

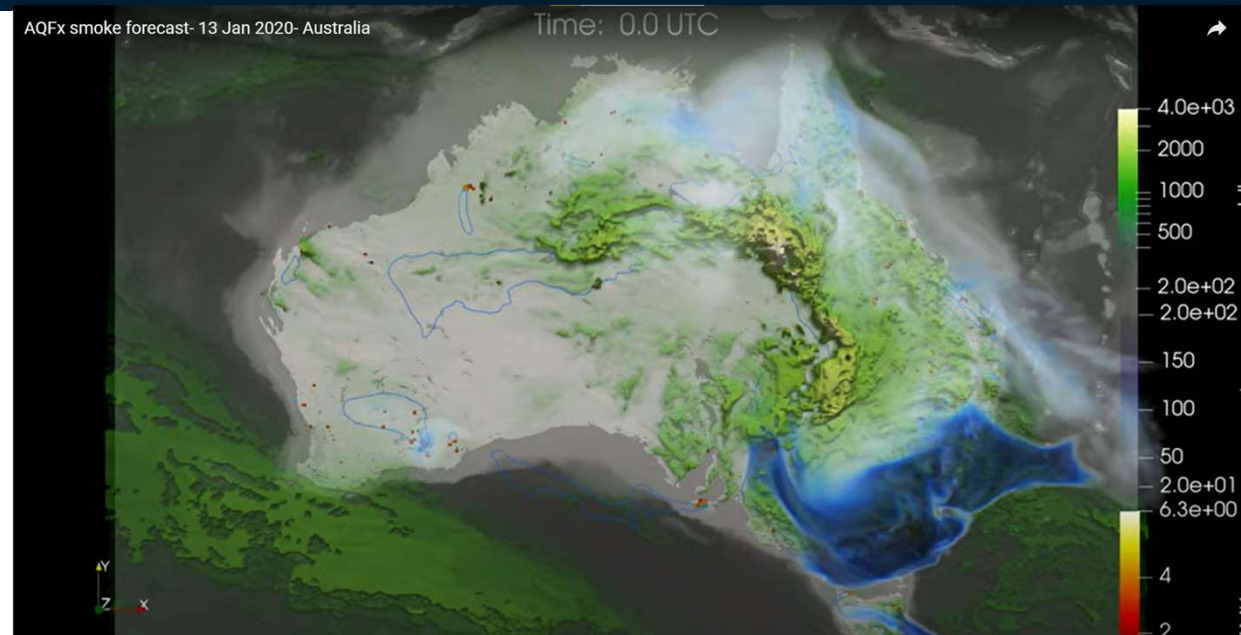


Australia's National Science Agency

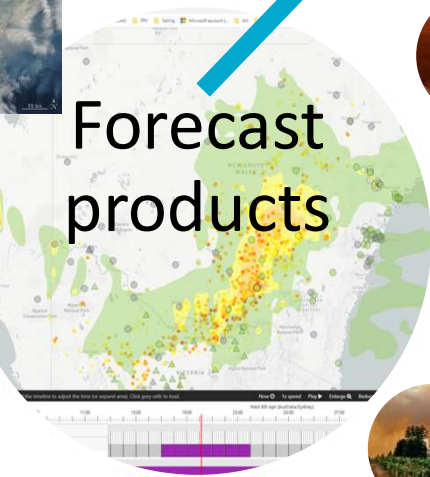
A tactical air quality forecasting tool – an aid for managing population exposure to smoke

[Air Quality Forecasting \(csiro.au\)](https://www.csiro.au)

