4) 4 deaths
- 5) Dozens of roofs lost, trees down, > 200000 houses without power, 57 schools closed

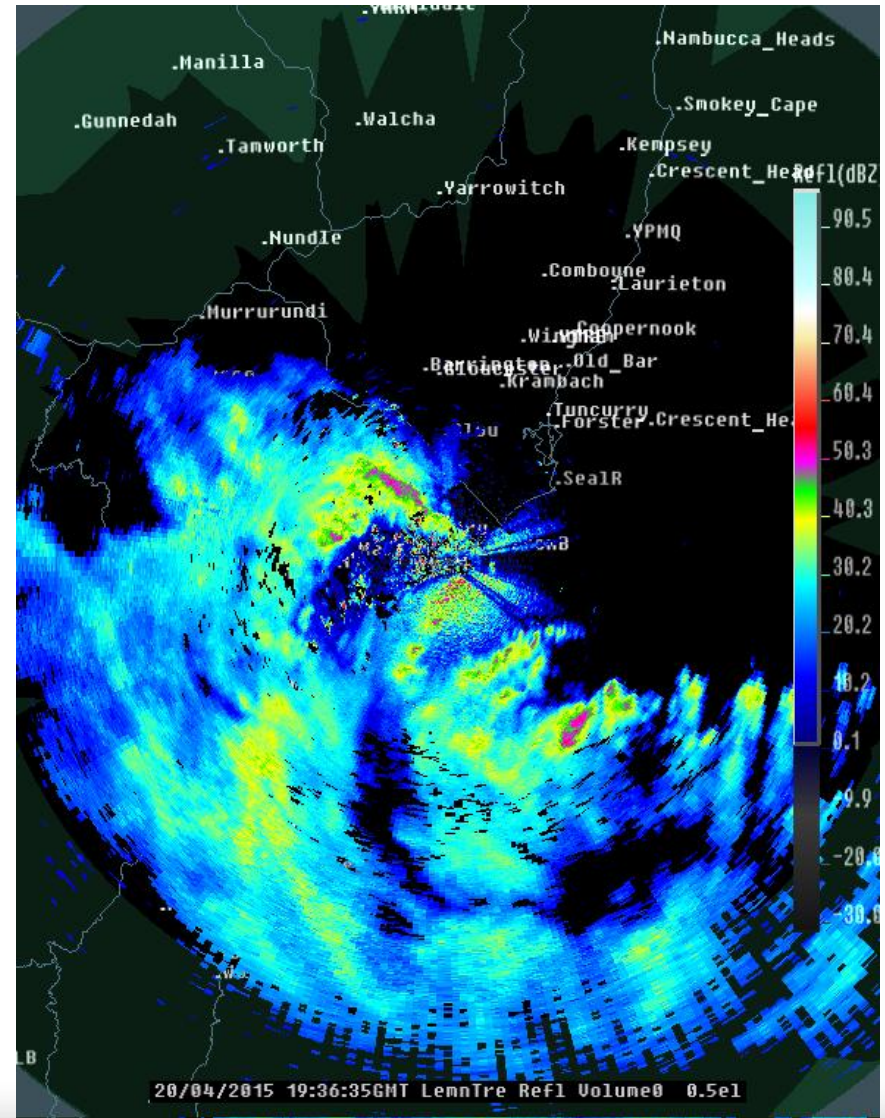


