

SPARK OPERATIONAL

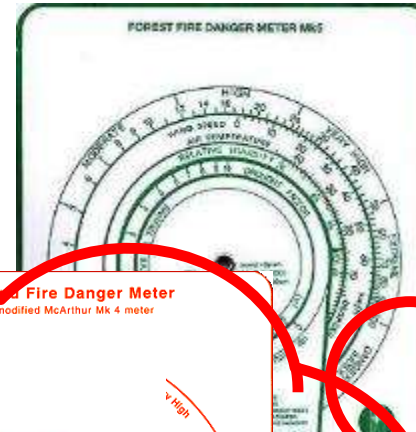
The Australian national bushfire simulator

John Bally, James Hilton, Andrew Sullivan, Will Swedosh, Sandy Whight

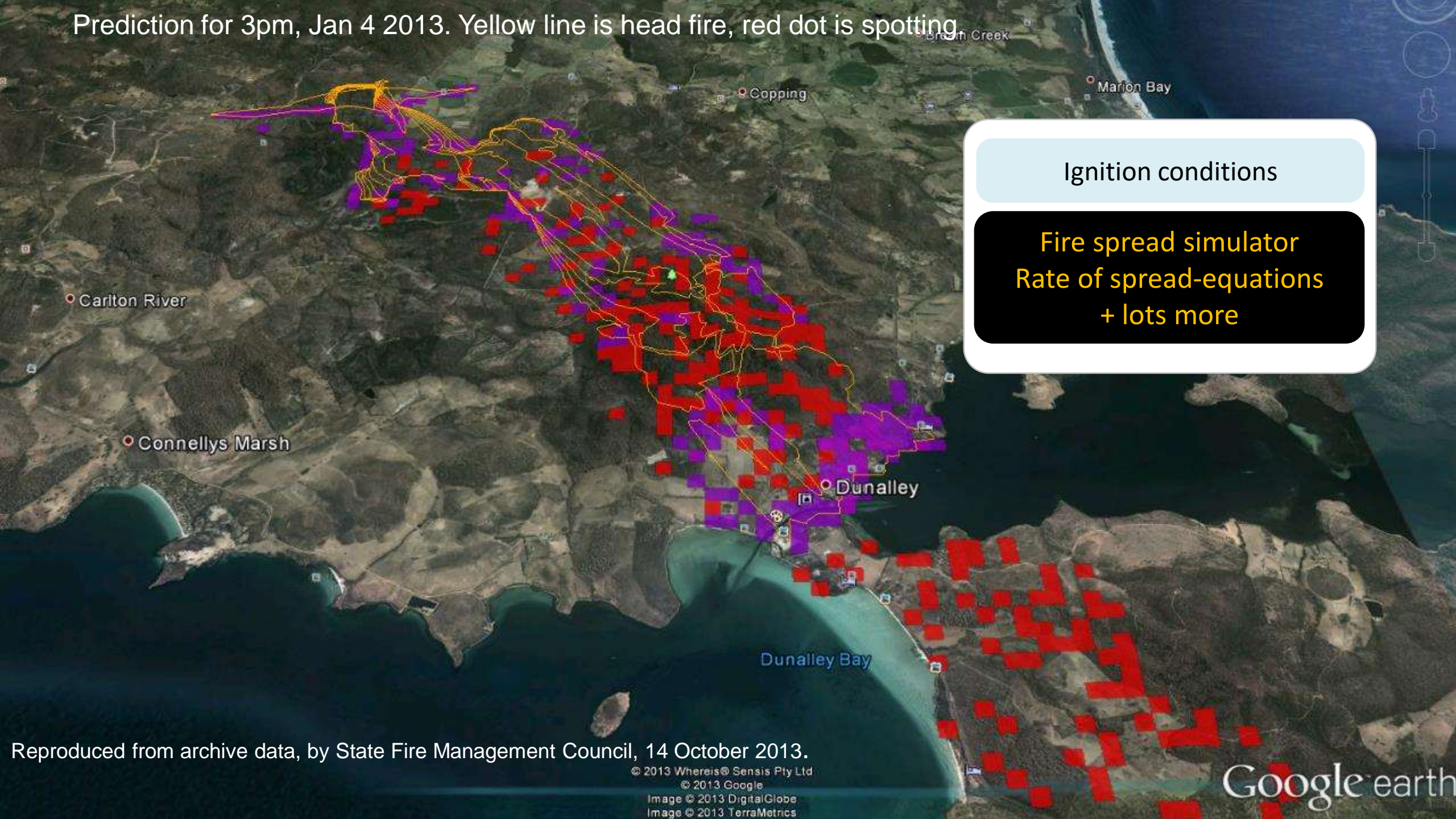


FBAN tools in Australia

- Simulations by hand
- Empirical models
- Kevin Tolhurst lifting to next level



Prediction for 3pm, Jan 4 2013. Yellow line is head fire, red dot is spotting



Ignition conditions

Fire spread simulator
Rate of spread-equations
+ lots more

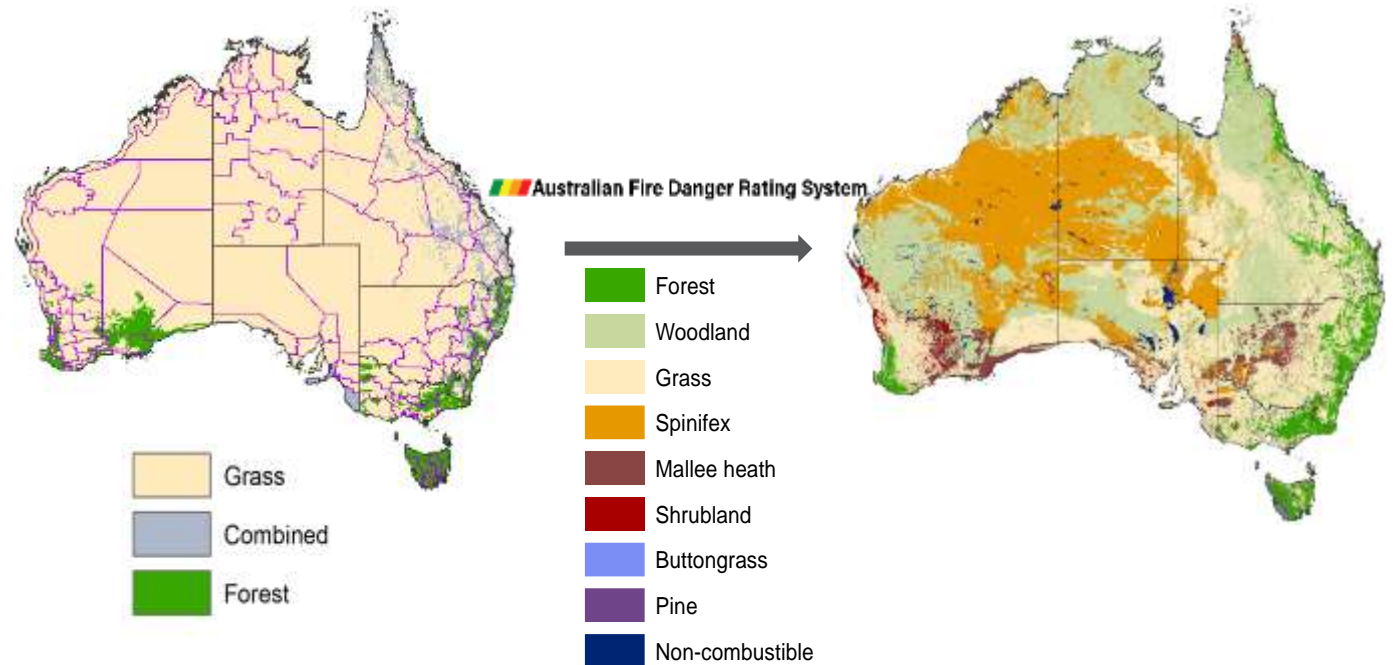
Reproduced from archive data, by State Fire Management Council, 14 October 2013.

