Once the dust settles – Assessing wind erosion after bushfires

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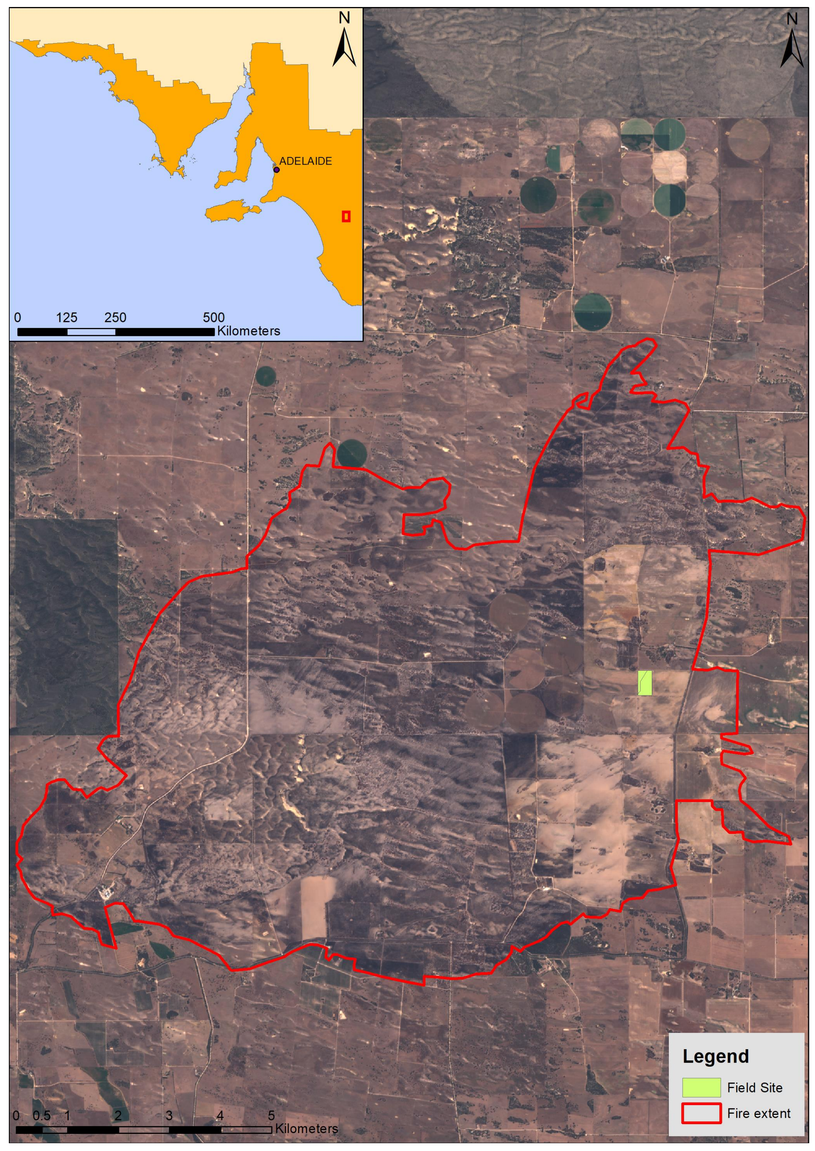
Background

- Wind erosion directly impacts human health (e.g. air quality, asthma) and agricultural productivity (e.g. loss of nutrients and top-soil)
- Bushfires remove protective soil cover of annual and non-woody plants
- Global climate models predict overall warmer conditions for Australia and an increased risk of bushfires in the future
- Limited number of studies measured the direct impact of bushfires on erosion

