Air Quality Forecast system (AQFx)

Real time smoke intelligence visual analysis tool (AQVx)

Alan Wain BoM
Fabienne Reisen CSIRO
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

BoM Access NWP → Agency Fire Data → Fire Spread Model → Emissions Model → CISO CTM → Plotting → Web Products → Verification

Satellite Information

EPA Inventory

EPA Observations

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

10m Windspeed: Bowral

2m Temperature: Bowral

Relative Humidity: Bowral

Forest Fire Danger Index: Bowral

Grassland Fire Danger Index: Bowral
Tier 1 point location SkewT-logP (F160)
Tier 1 Ventilation Index

$VI = \text{depth of mixed layer} \times \text{avg windspeed in mixed layer}$
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
Tier 3 – PM2.5 no chemistry
Real time smoke intelligence visual analysis tool - AQVx

Himawari satellite data

Sat- AOD

07-12/01/2009

AQVx

AQFx

BoM Radar

AQFx spatial (w-obs)

AQFx Time series

Satellite data

Social media

Citizen-science

Low cost sensors

EPA Airwatch

https://aqvx.app