Summary:

"Comparing High-Resolution Snow Mapping Approaches in Palsa Mires: UAS LiDAR vs. Modeling" by Störmer et al. evaluates snow distribution retrieval methods in palsa mires using UAS lidar and random forest (RF) modeling across three study sites in northwestern Finland. The study highlights the role of palsas as indicators of climate change and reviews remote sensing and machine learning approaches for estimating snow depth. Both methods produced comparable results, although RF modeling showed higher accuracies over thermokarst ponds and open areas. Overall, the paper offers valuable insights into snow cover dynamics over palsas, though minor revisions could enhance its clarity and impact.

Recommendations:

Line 6: Change "Digital Surface Model" to "Digital Terrain Model"

Lines 15-18: It may be preferable to present the UAS lidar results first and then note the enhancements made by using RF modeling. Differentiating the two could be misleading given that the RF model relies on input parameters derived from UAS lidar data.

Figure 3: Perhaps this figure could have the first row represent the UAS lidar process and the second row represent the RF process? Or maybe specify the input parameters to make it clearer?

Figure 5: The negative snow depth from UAS-Lidar is mentioned in the Discussion, but I would suggest briefly making note of it in the Results as well. Also, changing the color of the snow depth points to indicate snow depth measurements could also be useful to directly compare to RF and lidar data.

Table 3: Can you clarify why MAE and SD are missing for each of the 3 study sites?

Line 464: It could be helpful to quantify this tighter spread, since the numbers in the previous tables seem to indicate that RF would have lower variance.

Line 555: Clarify "open water" considering it's still snow covered in the winter dataset. Noting that the lidar is scanning open water in the summer dataset could be helpful to the reader.

Line 558: Volumetric scattering does occur when lidar scans a snow surface, but the error is on the scale of <4 cm at this wavelength. I would suggest the difference in snow depth (~30 cm) is most likely from scanning the open water during the summer as more absorption is occurring over this surface.

Lines 672-673: Perhaps it could be helpful to note the snow conditions at the time of winter data collection, which would also impact scattering and lidar returns (i.e., general age of snow/grain size, presence of light-absorbing impurities, etc.).

Lines 678-682: Could you specify which wavelengths would be used to improve snow depth mapping? Visible wavelengths would penetrate deeper into the snowpack, and shortwave infrared has a higher likelihood of absorption (Deems et al., 2013).

Minor Suggestions:

Line 14: "…0.77 and 0.691, respectively."

Lines 130-148: Looks like there's use of both past and present tense, maybe double check for consistency.

Line 147: "…approach provides the most reliable results, and (2) how do the snow depth patterns…"

Figure 1: The font in 1b could be larger. The "Road" label could also be replaced with "Route E8" instead.

Line 160: Instead of "in the west" perhaps "extends to the west"?

Line 249: May want to double-check the grammar on this line ("-,").

Line 375: I'd recommend using either "Especially" or "directly".

Figure 6: Perhaps it could be useful to clip the results to the palsa boundaries (or at least a palsa buffer) rather than the raster extent.

Line 490: "indicate" rather than "indicating"; RF may improve the lidar results, but I would be hesitant to present the results as distinct.

Figure 9: Maybe "demonstration" rather than "explanation"?

Line 732: Similar to the previous comments, perhaps "alternative" could be rephrased as this suggests that it's an independent method.

Figure A2: I would suggest differentiating the colors more, especially the white and yellow points.