bushfire&natural HAZARDSCRC

COUPLED FIRE-ATMOSPHERE MODELLING PROJECT

ACCESS-Fire

Waroona Fire case study

Mika Peace and Jeff Kepert

High Impact Weather, Research and Development, Bureau of Meteorology

Australian Government
Department of Industry, Innovation and Science

Business Cooperative Research Centres Programme

PROJECT OVERVIEW

1) Project started in March (7 months)
2) Progress with ACCESS-Fire slow due IT issues
3) Waroona case study draft
4) Implementation activities

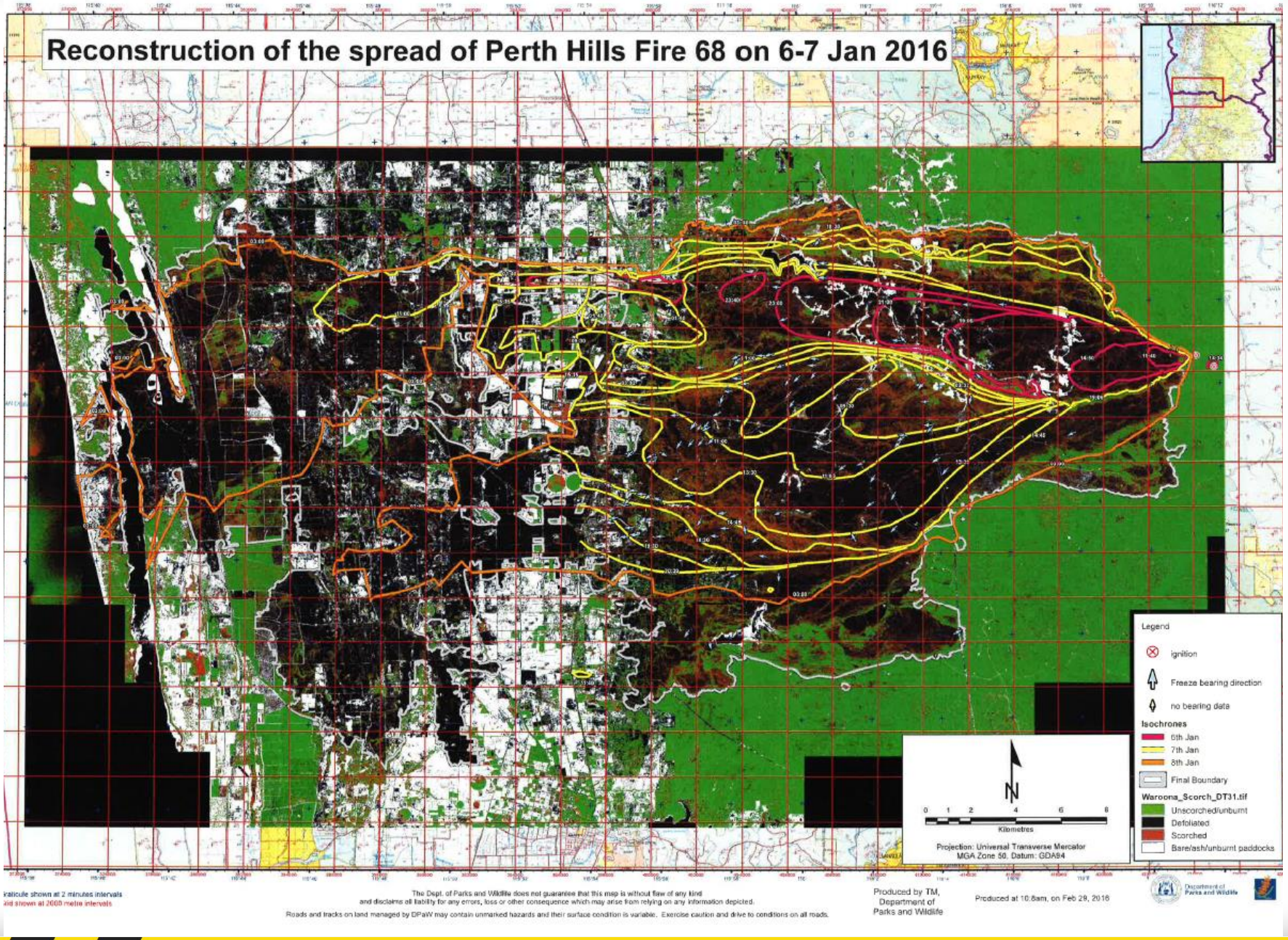
ACCESS-FIRE

1) What is a Coupled Fire-Atmosphere model and why use one?
2) What is ACCESS-Fire?
3) Monash/Melb Black Saturday study complete

THE WAROONA FIRE CASE STUDY

1) Mika Peace, Jeff Kepert, Brad Santos, Lachie McCaw, Neil Burrows and Robert Fawcett

2) 6, 7 January 2016 south of Perth
3) 2 x PyroCB events
4) 2 x destructive evening ember showers
5) Highest FDI does not coincide with EFB
6) Aim - Waroona case study in review by EOY