RADAR IMAGERY

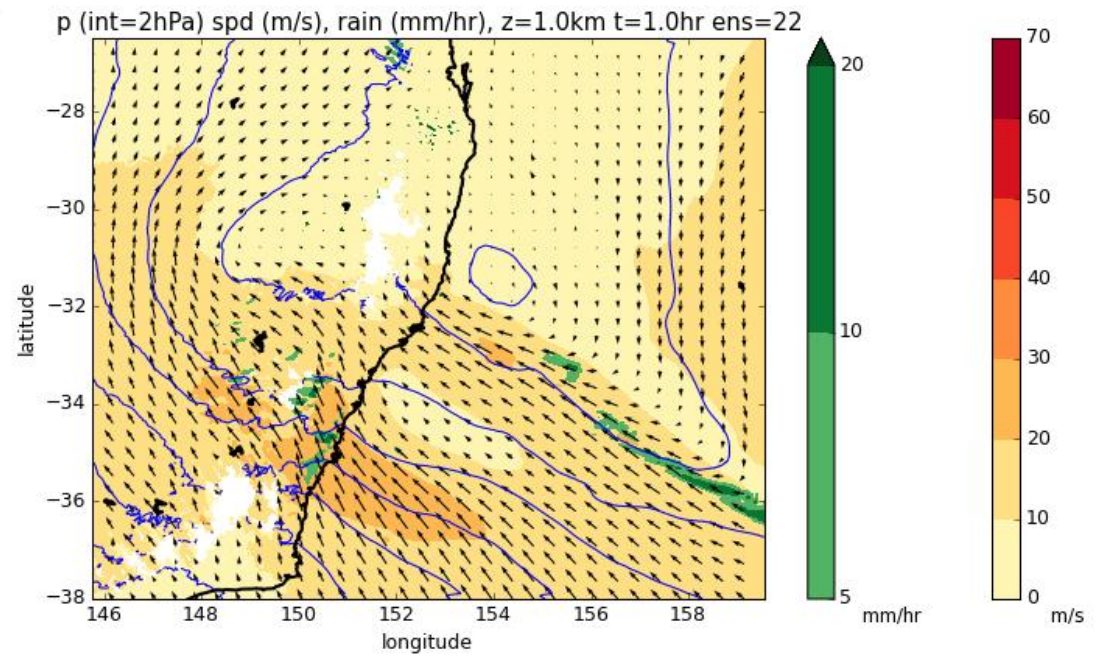
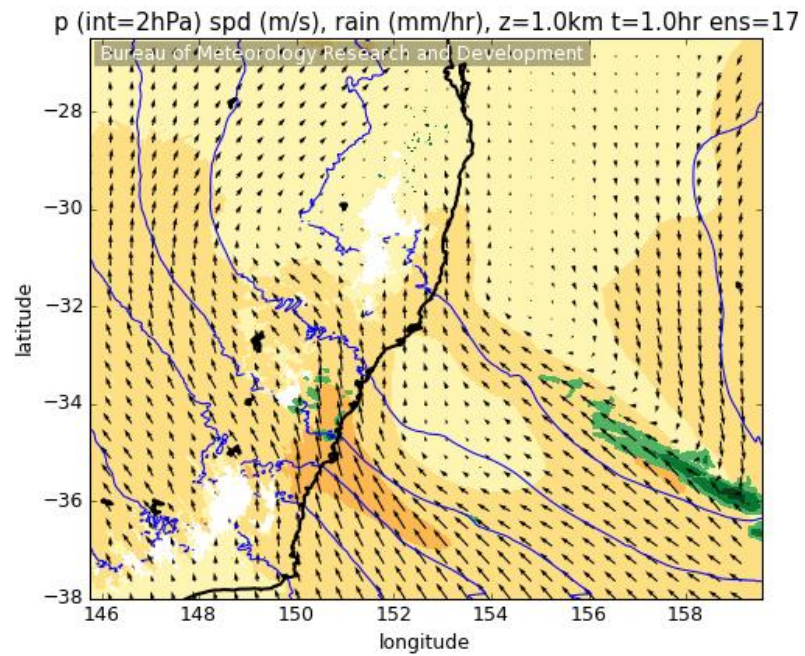
1336 UTC 20 April 2015



