

This paper used machine learning (ML) and satellite microwave data to examine Antarctic firn density. The authors did a good job of responding to all comments in the first two round of review. I only have one comments.

The addition of Appendix A with SMRT simulation is good except the claims that C-band data is sensitive to changes in snow layers up to 20 m. The change in dB reported in the graph are negligible. A change in 0.1 dB is not. The usual radiometric uncertainty is around 1 dB (Schmidt et al. 2018), everything under that can be noise. I would remove all the statements that C-band is sensitive to snow layers up to 20 m.

The C-band signal (useful in the density RF model) is probably not sensitive to volume scattering like the passive data but is sensitive to change in snow surface roughness condition (wind) and snow permittivity which are both link to snow surface density. This could be shown by using a surface scattering model like IEM in SMRT.

Schmidt, K., Tous Ramon, N., and Schwerdt, M.: Radiometric Accuracy and Stability of Sentinel-1A Determined Using Point Targets, *International Journal of Microwave and Wireless Technologies*, 10, 538–546, <https://doi.org/10.1017/S1759078718000016>, 2018