Reconstruction of the spread of Perth Hills Fire 68 on 6-7 Jan 2016
Legend
ignition
Freeze bearing direction
no bearing data
Isochrones
6th Jan
7th Jan
8th Jan
Final Boundary
Waroona_Scorch_DT31.tif
Unscorched/unburnt
Defoliated
Scorched
Bare/ash/unburnt paddocks
N
0 1 2 4 6 8
Kilometres
Projection: Universal Transverse Mercator
MGA Zone 50. Datum: GDA94
The Dept. of Parks and Wildlife does not guarantee that this map is without flaw of any kind
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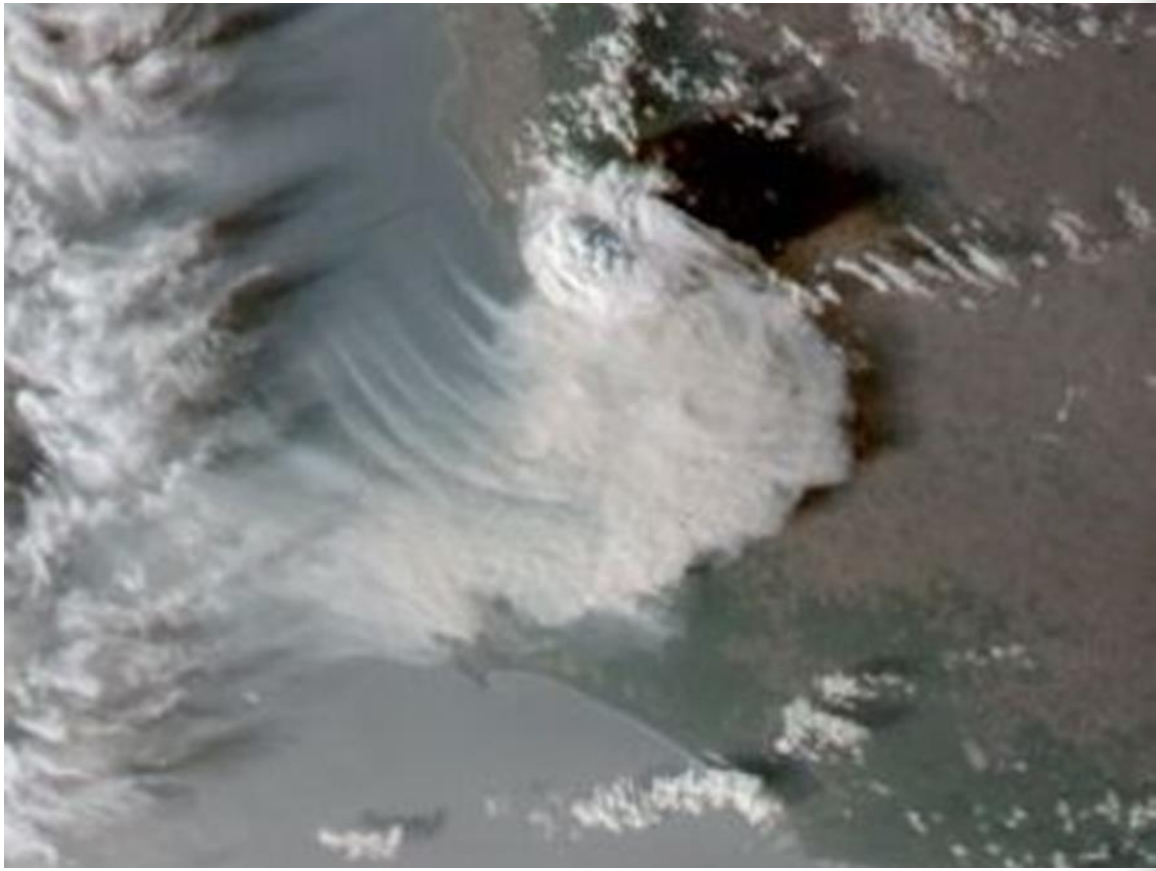
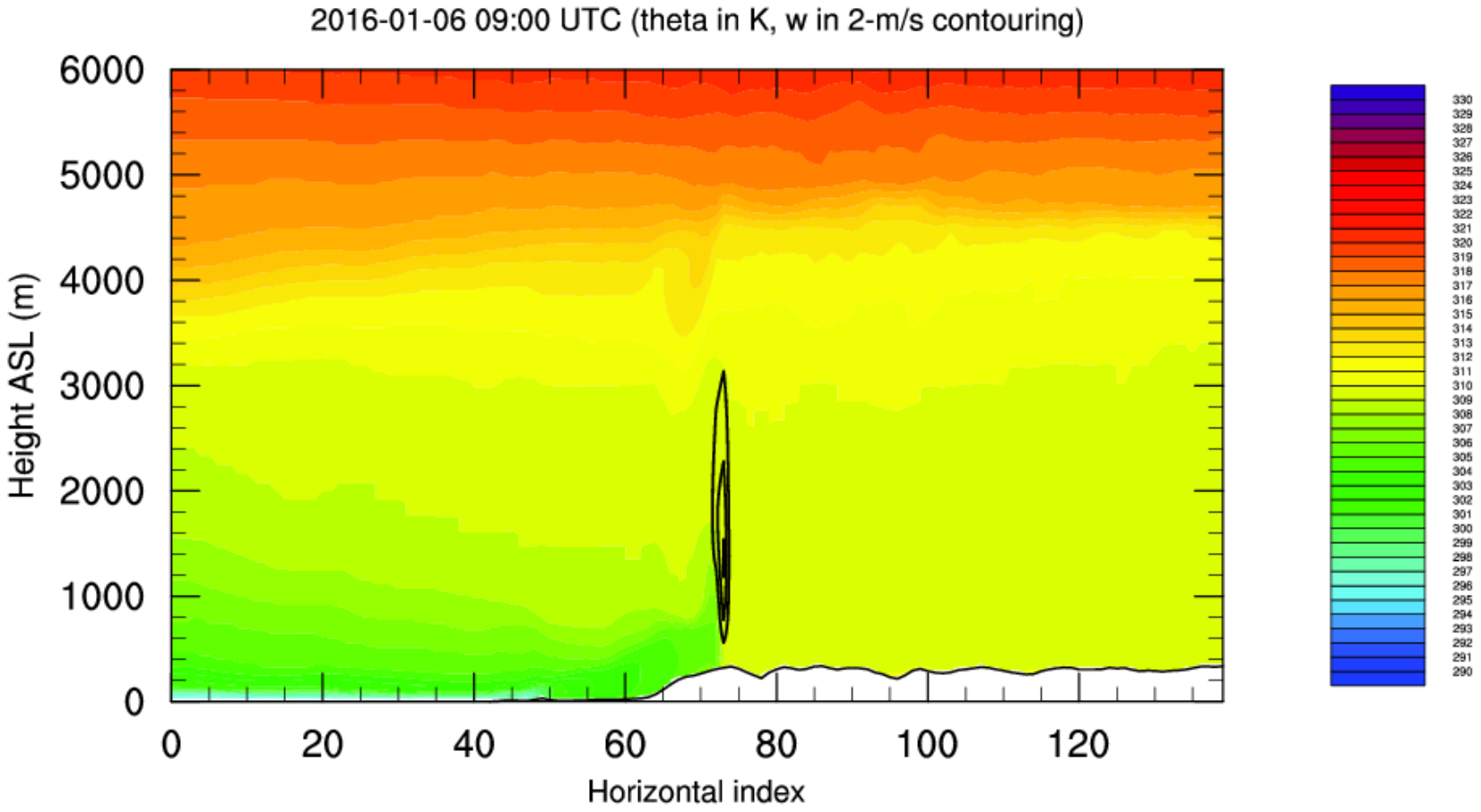
Produced at 10.8am, on Feb 29, 2016

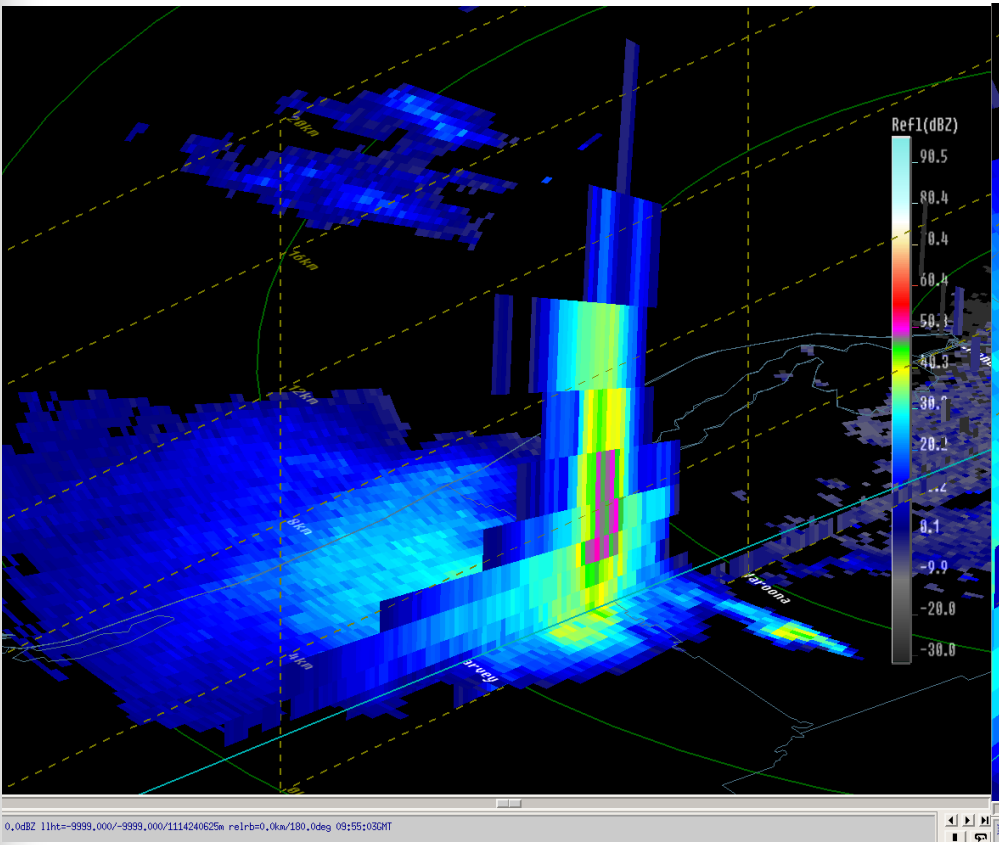
PYROCB EVENT 1, WEDNESDAY LATE AFTERNOON

