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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.

Anonymous Referee #3

Received and published: 13 February 2020

This paper provides an analysis of a significant pyroCb event in Tasmania (January 2013). The evolution of the plume is assessed using weather radar. Analysis of meteorology is largely based on the lower troposphere using the C-Haines index and FFDI. Fire severity maps are also included. The manuscript is generally well-organized and easy to read. Results are relevant to several research communities. The pyroCb phenomenon has been gaining significant attention in recent years. However, a few aspects of the paper require some clarification prior to publication. Please see my comments below.

Abstract line 18: "highly unstable atmosphere" do you mean "highly unstable lower troposphere" since you are referencing C-Haines?

Lines 65-70: lapse rate in lower-troposphere, mid-levels, or both?

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Line 139: “10 hPa”. . . .what are these high altitude data used for? C-Haines is only based on the lower troposphere?

Line 181: is there a reference for “typically happens at or near the start of fires”?

Line 195: please replace “was always higher than” with a specific range of values.

Section 3.1: In addition to surface fire weather, pyroCb are driven by the full 3-D structure of the troposphere. This discussion can be improved. The supplement provides thermodynamic profiles. Can you quantify the LCL and highlight the pressure levels that are used to calculate C-Haines? Was there any CAPE in these profiles? Please also provide a couple sentences describing the synoptic weather pattern that set the stage for this event.

Section 3.1.2: Please show a basic radar image/map at the peak of the pyroCb event for reader orientation.

Line 233: please briefly describe the significance of the 850-500 lapse rate in the main text.

Line 265: “good correlation of 0.5”. . . .what is good?

Line 269: “wind change at around 00:00”. . .is this a cold front? Some description is likely needed?

Section 4: Did you examine additional radar products for this case, such as velocity data? You might be able to get more information on the dynamics of the updraft and even particle characteristics. Radar data are one of the more underutilized tools in pyroCb research.

Lines 335-345: The soundings in the supplement do show the inverted-V structure typical of high-based convection, with some mid-level moisture in the profile at 1500. You can calculate total precipitable water to confirm. I believe that Peterson et al. provide more info on this.

Supplement: Please annotate the time of the pyroCb on the relevant figures.

Supplement: Define/explain “BARRA pseudo-soundings”

It would be nice to include a surface and upper level synoptic weather map that coincides with the soundings in Figure S1. This will provide some context on the large-scale meteorology driving this event.

Are the times listed local time or UTC?

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