# Re-review of "Integrating GPR and ice-thickness models for improved bedrock detection: the case study of Rutor temperate glacier" by Andrea Vergnano et al. (2025)

I am very excited to see this revised version, and commend the authors for the considerable effort they have invested in revising this manuscript. The new manuscript addresses almost all of my earlier concerns, and it is now written much more clear and well structured. Specifically, the research goals, hypotheses and scientific contribution are now stated clearly throughout the manuscript, the manuscript reads well, and the updated figures are much easier to read. I also really appreciate the inclusion of the comprehensive supplementary material, making these codes and the processing flow available is a valuable service to the community.

Lastly, I really appreciate the addition of pick classifications ("sure", "guided by models", "wrong"), as it reveals how manual and model-assisted interpretations interact. I have one suggestion that could further highlight the impact of the model inclusion when interpreting GPR data: I suggest adding a brief quantitative summary that exploits the pick categories, e.g. reporting the percentages of "wrong", "guided" and "sure picks" relative to the total GPR data. These could simply be mentioned in brackets throughout the text that is already there. I believe that the necessary data for this analysis now exists, and this should be straightforward.

Apart from this minor suggestion and a few trivial language suggestions below, I believe the manuscript is ready for publication and recommend acceptance after these have been addressed.

## Line-by-line comments

L9-11: I suggest rewording to: "Combined visualization of the GPR and model data in 2D and 3D…, especially where the GPR data contained scattering noise and interpretation was uncertain."

L15: Remove "whole", and maybe write in present tense, e.g. is made openly available…

L44: I suggest slightly re-wording to: "To study and address the issue in detecting bed returns obscured by scattering noise in temperate glaciers…"

L59-60: I suggest clarifying this a bit, e.g. the statement in the Results section is much clearer. "However, … 2008 to 2021. If the previous ice volume estimate was correct, Rutor Glacier would have lost 2/3 of its volume meaning that only 50 million m$^3$ still remain. However, while shrinking is evident, the remaining ice volume is likely larger given the large glacier area size." (please check if this is what you mean)

L61: I suggest specifying that the ice volume was underestimated in your hypothesis, e.g. "… ice volume estimate of 150 million m$^3$ is underestimated, …"

L114: I suggest removing "really"

L137: remove "little"

L218: replace "whole" with "entire"

L238: Replace "whole" with "broader"

L239: I suggest replacing "probably" with "likely"

L257-258: Could remove that last sentence from the paragraph, as it is a bit of repetition.

L334: I suggest changing to: "… which is close to the GlaTE…"

L335: You could replace glacier "outline" with "margin"

L340: Replace "quite" with "which is"

L341-345: I suggest reformulating this paragraph a bit to make it easier to read and make the message a bit more clear, for example something along: "Using these existing ice thickness model products to help interpreting the GPR data would be simpler than running the three models as performed in this study. However, these regional scale models may have outdated glacier outlines (which are changing rapidly)." (Please check if this is the message you wanted to convey. In terms of model uncertainty, I would expect that also the regional scale existing models have some sort uncertainty provided, but I am not familiar with them).

L353: I suggest being more specific and write: "Therefore, including modeled ice thickness to guide the GPR interpretations could …."

L356: I suggest changing to "…recognized to cause less clear GPR sections …"

L368-359: Instead of only explaining that you assigned "wrong" picks, I suggest giving a percentage of them (e.g. compared to the total GPR profile length) to further highlight how the models can help guide the GPR interpretation.

L373: I suggest rewording to "However, some drawbacks have to be considered."

L375-377: Could you clarify these two sentences a bit? What is meant by the "balance between GPR and models", and "leaking the models into the observations"? Do you mean the possibility of incorrect modeled ice thicknesses then leading to incorrect GPR interpretations (e.g. following a reflector that coincides with the model but is not the true bed)? I think this just needs some re-wording and being a bit more specific.

L407-408: I suggest rewording to: "This study highlights the benefit of combining the two worlds."

L408-410: This is just my personal preference, but I suggest instead of saying "GPR practitioners" and "modelers", rewording to e.g. "GPR applications" and "modeling studies".

L411-414: I suggest rewording to something along: "Thus, applying the workflow presented here to other glaciers with GPR data available could help calibrate regional models more accurately, …"

L423: Specify which map, I assume the bedrock topography?