

# FIRE WEATHER IN TASMANIA AND SMOKE PLUME DYNAMICS IN THE 2013 FORCETT-DUNALLEY WILDFIRE

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## BACKGROUND

- ▶ January 2013 fire season was among the most significant seasons in Tasmanian history.
- ▶ Fire weather conditions were high across the State.
- ▶ Several fires occurred, including Forcett-Dunalley (Fig.1), the most disastrous of the fires and globally significant, with plume height reaching 15 km on 4 January.
- ▶ We report on geographic variation of atmospheric fire weather index (C-Haines) in Tasmania in the context of the Forcett-Dunalley fire.



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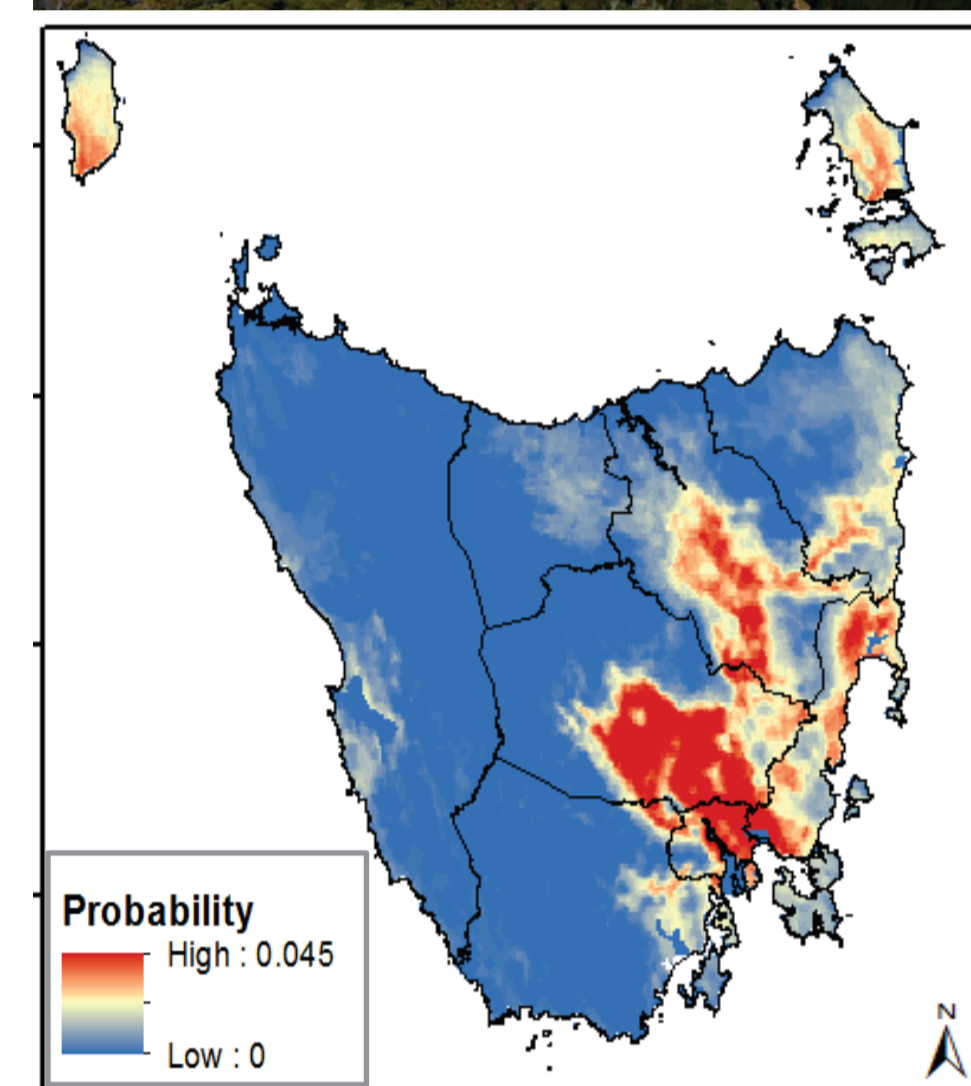


Fig 3: Probability map of extreme fire weather (C-Haines >9, FFDI >25)

## OBJECTIVES

1. To determine the spatial distribution of C-Haines in Tasmania at the start of the fire.
2. To investigate the spatio-temporal variation of days with elevated C-Haines and McArthur Forest Fire Danger Index (FFDI) in Tasmania.
3. To assess temporal variation of the smoke plume and its relationship with fire weather and fire severity patterns.

