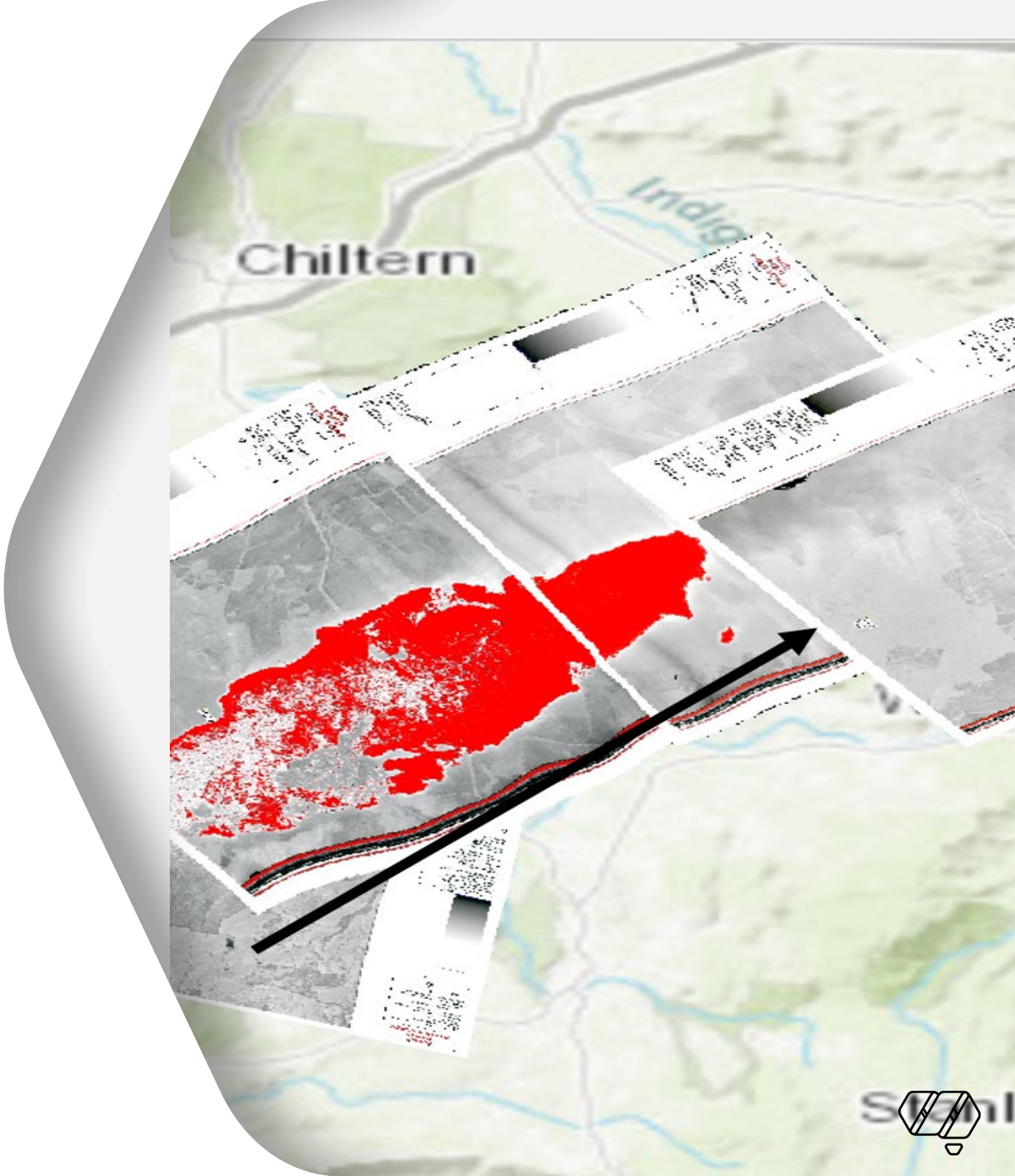
Natural Hazards Research Australia

Capturing uncertainty in bushfire spread prediction

Bayesian Rate of Spread Model



Michael Storey
Associate Research Fellow
University of Wollongong

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Develop a Bayesian probabilistic bushfire rate of spread model for operational use (ROS, Rate of fire growth?)

Develop tools and approaches to generate and communicate probabilistic predictions in operational settings.

Develop a comprehensive rate of spread database that is easy to query and share (Polygons, images, other fire data?)