Fabienne Reisen | CSIRO Environment
2023 Savanna Fire Forum, 21-22 February 2023



AQFx - a tactical tool to aid decision-making



HEALTH



Impacts on public outdoor events



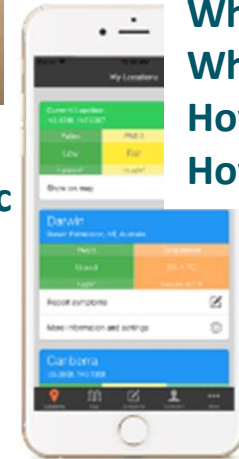
VISIBILITY



Impact on transport sector



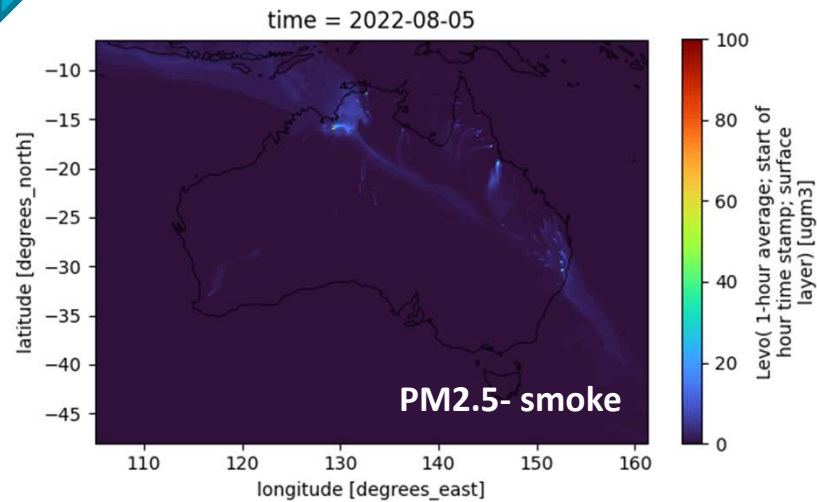
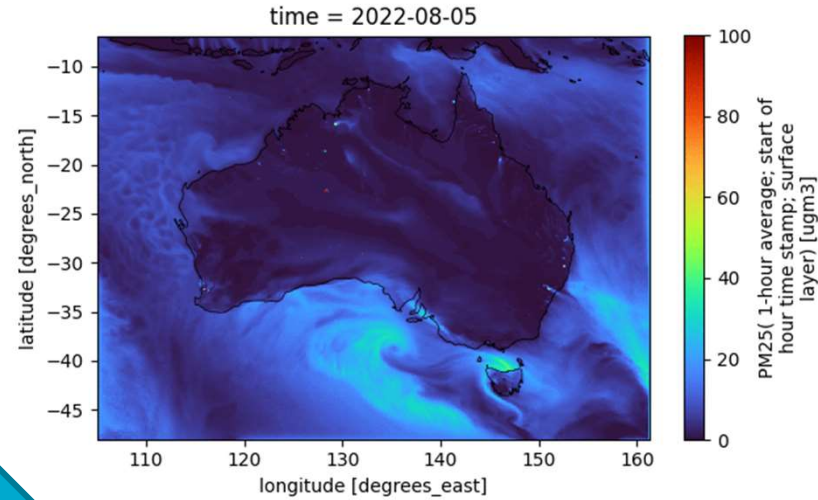
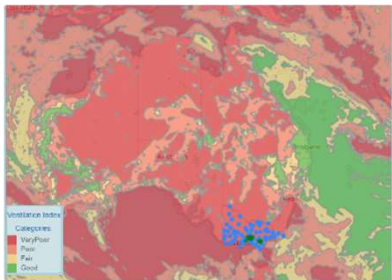
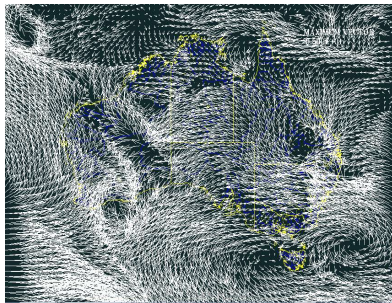
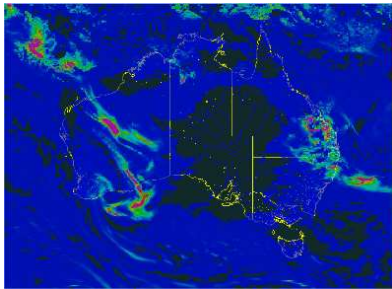
At-Risk INDUSTRIES



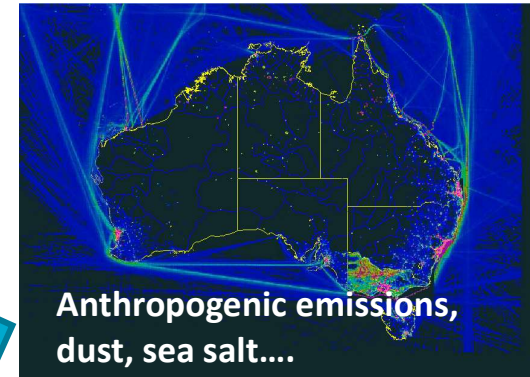
Where?
When?
How long?
How intense?