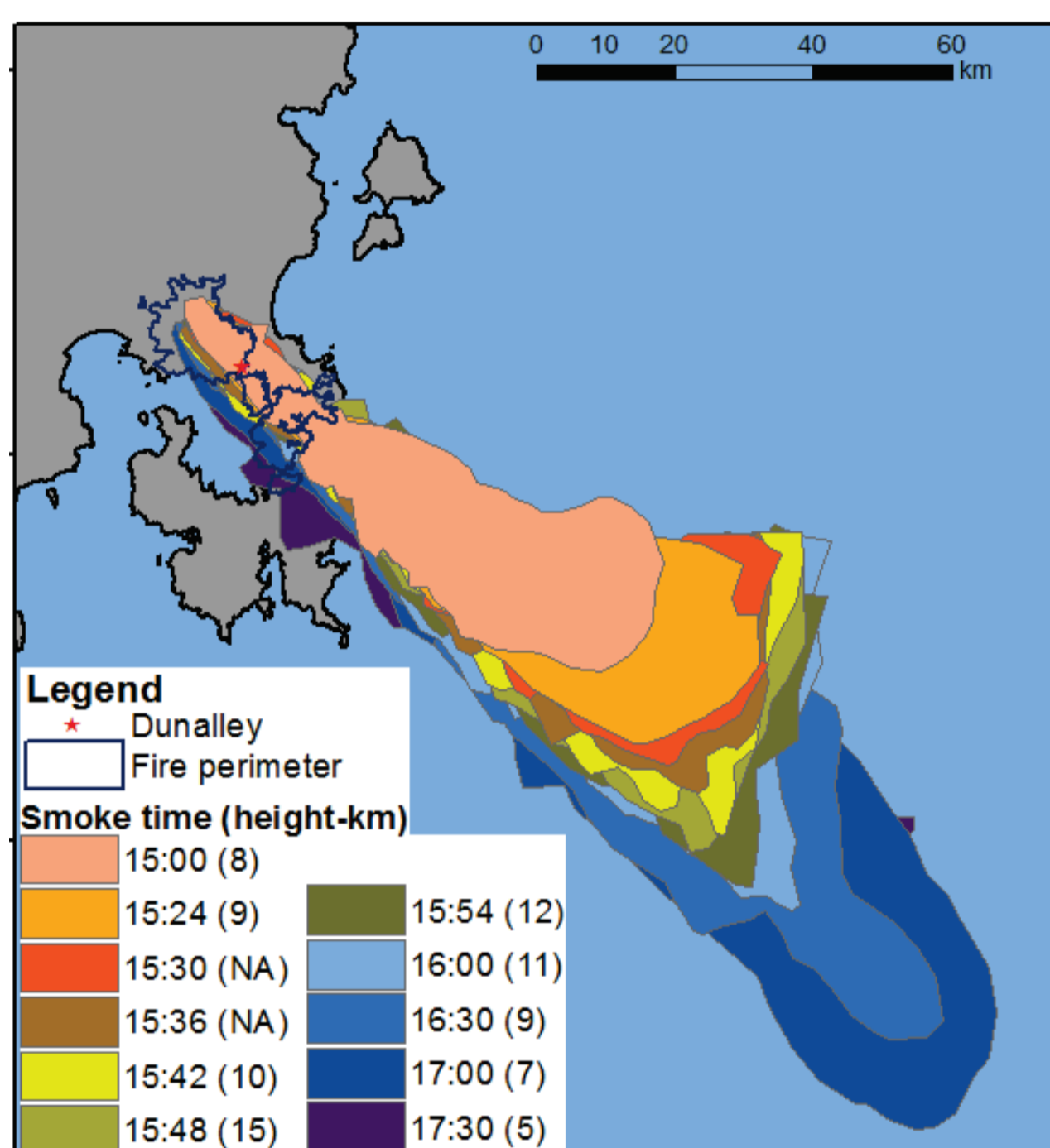


Fig 1: Smoke plume progression on 4 January

## METHODS

### C-Haines and FFDI:

- ▶ Extracted daily FFDI and calculated daily C-Haines from gridded BARRA (2007-2016)
- ▶ Determined spatial distribution of extreme weather in Tasmania when C-Haines >9 and FFDI >25

### Smoke:

- ▶ Extracted plume metrics (size & height) for 4 January 2013 from weather radar.
- ▶ Determined relationship with FFDI and fire severity patterns

