Review of Mattea et al., 'Firn changes at Colle Gnifetti revealed with a high-resolution process-based physical model approach'

In this study, the authors present a coupled energy balance and firn model and compare the model's output to a large dataset of firn temperature records, as well as one firn core record of refrozen melt, at Colle Gnifetti. The authors quantified the increase in firn temperature as well as surface melt totals in this location over the period of 2003-2018. Improving surface energy and firn models is an important pursuit, especially under a warming climate scenario and the uncertainties in firn meltwater retention capabilities.

This is a nicely organized and clearly written manuscript. Additionally, the figures are logically organized and easy to interpret (with a few minor suggestions for improvement below). Please find my general and line-specific comments below.

General comments:
Throughout the Discussion section, there were many mentions of imprecise comparisons and statements of significance without any quantification. The Discussion would be improved by the incorporation of values that justify statements of significant changes, variability, and appearances of correlation.

Further explanation of how the authors calculated the amount of refrozen melt was present in the unifr-2019 firn core would be helpful. How were the 31 cm of refrozen layers in the core, which certainly contained a mixture of ice and firn layers, converted to m w.e.?

The study highlights that there are still many unknowns with respect to predicting the depth of refreezing meltwater in a firn column. The authors mention that the percolation routine for the EBFM needs to account for the firn density and stratigraphy in order to improve the estimates of z_lim. Additionally, the microstructure of firn layers as well as the permeability of both undisturbed firn layers and those containing refrozen meltwater will be important for accurately estimating these depths of percolation.

Figure 1:
-   The '(a)' and '(b)' labels in the two panels of the figure are hard to notice. Consider enlarging the labels or bolding the font.

-   The legend symbol for the model cells is confusing because it's the same color as only one of the sites (SK). Perhaps make the legend symbol a neutral color to make it clearer that you're referring to all of the square boxes in the figure.

-   It's not clear how the areas depicted in the two panels overlap. Consider adding a marker in panel (b) to designate where the CG study site is.

Figure 3:

- Which of the firn core sites in panel (a) is the KCC core site? Indicating this information would give more context to the results shown in panel (b) as well as areas of the text where KCC is mentioned.

Figure 6:
- The '(a)' and '(b)' labels in the two panels of the figure are hard to notice. Consider enlarging the labels or bolding the font.

Figure 8:
- It would be helpful to remind the reader of what the energy balance component acronyms stand for in the caption, especially 'SHF', 'LHF', and 'GHF' which are note explicitly defined in the text before this figure.

Line Specific Comments:
Line 27: 'Besides' instead of 'Beside'
Line 35: somewhat awkward transition here. What 'Then' is referring to is vague?
Lines 48-49: is this the current range of firn temperatures, or the range measured in the 1976 campaign?
Line 68: change 'on' to 'of' at the end of this line
Line 121: 'Besides' instead of 'Beside'
Lines 234-235: It's not immediately clear why the depth of 4 m in this study matches the firn temperatures of the CG saddle point at a depth of 20 m. What data was compared to determine the 4 m depth for z_{lim}?
Line 314: remove 'in' after 'As such,'
Line 322: should these units be $°C\ yr^{-1}$?