Snow Water Equivalent (SWE) is a key parameter in hydrological, climatological and meteorological applications. New efforts for spaceborne radar-based SWE retrieval algorithms are under development and this paper offers great insight. This paper focuses on the influence of prior information, first guess SWE in this case, on the retrieval. They use previous SWE retrieval in a time series over a winter which reduces the influence of bias from SWE prior coming from an external source. This has benefits in SWE retrieval for future-based satellite missions. This paper is well structure and easy to read. I only have a few comments that would help the understanding of the reader.

Specific comments:

Line 48: the scattering albedo ω is not well known in the snow community. I suggest defining it a little bit more.

Line 96: "*model predictions of the same*…" what?

Section 4.1: Is it snow surface scattering or ground surface scattering (background)? I think I know the answer, but it is a bit confusing. Sometimes both terms are used (Line 188-189). I suggest sticking to one and defining it more clearly.

Line 173: remove *when.*

Line 185: "Surface *scattering is assumed to remain constant throughout the entire winter".* Why is that? perhaps cite a paper about constant soil permittivity over the winter.

Line 186: The observation uncertainty symbol is wrong.

Figure 2-3-4: It says on the legend that b) and e) show the SWE of ERA5 + bias. Is it a typo or the bias is indeed shown? It seems like the SWE contains no bias from the curve on the graph.

Section 6: One quick takeaway looking a Fig 2 and 3 is that we don't need retrieval, ERA5 is already good. ERA5 SWE prior is close to the true SWE, even before the retrieval. I doubt this is a takeaway you want the reader to leave with. A comment on this was made in section 2.5 on why ERA5 is good at this site but I think commenting again would help. It feels like the method relies on good prior estimation of SWE to predict SWE.

Line 254-255: This information on the scattering albedo could be useful earlier in the intro. Also, this might concern the Zhu et al 2018 retrieval but why not use correlation length or grain size directly as a variable instead of this proxy? I'm not completely sold on the scattering albedo yet!