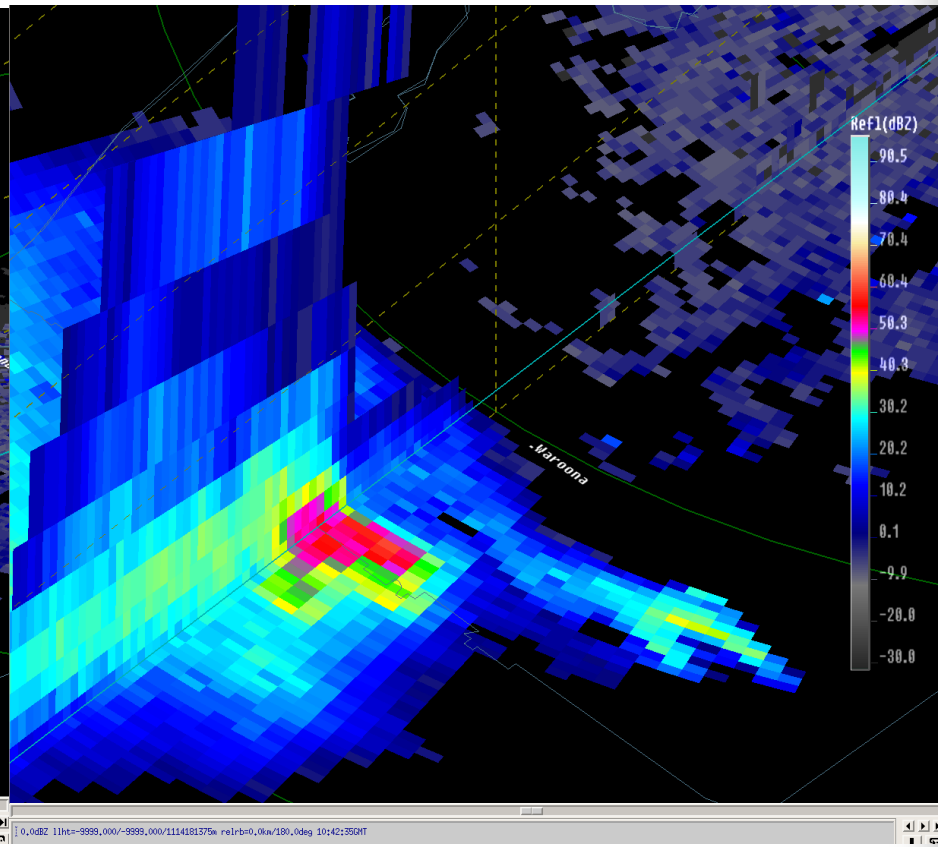
1) Multicellular storm
2) Leading edge of sea breeze front shows strong up-motion
3) Tops to nearly 15km!
4) Lightning ignited new fires downwind
5) Gust front at Wagerup AWS





ACCESS PLOT VERTICAL MOTION


Refl(dBZ)
90.5
80.4
70.4
60.4
50.3
40.3
30.2
20.2
10.2
0.1
-9.9
-20.0
-30.0
Yakin
Yakin
Yakin
Yakin
Yakin
Maroona
Maroona
0.0dBZ 1lht=-9999.000/-9999.000/1114240625m relrb=0.0km/180.0deg 09:55:03GMT


Refl(dBZ)
90.5
80.4
70.4
60.4
50.3
40.3
30.2
20.2
10.2
0.1
-9.9
-20.0
-30.0
Maroona
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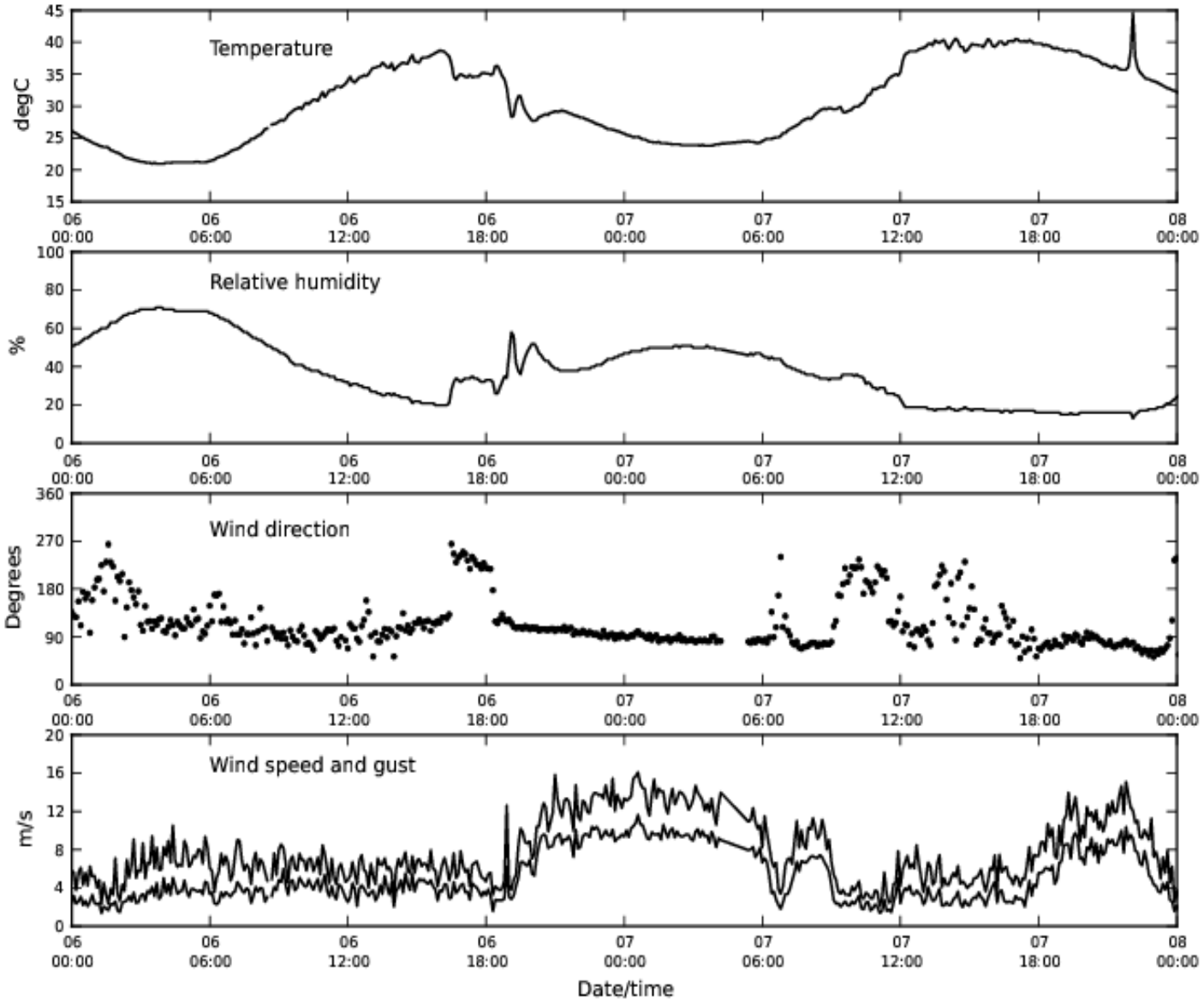
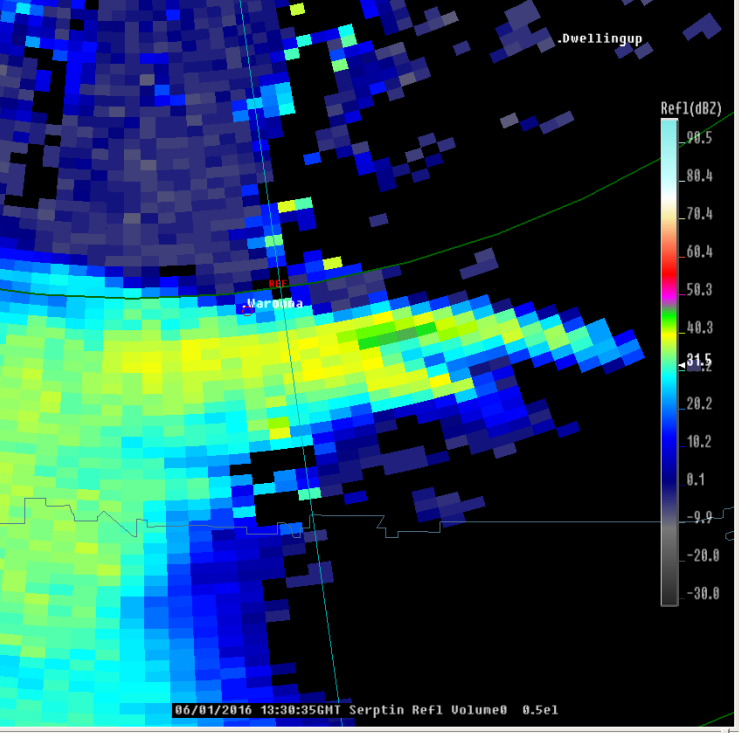
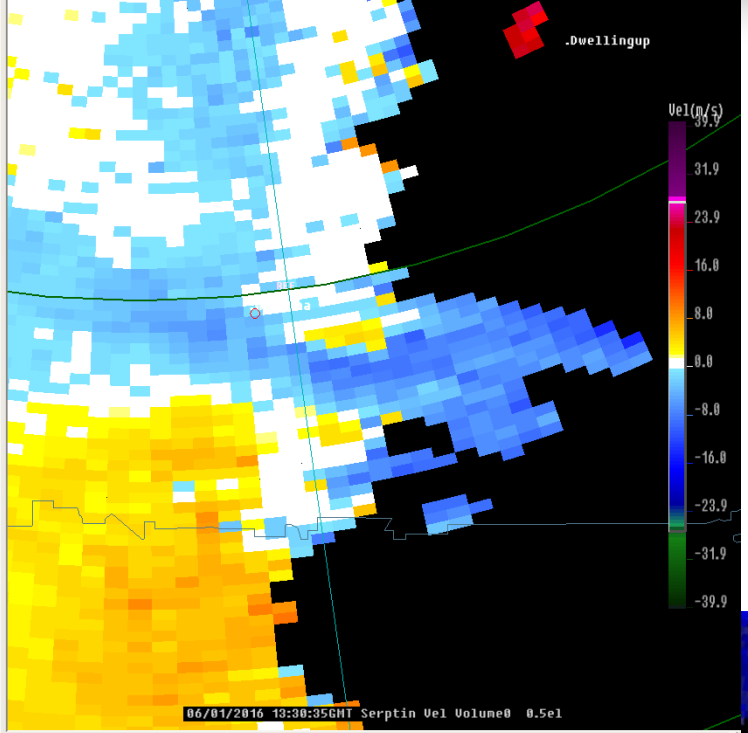


