Air Quality Forecast system (AQFx)

Real time smoke intelligence visual analysis tool (AQVx)

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Aim:

1. To provide air-quality intelligence to agencies involved in prescribed burning.

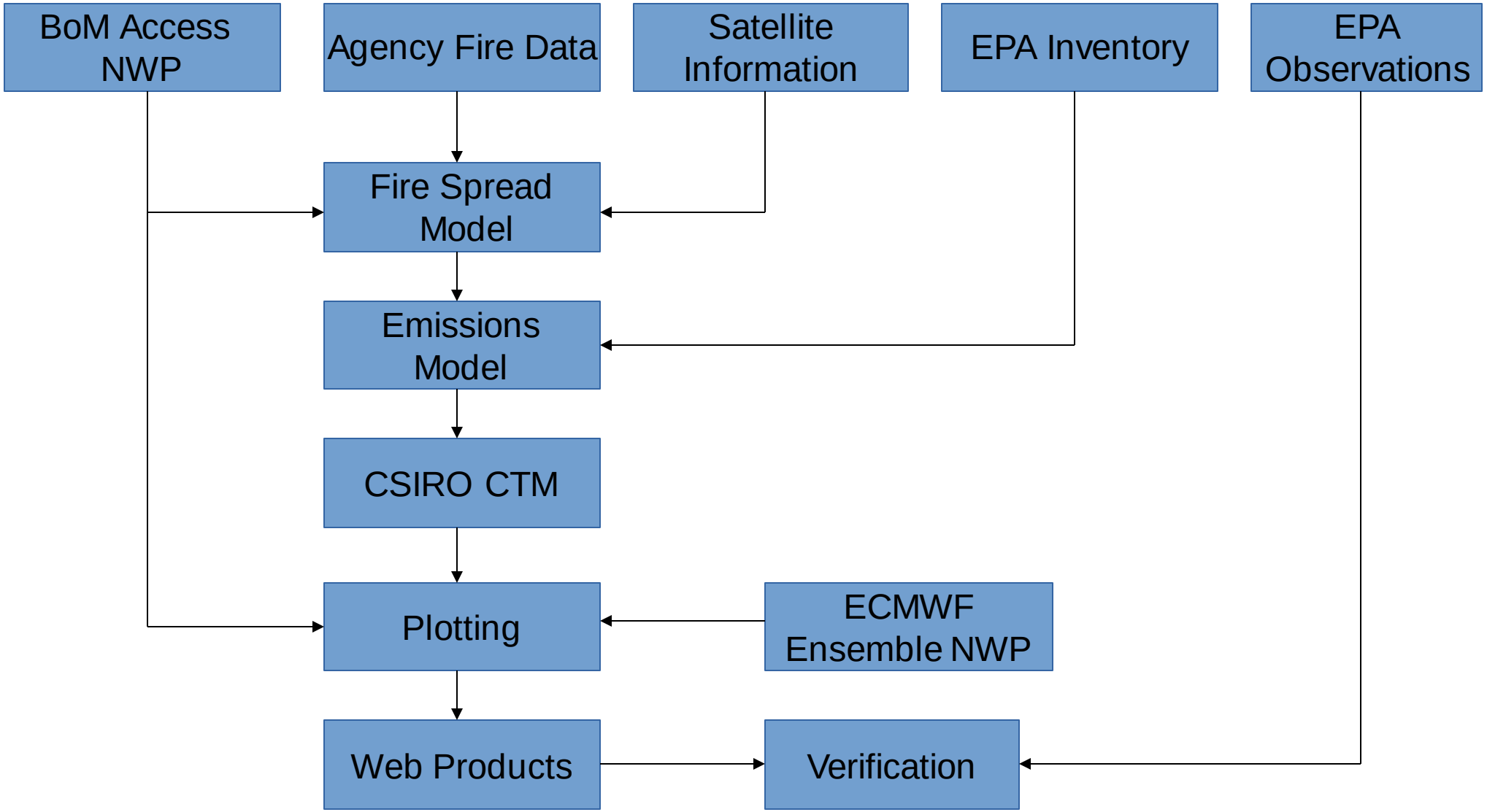
2. To provide support during bushfire operations

3. Provide air-quality forecasts

4. Provide dust forecasts

5. Pollen forecasts

AQFx Process



http://www.bom.gov.au/general/reg/smoke/AQFx

AQFx:
3 levels:

- **tier1**: 3 - 10 day forecasts of fire weather variables

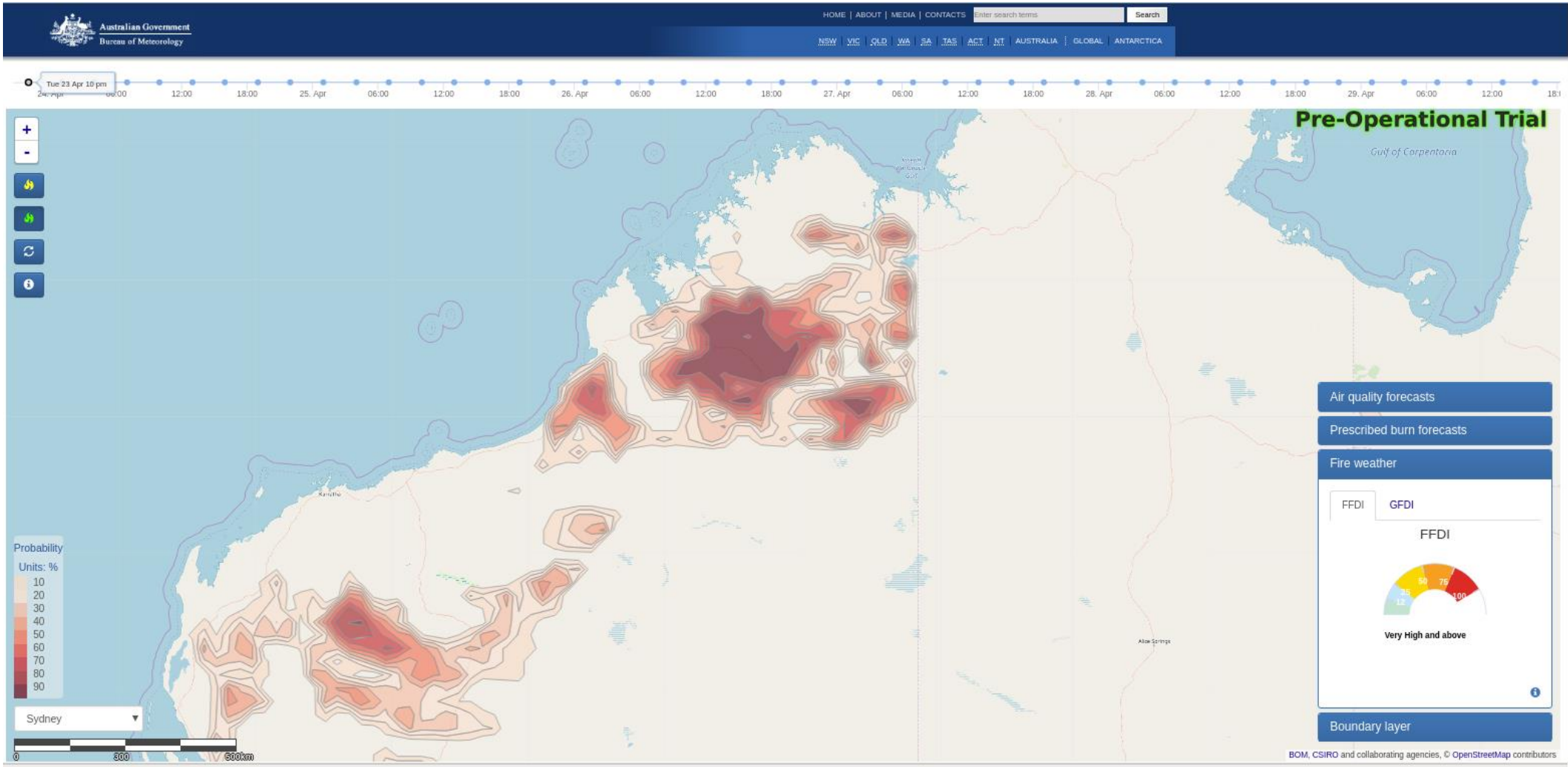
  tier2: 1 - 3 day forecasts of Air Quality with full chemistry

  tier3: 1 - 3 day forecasts of PM2.5 from planned burn locations tracer only, no chemistry.

Tier 1

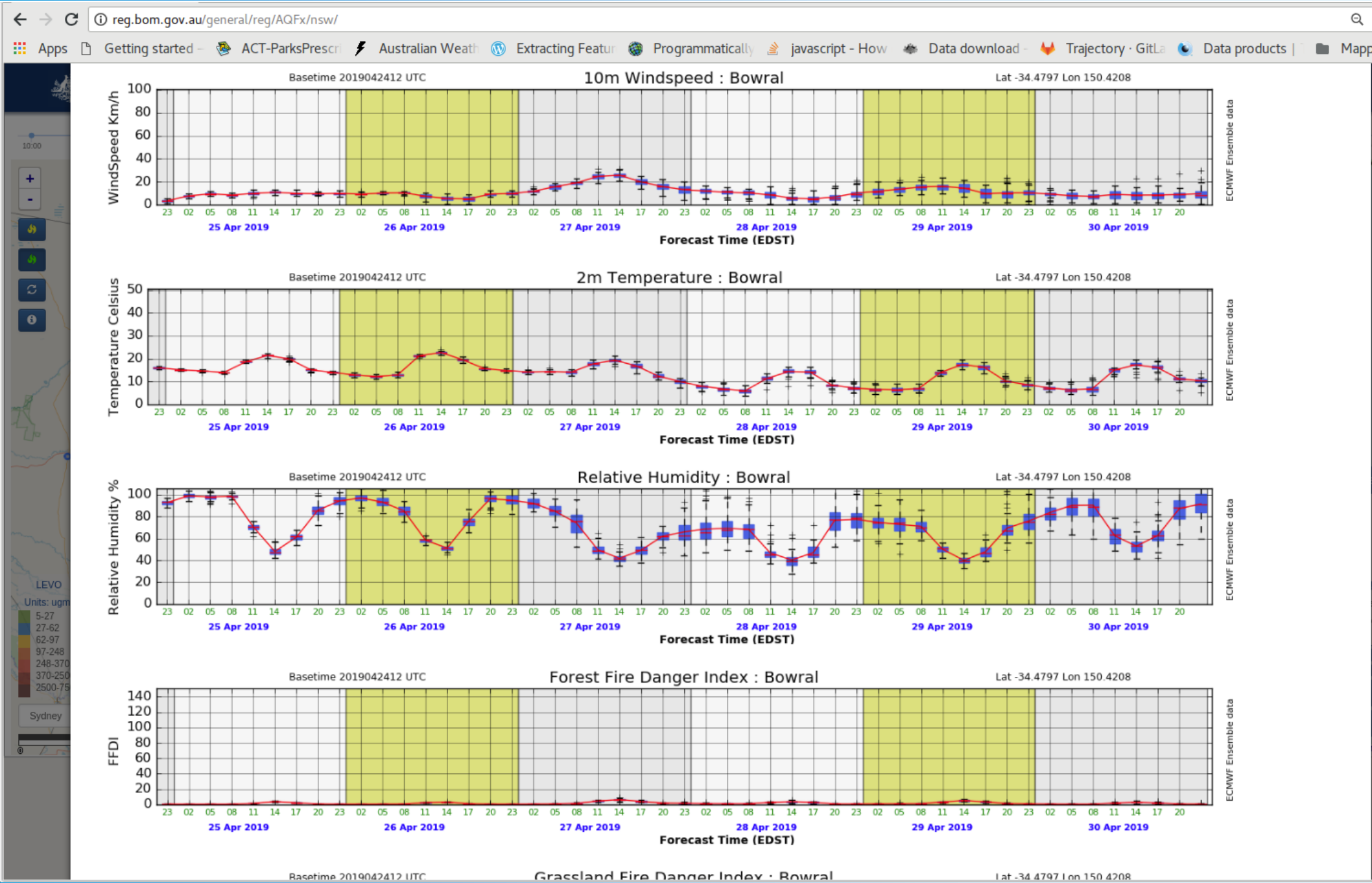
- Spatial Plots using ensemble NWP
  - Ventilation index
  - Boundary Layer Depth
  - FFDI/GFDI
- Point locations (42 in NSW)
  - Ensemble meteograms
  - F160’s
  - Access-G meteograms