Completion at the end of 2026

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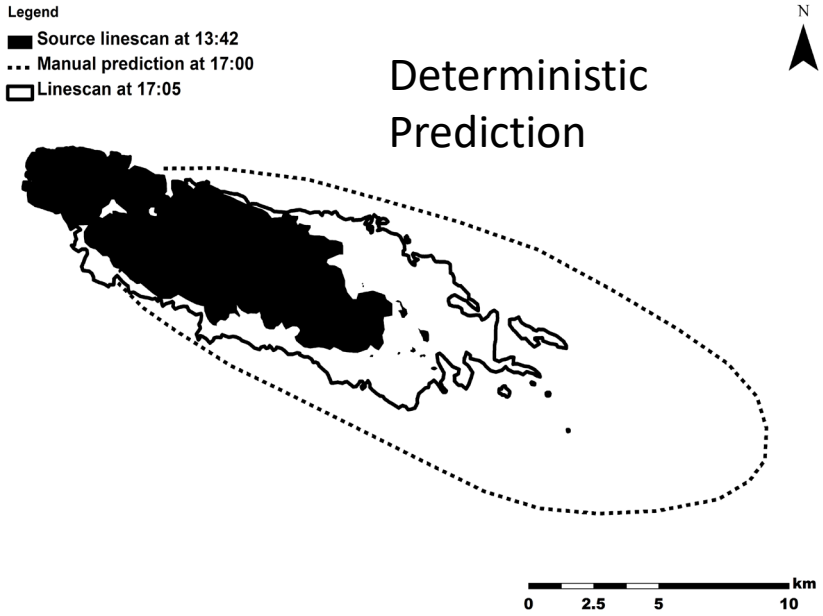
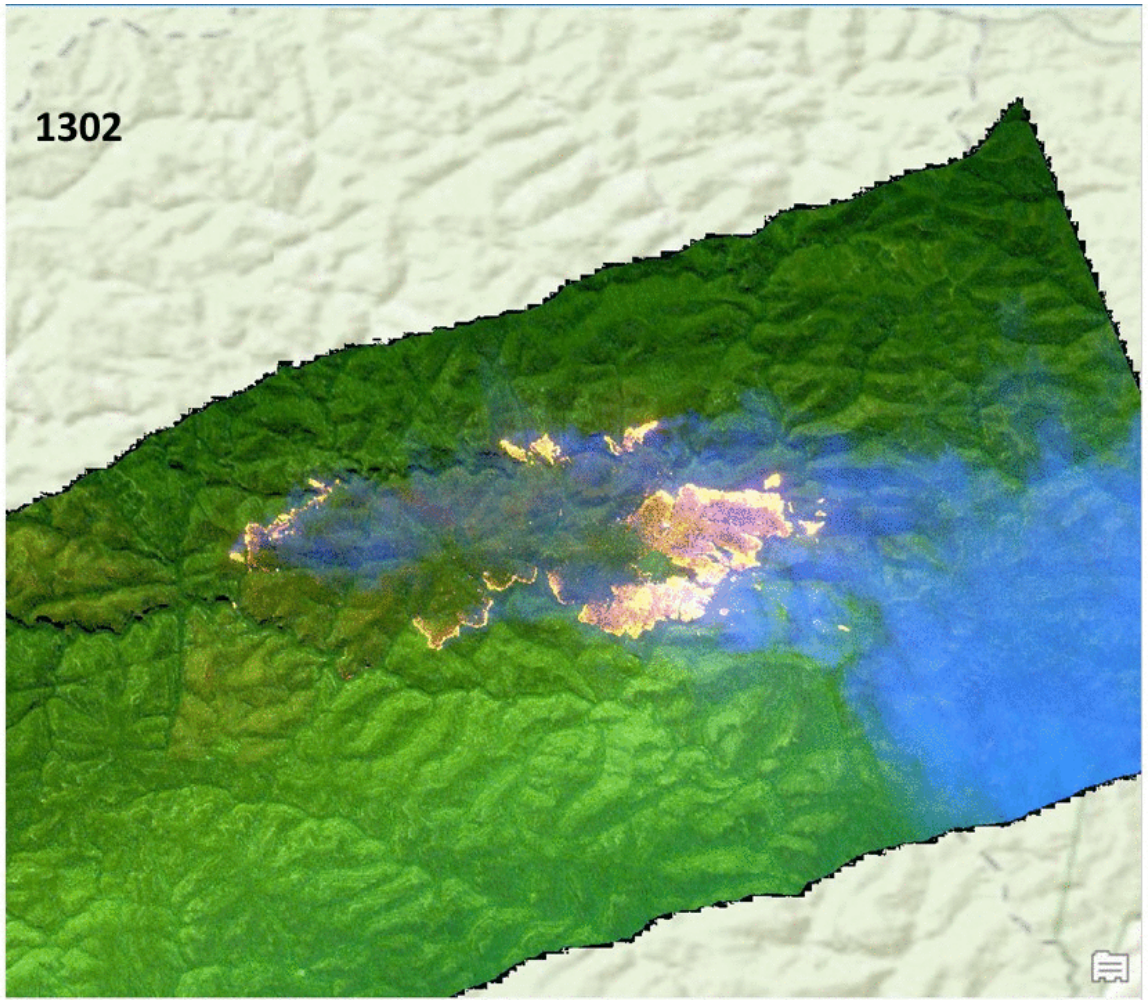
Complex fire spread

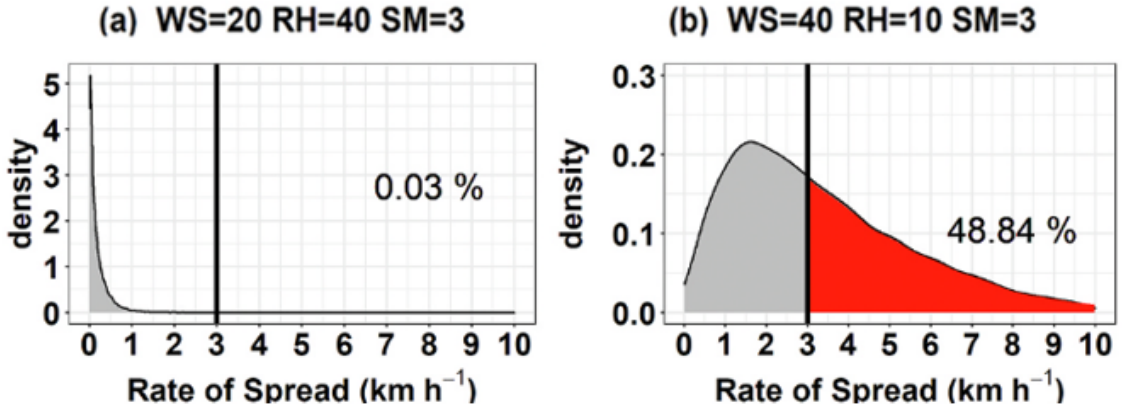
- Topography
- Spotting (incl. ridge to ridge)
- Wind gusts
- Extreme fire behaviours
- Lateral spread
- Atmospheric coupling





