

Improving Fuel Load Estimation at Regional Scales Using Satellite Data



THE UNIVERSITY of ADELAIDE

Lulu He¹, Amelie Jeannau¹, Simon Ramsey², Douglas Radford¹, Aaron Zecchin¹, Karin Reinke², Simon Jones², Hedwig van Delden³, Tim McNaught⁴, Seth Westra¹, Holger Maier¹

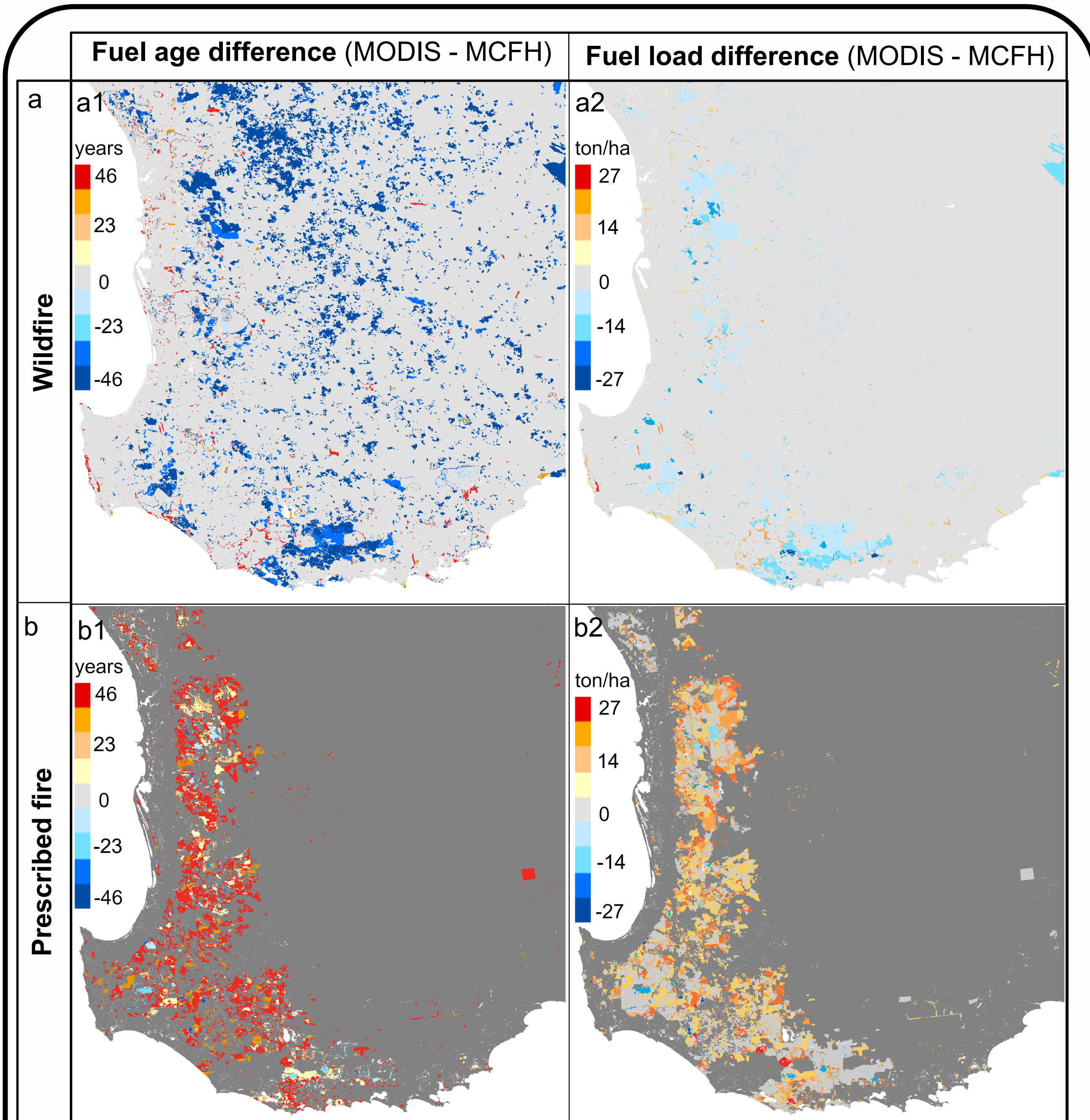
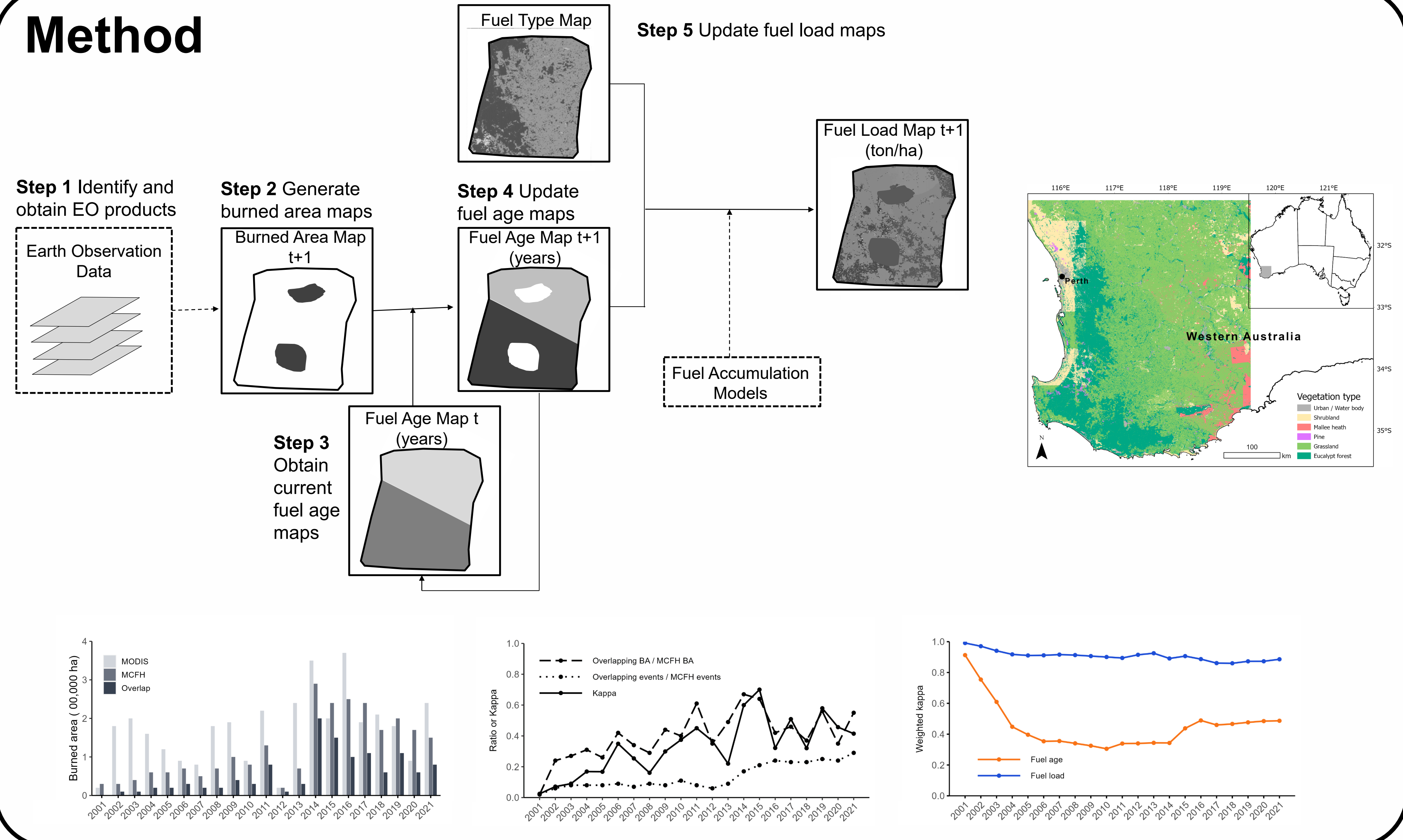
Introduction

- For decades, fire and fuel managers have relied on manually compiled fire history datasets to estimate fuel load.
- Manually compiled fire history data have shortcomings, resulting in inaccuracy of fuel load estimation.
- Satellite data offers an alternative input to calculate fuel load at regional scales and beyond.