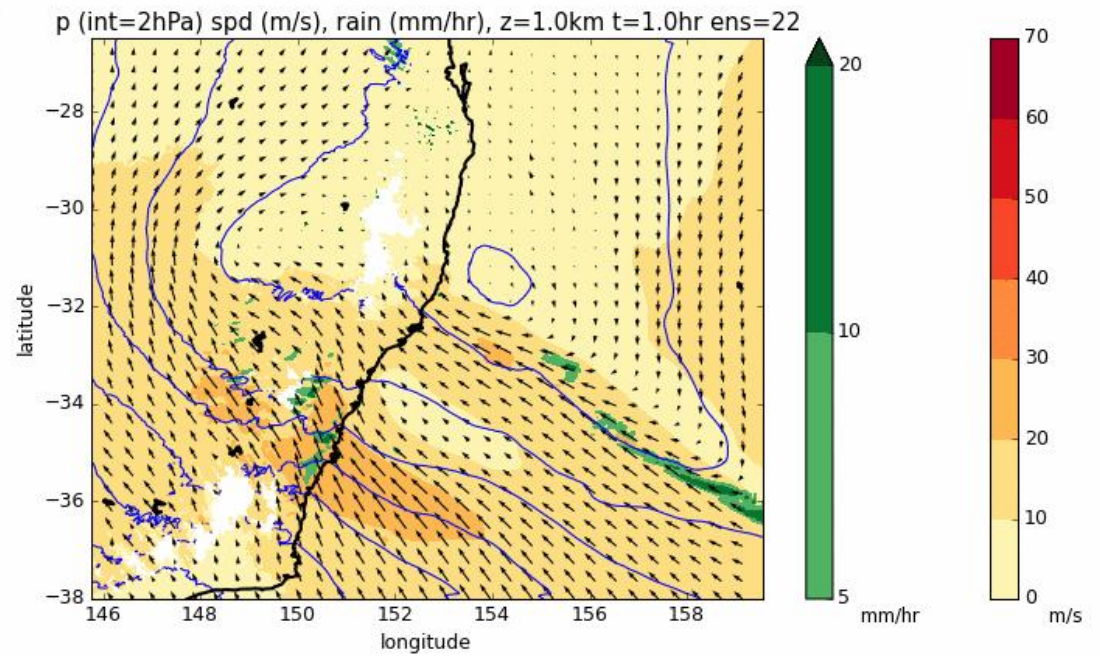
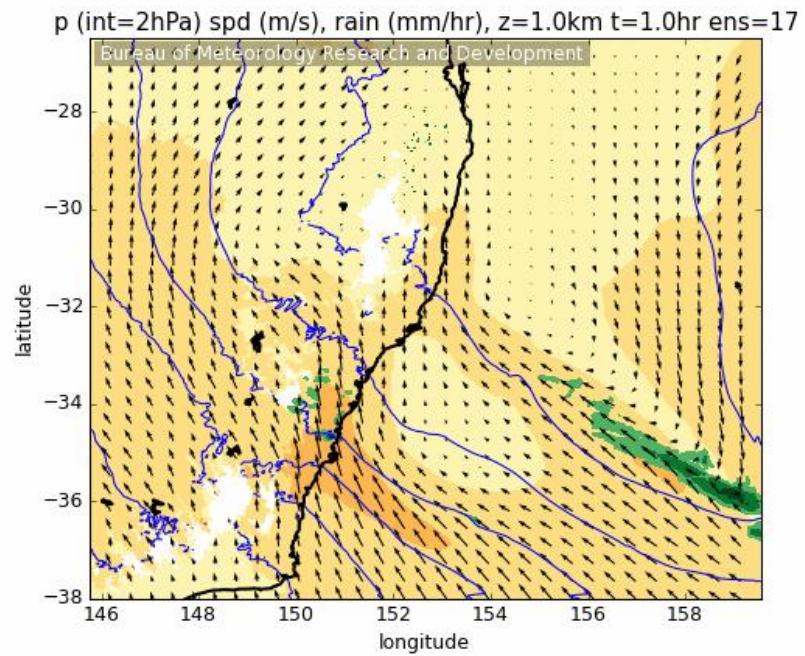
1936 UTC 20 April 2015