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Google earth

Simulator Evaluation for Australia

- What is the best simulator overall?
- Tested 4 simulators against the same case studies
- Cost-benefit analysis
- http://www.bom.gov.au/research/publications/otherreports/FPS_Final_Report_v1.81_Evaluation_Of_Simulators_Release.pdf



Separation of software from models

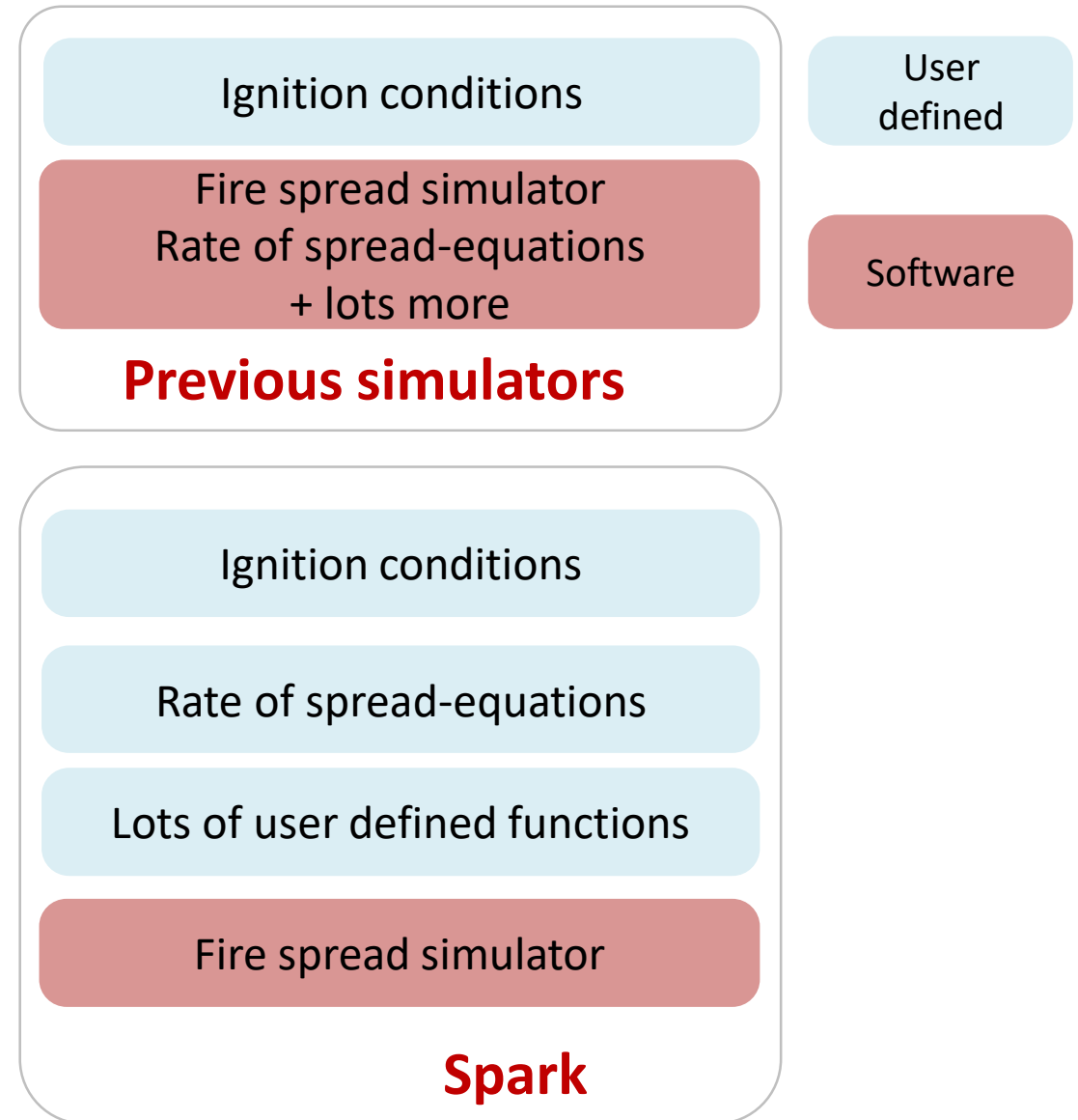
- Models can be developed and tested by users
- Common platform for bushfire modelling
- Independent expert contributions to overall system

