COMMUNITY COMMENT 1:

Comment:

I thought this was an interesting paper and I liked the approach taken. One question I had reading through the preprint is what controls whether LW_bc recovers to nonzero values (and the timescale of this recovery) after hitting 0 mm WE. Whether or not the snowpack hits LW_bc = 0 mm WE is an important part of its evolution, and (at least a) qualitative discussion around its behavior could help improve the manuscript.

Response:

Seasonal snowpack will always reach LW_{bc}=0, as this is a requirement for fully melting the snowpack and allowing the water held in the snowpack to runoff. The primary source for cold content in snow is the temperature of the snow when it accumulates (73% to 84% according to Jennings et al. (2018)). Radiative heat transfer and turbulent heat transfer account for the remaining cold content in the snowpack. This implies that the time scale of recovering cold content is less than a day since a cold snow on top of a snowpack with zero cold content will immediately add cold content to the snowpack average.

Proposed Action:

We will add the following sentences to the paragraph discussing cold content:

“Using a combination of observations and model simulations, Jennings et al. (2018) conclude that more than 73% to 84% of cold content development is accrued during snowfall events, with cold snowfall directly adding to cold content of the snowpack. Radiative heat transfer and turbulent heat transfer account for the remaining cold content in the snowpack.”