Bayesian predictions

Bayesian



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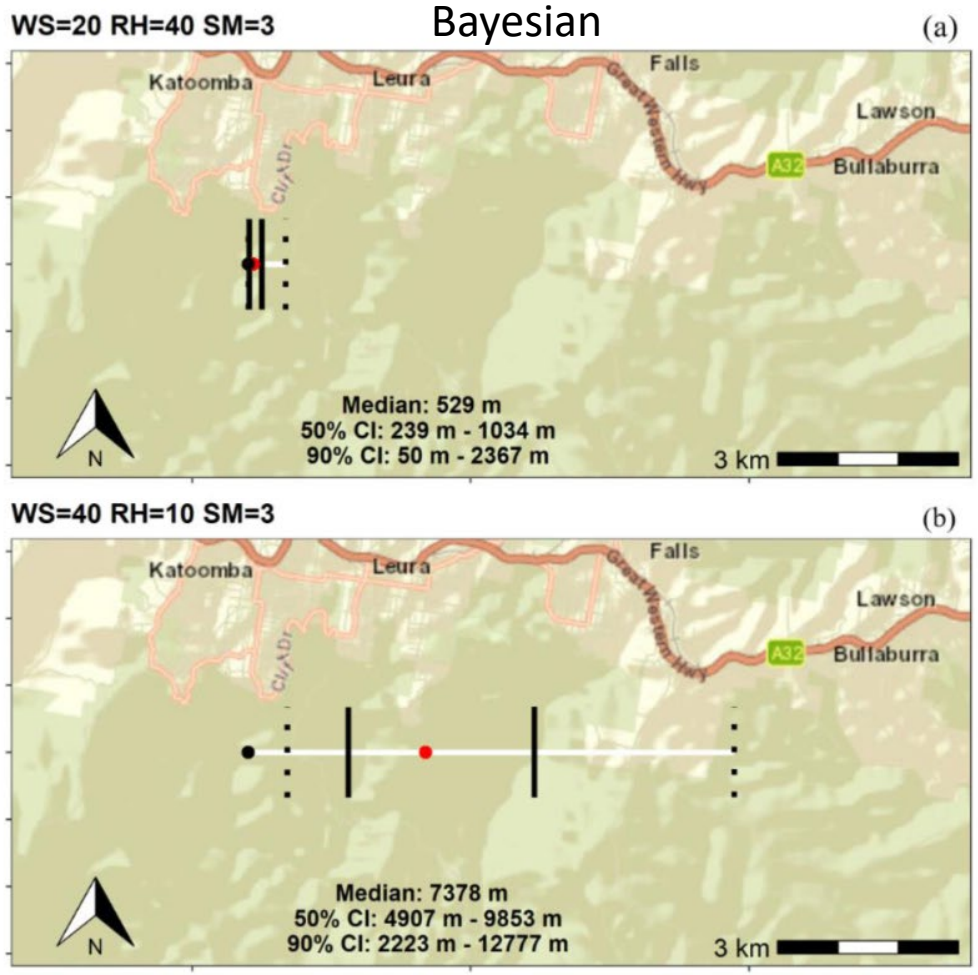
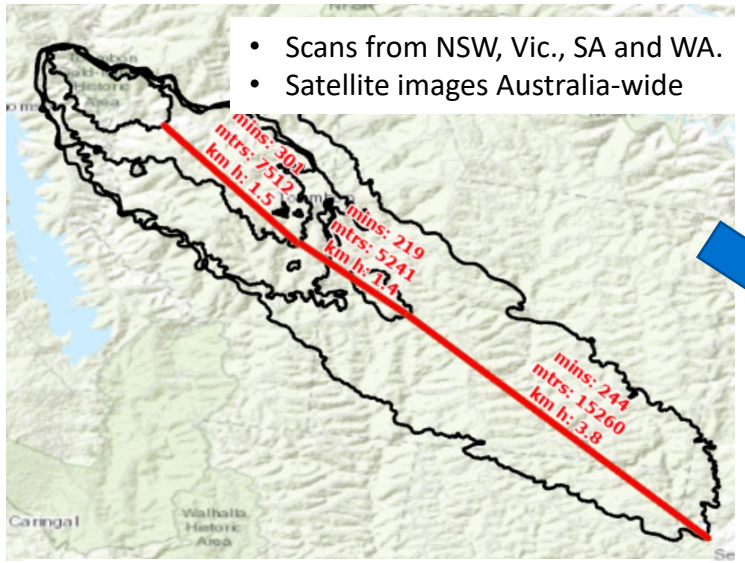
Bayesian