Parallel development

- Spark team develop core capability
- Researchers/users develop models
- End users deploy and configure system

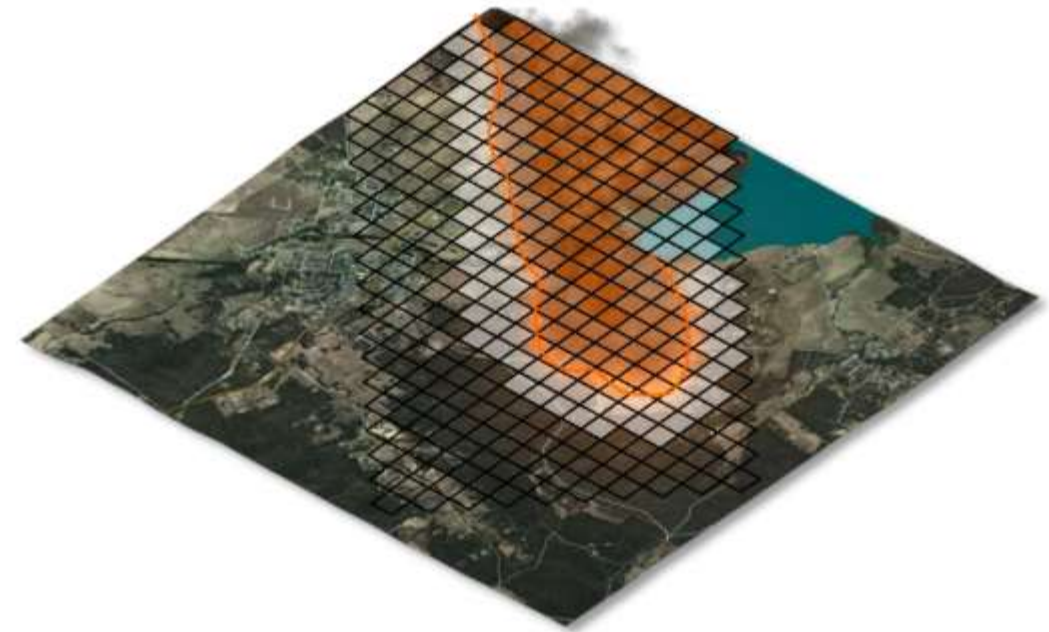
Modular design

- Python-based, open CL C, Javascript (UI)
- Client/server architecture



What is Spark

- Spark is a bushfire prediction *framework* developed by CSIRO
- Rate of spread based on input data – wind, fuel, terrain
- Spark Operational