How are forecasts generated?


BoM weather forecast



National emissions



How are smoke emissions derived?



Top – down approach:

$$\text{Emissions}_i = \alpha \times \int_{t_1}^{t_2} FRP(t) dt \times EF_i$$

Smoke composition
Emission fluxes

Plume rise
models

Temporal and spatial
information on area burnt

Bottom – up approach:

$$\text{Emissions}_i = \text{Area burned} \times \text{Biomass consumed} \times EF_i$$

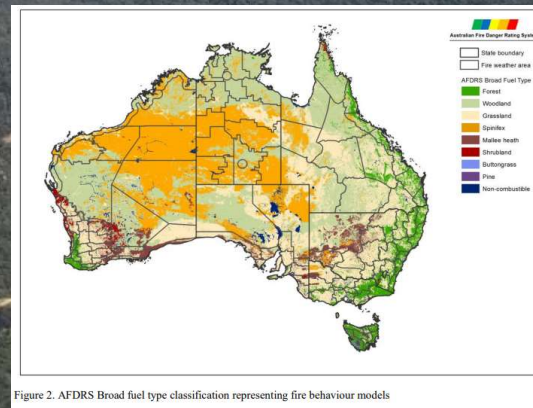


Figure 2. AFDRS Broad fuel type classification representing fire behaviour models

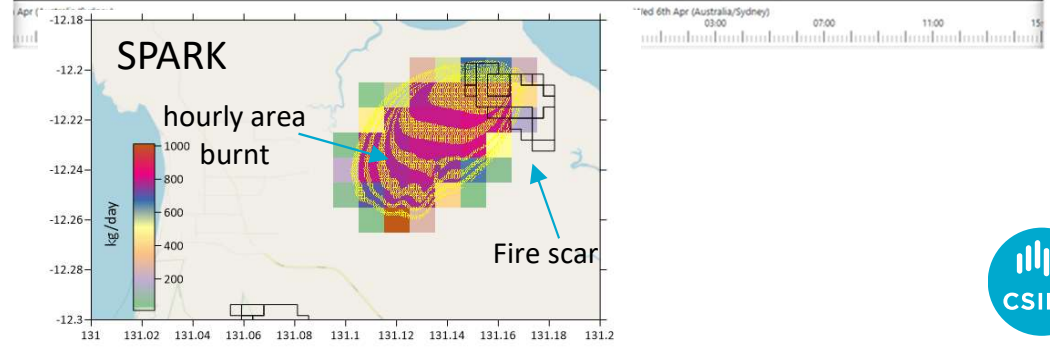
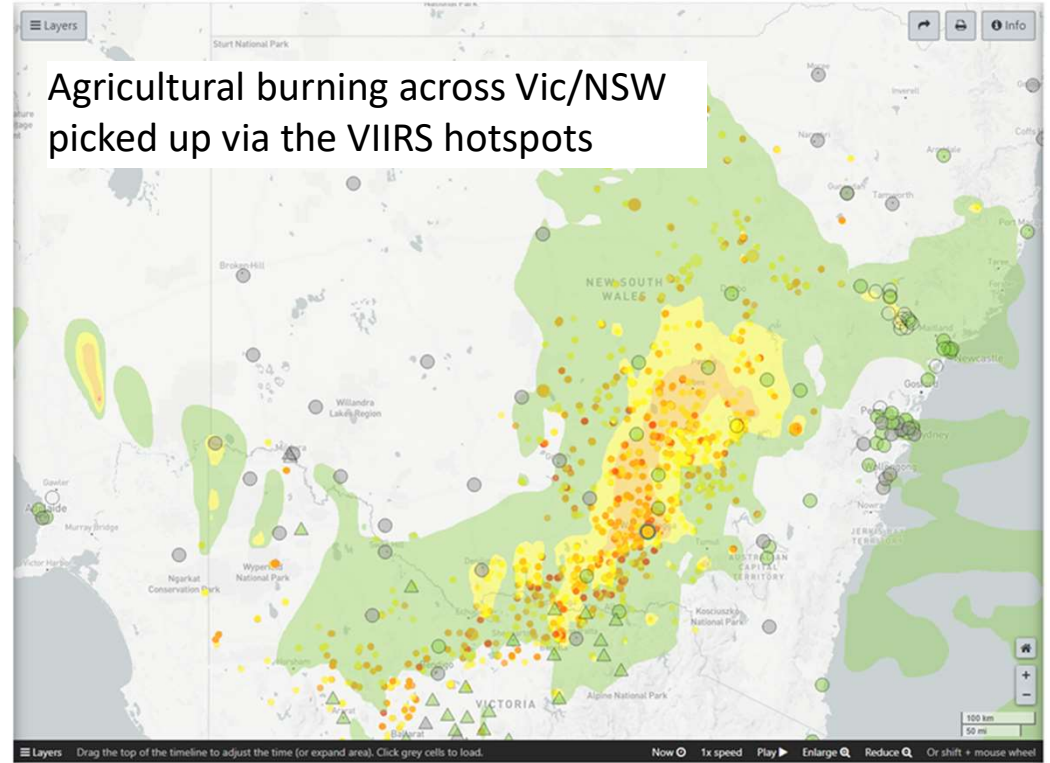
Fuel load mapping

