Smoke forecasting in Australia using AQFx

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The Department of Environment, Land, Water and Planning (DELWP)

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Australian Government
Bureau of Meteorology

CSIRO

CLIMATE SCIENCE CENTRE
www.csiro.au

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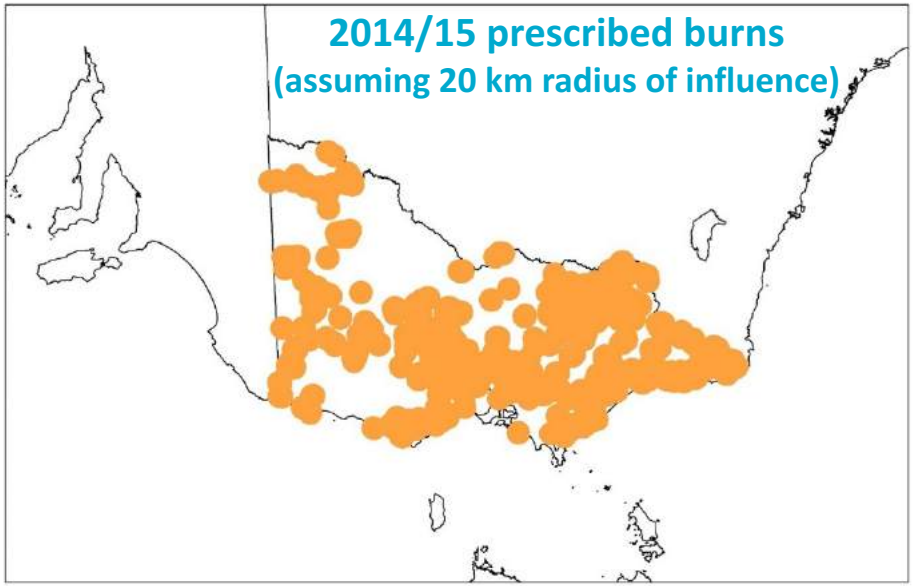
The bushfire/planned burn conundrum

To reduce fire risk, the 2009 Victorian Bushfires Royal Commission recommended that the Victorian Government aim to burn at least 5% of public land as an annual rolling target.

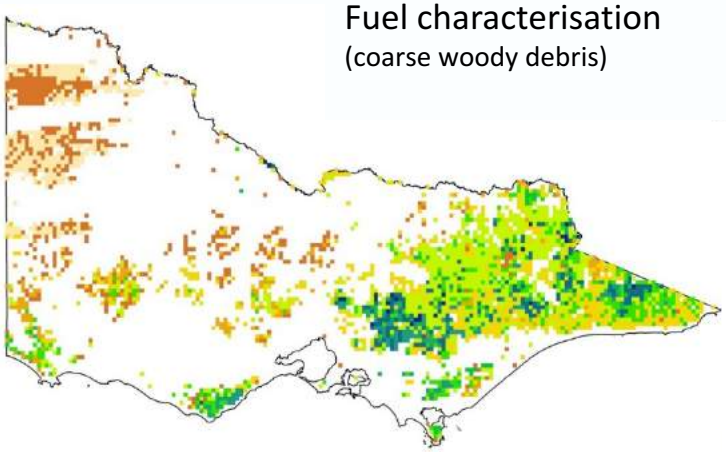
2015 Lancefield-Cobaw Fire Investigation- Fire agencies will no longer work toward a target for the number of hectares of land burnt.
Instead a risk reduction target will be used. Community engagement is paramount



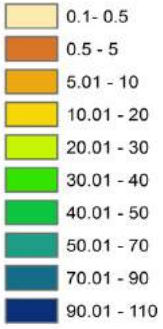
The Victorian Smoke Forecasting project

Develop a smoke emissions and transport modelling framework to aid in the management of planned burns.

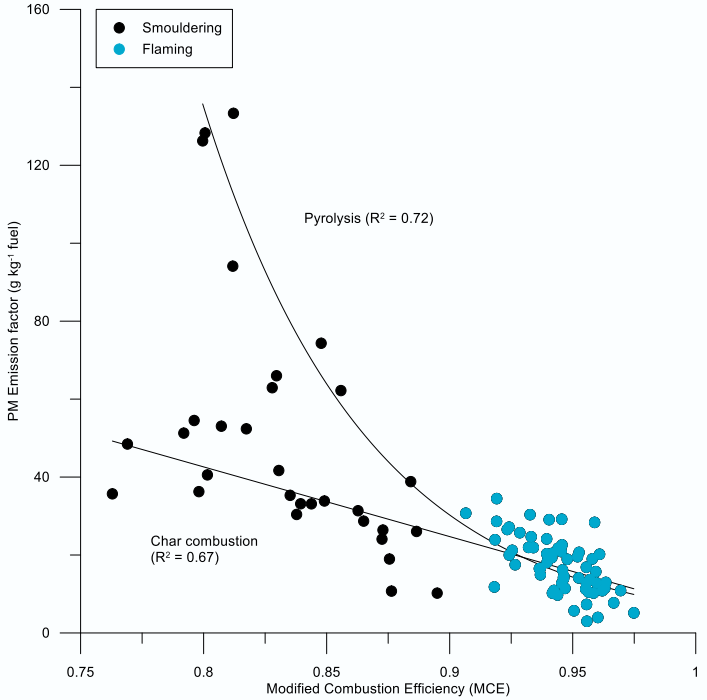
Fuel characterisation
(coarse woody debris)

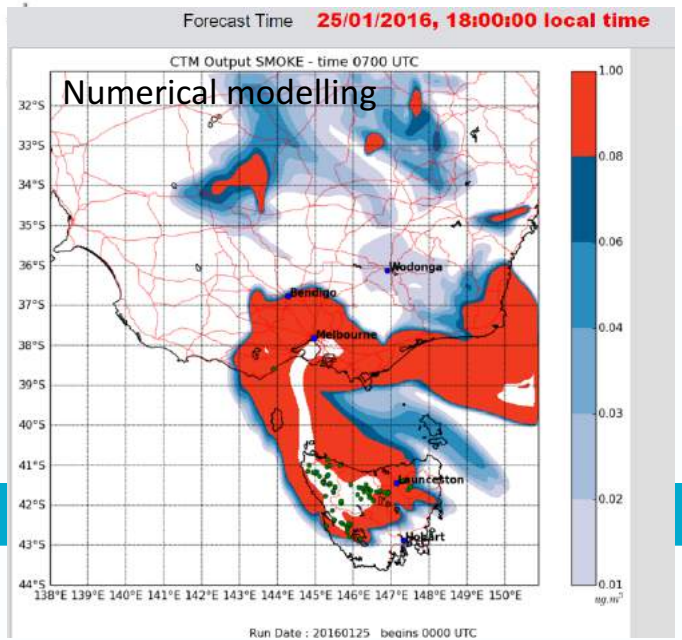


(t/ha)