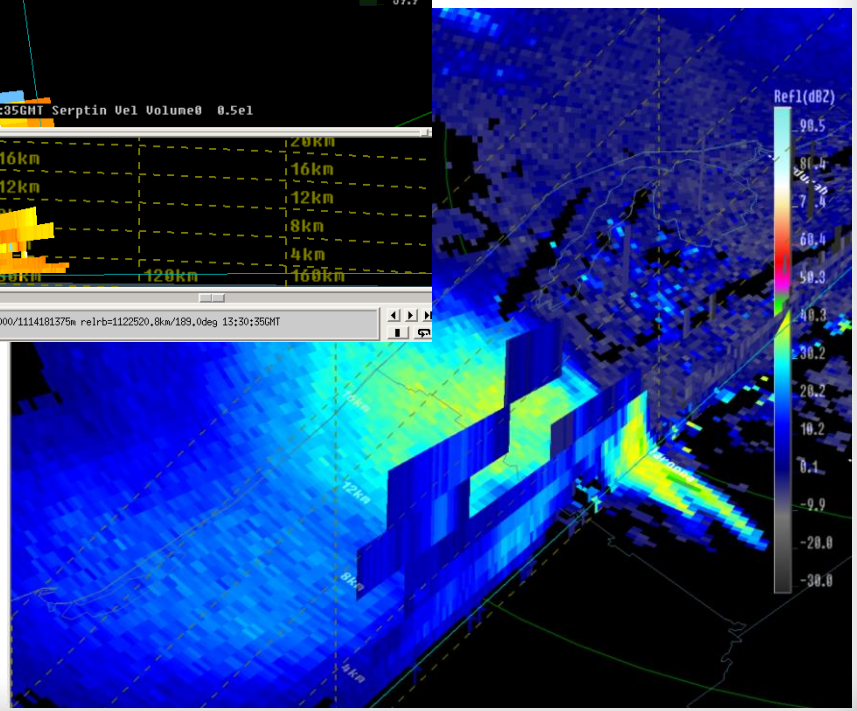
WAGERUP AWS (ALCOA)

EMBER STORM 1 – WAROONA, WEDNESDAY EVENING

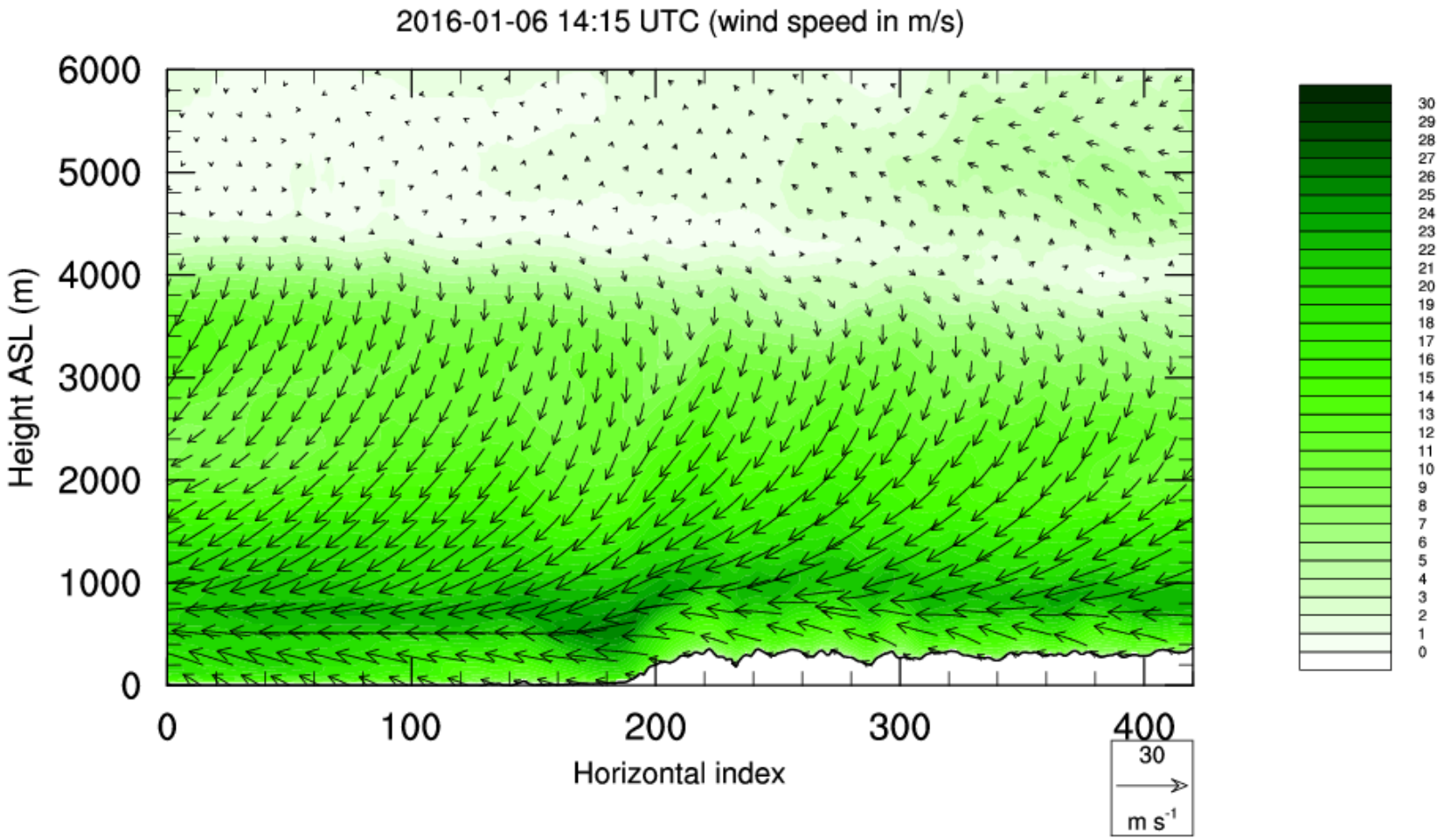
1) "Destructive ember storm"
2) PyroCB not the likely mechanism due to timing
3) Fire was closer to Waroona than IMT expected
4) Ignition from lightning strikes and gust front
5) Doppler radar shows convergence zone
6) Downslope winds and hydraulic jump