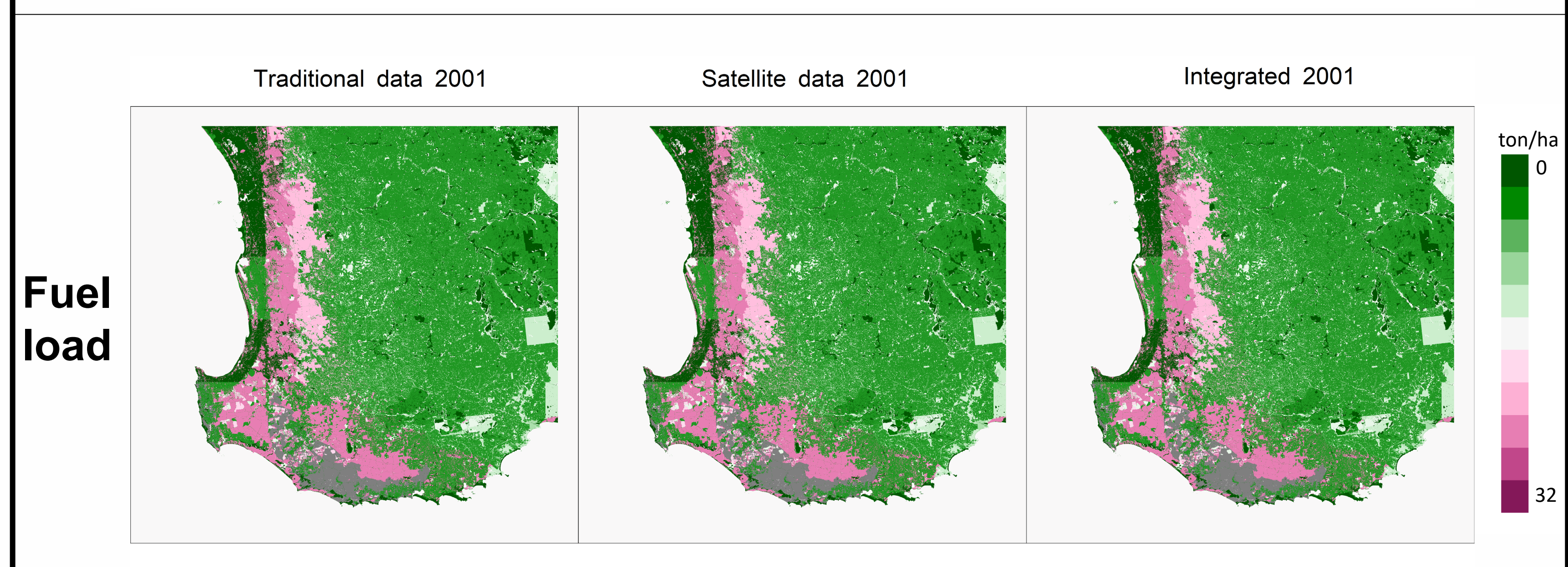
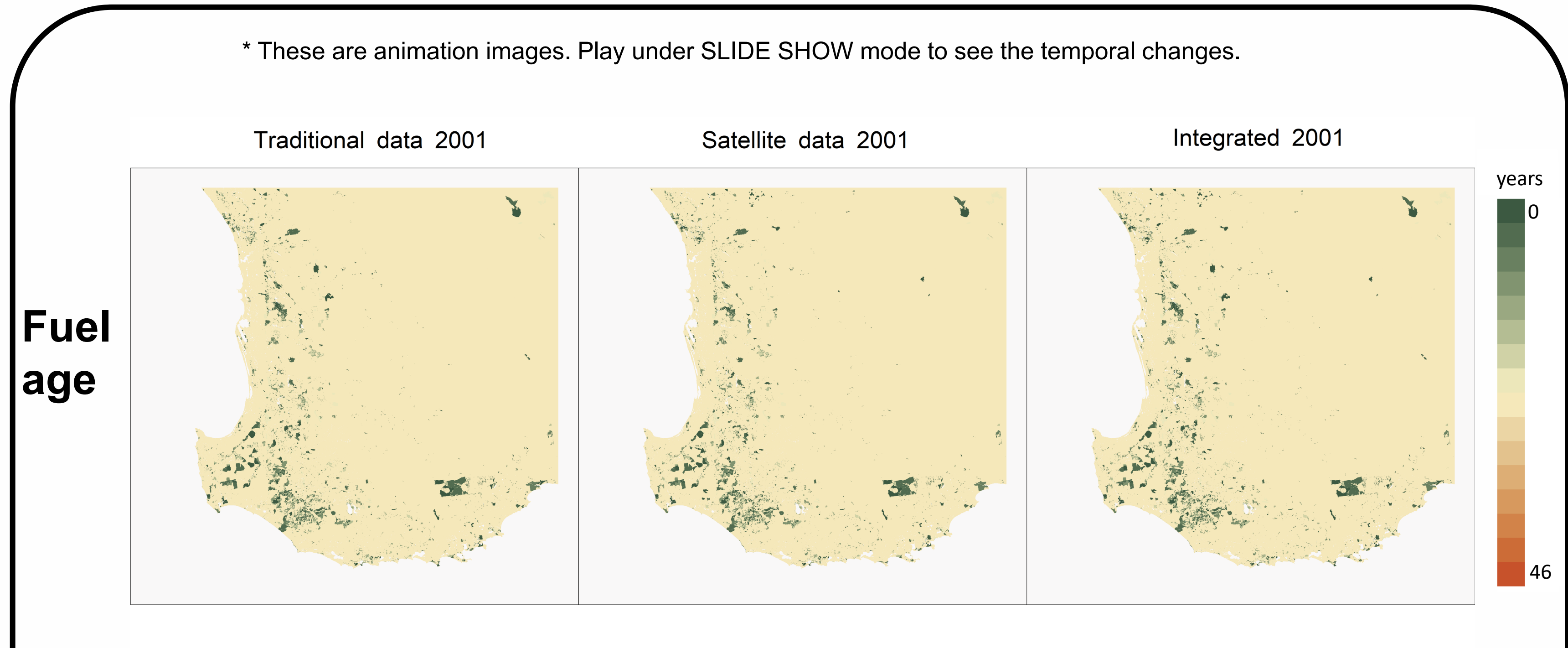
Aims