Emission characterisation



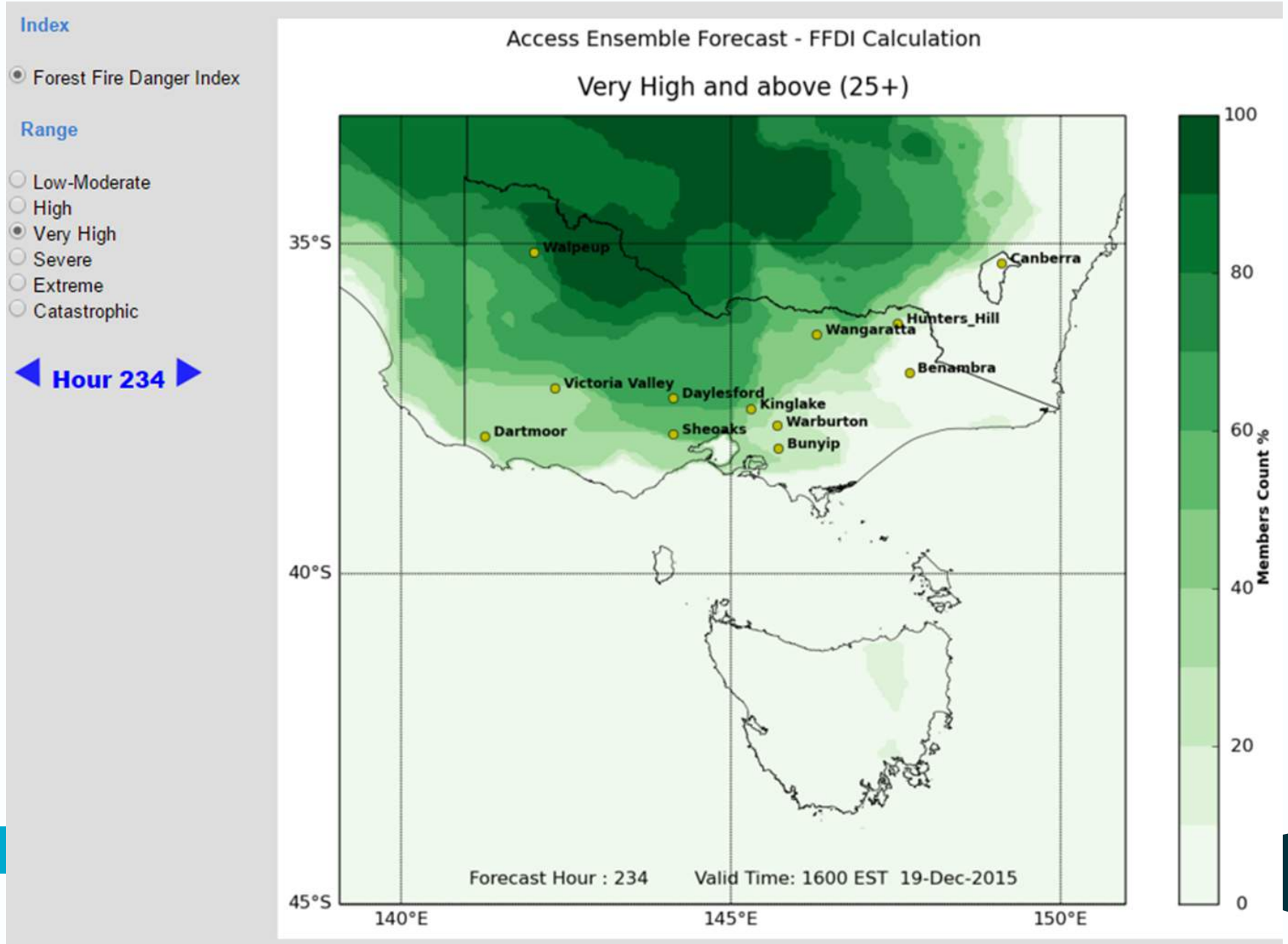


AQFx science tiers and products

Weather and emission-transport-chemistry- 10 day to 24 h outlook

Coming week	Dangerous conditions? Can I schedule fuel reduction burns?	10-day 24-member ACCESS-GE ensemble	Weather variables Fire danger indices
Next few days	What about existing air pollution?	ACCESS-R / ACCESS-C / ACCESS-RUC + Chemical Transport Model Emissions (GFAS, Sentinel, Scans, Phoenix Rapidfire-> smoke)	PM10, PM2.5, O_3, NO_2, NO_x, CO
Today/ tomorrow	**Proposed fuel reduction burns- where will the smoke go?**	**Phoenix Rapidfire** **Chemistry transport Model** **Fire data**	**Individual and total air pollution load**