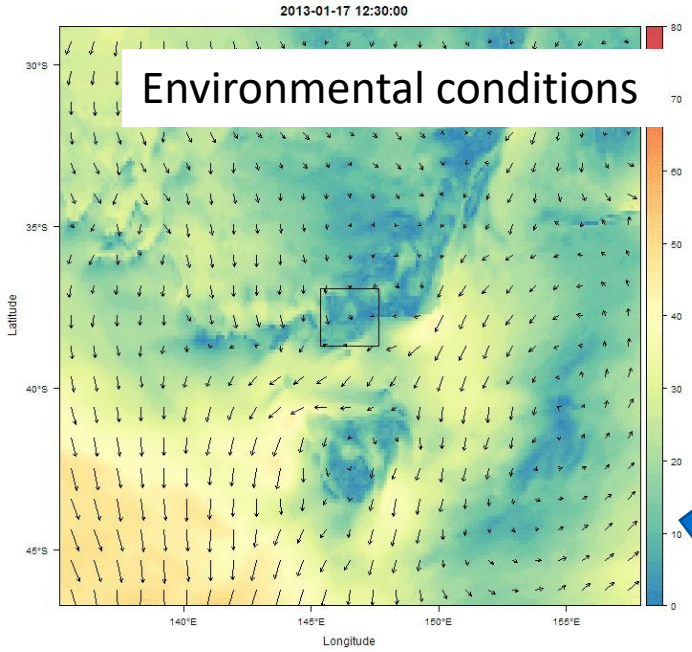


After one hour, the fire will most likely end up somewhere between the black lines. If the fire has extreme behaviour, there is a small chance it could spread as far as the black dotted line.