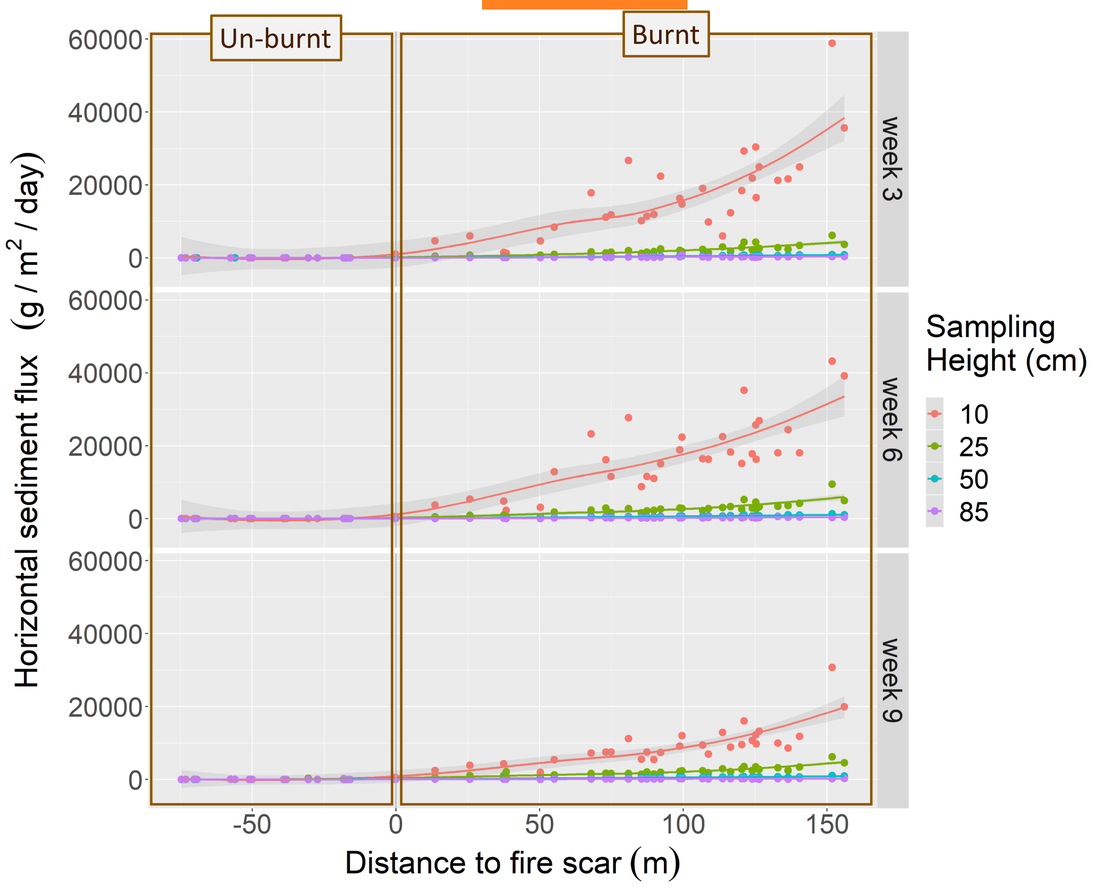
This work demonstrates how spatial patterns of surface cover reduce airborne sediment transport after bushfires