Tier 1- FFDI spatial consensus forecasts



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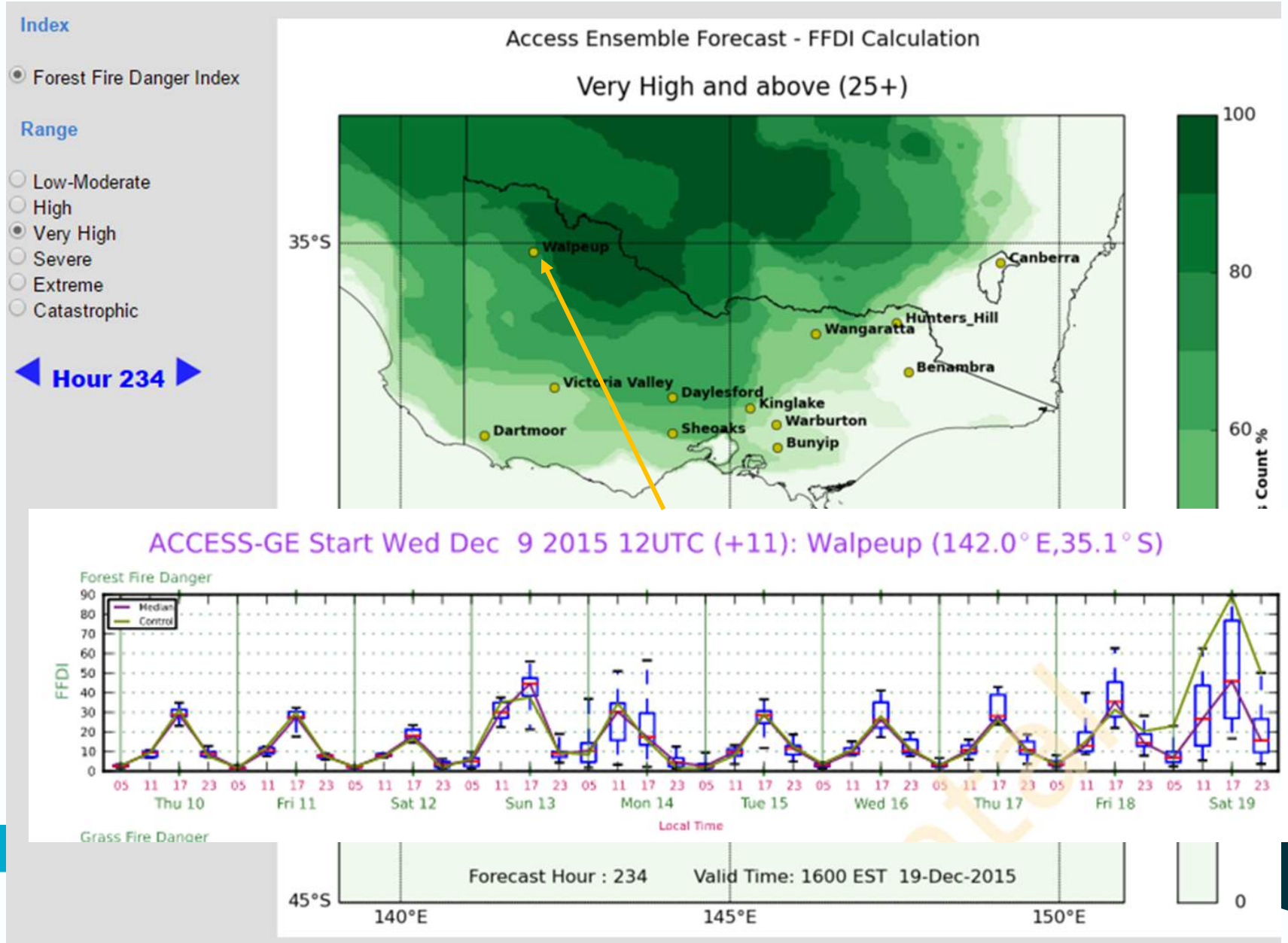
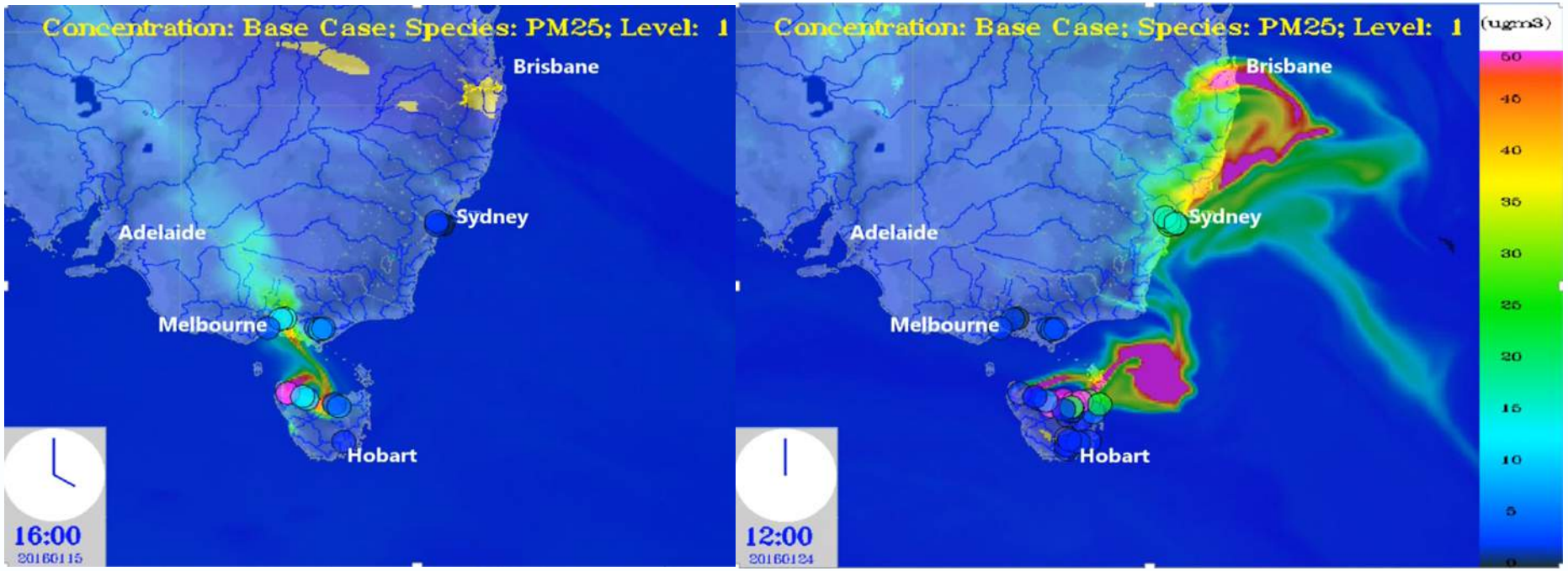
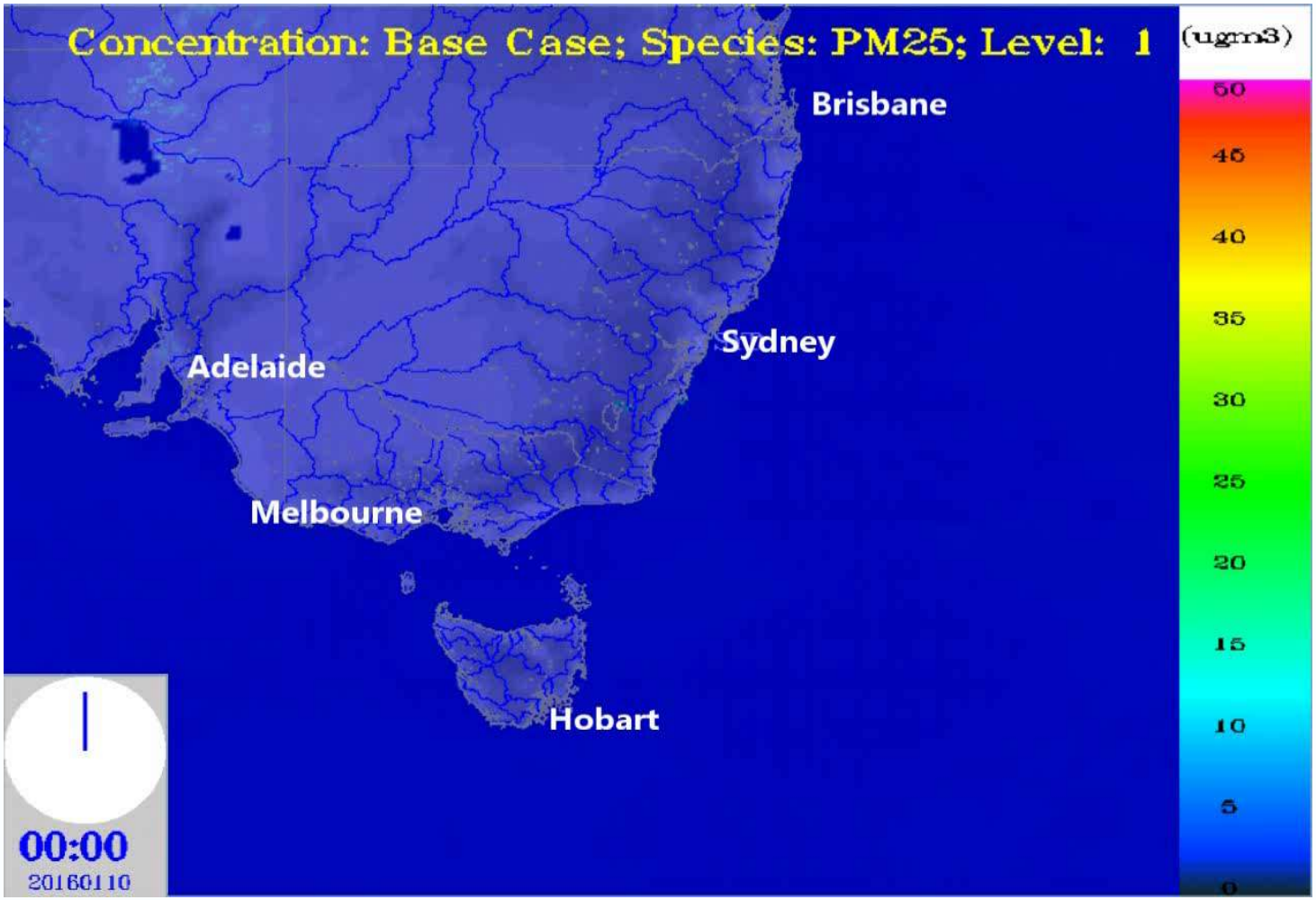