The approach

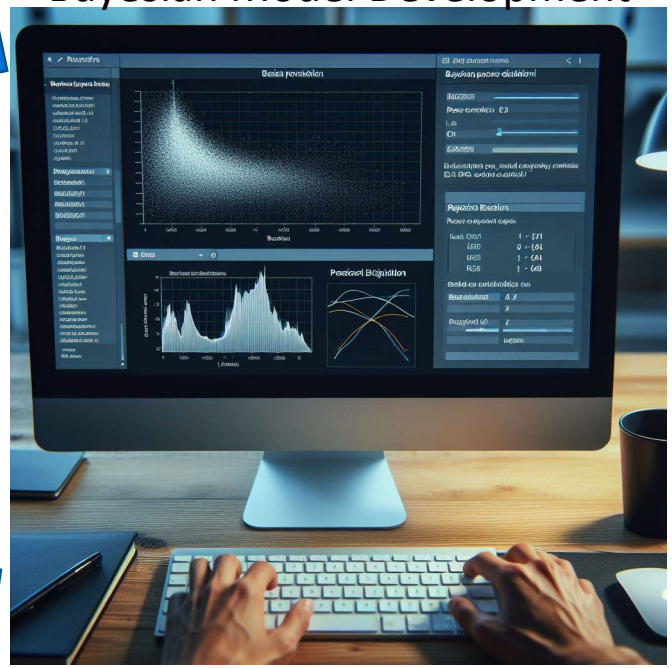


- Scans from NSW, Vic., SA and WA.
- Satellite images Australia-wide

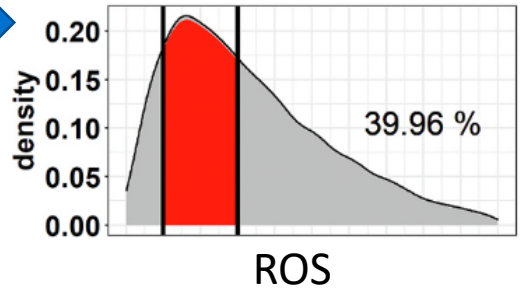


Environmental conditions

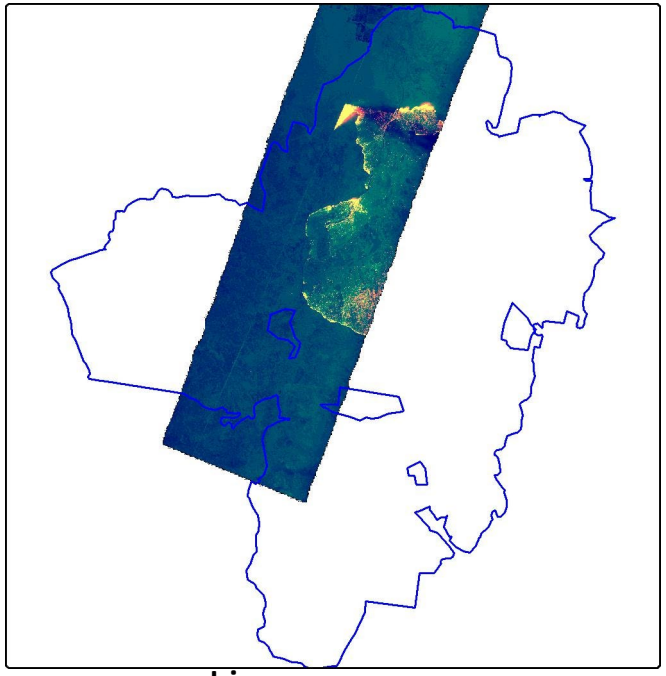
Bayesian Model Development



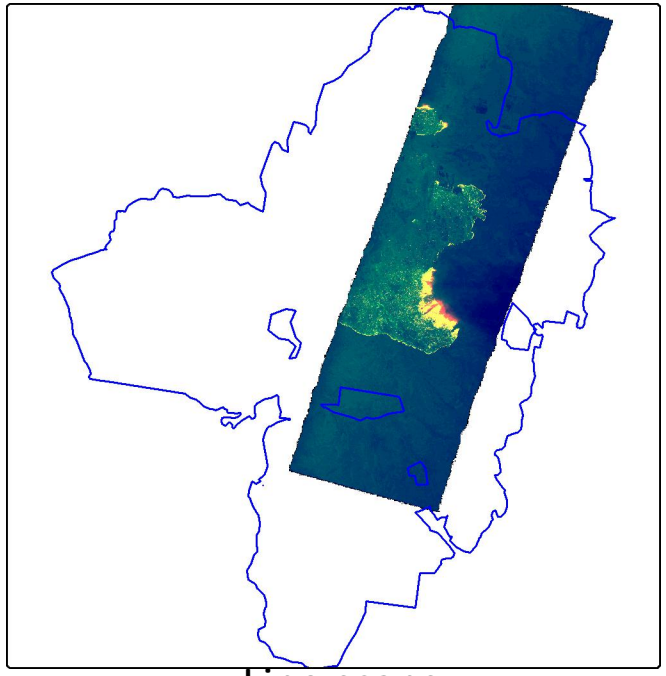
Predictions



ROS



Line scans



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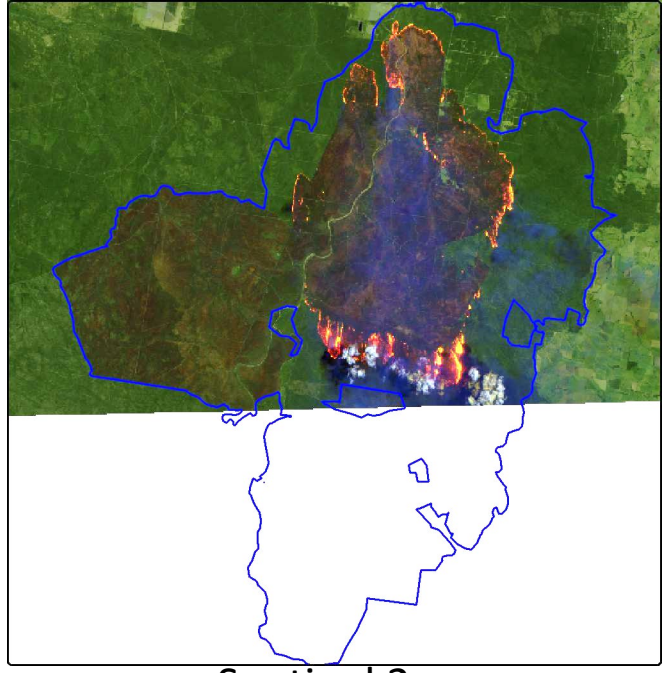
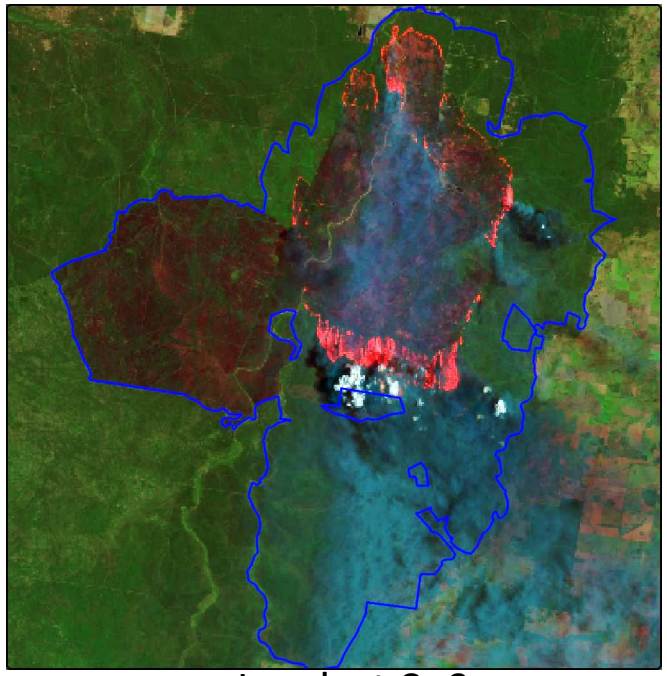
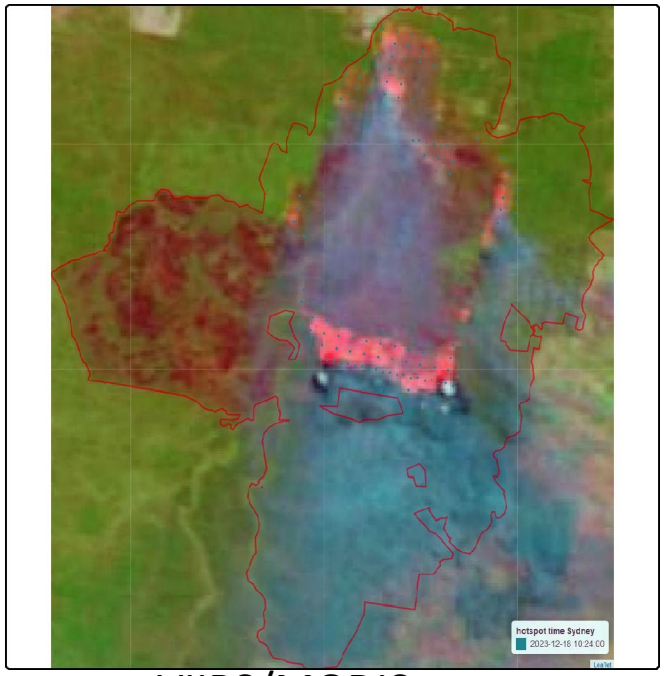