- Unified with fire behavior models
- Coarse woody debris (smouldering)

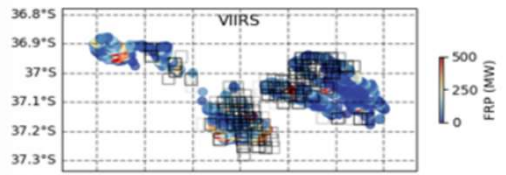
Increase robustness & accuracy of forecasts

Applying the Swiss Cheese Model to determine area burnt -

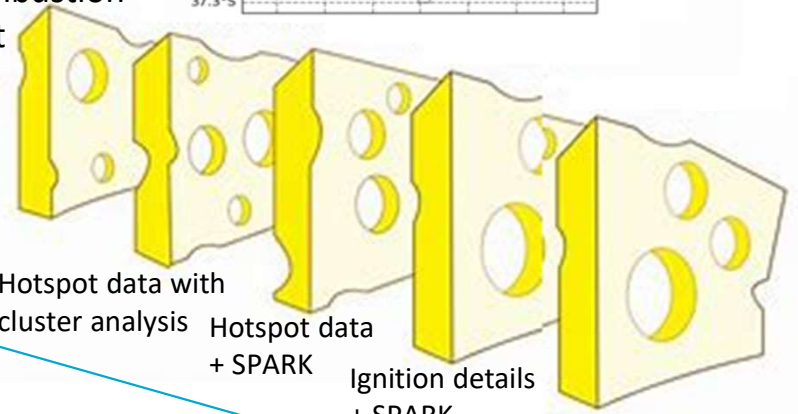
All layers are important because each layer is not perfect