Method

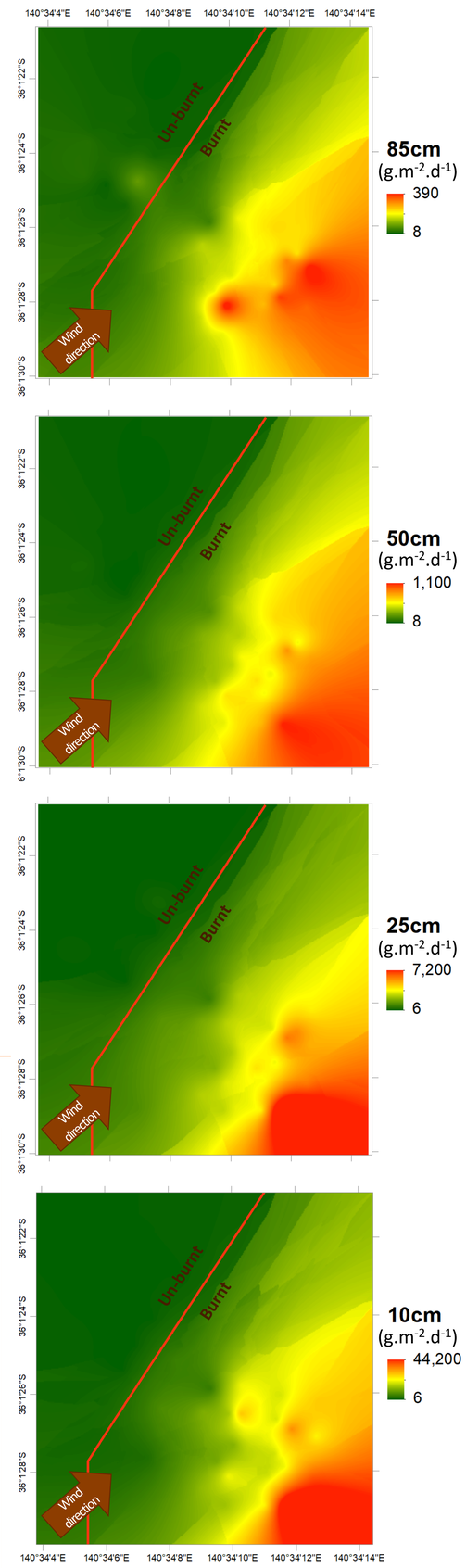
- Based on a protocol developed by the US Department of Agriculture
- High-density dust sampling at 4 heights on adjacent burnt and un-burnt cropped paddocks
- Trapped sediments were collected and weighed every 3 weeks.
- Point data was interpolated to create spatial distribution maps of horizontal sediment flux

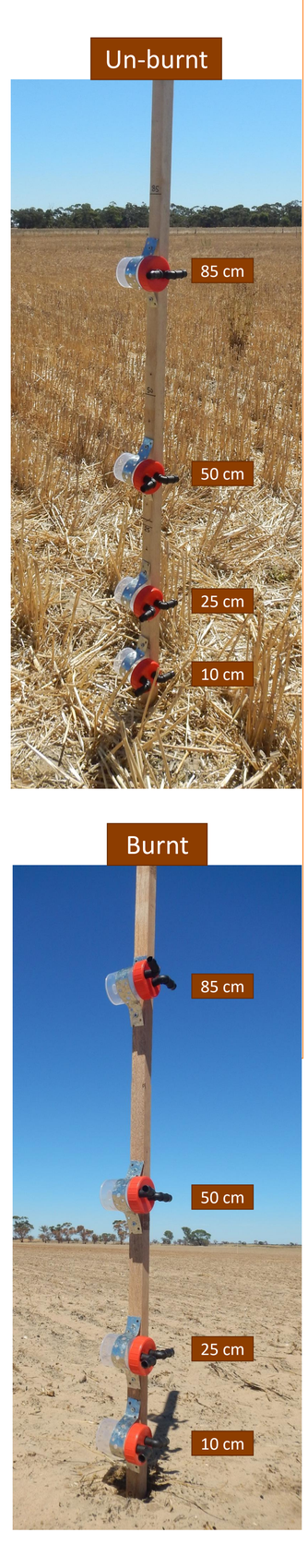
Results



- Mean horizontal sediment flux is larger at lower sampling heights on burnt plot and rapidly decreases with height
- We can observe a significant edge effect as sediment flux increases with distance from burnt-unburnt boundary
- Higher variability of mean horizontal sediment flux on burnt plot compared to un-burnt

Total horizontal sediment flux distribution





Outcomes

- Crop stubbles after harvest can effectively reduce airborne sediment transport
- Increasing edge effect through the addition of roughness elements can decrease erosion risk after bushfires
- Mosaicking agricultural landscapes with fire-breaks could therefore reduce wind erosion risk (e.g. mix of perennial and annual plant cover)
- This method is sufficiently simple to be widely adopted for broad-scale parameterisation and validation of soil erosion models

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