Tier 1 -Calculated FFDI/GFDI from Ensemble data

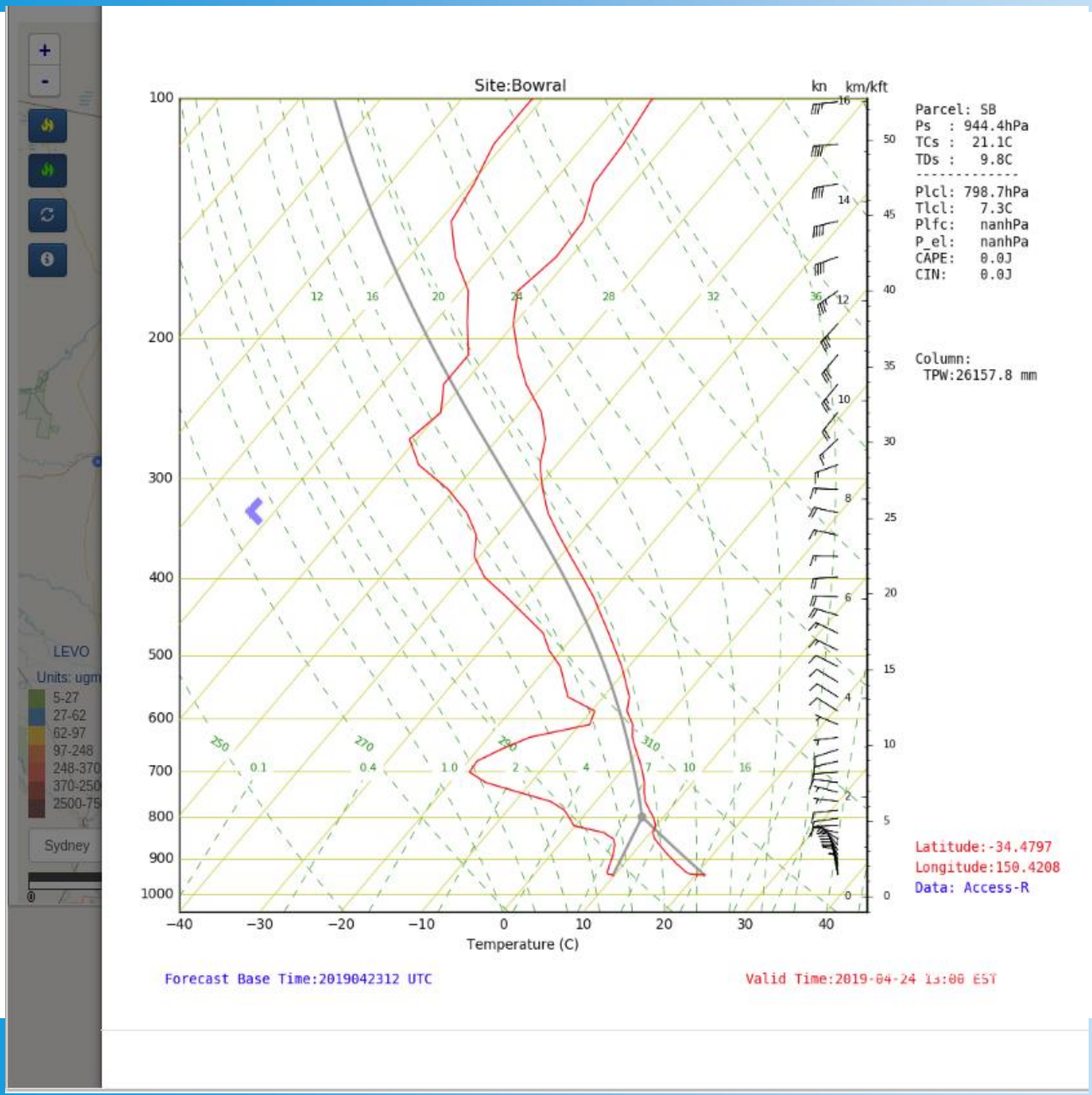


Contour plot of % ensemble members where selected threshold is equalled or exceeded (FFDI>= Very High in this example)