Tier 2- local to over-the-horizon events



The 2016 Tasmanian fire. A total of 229 vegetation fires were recorded from 13th January to 15th March burning a total area of 124,742ha, including 1.27% of the Tasmanian Wilderness World Heritage Area.

Tier 2- local to over-the-horizon events



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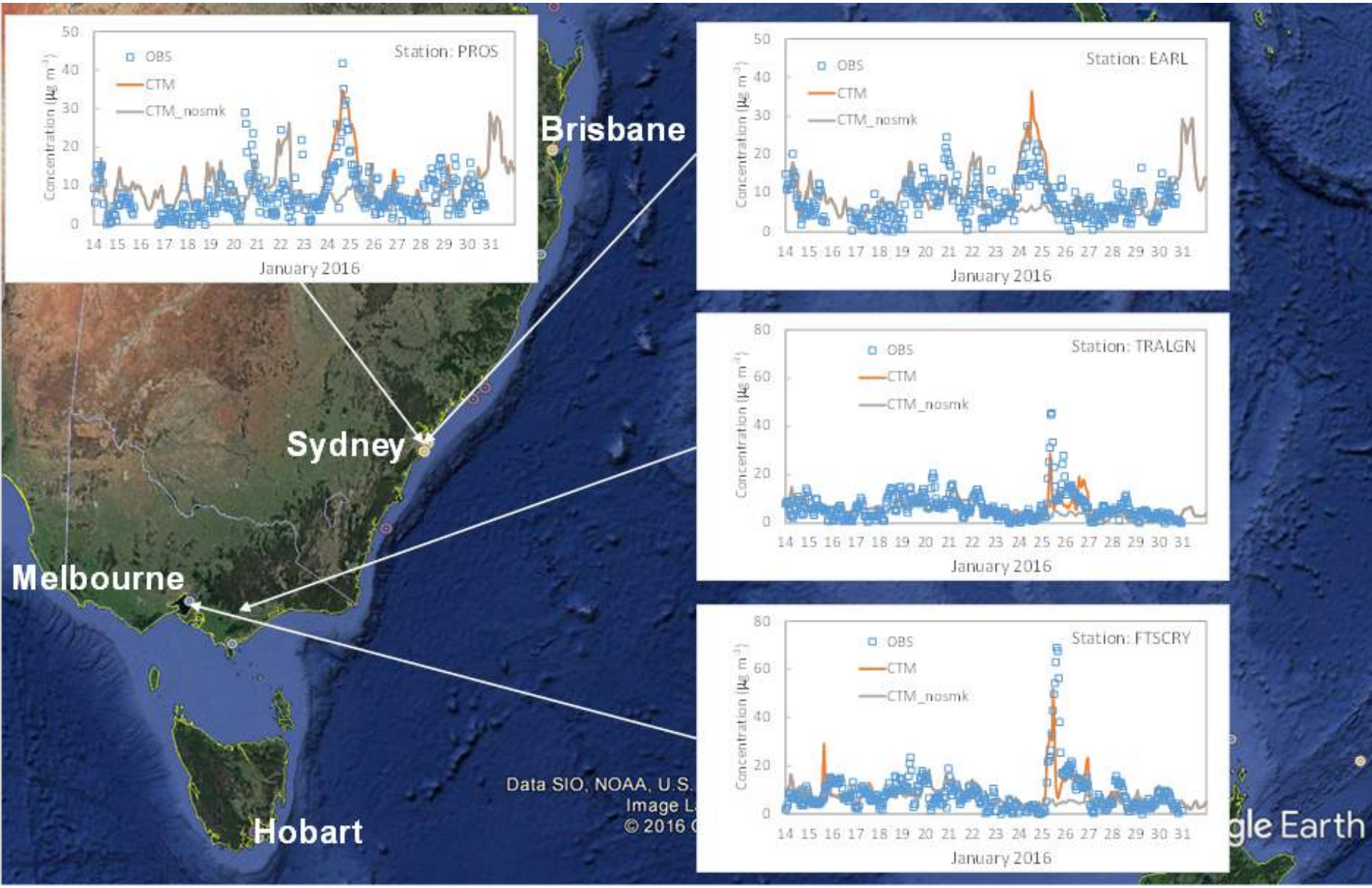
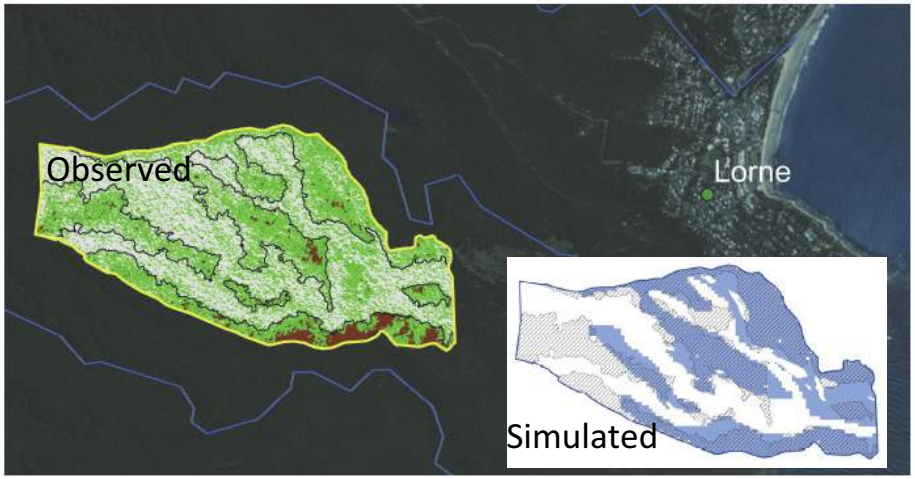
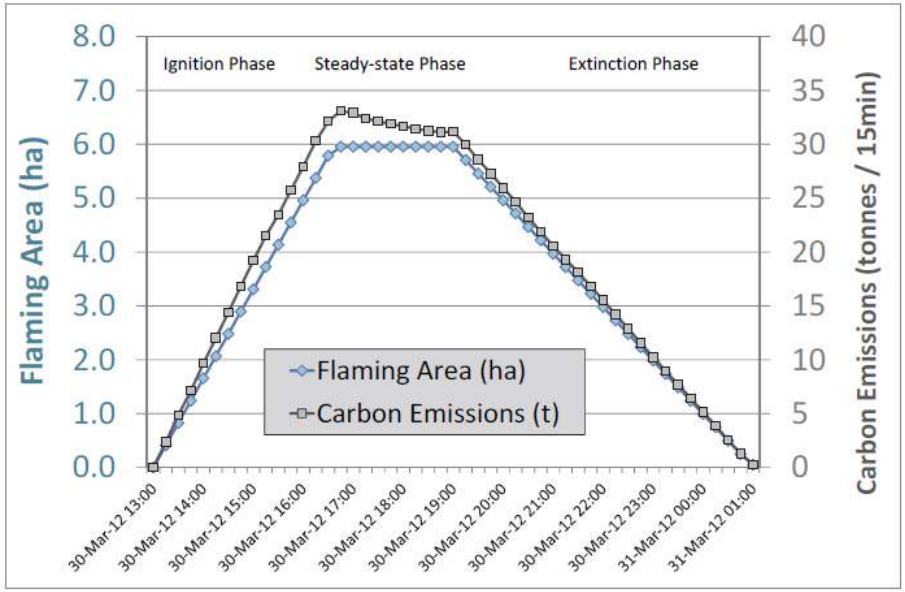