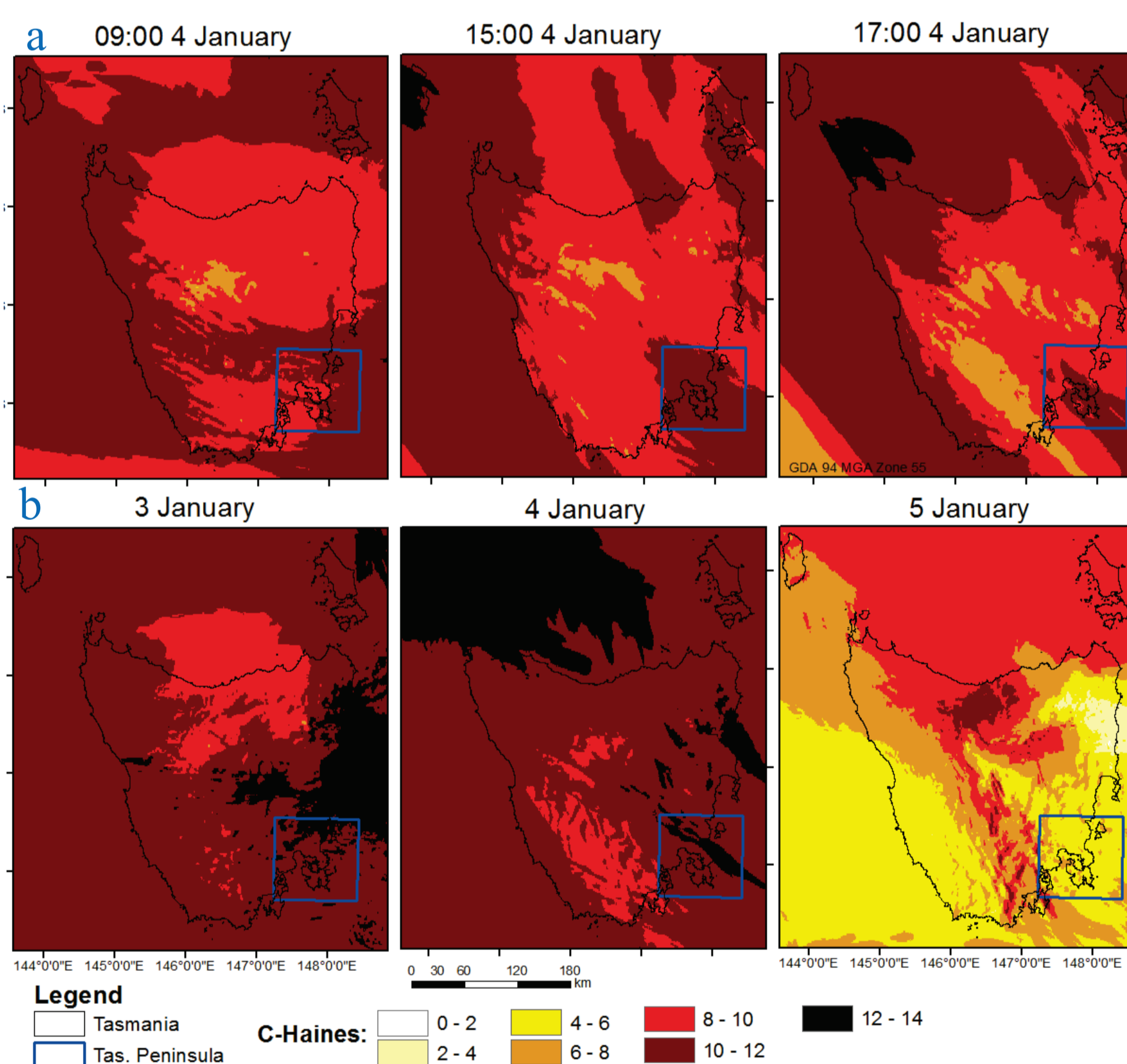


Fig 2: Geographic variation of (a) hourly and (b) daily max. C-Haines at the start of fire. Blue square represents Tasman Peninsula.

