Surface melting significantly affects Antarctic ice shelf thermodynamics and stability, but limited observational data restricts firn model accuracy. This work introduces a framework combining microwave radiometry with firn modeling to assess meltwater percolation. This work highlights the fact that higher layer resolution could benefit water percolation modelling. Brightness temperature measurements are used to link strong absorption of the signal to different meltwater event produces by the different model resolution. However, it is not clear to me what the simulations with MEMLS brings to the paper other than the fact that it can be model… Maybe I missed something. I only have minor comments.

Specific comments:

L16-17: Can you describe a bit more why? I think the abstract could benefit from being a bit longer.

L22-23: Should it be the sentence of the intro? Just a suggestion.

L81: "and other properties"… snow microstructure? Maybe hint that it doesn't so its better introduce for the section 2.4.

L87 "models parameters are adjusted accordingly" Which parameters? Please enumerate if possible.

L118: "originate from hundreds of meters within the ice". If dry I assume? It could be good to mention that the signal doesn't penetrate as deep if wet.

L170: I think you mean coherent…

L170: "to properly account for scattering". When running in coherent mode, there is no volume scattering, only surface scattering from interface (Wiesmann and Matzler, 1999). In this case, the microstructure would only affect the extinction coefficients and the propagation of the signal. I think this deserves a bit more attention. Are you getting volume scattering from MEMLS in the simulations?

L172: I would specify its only for ice sheet and not widely used...

L177: "to allow scattering effects to diminish over time". Can you clarify? It's usually the opposite for dry terrestrial snow because of ground emission. It is explained pretty well on L225-226, perhaps move it earlier?

L202: Maybe rephrase to "Because we use MEMLS to" ...?

L216: I suggest not using "probe" but measured or sensed instead.

L247: I cannot find Section 2.4 in Picard et al 2022.

L267: I think you mean Figure 3d?

L286: Why in supplement? The paper would benefit from having more figures in the text and not in supplement.