Brisbane
Sydney
Melbourne
Hobart
Station: PROS
Station: EARL
Station: TRALGN
Station: FTSCRY
OBS
CTM
CTM_nosmk
Concentration (µg m⁻³)
January 2016
Data SIO, NOAA, U.S.
Image L
© 2016
gle Earth

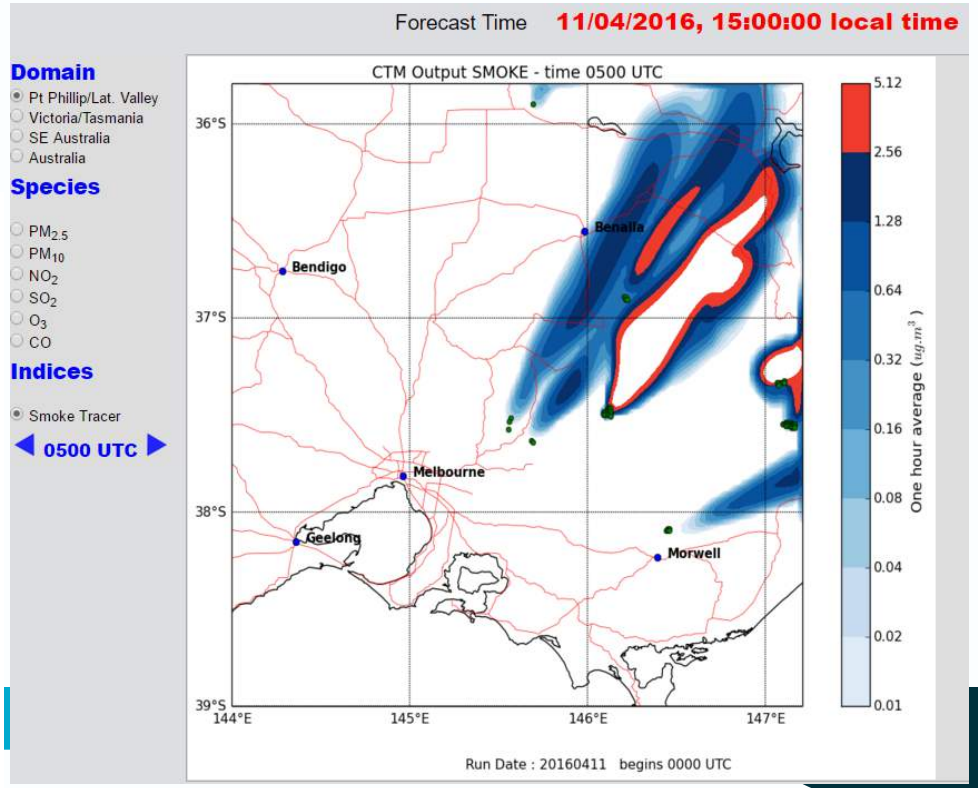
Tier 3- prescribed burn forecasts

Prescribed burn simulator

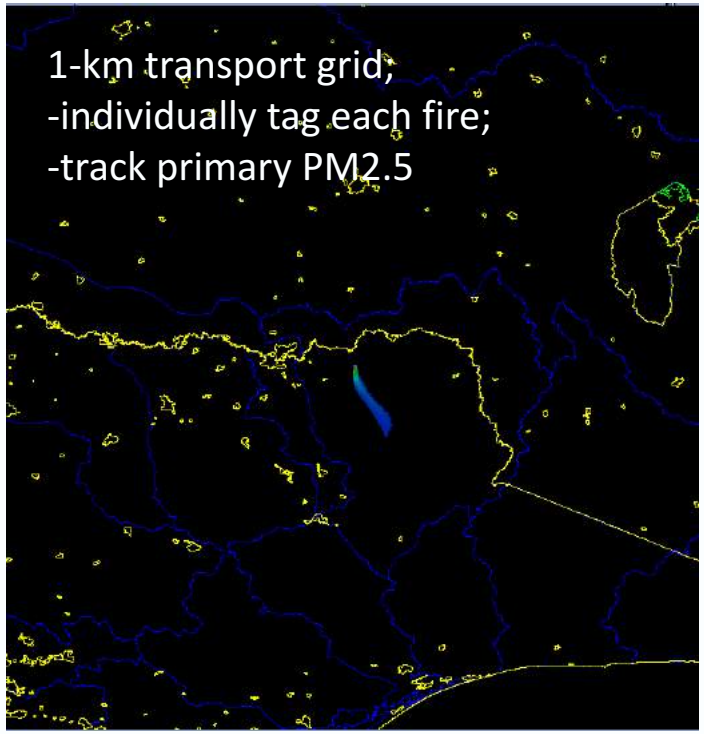


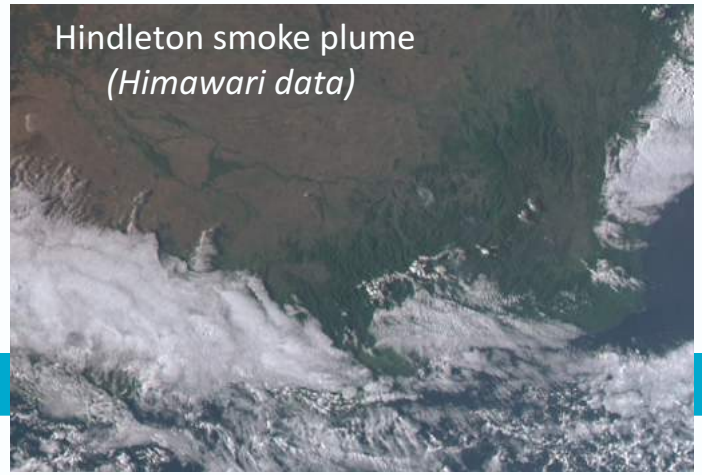


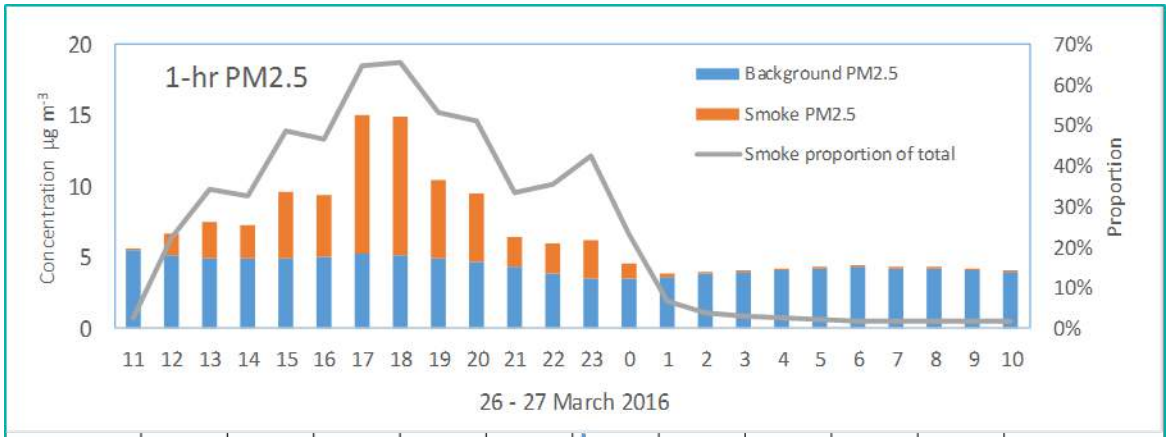
The simulator is coupled to daily fuel management burn proposal data and linked into the daily forecasts