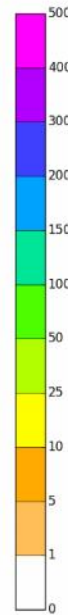
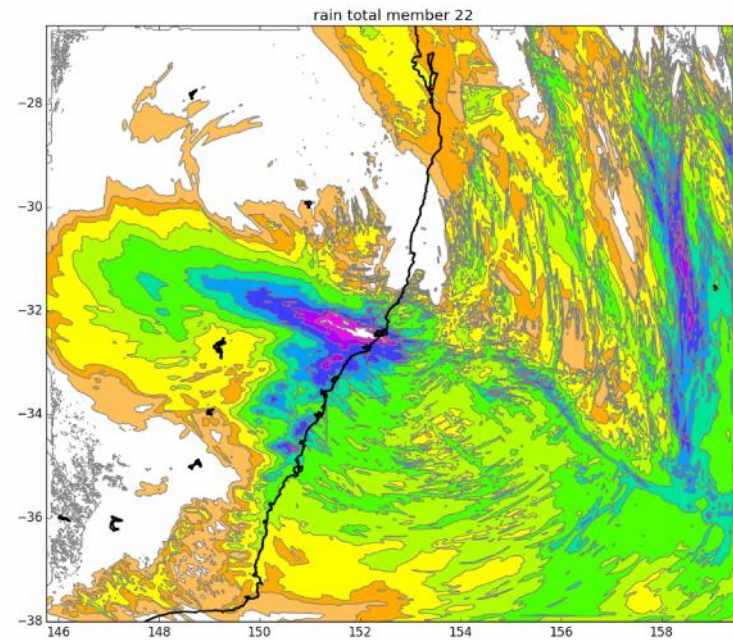
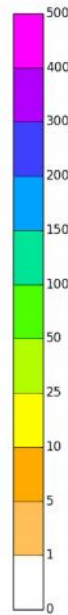
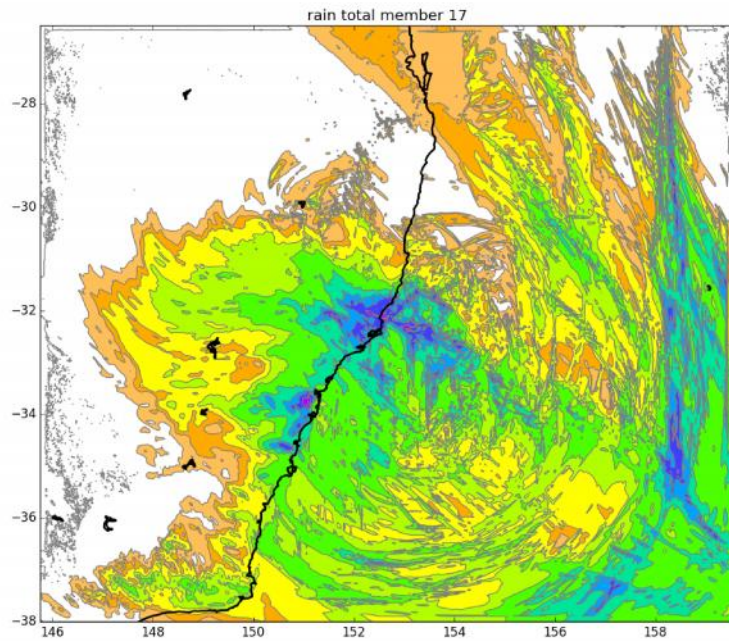
TWO MEMBERS OF ENSEMBLE