DOPPLER RADAR 2130HR 06/01/2016


2016-01-06 14:15 UTC (wind speed in m/s)
Height ASL (m)
6000
5000
4000
3000
2000
1000
0
0
100
200
300
400
Horizontal index
30
m s-1
30
29
28
27
26
25
24
23
22
21
20
19
18
17
16
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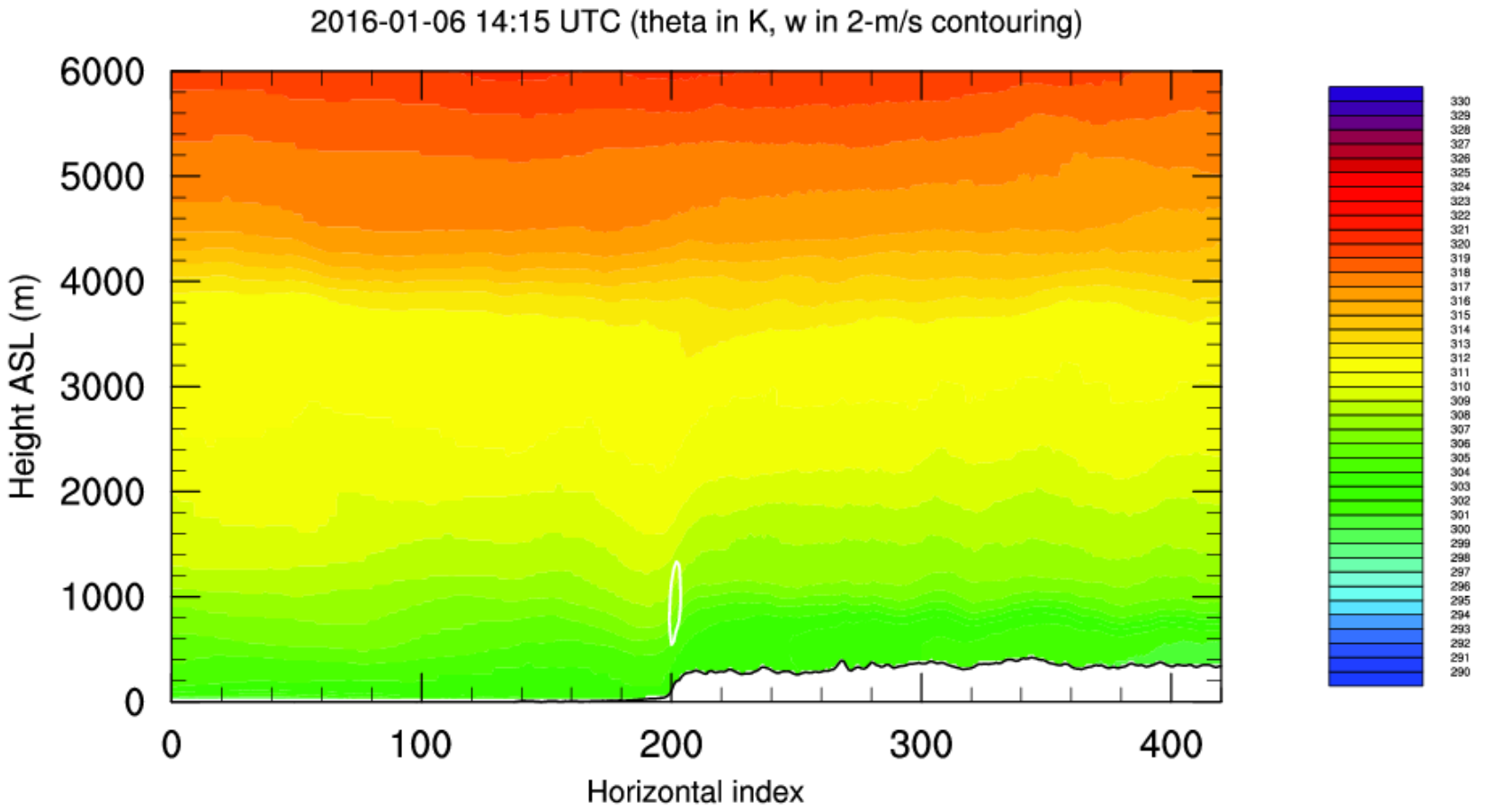
4
3
2
1
0