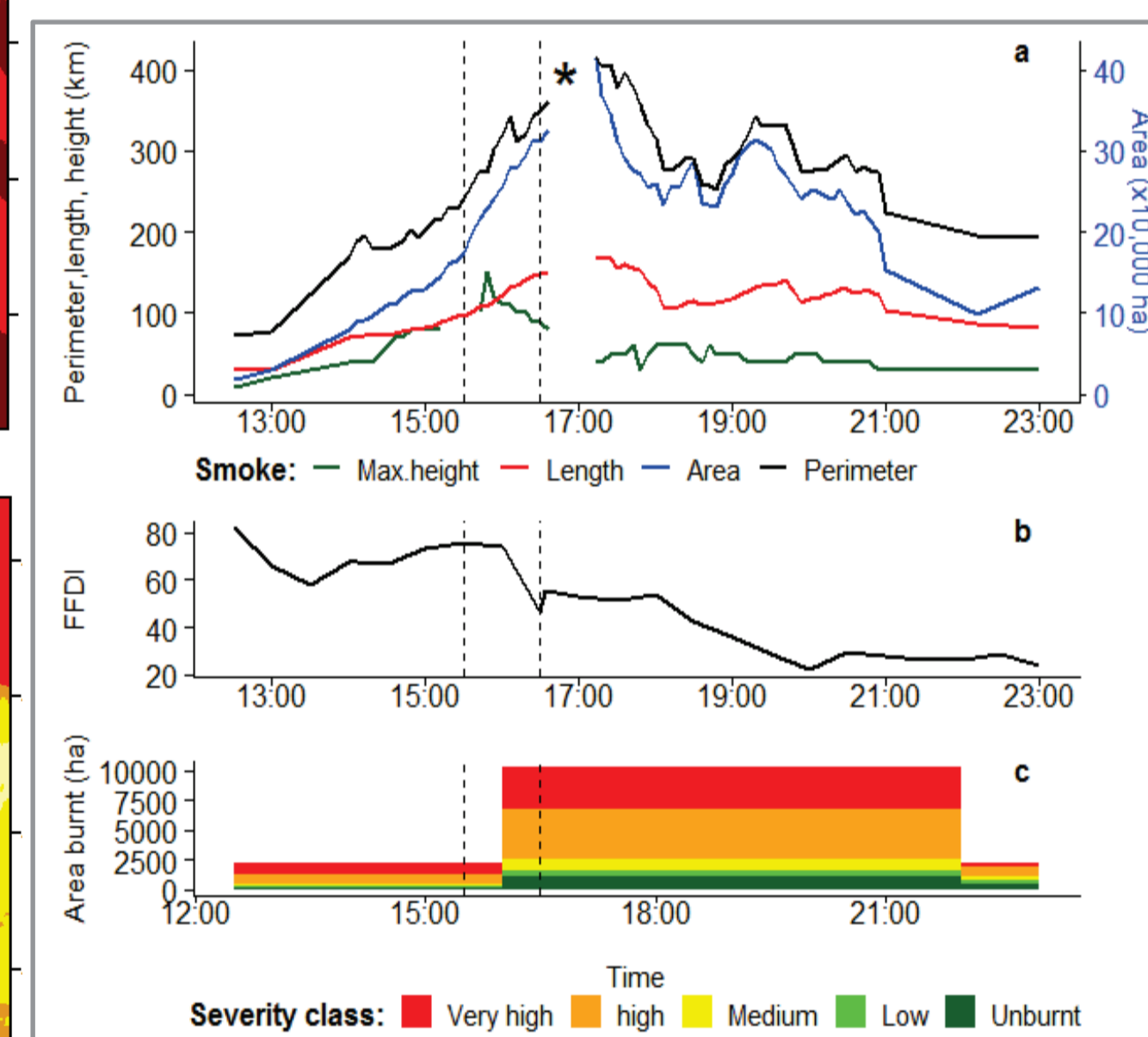


Fig 4: Trace of smoke plume, FFDI and fire severity during peak fire behaviour in the Dunalley fire. Max. height is multiplied by 10.

## RESULTS & DISCUSSION

- ▶ Extreme C-Haines on 3-4 January, moderating on 5 January (Fig 2b). In Tasman Peninsula on 4 Jan., C-Haines of 8-10 at 9am, increasing to 10-12 at 3pm (Fig 2a).
- ▶ Eastern and south-eastern Tasmania have a higher probability of a day with extreme fire weather conditions (Fig 3).
- ▶ An extreme fire day described better by combined high C-Haines and FFDI.
- ▶ A rapid increase in plume metrics from 14:00 to 17:00 (Fig 4), and reduction subsequently. Increase in area burnt and fire severity after intense fire at 15:30.