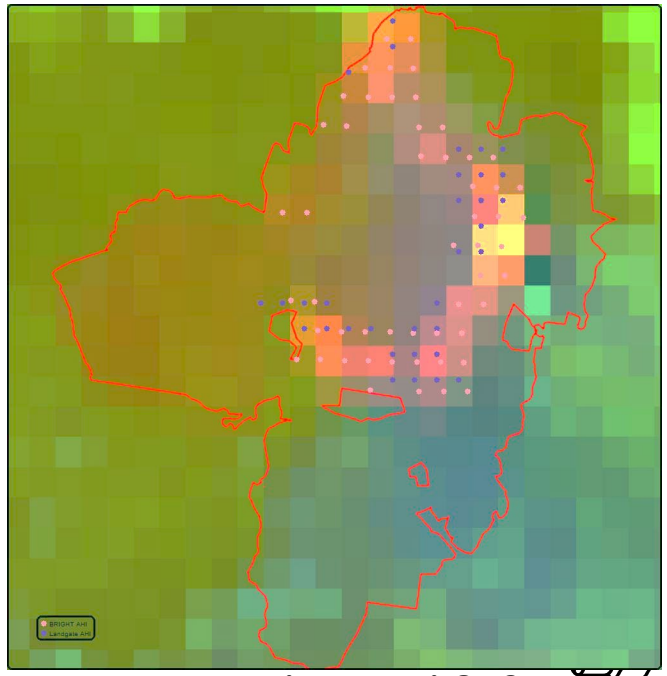
Sentinel 2



Landsat 8, 9

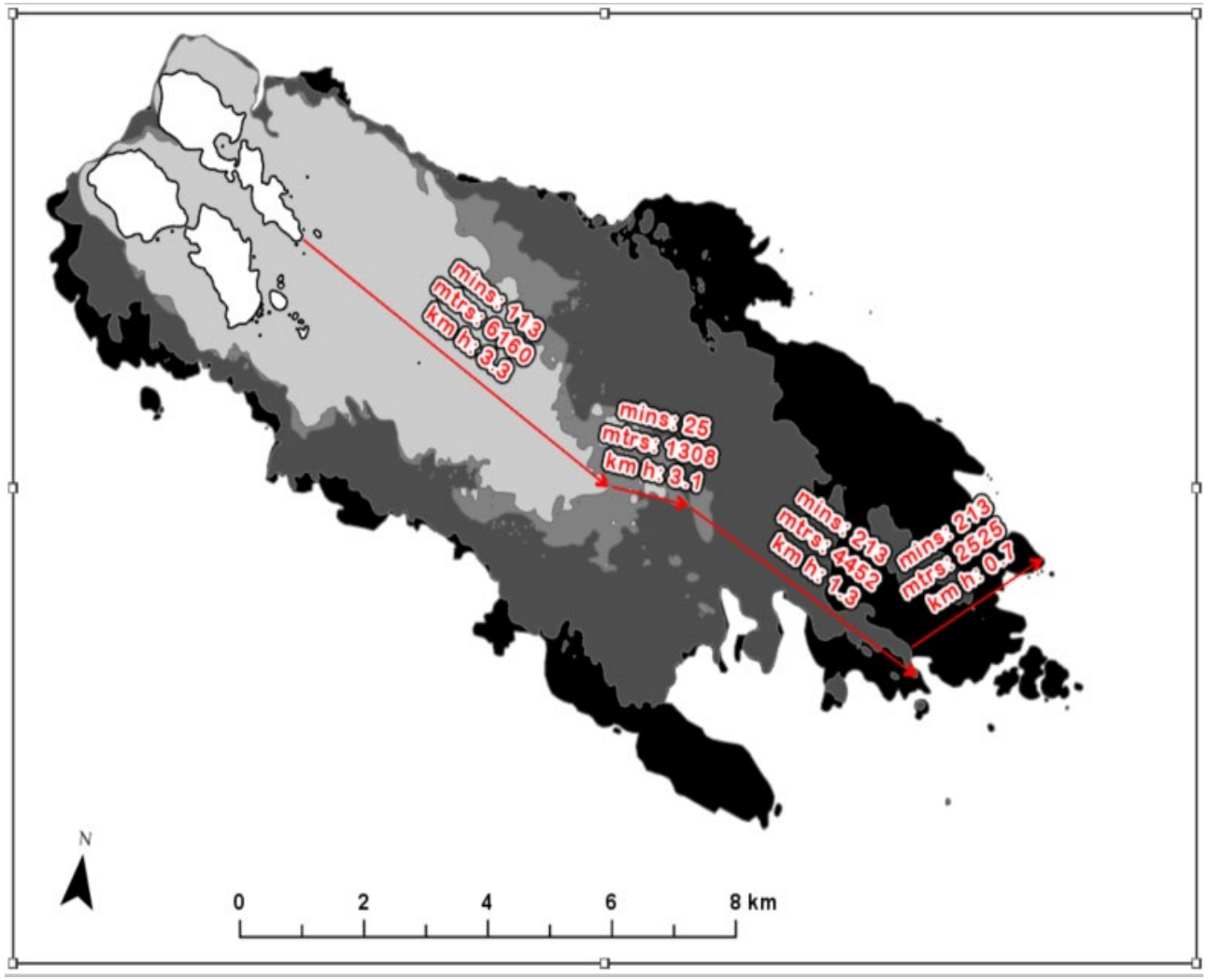


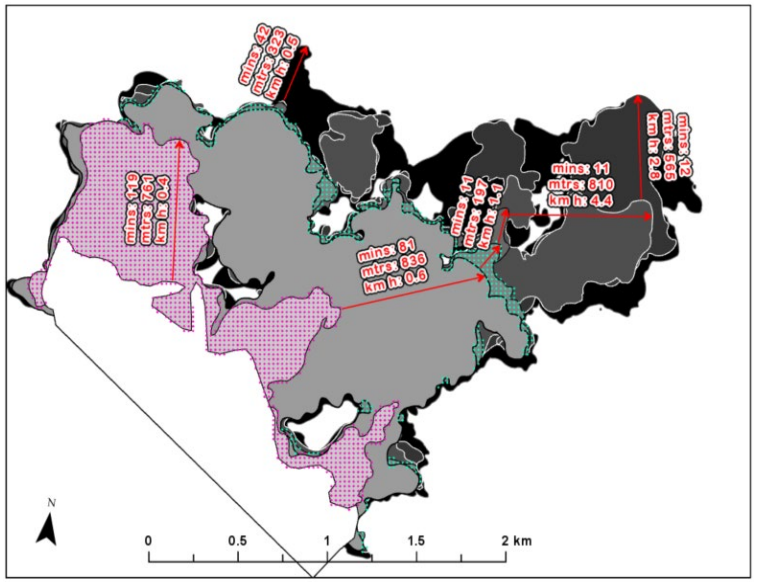
VIIRS/MODIS

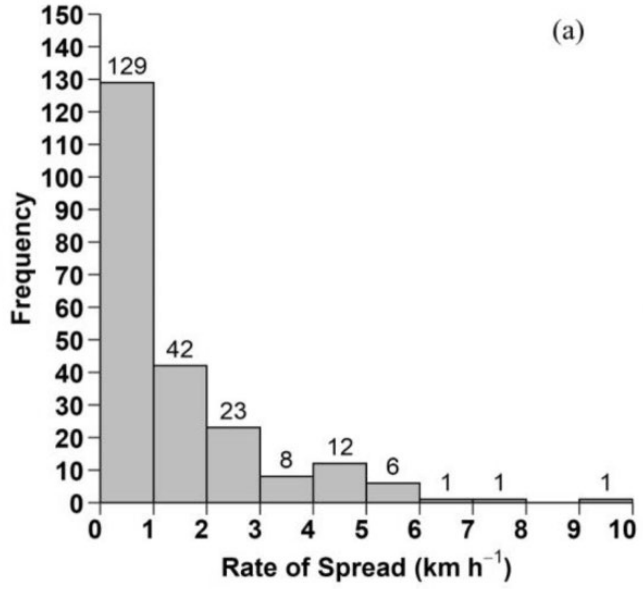


Himawari 8, 9

Measuring Rate of Spread

