Reviewer 1 comments and author answers:

The paper describes a novel approach to permafrost PJI tested in different sites of Tien Shan and Pamir. The paper is well written, with rigorous description of the methodologies adopted. Conclusions are fully supported by the relevant results. The only criticism I have is about the paper length (52 pages) that makes the manuscript hard to read. In my opinion the authors jointed 2 works that may be separated in 2 different contributions helping the reading: a work about the relevant permafrost characterisation of the remote studied areas, and a work about the novel PJI-GM approach and its comparison with the more common PIJ-AR. I obviously leave to the editor the decision about suggesting the splitting or not.

Dear Jacobo. Thank you for your positive feedback and thoughtful suggestion regarding the manuscript length. We understand the concern, but we believe splitting the paper would reduce its impact. The permafrost characterization alone might not attract enough interest, and keeping the work unified allows us to better connect the data with the methodological advancements. To improve readability, we will revise the manuscript to remove redundancy as suggested and make it more concise while keeping the content intact. We hope this addresses your concerns.

I suggest to sum up the discussion avoiding some repetition as in ln540, and to insert before the most relevant findings (e.g. Ln625-635) , and the important landforms / ice content relations.

We shortened the discussion, which is now about 30 lines shorter than in the original manuscript.

I noted some typo that need corrections:

LN 472 Sentence about support of higher standard deviation not clear

Thank you for pointing out the unclear sentence on LN 472. We have reviewed the text and clarified the statement regarding the higher standard deviation:

This is also quantitatively supported by the higher standard deviations for the PJI-GM (see Fig. 12 1a vs. 1b), indicating greater variability in the tomograms. Higher standard deviations suggest the PJI-GM model captures more heterogeneous subsurface features.

LN 531, 533, 556 typo figures numbers

Thank you for noticing. We have corrected these errors.