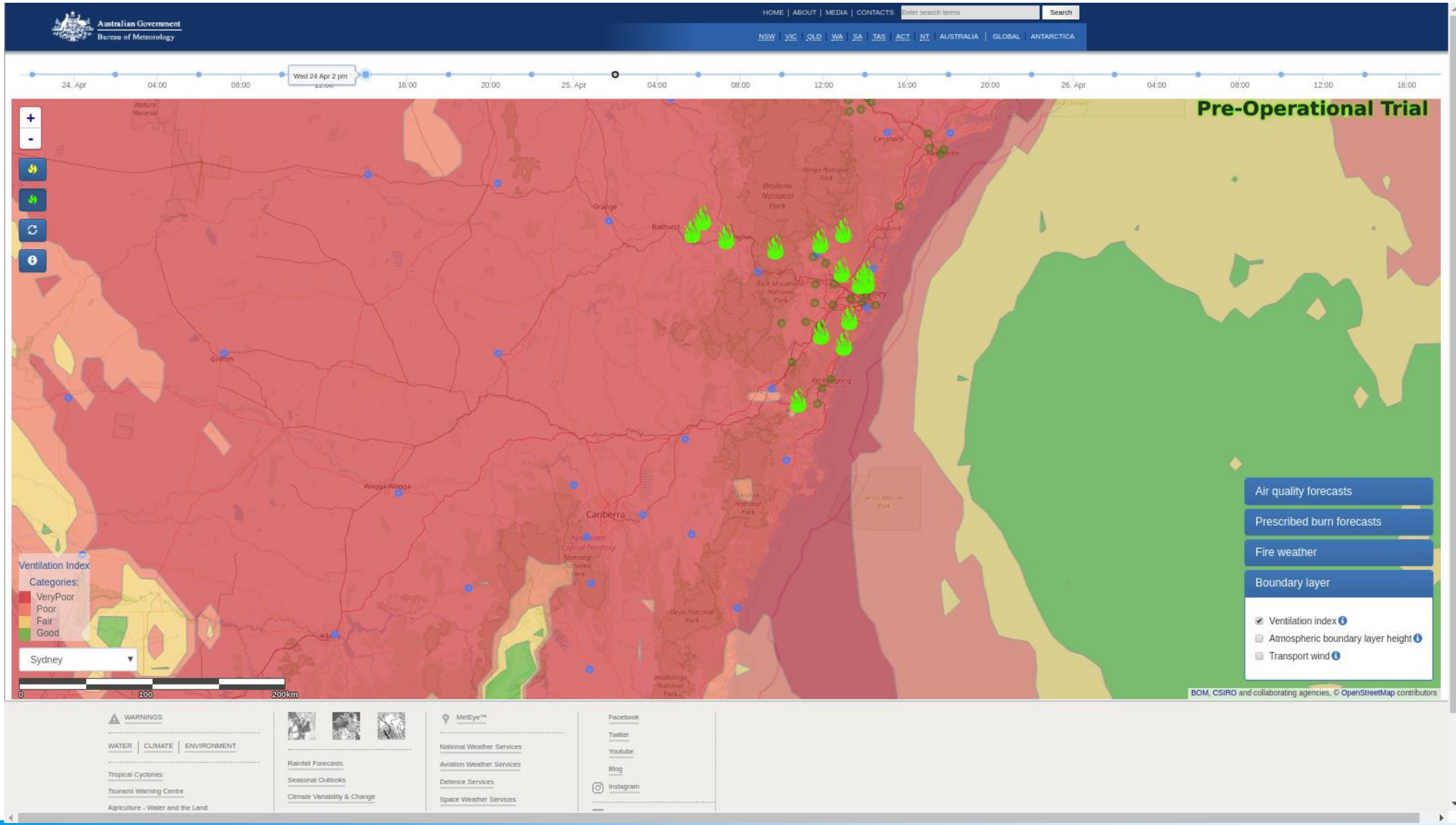
Tier 1 Point locations 6 day plots



Tier 1 point location SkewT-logP (F160)