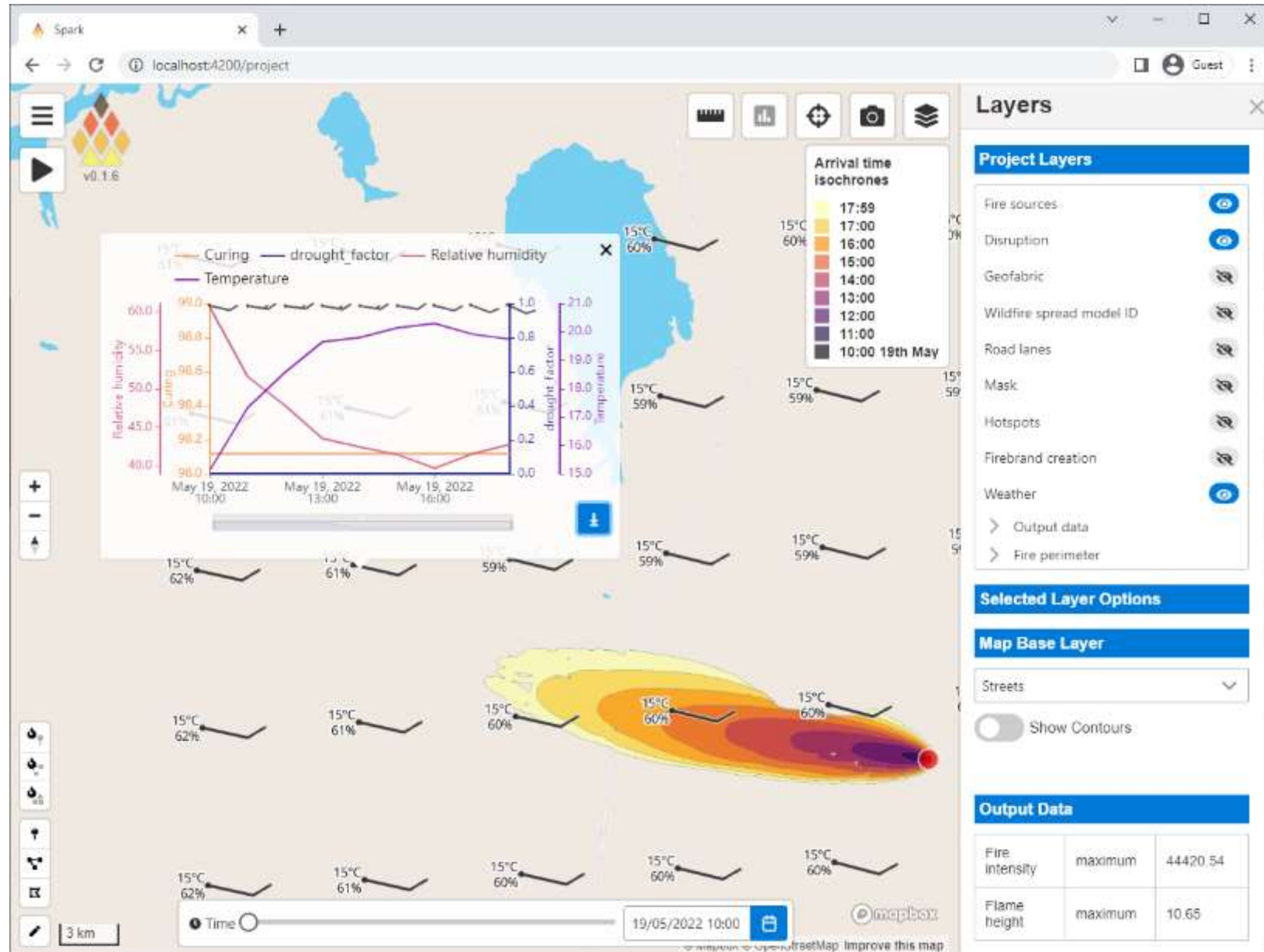


Level set method

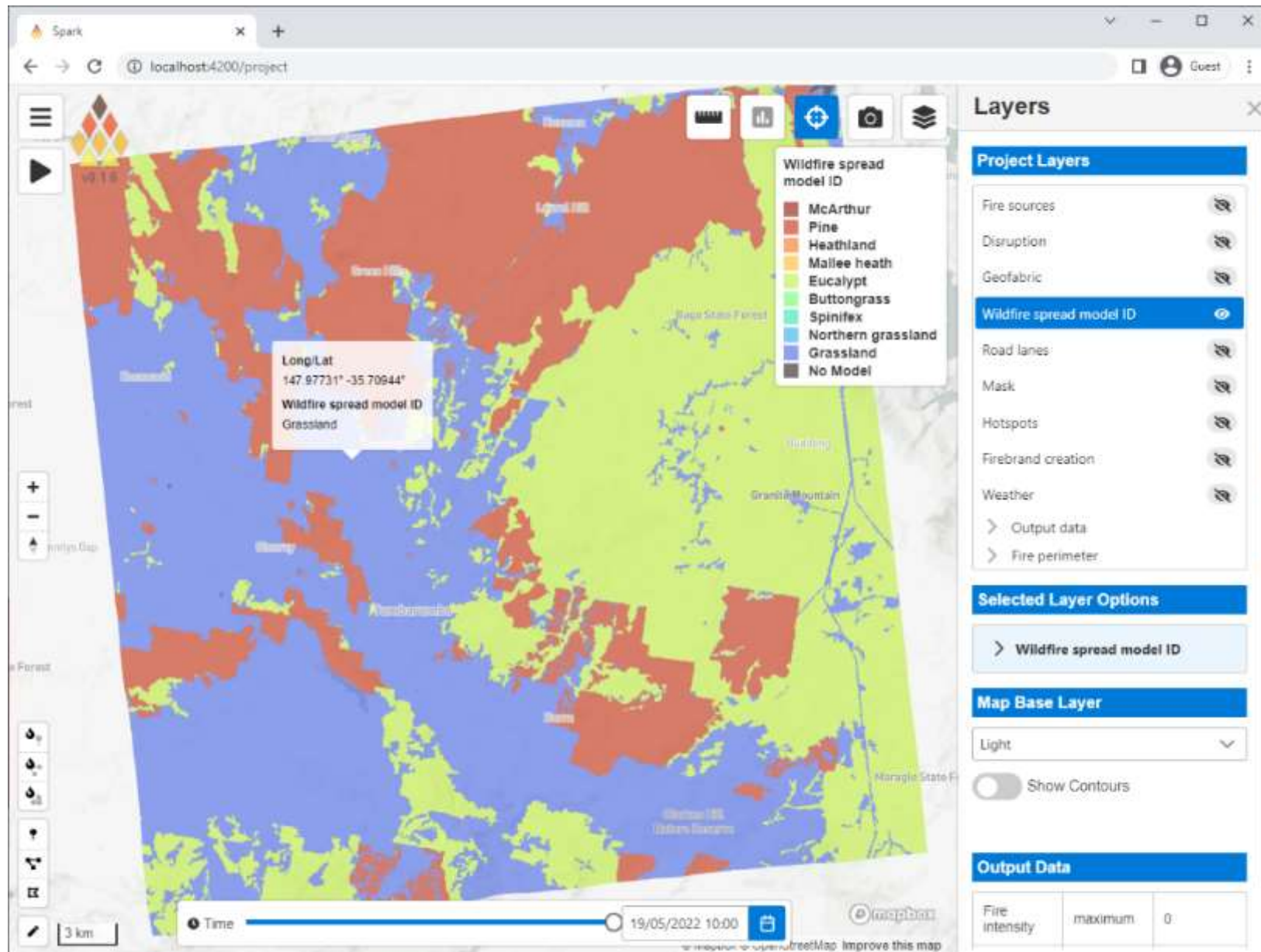
Spark design principles

- Codebase is ***Modern, Modular, Maintainable***
- **UI** is clean, simple and ***Optional***.
- All **inputs visible** (ignitions, weather, fuel, land attributes)
- **Interactively edit** ignitions, fuels, disruptions, weather
- Runs **wide range of fire behaviour models** and sub-models
- Easily *connect to data sources* (eg hotspots, lightning, curing etc etc)
- **Flexible output generation**
- **Ensemble** capable