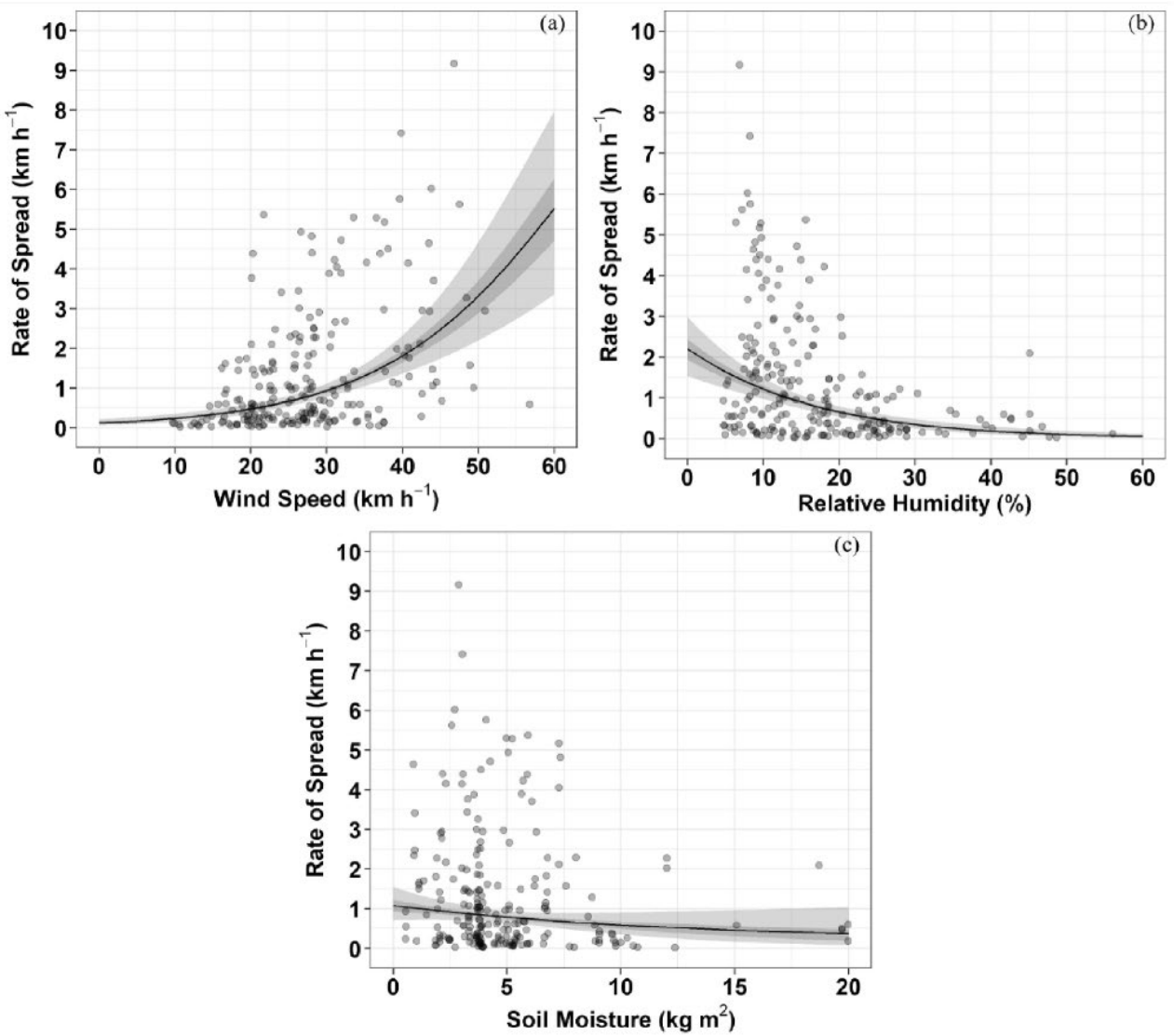






Predictors and modelling

- Weather (surface, upper, FMC etc?)
- Topography (slope or roughness etc.?)
- Fuel (structure? load? moisture?)
- Focus on forest
- Model selection process