2016-01-06 14:15 UTC (theta in K, w in 2-m/s contouring)
Height ASL (m)
6000
5000
4000
3000
2000
1000
0
0
100
200
300
400
Horizontal index
330
329
328
327
326
325
324
323
322
321
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319
318
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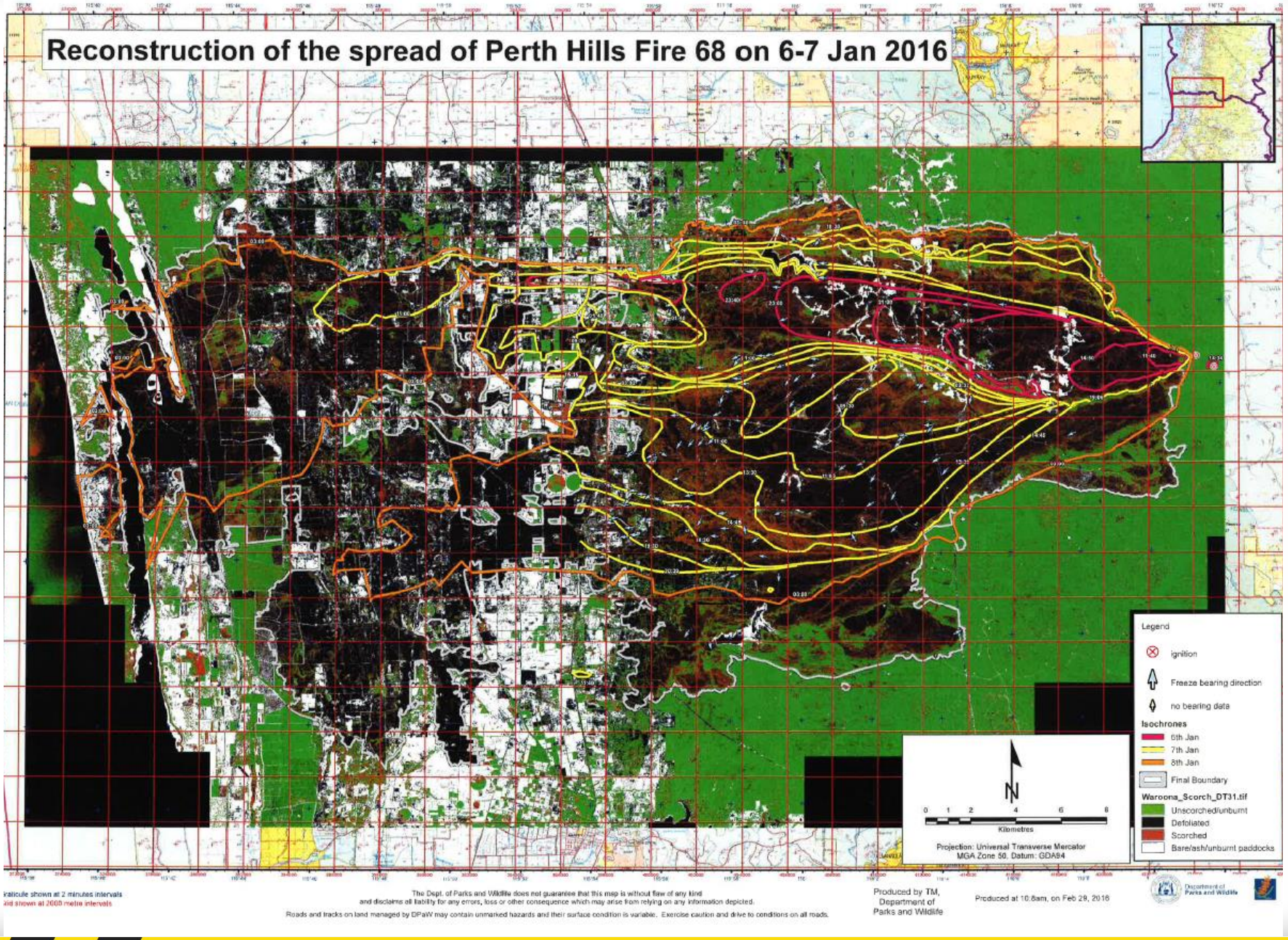
290

PYROCB EVENT 2, THURSDAY MORNING

1) Against normal diurnal trends
2) Pulses and pileus cloud in high shear environment
3) Extensive defoliation
4) Wind convergence on Doppler radar along 10-20 km long fire front
5) Anomalous direction spread
6) Max FFDI mid afternoon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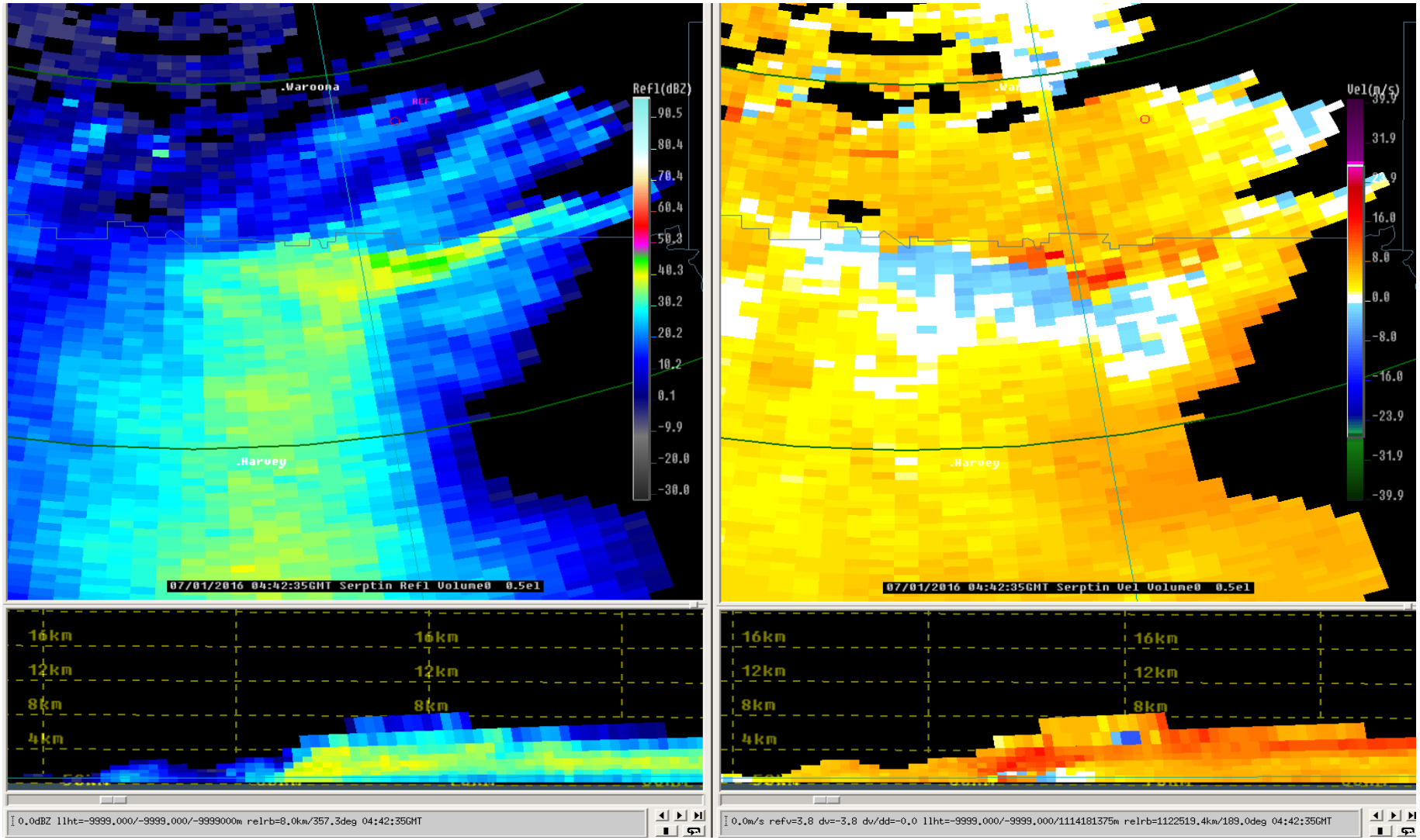
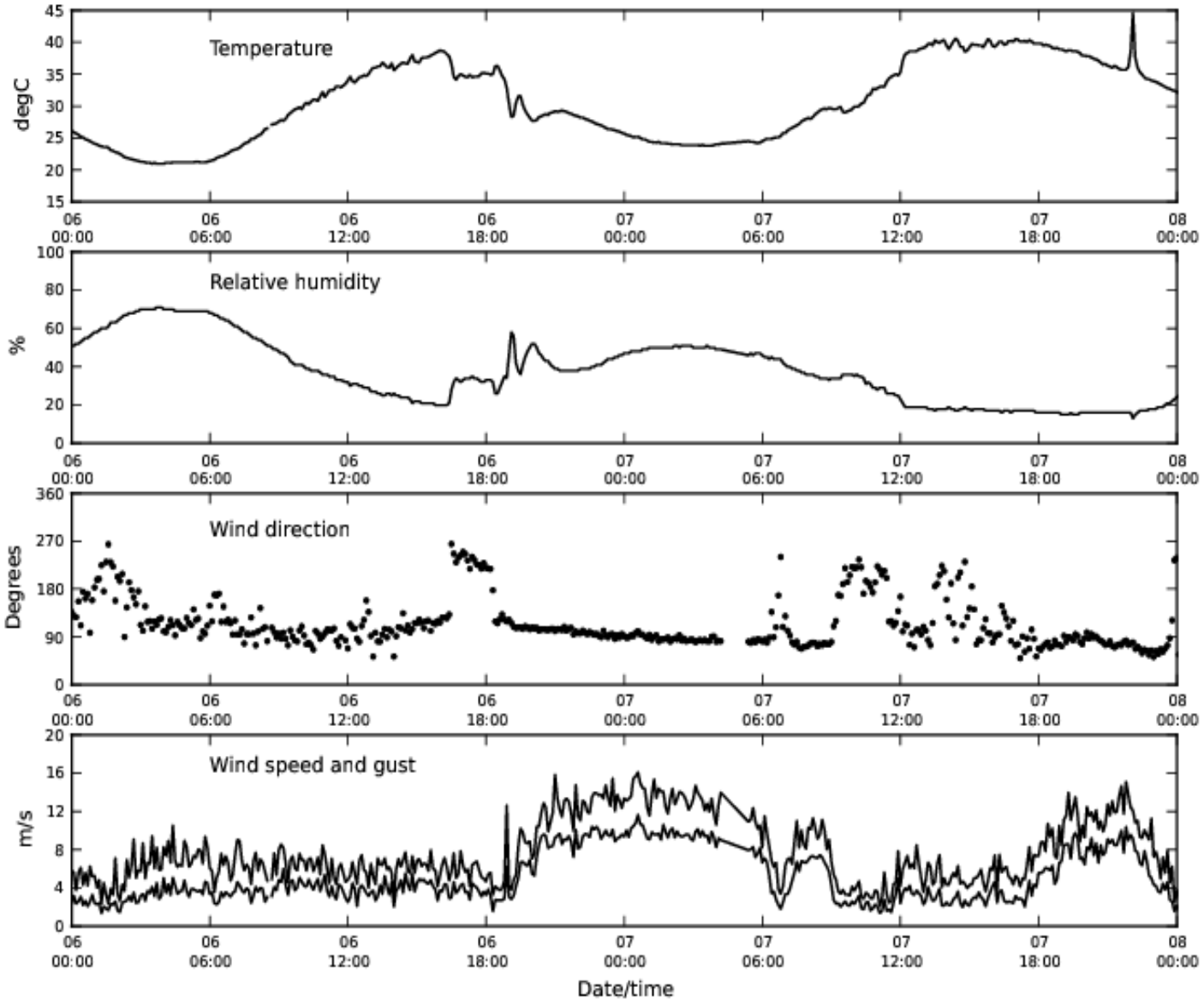