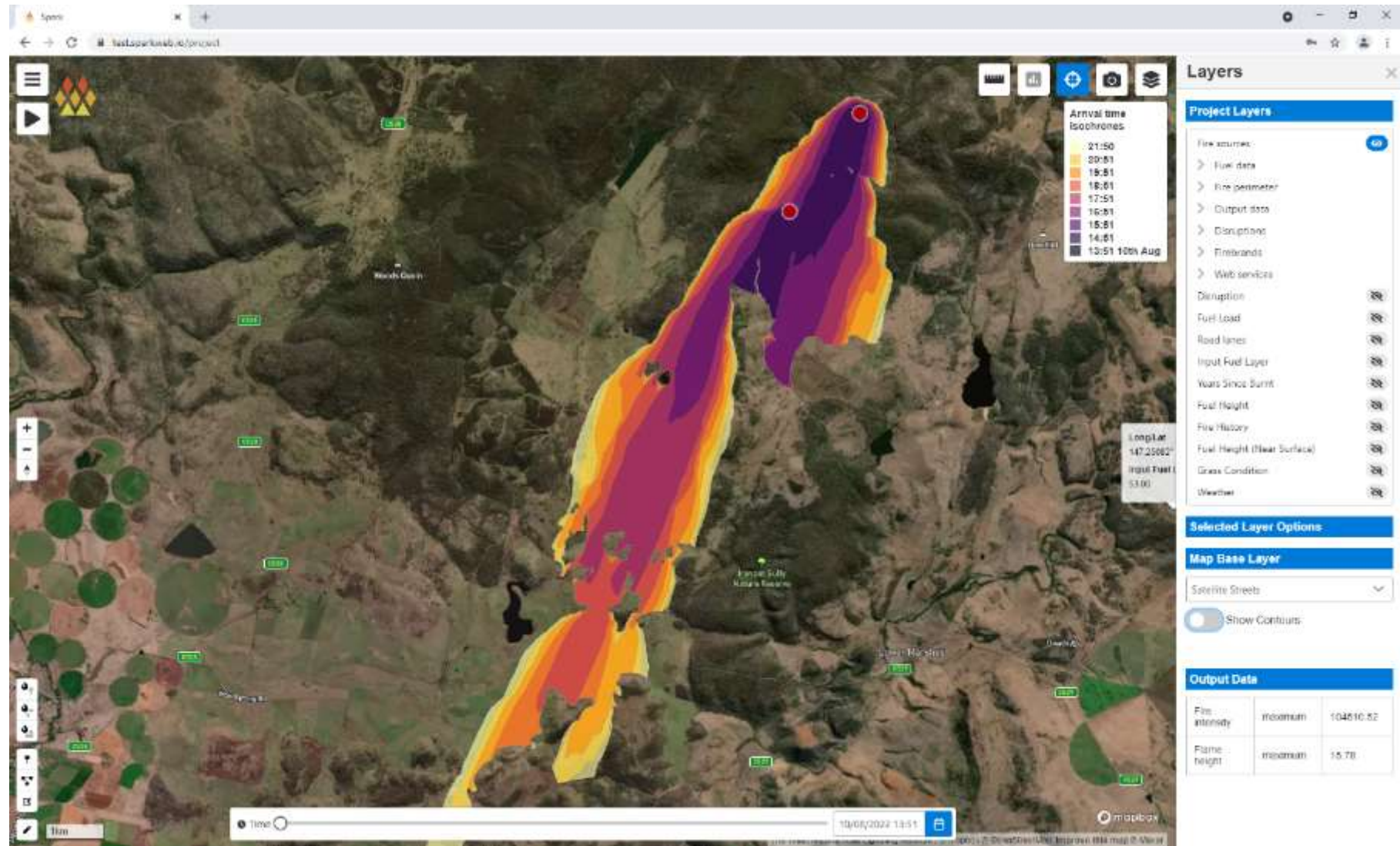
Visualisation of weather data