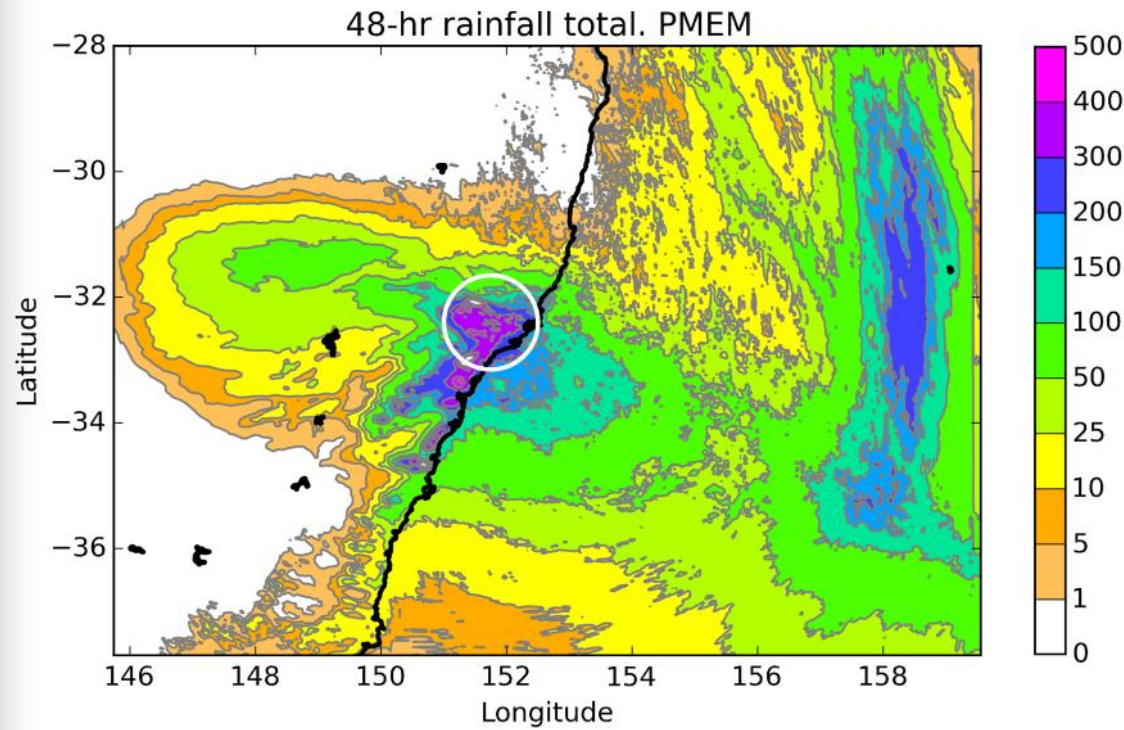
TWO MEMBERS OF ENSEMBLE



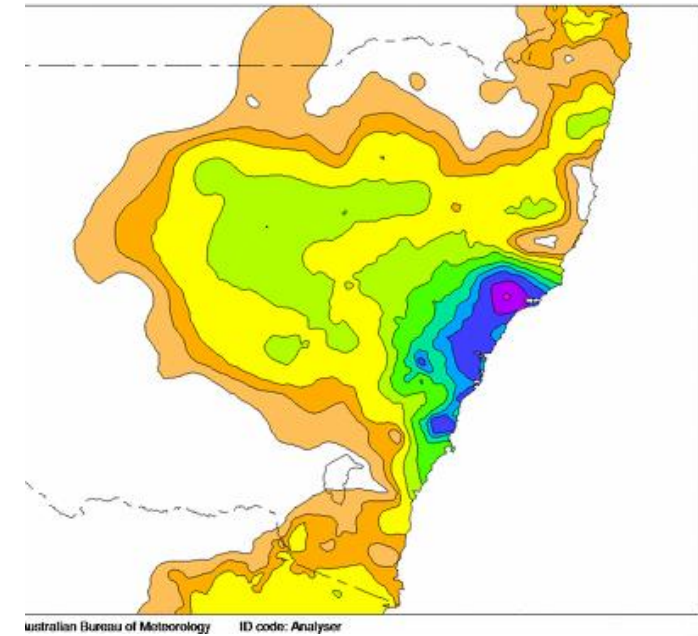
48-HOUR RAINFALL TOTALS



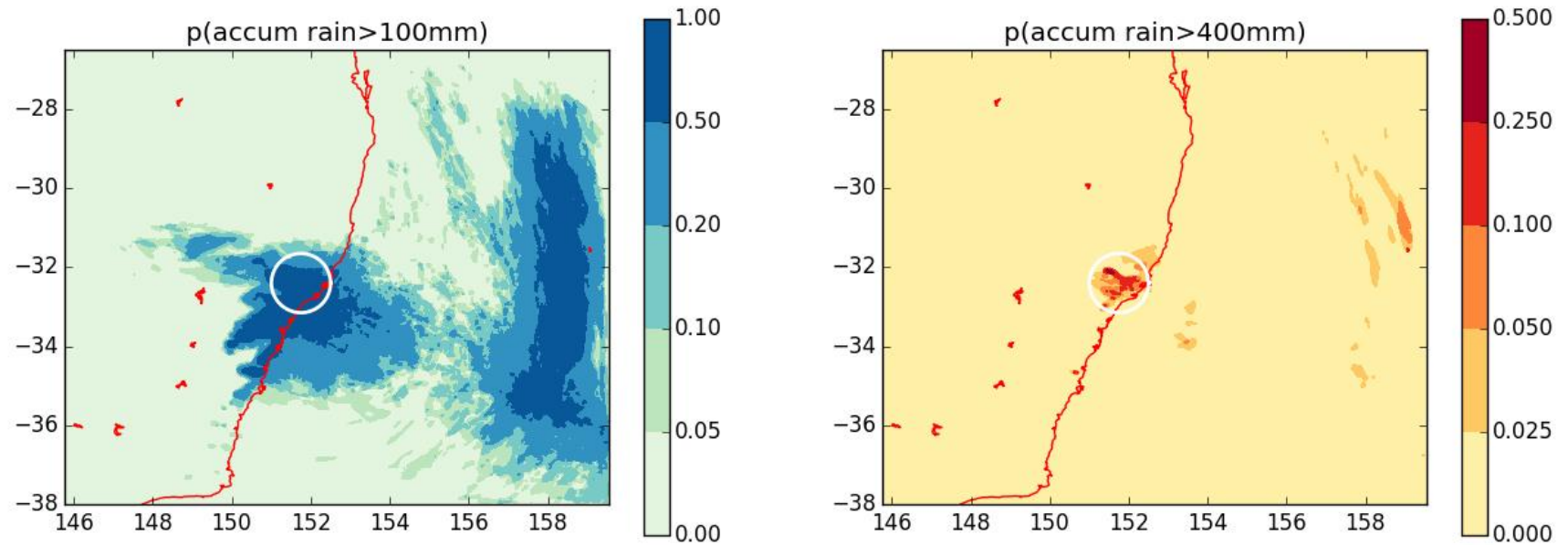