Tier 1 Ventilation Index

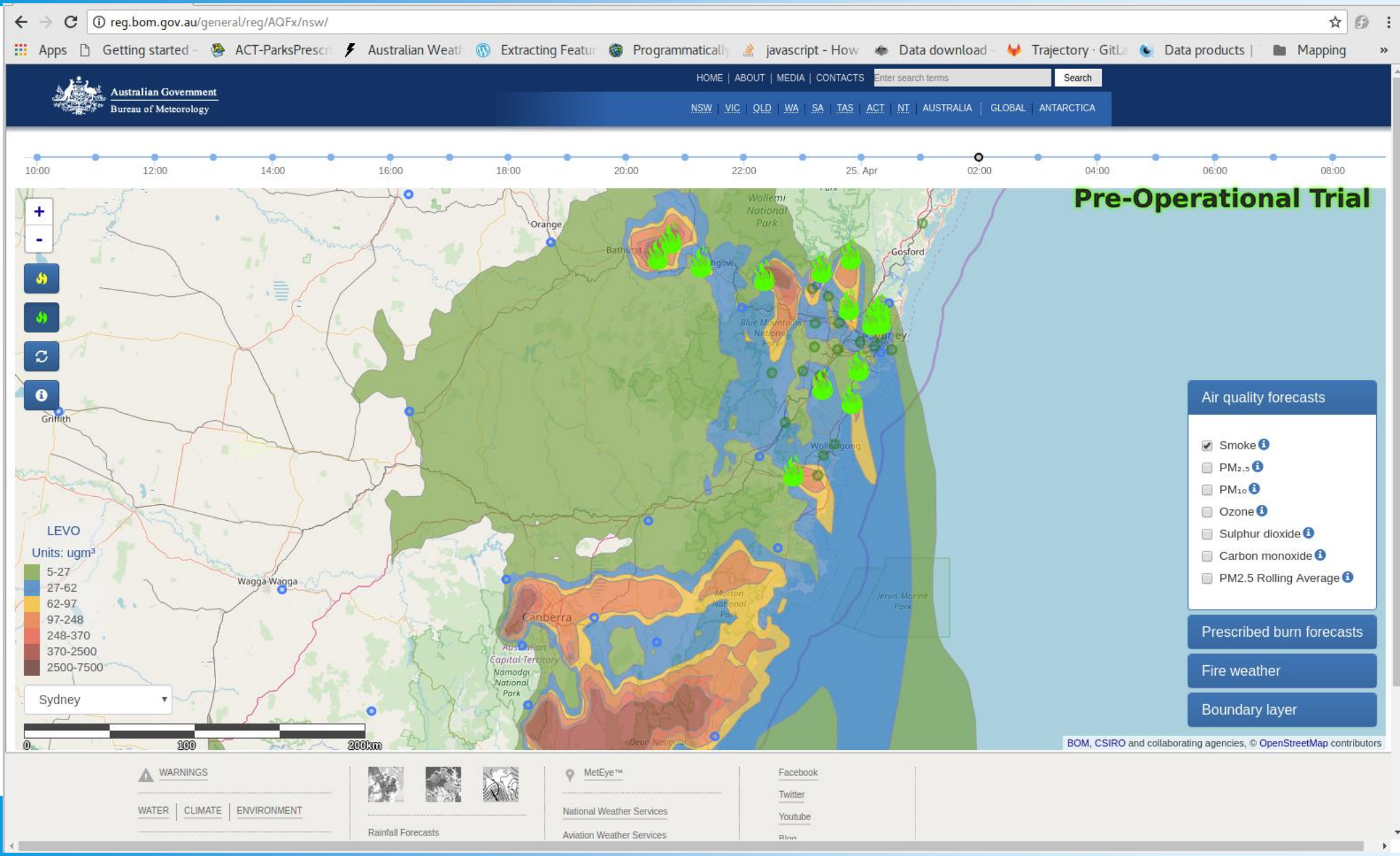


VI = depth of mixed layer *avg windspeed in mixed layer

Tier 2

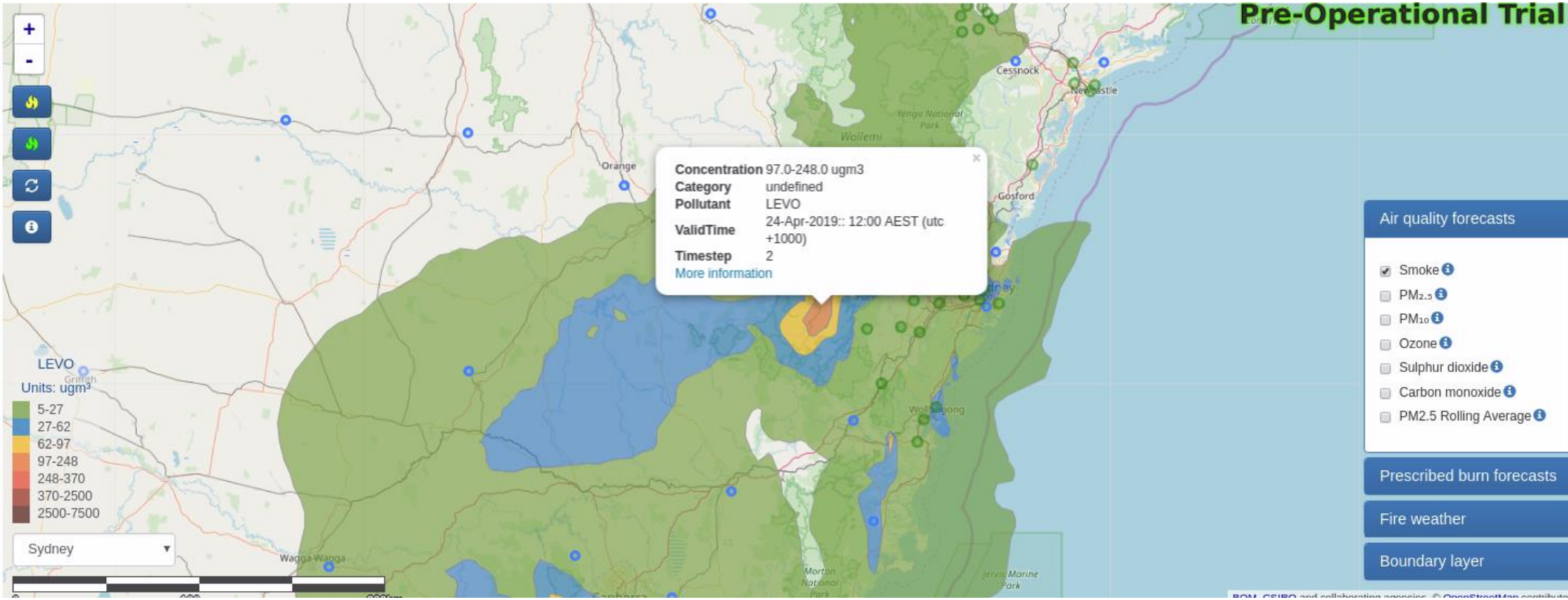
- Full chemistry model including production of secondary aerosols.
  - 140 species
- 3 nested domains
  - Australia
  - SE Australia
  - Access City (SY, VTAS)
- 30 – 45 minutes on 1000+ cpus