- Design a framework that enables satellite data to be used to estimate fuel load.
- Evaluate the framework via a case study in a fire-prone landscape in WA.
- Demonstrate that satellite products, such as MODIS MCD64A1, can be utilised to support fire and fuel management decisions.

Method



The accumulated difference between MCD64A1 (MODIS) and manually compiled fire history dataset (MCFH) in calculating fuel age and fuel load by (a) wildfires and (b) prescribed burns until the end of the study period. Subtracting MCFH from MODIS applies to all maps. In a1 and b1, fuel age difference values range from -46 to 46 years, red denotes burned area solely recorded in MCFH, light grey denotes no difference, and blue denotes the accumulation of burned area solely mapped by MODIS. In the a2 and b2, fuel load difference value ranges from -27 to 27 ton/ha. Red denotes MODIS fuel load is more than MCFH fuel load, light grey denotes no difference, and blue denotes MODIS fuel load is less than MCFH fuel load. Dark grey colour in b denotes null data as prescribed burns were not observed in these regions.



Key messages:

- Earth Observation (EO) data can support fuel management decisions by estimating fuel load at regional scales.
- EO efficiently reports burned areas across the landscape, especially in remote regions.
- The undisruptive mapping approach of EO enables complete records of burned areas, both temporally and spatially, allowing accurate estimation of fuel load.
- The automation of EO mapping saves resources and capability, representing a beneficial approach to collecting data.



Dr. Lulu He
Postdoctoral researcher | SmartSat CRC P3-23
Natural Hazards Research Group | University of Adelaide
E: lulu.he@adelaide.edu.au

¹School of Architecture and Civil Engineering, The University of Adelaide. ²School of Mathematical and Geospatial Sciences, The University of Royal Melbourne Institute of Technology (RMIT). ³ Research Institute for Knowledge Systems (RIKS), The Netherlands. ⁴ Department of Fire and Emergency Services, Western Australia.