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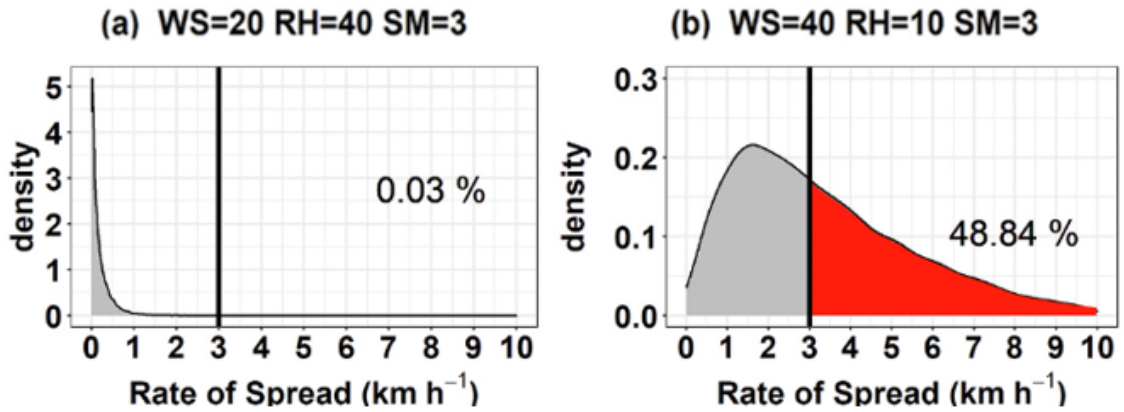

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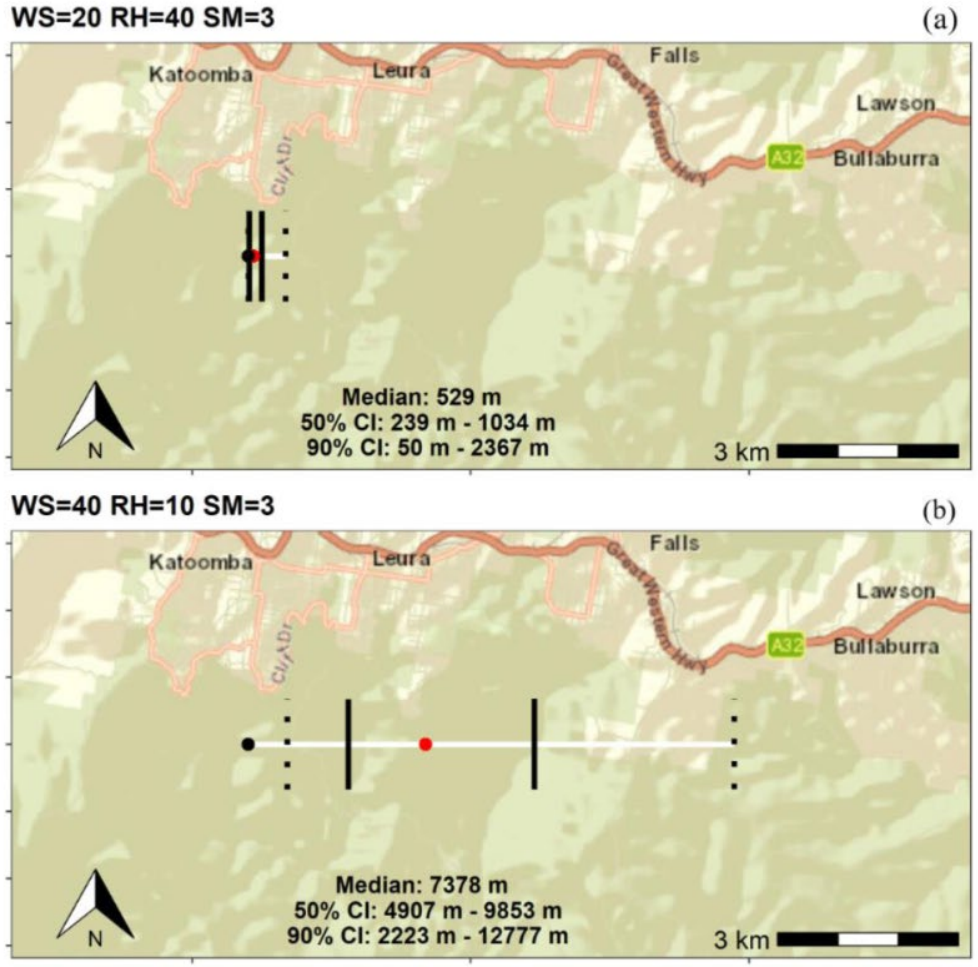

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