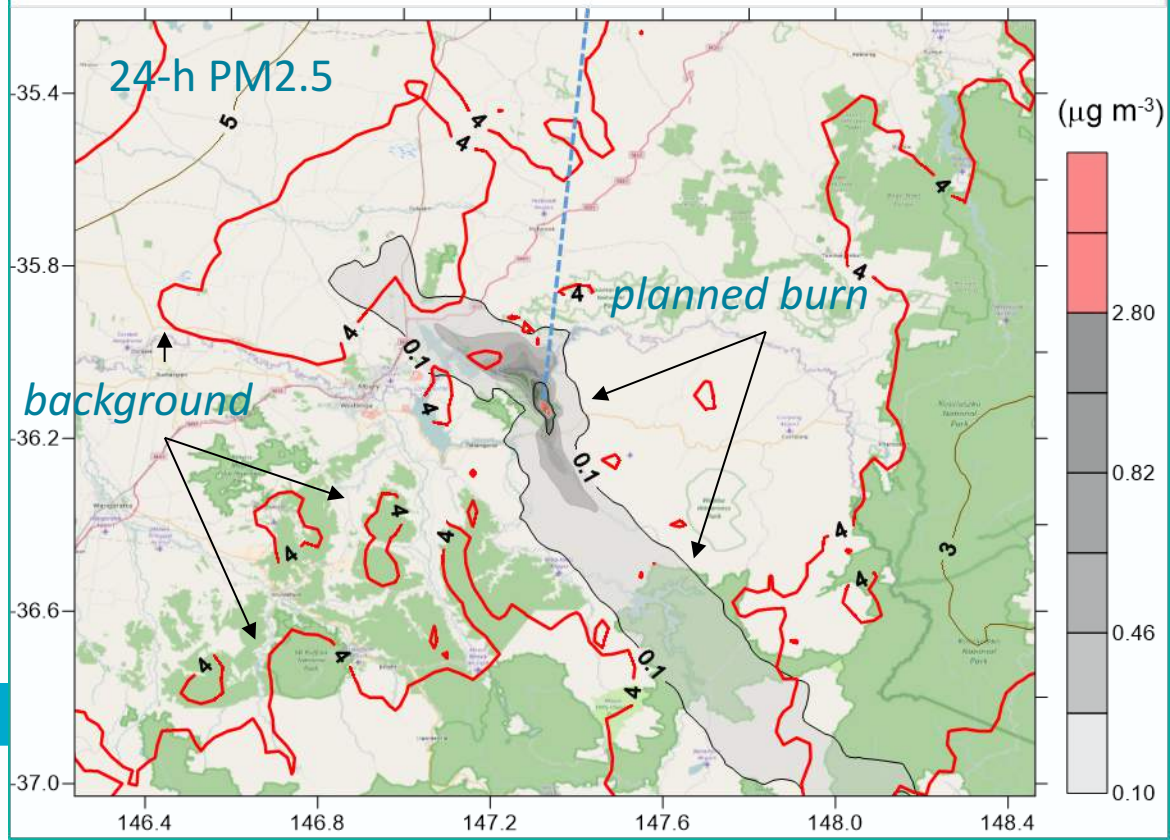


Example- March 2016 Hindleton burn- NE Victoria

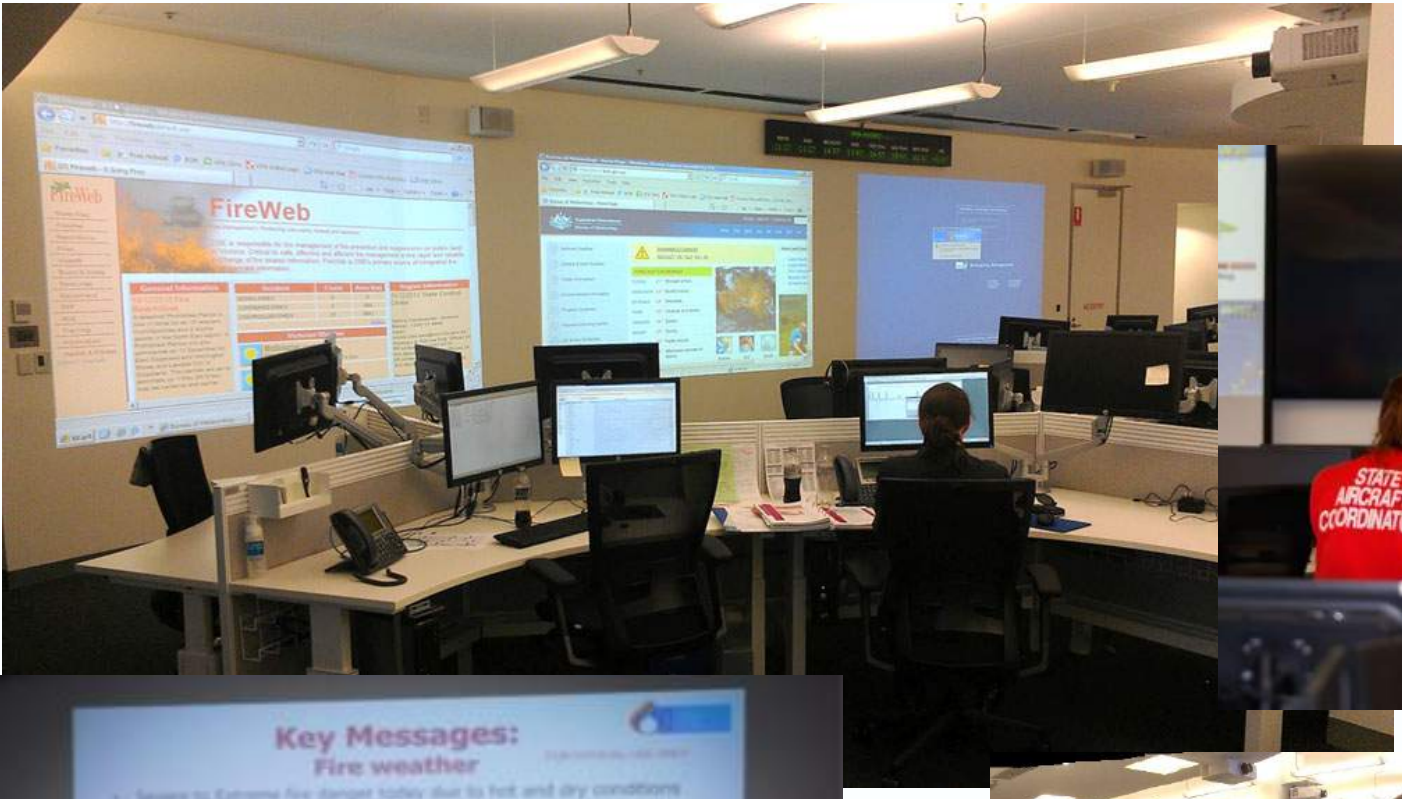




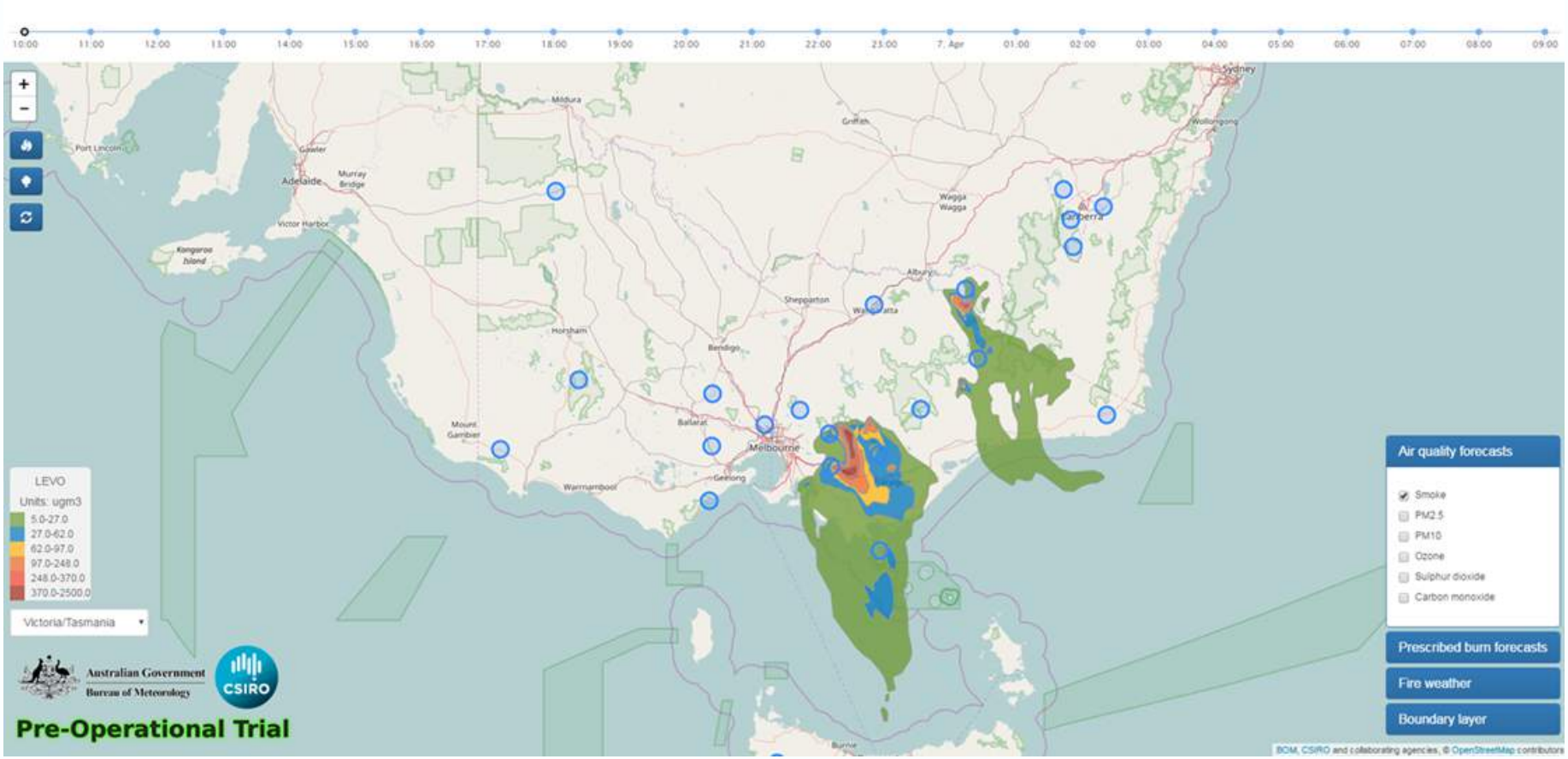




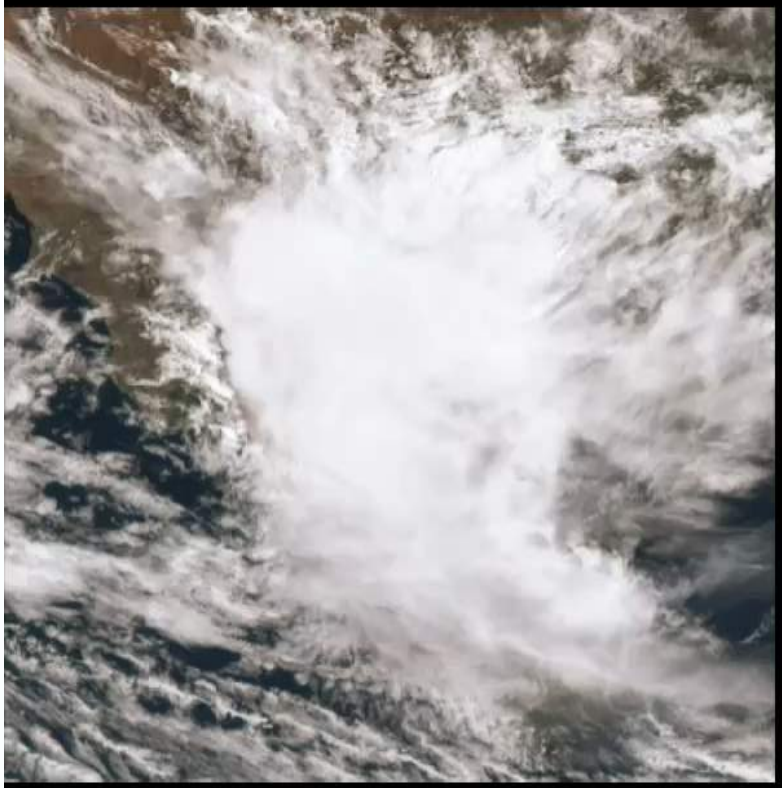
Real time smoke management

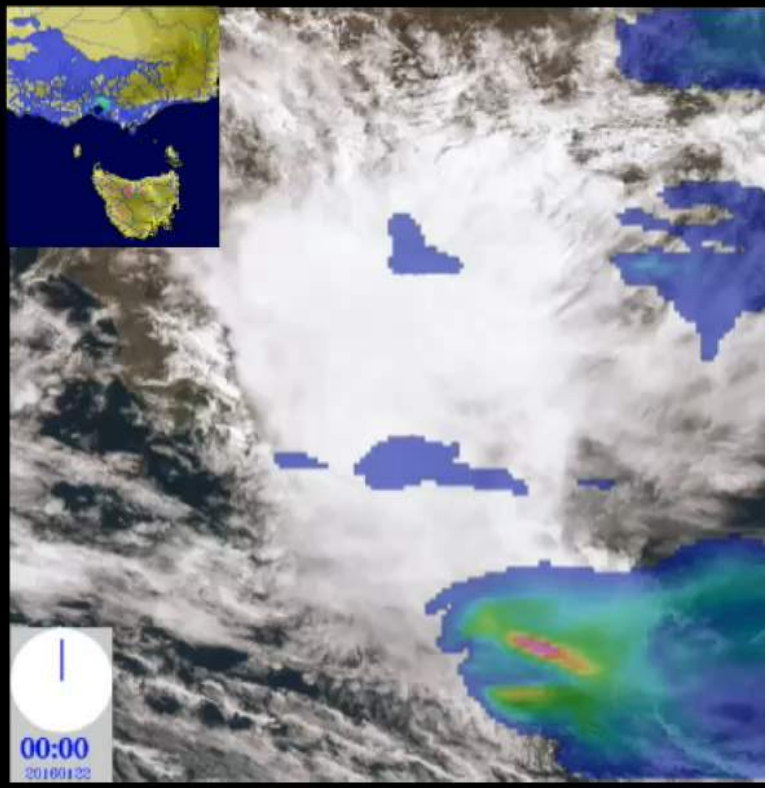


AQFx forecast portal



Himawari satellite Vis+IR. Including Smoke forecast 22-25 January 2016

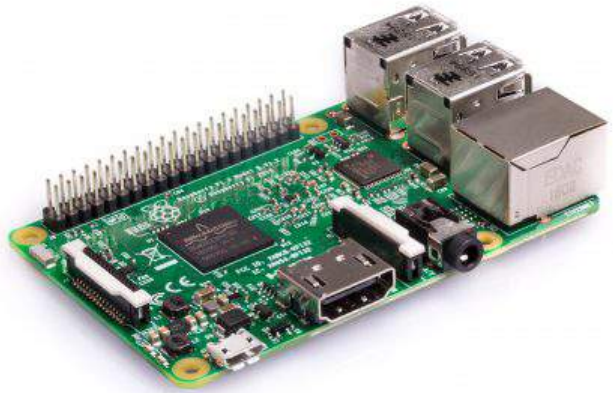




Community outreach- STEM in schools

2015 Lancefield-Cobaw Fire Investigation-

Community engagement is paramount!



Lesson 1: Air Pollution Basics

Lesson 2: Biomass Burning

Lesson 3: Build a PM sensor

Source: http://pixshark.com/air-pollution-cartoon-for-kids.htm

AQFx – knowledge gaps

- Improvements to fuel load data
- Verification of the fire behavior models
- Smoke characterization- capture additional vegetation types; fuel sizes; plume chemistry
- Plume rise
- Ensemble modelling
- Dynamic global boundary concentrations
- Health forecasting

Questions?