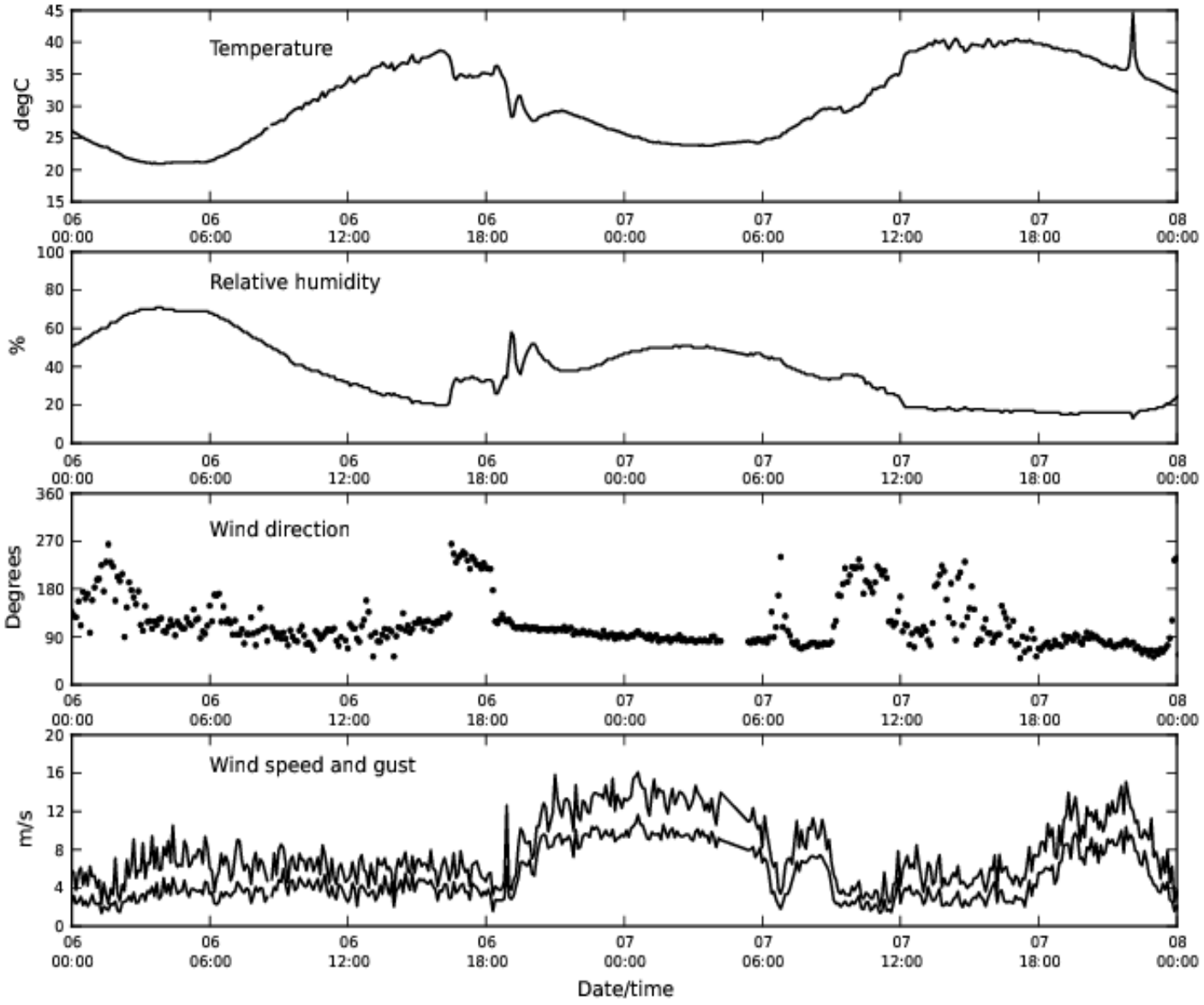
Doppler radar 1240hr 07/01/2016 (between convective pulses)



WAGERUP AWS (ALCOA)

EMBER STORM 2 – YARLOOP, THURSDAY EVENING

1) Rapid onset of ember shower after 7pm
2) 2 fatalities and over 100 homes destroyed
3) Radar shows rapid increase in plume height (3000m to 8000m) between 1910hr and 1933hr
4) Winds consistent with downslope winds
5) High-res ACCESS analysis in progress



