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Natural Hazards and Earth System Sciences
Discussions

# *Interactive comment on* "Evolution of an extreme Pyrocumulonimbus-driven wildfire event in Tasmania, Australia" *by* Mercy N. Ndalila et al.

**Paulo Fernandes (Referee)**

pfern@utad.pt

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The manuscript subject is the analysis of a pyroCb event in Tasmania, the first on record, that occurred in the Forcett-Dunalley on 2013. Its formation and evolution is related to fire danger and the C-Haines index, as well as with fire severity. I found the work solid and writing effective. The only issue of note is the role attributed to VLS (vorticity-driven lateral spread) by the authors. From the information and figures provided I really don't see enough empirical evidence for it, so I think the text could be more cautious. See below specificcomments addressing mostly minor concerns.

L11. I am not sure whether pyroCb development can be called a fire characteristic.

L31. 'energetically intense". Fire intensity is energy by definition. Maybe rephrase to



'high-intensity' or similar.

L32. Shouldn't it be 'conducive to'?

L35. Check ';', it's breaking the sentence flow.

L35-36. Temperature is essentially expressed through fuel dryness. So remove the former or remove the later and add relative humidity.

L37. This is a narrow definition of an extreme fire, as deep flaming and atmosphere coupling are often absent. Better to rephrase to make more explicit what the authors consider extreme, i.e. a particular type or range of extreme fire behaviour.

L46. 'Near the pyroCb' suggests it is near the surface.

L64. More accurately, the C-Haines index indicates the potential for large fire development.

L65. From 0 to 13?

L190. 'These thresholds were chosen to define an elevated fire weather day (95th percentile)' is confusing. Maybe 'to correspond' instead of 'to define'?

L218. The figure would benefit from the inclusion of wind direction. Did it change noticeably during the fire duration and is there information about wind direction at different heights? This can be important in relation to the assumed/inferred VLS subsequently in the text. Changes in wind direction impact the fire plume and can change spotting patterns hence modifying fire growth rate and direction.

L239 (Figure 3). So, fire severity distribution is for three periods? Wouldn't it be possible to partition those more? This would require fire growth isochrones or perhaps take advantage of the information provided by Jon Marsden-Smedley report? Also, to supplement fire severity and context, the text could indicate (possibly in the discussion) rates of spread of the wildfire for those periods, as they are available (at least in part, did not check) in said report.

L255. I know it is given in another paper, but readers would benefit from additional information about fire severity in the Methods section.

L256. See comment regarding L239.

L291. 500 ha is not that high as a large fire size threshold. I would appreciate an enhancement of this figure where the green dots were attributed different colours corresponding to different fire size classes.

L327. 'satellite fires'?

L425. And yet, Phoenix does not incorporate fire-atmosphere relationships, right?

L436. The interactions with terrain were suggested, rather than shown. From what I see in the supplementary material the VLS areas were quite small and fragmented in the landscape.

Enjoyed reading the manuscript,

Paulo Fernandes

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