Tier 2 – full chemistry

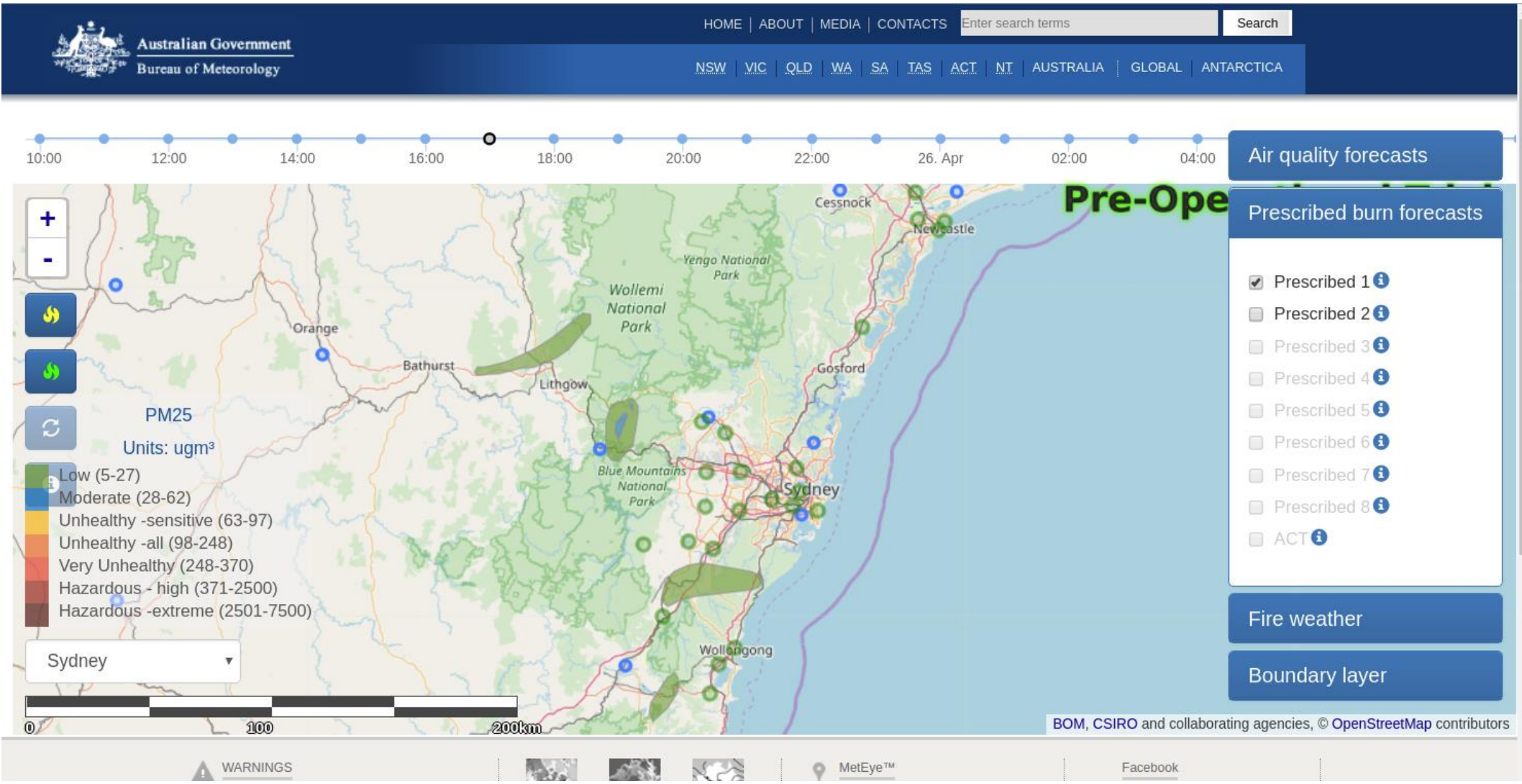


Including secondary pollutant production

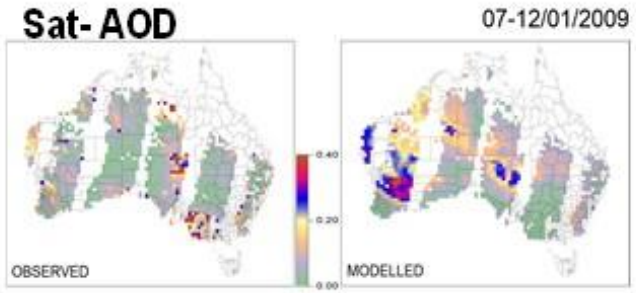
Tier 2

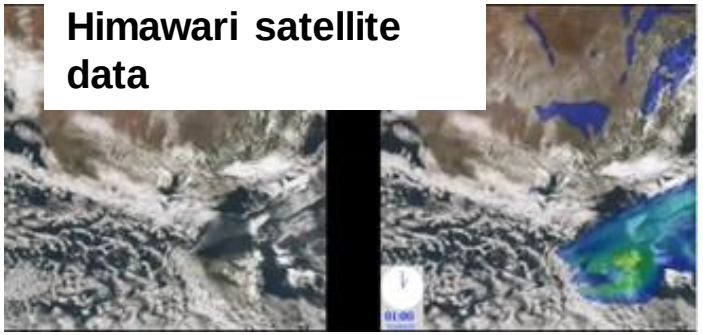

Pre-Operational Trial
Concentration 97.0-248.0 ugm3
Category undefined
Pollutant LEVO
ValidTime 24-Apr-2019:: 12:00 AEST (utc +1000)
Timestep 2
More information
LEVO
Units: ugm3
5-27
27-62
62-97
97-248
248-370
370-2500
2500-7500
Sydney
Air quality forecasts
Smoke
PM2.5
PM10
Ozone
Sulphur dioxide
Carbon monoxide
PM2.5 Rolling Average
Prescribed burn forecasts
Fire weather
Boundary layer
Orange
Cessnock
Gosford
Wollemi
Wagga Wagga

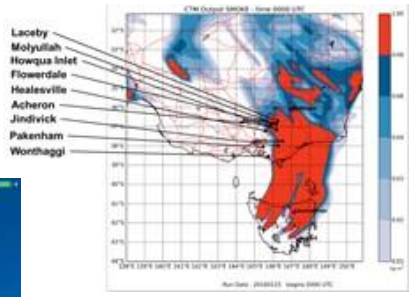
Tier 3 –PM2.5 no chemistry



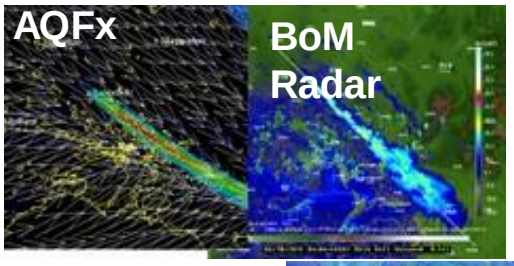
Real time smoke intelligence visual analysis tool - AQVx