PROBABILITY-MATCHED ENSEMBLE MEAN



Australian rainfall analysis (mm) 21st to 22nd April 2015
Australian Bureau of Meteorology

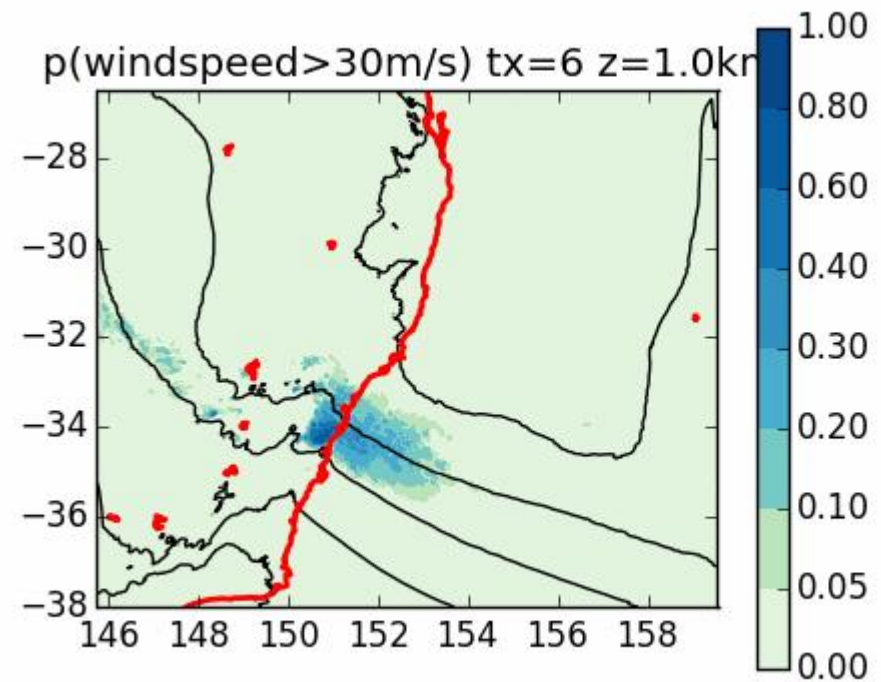
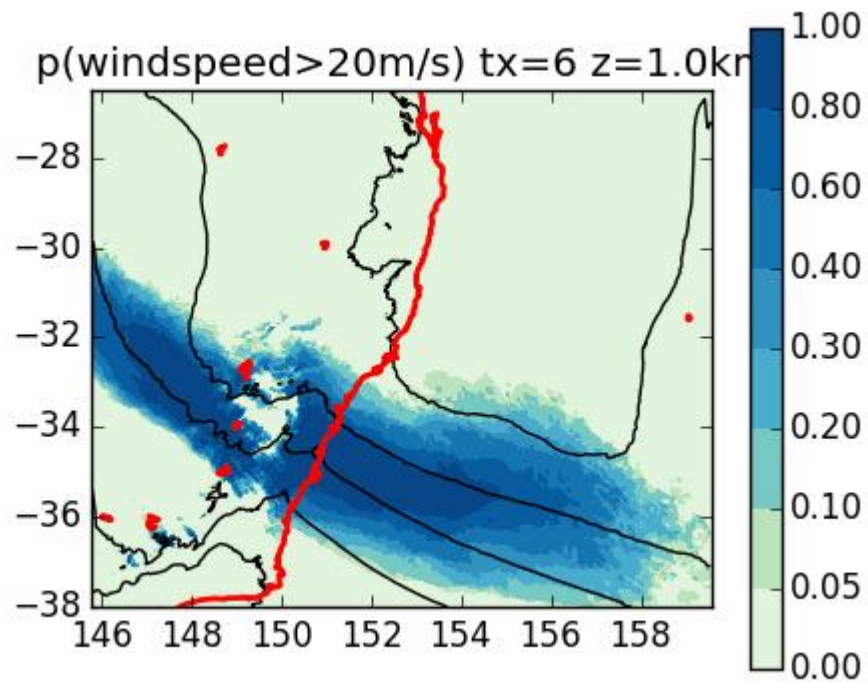