Top-down approach



FRP & combustion coefficient

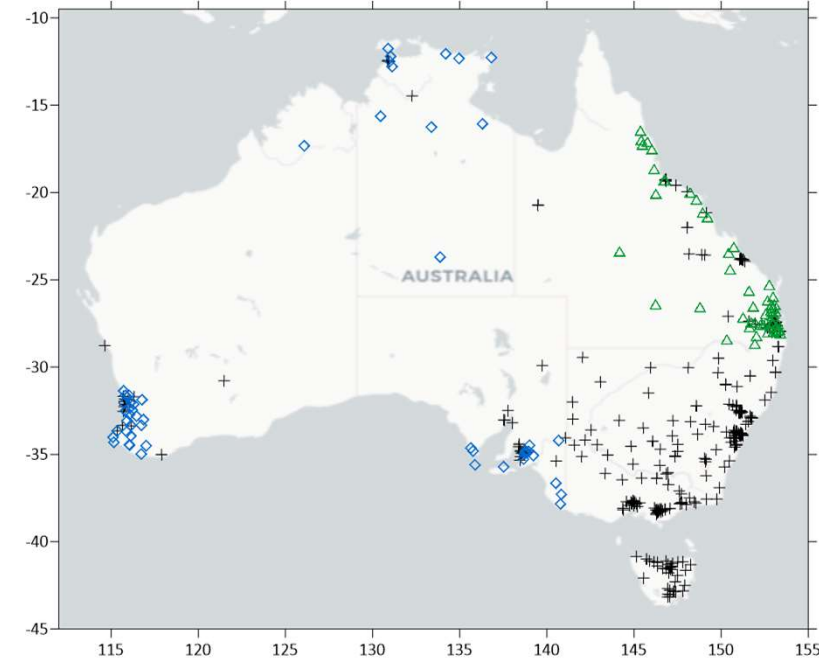
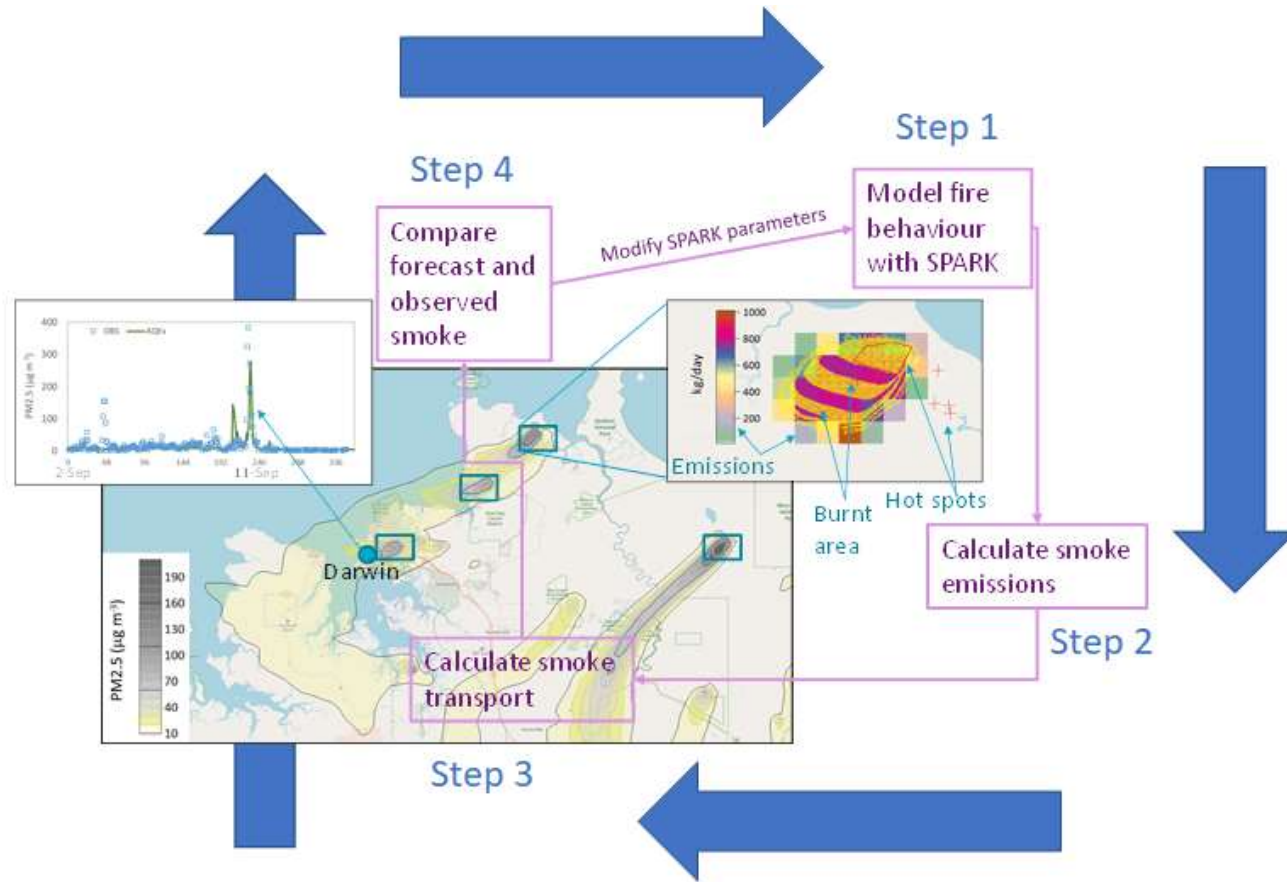