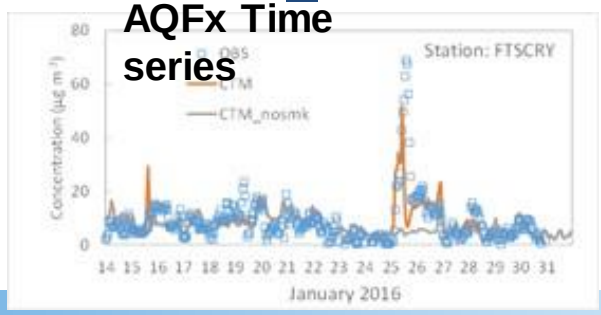


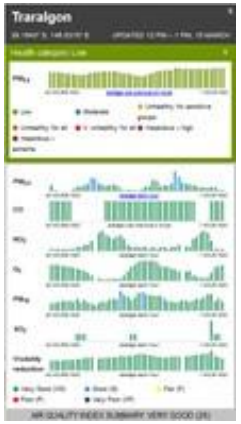




Citizen-science



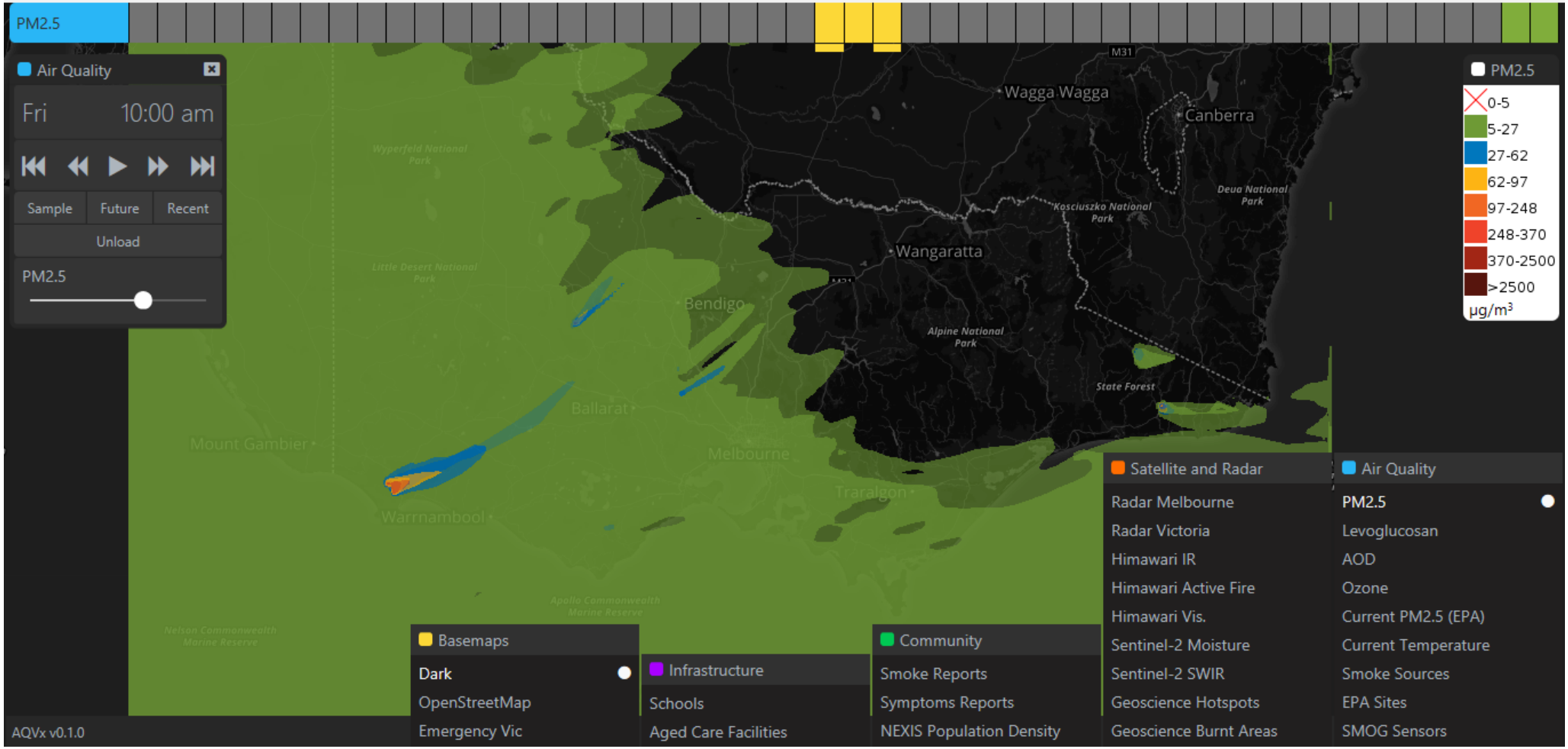




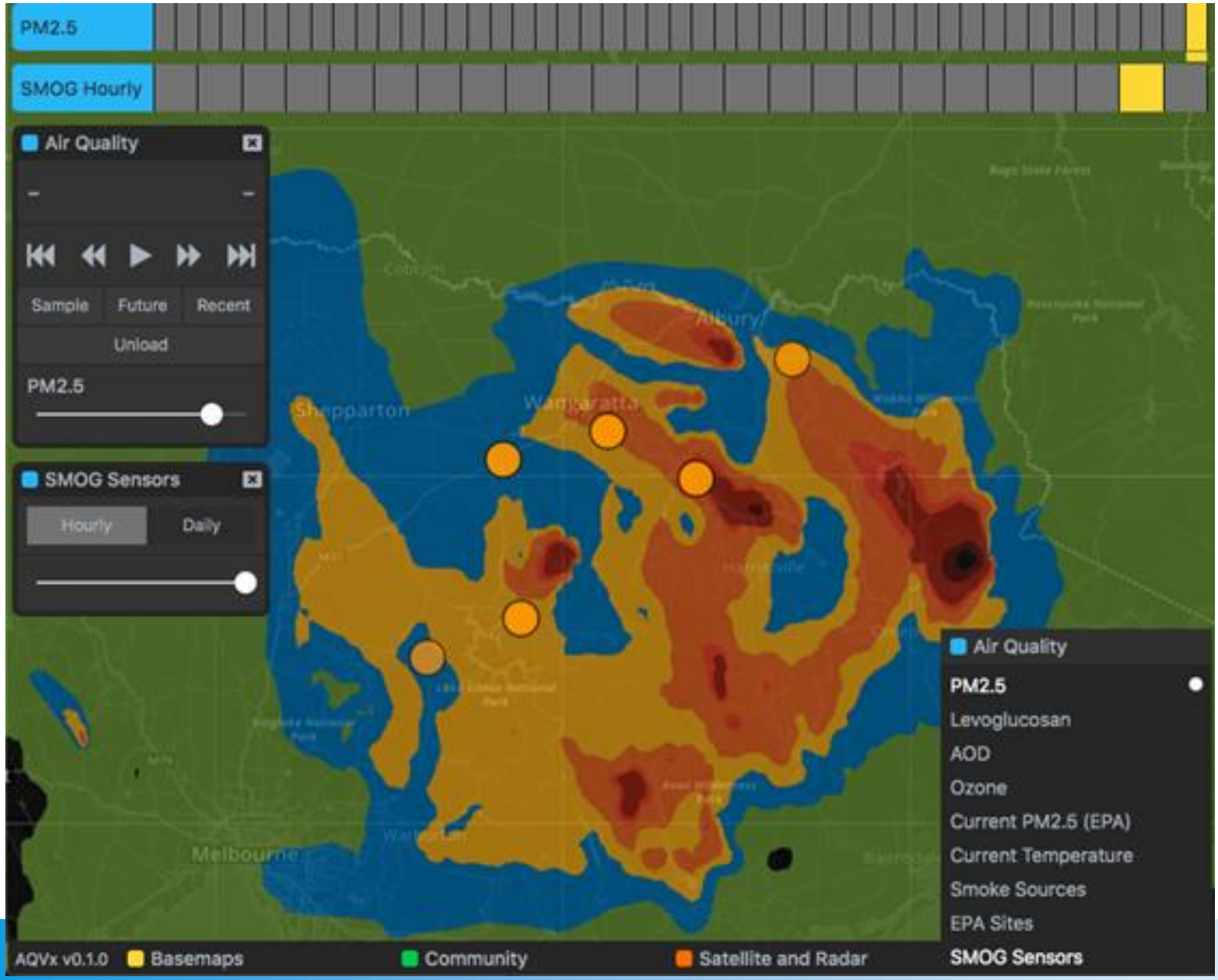
EPA Airwatch

https://aqvx.app

AQVx


PM2.5
Air Quality
Fri 10:00 am
Sample
Future
Recent
Unload
PM2.5
Wagga Wagga
Canberra
Wangaratta
Bendigo
Ballarat
Mount Gambier
Melbourne
Traralgon
Warrnambool
Wyperfeld National Park
Little Desert National Park
Kosciuszko National Park
Deua National Park
Alpine National Park
State Forest
M31
PM2.5
0-5
5-27
27-62
62-97
97-248
248-370
370-2500
>2500
µg/m³
Satellite and Radar
Radar Melbourne
Radar Victoria
Himawari IR
Himawari Active Fire
Himawari Vis.
Sentinel-2 Moisture
Sentinel-2 SWIR
Geoscience Hotspots
Geoscience Burnt Areas
Air Quality
PM2.5
Levoglucosan
AOD
Ozone
Current PM2.5 (EPA)
Current Temperature
Smoke Sources
EPA Sites
SMOG Sensors
Basemaps
Dark
OpenStreetMap
Emergency Vic
Infrastructure
Schools
Aged Care Facilities
Community
Smoke Reports
Symptoms Reports
NEXIS Population Density