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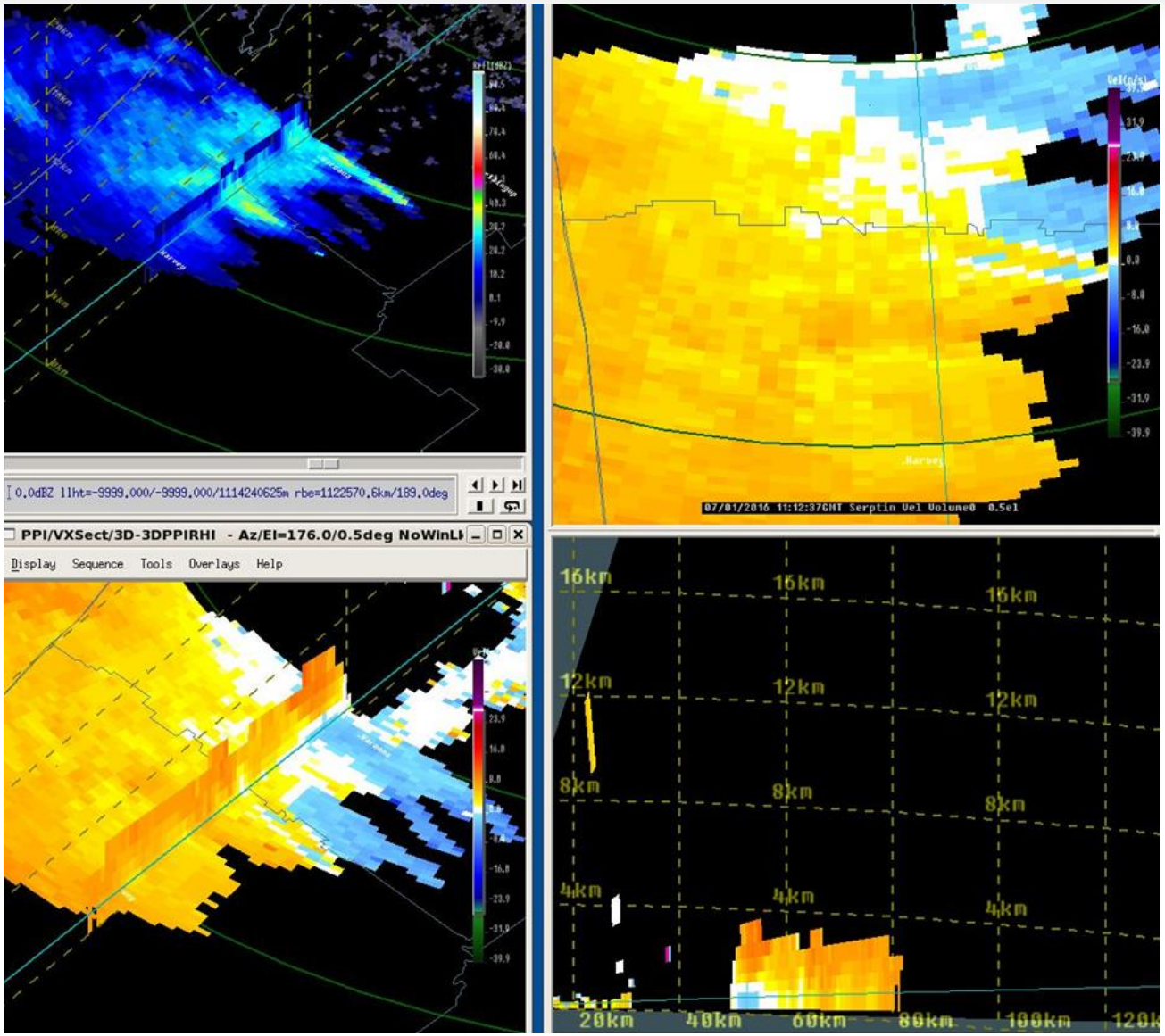
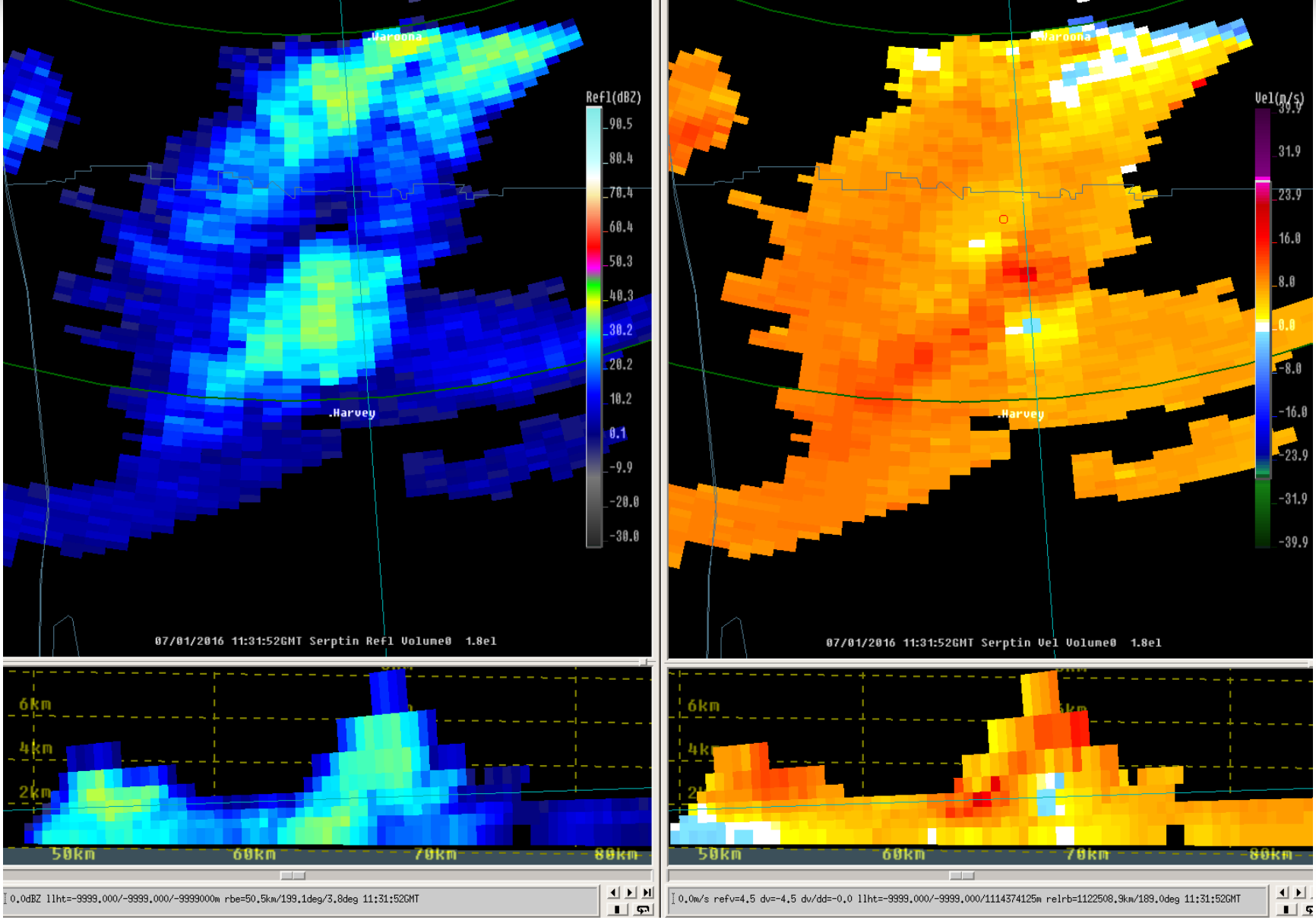


SERPENTINE RADAR 1912HR



VELOCITY COUPLET 1931HR

UTILISATION ACTIVITIES AND OPPORTUNITIES

1) Operational support for High Impact Weather Events (SEC during recent floods)
2) SA Pinery Fire report
3) CFS Embedded Meteorologist (Oct/Nov 2016)
4) Review of "Outposted Meteorologist" training and skills
5) Implementation of fire research in collaboration with Extreme Weather Desk (2016-17 fire season trial)
6) Contribution to AFAC Fire Weather Training
7) Waroona case study to be developed as a training module (BMTC collaboration)

PROJECT STATUS (7 MONTHS)

1) BNHCRC milestones
   a) Behind on ACCESS-Fire component
   b) Good progress across activities in implementation and training/reimagining of fire weather services
   c) Waroona case study (not an original deliverable)
   d) Expect to simulate two case studies in parallel when model is running