Atmospheric Chemistry and Physics Discussions

Atmos. Chem. Phys. Discuss., referee comment RC1
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Comment on acp-2022-610

Anonymous Referee #1

Referee comment on "In situ microphysics observations of intense pyroconvection from a large wildfire" by David E. Kingsmill et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2022-610-RC1, 2022

This paper describes in situ microphysics observations of intense pyroconvection for a large wildfire in Idaho from an airborne platform. Content includes both dry (mainly smoke/ash) and moist (pyroCu) pyroconvective plumes. A variety of parameters are presented to showcase microphysics data for the diameter range of 10 μm to 6 mm. This is supplemented with weather instrumentation and a cloud radar onboard the aircraft, along with ground-based weather radar. Results from this study fill a critical gap in measurements of pyroconvection, especially for pyroCu. The content is well organized, the figures are of high quality, and the narrative is generally easy to follow. I recommend publication after addressing the minor edits below.

The hardest part for me to follow was in the last few paragraphs on the pyroCu discussion (Lines ~460-490). The fine details of the Nevzorov probe clutter the messaging about cloud droplets, cloud ice vs. pyrometeors. Perhaps some rearrangement of the sentences might help. Think of readers less familiar with the details of the instruments, who want to know what's going on inside a pyroCu.

The differences for penetration #3 compared with the other pyroCu data is interesting. Might the biomass/vegetation be different in that part of the fire front? It's the only penetration along the eastern part of the fire front. Perhaps being a bit lower in altitude was enough of a factor?

Is there anything you can say in the conclusions on how these data might be used in fire-scale modeling work?

Anything you can say on the potential for precipitation development should these pyroCu continue developing into a pyroCb? Are there any existing observations of traditional cumulus clouds for a direct microphysics comparison with the pyroCu? Ideally, this would be in a similar thermodynamic environment.

You may consider making the figure letters a bit larger for some of the panels.