AQVx v0.1.0

AQVx


PM2.5
SMOG Hourly
Air Quality
Sample
Future
Recent
Unload
PM2.5
SMOG Sensors
Hourly
Daily
Shepparton
Wangaratta
Albury
Melbourne
Air Quality
PM2.5
Levoglucosan
AOD
Ozone
Current PM2.5 (EPA)
Current Temperature
Smoke Sources
EPA Sites
SMOG Sensors
AQVx v0.1.0
Basemaps
Community
Satellite and Radar

AQVx

PM2.5
Smoke Sources
Fri 5:00pm
Air Quality
Fri 5:00 pm
Sample
Future
Recent
Unload
PM2.5
Smoke Sources
Location 3.5Km Wnw Of Redbank
Categories Planned Burn, Planned Burn
Size 738.60 Ha.
Status In Progress
ID 753407
Completed No
Created 9:43 am
Smoke Sources
Incident
Active Incident
Planned Burn
Active P. Burn
PM2.5
0-5
5-27
27-62
62-97
97-248
248-370
370-2500
>2500
µg/m³
Air Quality
PM2.5
Levoglucosan
AOD
Ozone
Current PM2.5 (EPA)
Current Temperature
Smoke Sources
EPA Sites
SMOG Sensors
Wagga Wagga
Canberra
Wangaratta
Ballarat
Mount Gambier
Melbourne
Traralgon
Warrnambool
Kosciuszko National Park
Alpine National Park
State Forest
AQVx v0.1.0
Basemaps
Infrastructure
Community
Satellite and Radar