Review: Nanna B. Karlsson

Dear Sara-Patricia Schlenk and co-authors,

Thank you for your thorough response to the referees' comments. I am overall happy with your outlined changes and would like to invite you to submit a revised version for consideration.
Based on the responses, it was not always completely clear whether you intended to implement some of the discussion points raised in your replies. I therefore iterate here for clarity where it is necessary to include your response to the referees specifically.

Dear Prof. Karlsson,

We are very grateful for your insightful comments and valuable guidance during the revision of our manuscript. We have carefully considered all the detailed feedback provided and have implemented the necessary changes throughout the text. Our point-by-point responses and manuscript adjustments are outlined following your comments below.

Please add the following to the revised manuscript:

Given that both referees suggest that data from C-band acquisitions are included, I ask you to include a couple of sentences describing that you did analyse data from this band and briefly summarise your findings, whether the analysis supports your hypothesis.

We appreciate the suggestion from both referees to include C-band data analysis. We have updated Sections 1 and 2 to confirm that C-band data was acquired during the campaign and to clarify the previous research by Pardini et al., 2016 and Parrella et al., 2021. However, we respectfully argue against including a brief summary of C-band results in this manuscript. The introduction of C-band findings would necessitate an extensive contextual discussion regarding the differing interaction mechanisms. A sentence or two would risk detracting from the focus of our primary hypothesis by raising questions that cannot be adequately addressed within the current scope.

Describe that you have investigated the effect of incidence angle and found it to be secondary to the spatial variations you observe.

We have described the influence of the incidence angle on our observations in Section 4.1.

Add information to the effect that you have looked into CRESIS OIB data and found similar subsurface features as in the sounder data.

We have incorporated information regarding the CRESIS OIB data in the tomography section (Section 4.3.1), confirming that similar subsurface features were observed in both datasets.

Add a sentence regarding the results that can be derived from the tomograms from X- and L-band.

We have inserted a sentence in the specified section (Section 4.3.1) that now clarifies the distinct subsurface information derived from the X-band and L-band tomograms.

Briefly explain why the matrix filter to suppress surface scattering contribution picks up a layer in 30 to 50m depth

We have inserted a sentence in the relevant section (Section 4.3.1) that further explains the matrix filter.

In addition, I would like to request the following:

Consider whether the new image showing backscatter for the different bands, together with a summer image, could be included in the appendix.

We have considered this suggestion and included the comparison image showing backscatter for different bands and the summer reference image in Appendix B.1.

I agree with referee Dr. Helm that H and /or HH, HV power along the flight track can easily be added to Fig. 6 without subtracting from the focus of the manuscript.

We have considered the suggestion and added the Entropy (H) along the flight track as Figure 6f, addressing the request to include additional polarimetric information.

I also agree that figures should be colourblind friendly. I appreciate that there is a standard presentation of tomography in the community; however, a quick Google search returned many examples of tomography plots using the viridis colour palette, so I don't think your argument is valid here.

We acknowledge the point regarding the use of community standards versus colorblind-friendly palettes. We have revised the figures and now use the Viridis color palette for all tomography plots to ensure accessibility, as suggested.

Please clarify the following response: "This 'band' is generally located deeper for the radar-dark features and higher for the radar-dark features (see Tomographic analysis and Modelling approach)." Which is radar-dark and which is radar-bright?

Thank you for noting this error. We apologize for the ambiguity and have clarified the text below to correctly distinguish between the radar-dark and radar-bright features.
The "dark reflection band" you describe aligns with what we interpret as our subsurface scattering layer, representing the transition between the low-backscatter layer above and the higher-backscatter area below. This “band” is generally located deeper for the radar-dark features and higher for the **radar-bright** features (see Tomographic analysis and Modelling approach).