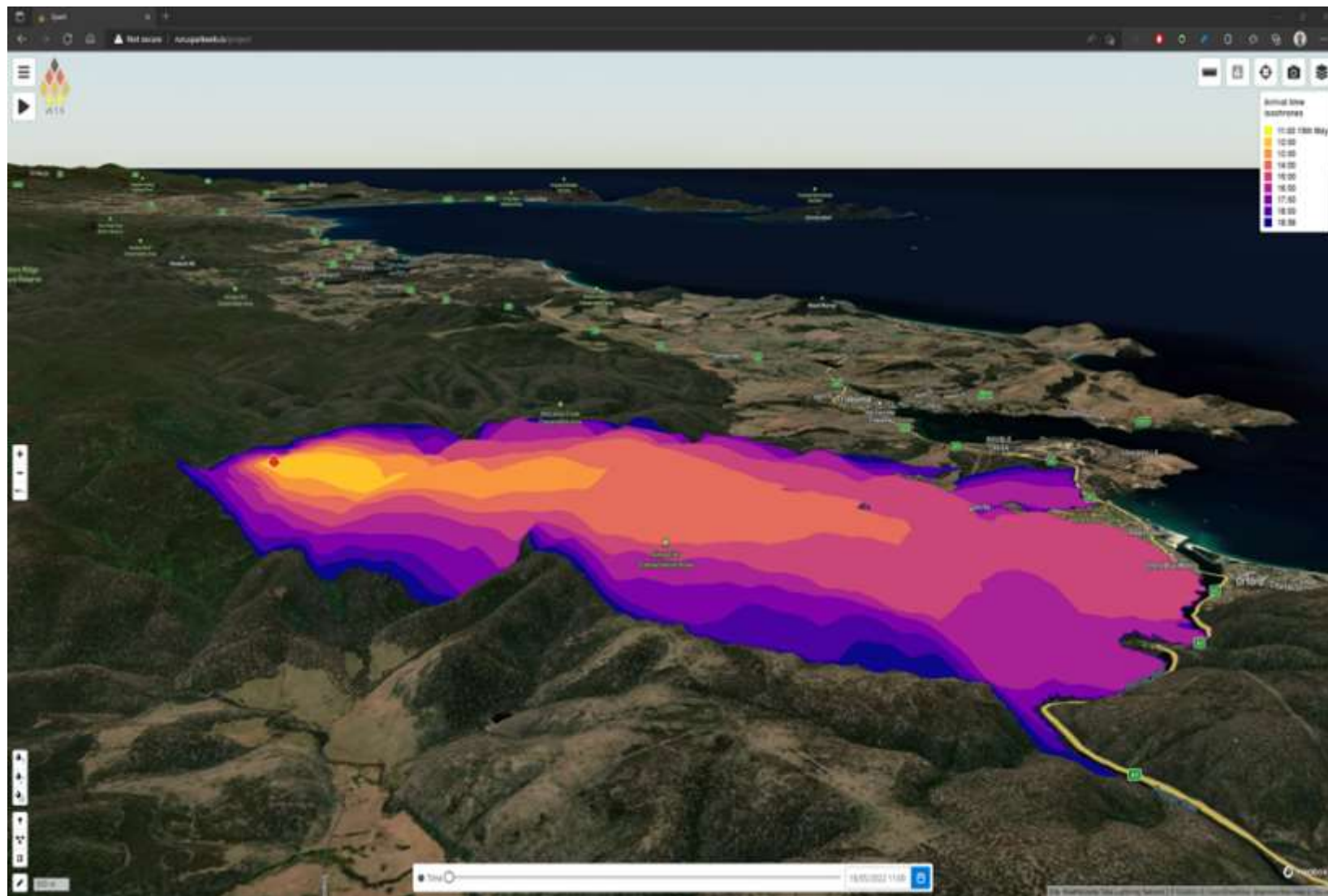
Visualisation of fuel type

