

Interactive comment on “The Chisholm firestorm: observed microstructure, precipitation and lightning activity of a pyro-Cb” by D. Rosenfeld et al.

D. Rosenfeld et al.

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The authors thank Referee #1 for the helpful comments. We will emphasize that the main new aspects in this study are the microphysical observations and inferences on the pyro-Cb.

Definition of a Cb: We will define more accurately a pyro-Cb, in line with the suggestion of the reviewer.

The released sensible heat from the fire: The same energy is much more destructive when released as an explosion compared to being released at an even pace over time. The destructive shock wave and the pulse of scorching radiation occur only when an explosion occurs. This is the reason for the vastly different manifestations of the release

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of similar amounts of energy between an atomic bomb and a continuous burning.

The numbers of the energy release were adopted from the Final Documentation Report of the Chisholm Fire (ASRD, 2001). As part of that report, the amount of fuel consumed by the fire was sampled at the fire location. The estimate of 7.6 kg/m^2 is given as an average over the burned area and includes above ground biomass, surface fuel and duff. Only the burned fraction is considered, so incomplete burning is accounted for.

The amount of heat invested for drying of green vegetation is not accounted for. Even if a very high effective fuel moisture value of 40 % is assumed, i.e. for each kg of fuel burned 0.4 kg of moisture were released from drying of the fuel, soil and vegetation, the effective sensible heat released would be $18700 \text{ kJ/kg fuel} - 2500 \text{ kJ/kg_H}_2\text{O} \times 0.4 \text{ kg_H}_2\text{O/kg_fuel} = 17700 \text{ kJ/kg_fuel}$. It must be noted that the evaporated moisture results in additional latent heat release in the pyroCb and thereby also enhances the convection.

Figures 6 and 7 are designed to occupy a full page each. This will be worked out with the technical editor. In the mean time, they appear larger in the online PDF version.

The style and grammatical suggestions will be fixed in the final ACP version.

Reference: ASRD: Final Documentation Report - Chisholm Fire (LWF-063), Forest Protection Division, ISBN 0-7785-1841-8, Tech. rep., Alberta Sustainable Resource Development, 2001.

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