RAINFALL PROBABILITIES



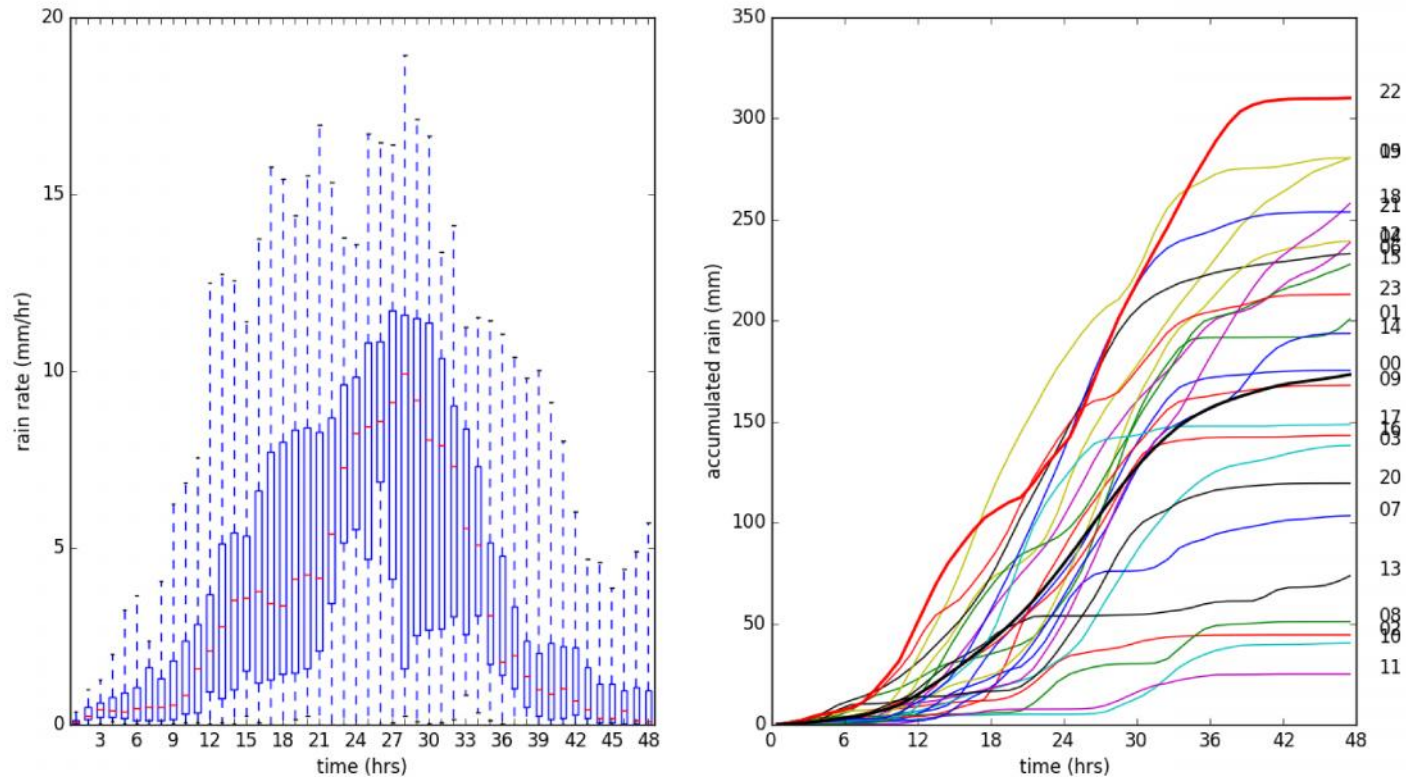
Probabilities of 48-hour total rainfall exceeding 100 mm and 400 mm