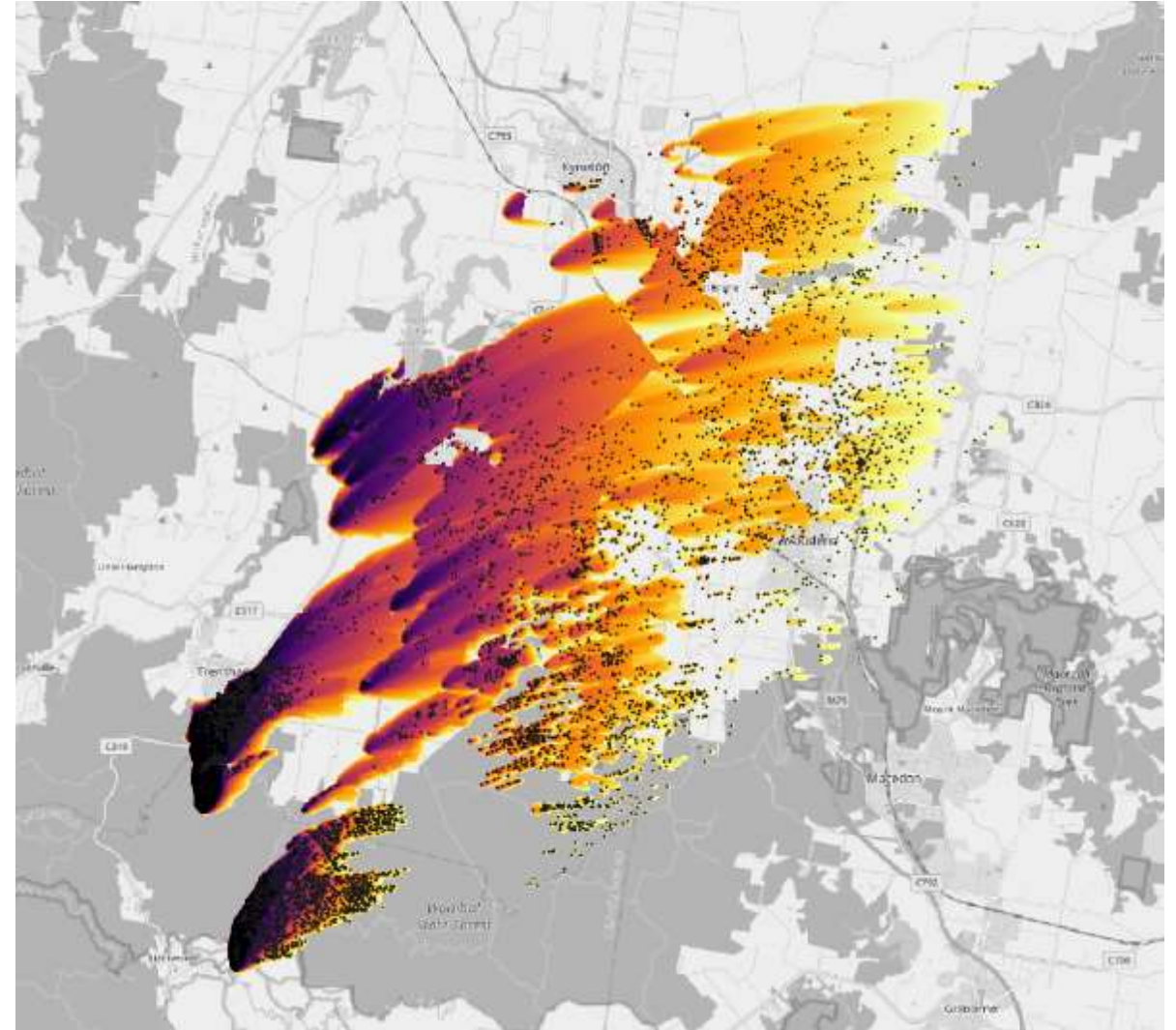
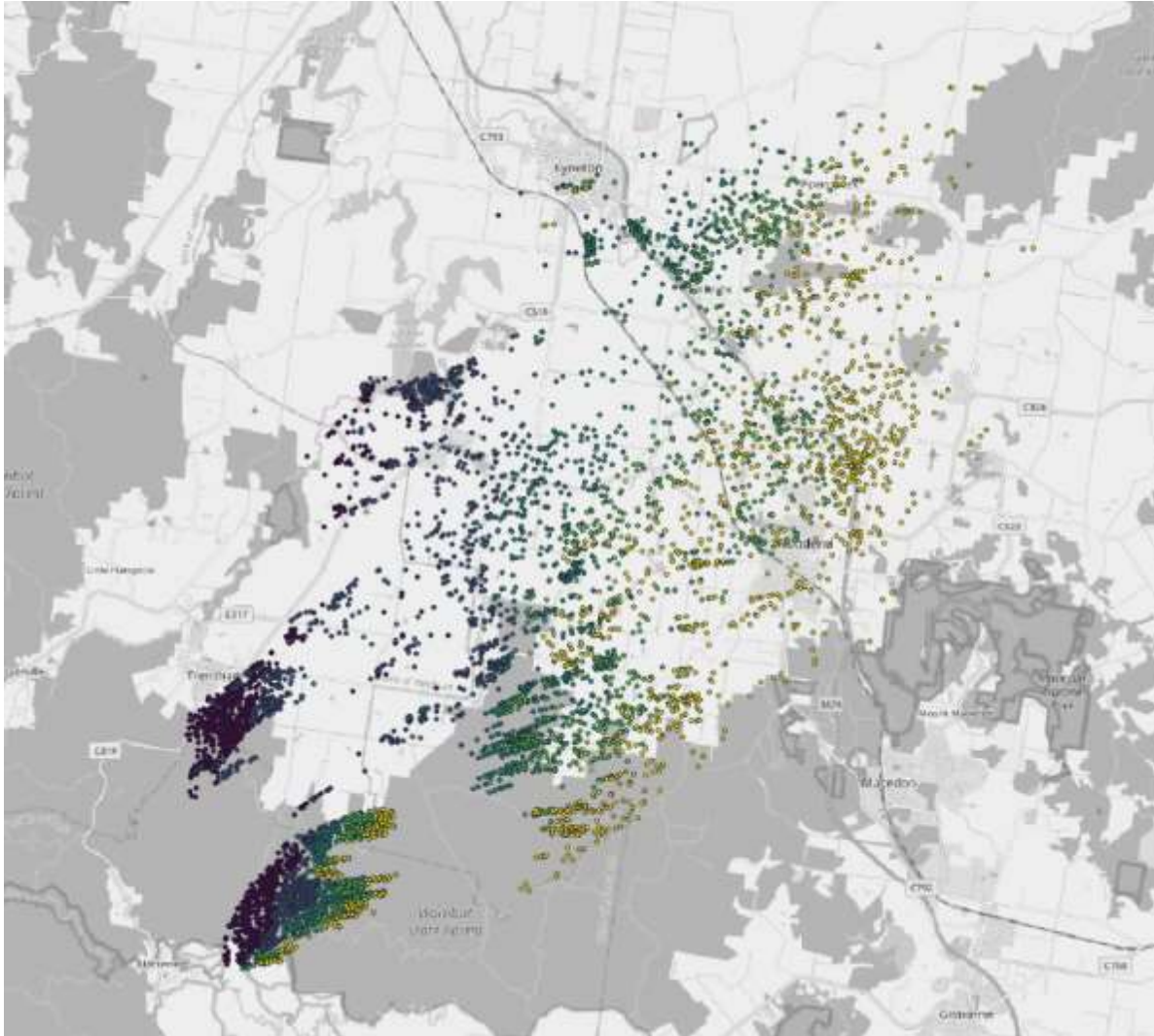