Hotspot data with cluster analysis
Hotspot data + SPARK
Ignition details + SPARK
Fire shape files provided by agencies

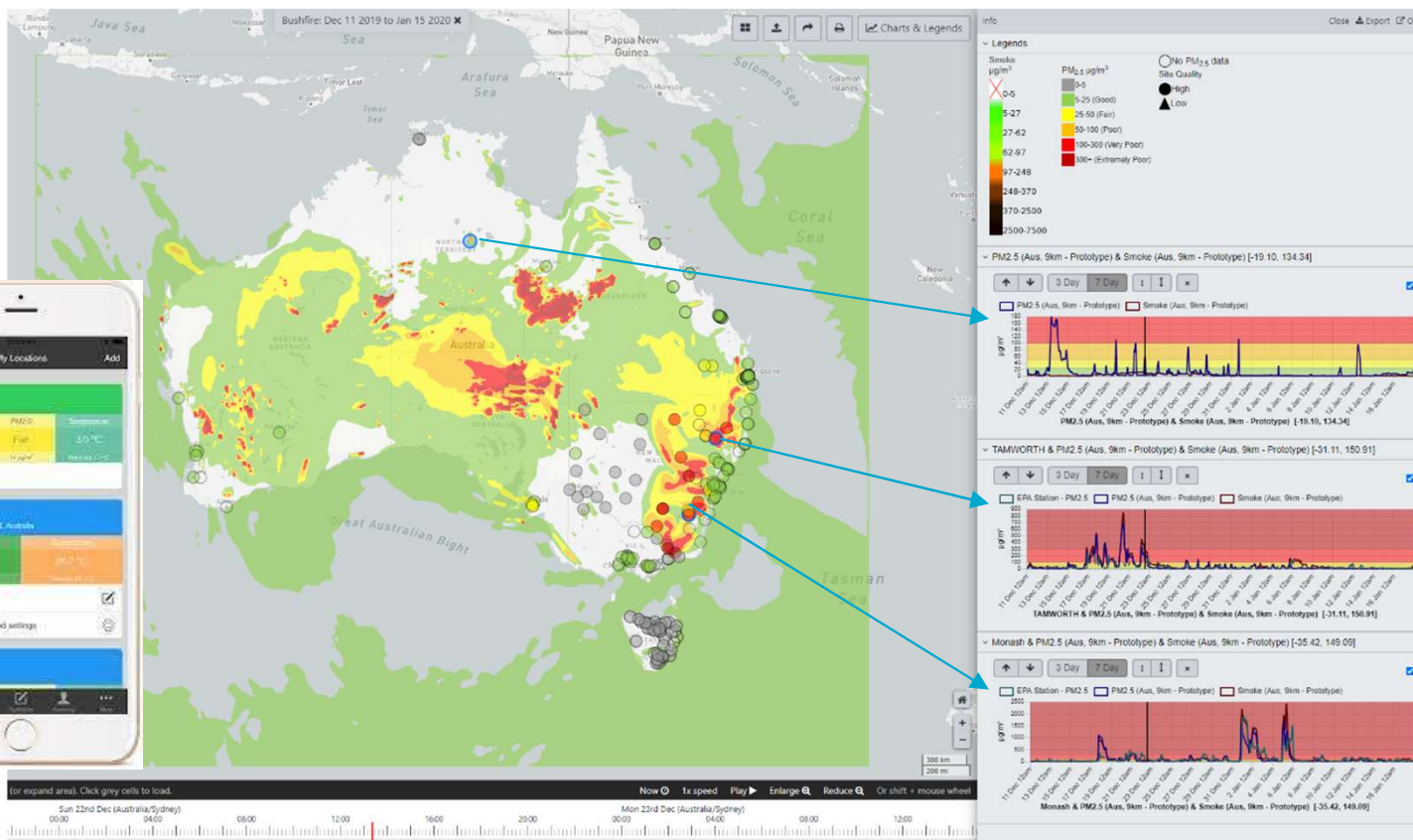
Bottom-up approach



Data assimilation – Satellite and surface observations



PRODUCTS - Cohesive & nationally consistent smoke forecast risk via cloud-based communication capabilities