WIND PROBABILITIES



RAINFALL DISTRIBUTION DUNGOG

Ensemble rain in Dungog catchment



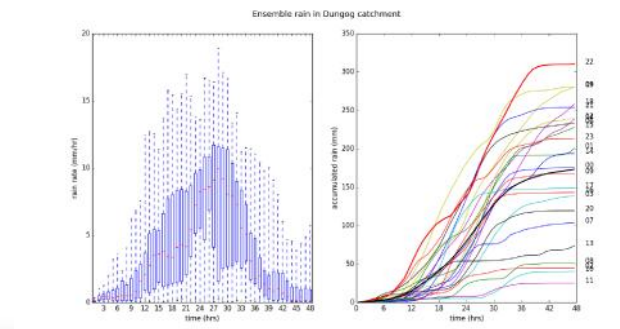
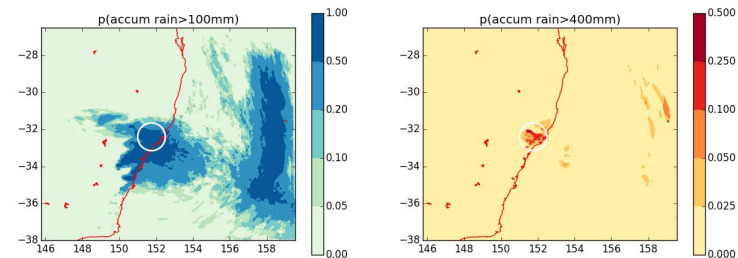
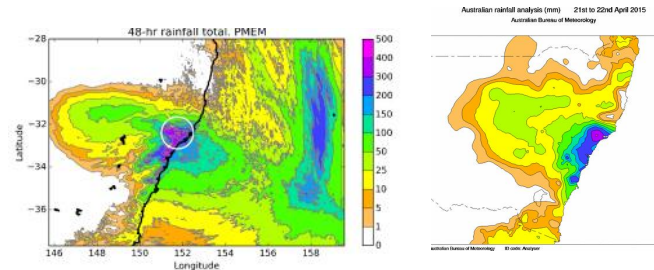
- 1) Left: hourly rainfall distribution
- 2) Right: rainfall accumulation by ensemble member
- 3) Averaged over 50-km circle centred on Dungog catchment

ENSEMBLE PREDICTION OF SEVERE WEATHER

Ensemble prediction

- Is more accurate
- Supports objective probabilistic prediction
- Enables better risk management

- Is coming soon to a weather office near you



IN THE LAST YEAR, WE HAVE ...

- 1) 2 papers published
- 2) 2 papers ready to submit
- 3) 2 papers in advanced preparation
- 4) Hazard note and much media on downslope winds and fire blowups
- 5) Numerous seminars, AFAC presentations, etc.
- 6) Final report for first 3.5 years
- 7) Bureau is routinely running a prototype hi-res EPS for eventual operations
- 8) Will Thurston has found a new job
- 9) Run out of room on this slide 😊

IN THE COMING YEAR, WE WILL ...

- 1) Finish off our papers
- 2) Start work on ember transport parameterisation
- 3) Verify the plume modelling against radar obs
- 4) Do a case study of the SA tornado outbreak
- 5) Present at conferences
- 6) Work with Bureau Extreme Weather Desk on forecast ideas for pyrocumulus
- 7) Replace Will
- 8) Work with Harald Richter and Geosciences Australia on the impacts project

UTILIZATION