3D landscape view

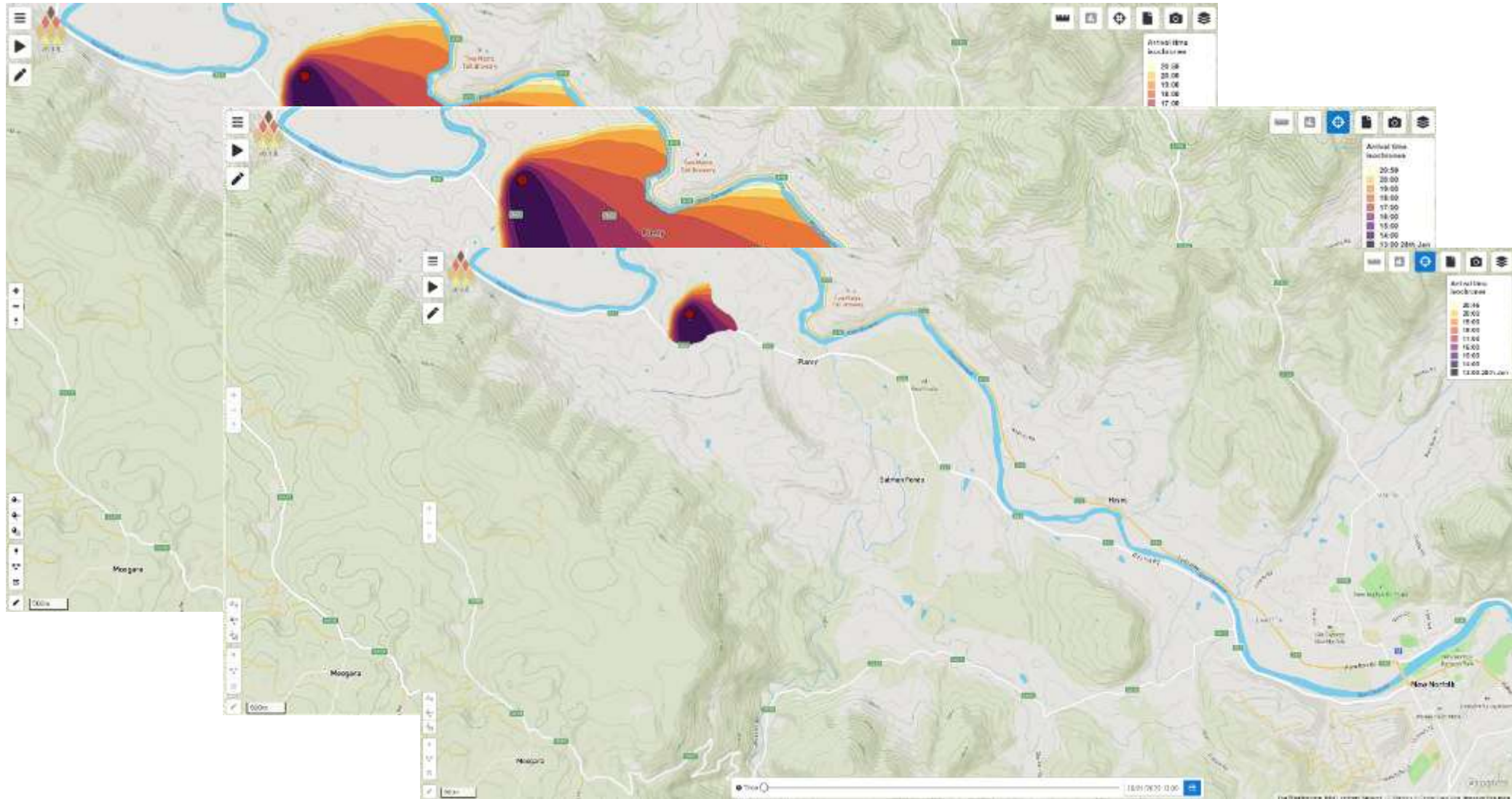


3D landscape view



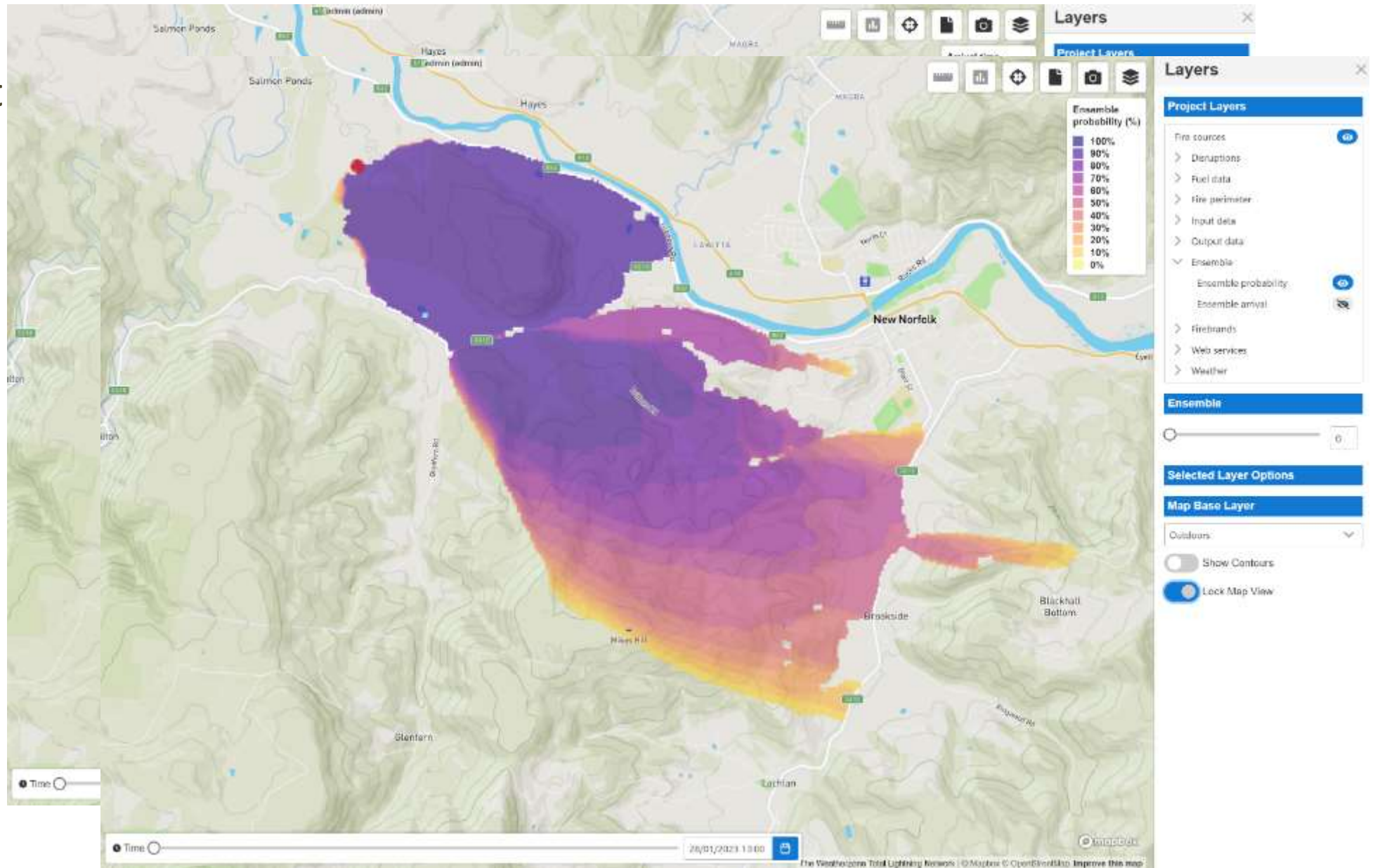


Ember Transport Model



Configurable disruptions

Chance of Impact from Ensembles



Important!

- A tool not a solution
- Decision support tool, NOT a decision making tool
- Need to have policies for how data is managed in, curated and managed out
- Coupled fire behaviour models – much too slow but part of an evolving model ecosystem
- Very clever people have built this and made it look fabulous – which is dangerous
- Still need to train people in fire behaviour analysis
- Still need to have outputs linked to a good communications framework