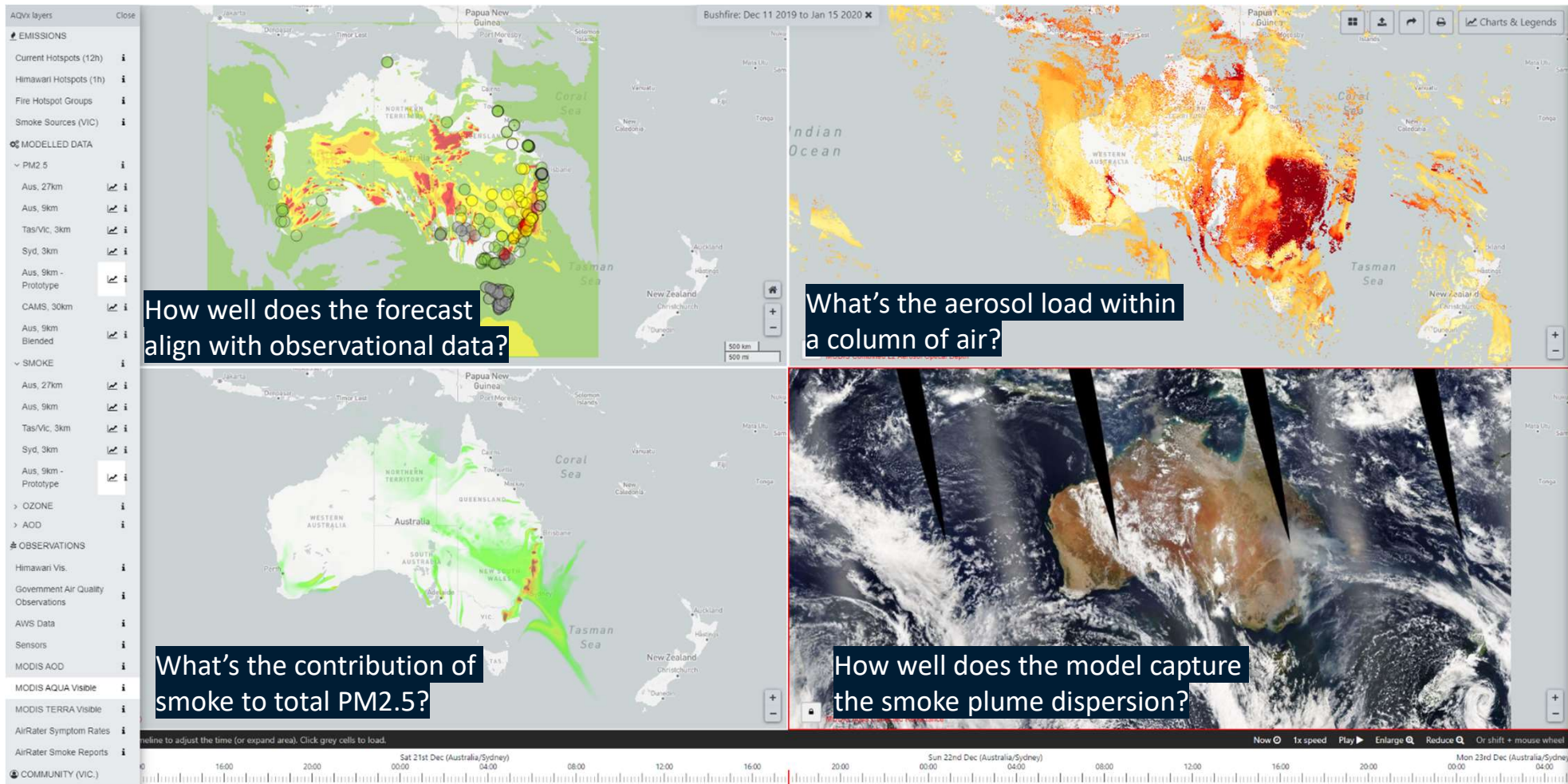


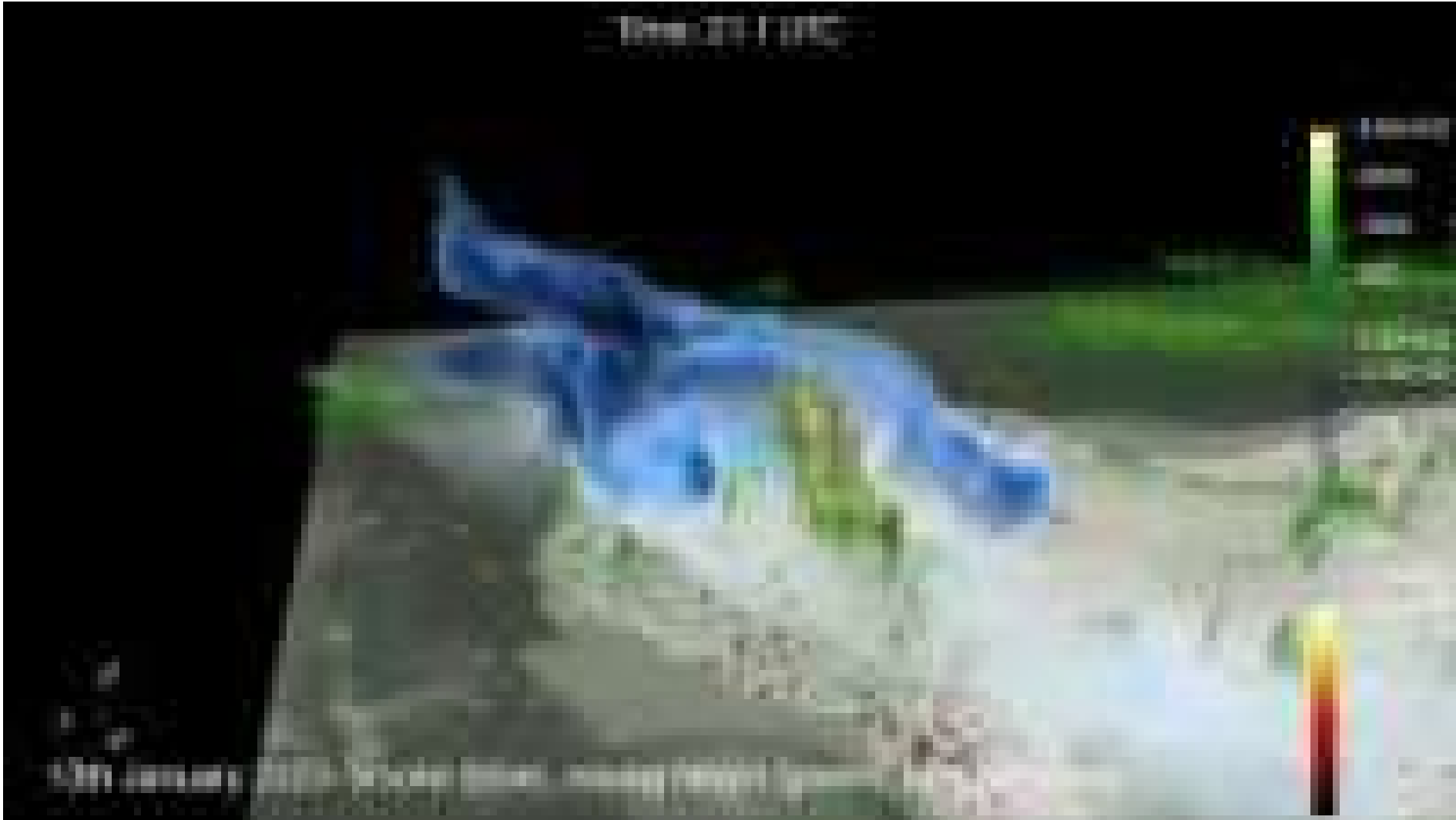
ENGAGEMENT

Australian State and Territories Fire agencies, Environment Agencies, Health Departments and organisations;
At-risk industries;
Research/Universities

Ensure system is robust, is fit for purpose, and is optimised for stakeholder applications

Multi-panel visualisation







Thank you

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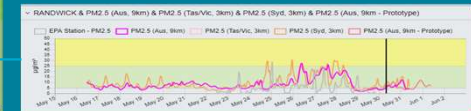
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Australia's National Science Agency

“All models are wrong, but some models are useful”

- George Edward Pelham Box

https://en.wikipedia.org/wiki/All_models_are_wrong



<https://research.csiro.au/aqfx/>