The review comments are shown in black and the author responses in red.

We would like to thank the reviewer for reviewing our manuscript. We appreciate all the comments and will revise our manuscript according to them. Please find below our responses to the comments.

This is a worthwhile study, although it is far from the first to evaluate model simulations of SWE, SCE and albedo in comparison with satellite-based datasets. It may be that this paper is the first with this precise combination of snow properties, reanalyses and observations, but it is mostly restricted to documenting differences without adding understanding. How much of the exaggerated SCE trend in ERA5 is due to the discontinuity in IMS assimilation? How closely are SCE and albedo anomalies related, and to what extent are they masked by forest cover? Difference plots for the means in Figure 1 would be useful. What can be said about the relative contributions of assimilation and resolution to differences between ERA5 and ERA5-Land?

We will edit the manuscript to address these questions and to add understanding about the differences. We will add more discussion on IMS and how adding IMS affects the snow cover estimates. We will discuss more closely the relationship between SCE and albedo. Also, we will add more information and discussion about the differences between ERA5 and ERA5-Land. We will also add difference plots for the means in Figure 1.

The abstract states that "The analysis shows that both ERA5 and ERA5-Land overestimate SWE". The three datasets used as the reference for SWE in mountainous regions are themselves model products, two of them driven by the ERA-Interim predecessor of ERA5. All that is conclusively shown here is that ERA5 and ERA5-Land have larger SWE in mountainous regions than these other model products. Does the overestimate of SCE in ERA5, even after 2004, just show that IMS overestimates SCE? How much of the differences in SWE be attributed to differences in precipitation and temperature driving data between ERA5 and ERA-Interim?

It is true that in mountainous regions, this analysis shows the difference between ERA5 or ERA5-Land and other model products. Currently, there are no observation-based SWE products available for mountainous regions. However, as mountain areas store a considerable portion of snow mass, we decided to include them in this analysis as well, despite the lack of observation-based data products. We acknowledge that comparing ERA5 and ERA5-Land with other model products might be problematic and therefore, we have also plotted the timeseries for non-mountainous regions only (Fig. S2). In the mountainous regions, we have used the mean SWE of three model products, which is an approach that has been used in other studies too (Mudryk et al., 2020; Derksen and Mudryk, 2023).

Also, averaging over multiple products can improve the accuracy of SWE estimates (Mortimer et al., 2020), making the SWE estimates more reliable.

However, we agree that this issue needs further discussion and therefore, we will add more discussion on this topic. We will also add discussion about the issue that model products use ERA-Interim and how this affects the analysis. Also, we will check the wording and will emphasize throughout the text, that in mountainous regions, we are comparing ERA5 or ERA5-Land with other model products and not with observation-based products so that the issue will be clear for the readers. We will also add more information and discussion about IMS and its effect on snow cover estimates.

Derksen, C. and Mudryk, L.: Assessment of Arctic seasonal snow cover rates of change, The Cryosphere, 17, 1431–1443, https://doi.org/10.5194/tc-17-1431-2023, 2023.

Mortimer, C., Mudryk, L., Derksen, C., Luojus, K., Brown, R., Kelly, R., and Tedesco, M.: Evaluation of long-term Northern Hemisphere snow water equivalent products, Cryosphere, 14, 1579-1594, https://doi.org/10.5194/tc-14-1579-2020, 2020.

Mudryk, L., Santolaria-Otín, M., Krinner, G., Ménégoz, M., Derksen, C., Brutel-Vuilmet, C., Brady, M., and Essery, R.: Historical Northern Hemisphere snow cover trends and projected changes in the CMIP6 multi-model ensemble, Cryosphere, 14, 2495-2514, https://doi.org/10.5194/tc-14-2495-2020, 2020.

Because discussion of hemispheric timeseries trends is followed by the same for continents, Figures 2 and 3 and much of the discussion in 3.1 could be cut.

After consideration, we decided to keep Sect 3.1, as we think it will bring useful information about the changes in snow cover. Our logic in the Results section is to start with large-scale results and move towards a smaller scale. We think it is useful to show the results also for the entire NH, as the changes in snow cover will affect, for example, the Earth’s energy budget.

Minor points:

The albedo paragraph starting at line 34 interrupts the discussion of snow cover; I think it would sit better at a later point in the introduction.

We will move this paragraph to Sect. 2.1.

88 “relatively sparse” – relative to what?

We will remove the word “relatively”.

110 Important to note here that IMS does not provide information on SWE, and it is not assimilated in ERA5 at elevations above 1500 m. Describe how assimilation of SCE is used to update SWE.
We will edit the text according to the comment.

136 This sentence is a repeat from line 98.
We will remove this sentence.

141 Note that Equation (1) is from the HTESSEL documentation (and needs to be limited to a maximum of one).
We will revise the text according to the comment and add a reference.

168 Not all of the datasets in 2.2 are satellite based.
We will change the subtitle to "Reference datasets".

184 Mortimer et al. (2022) referenced here did not evaluate the bias-correct SnowCCI and states that v2 is an improvement relative to v1.

It is true that there are improvements in v2 relative to v1. For example, v2 shows better seasonal evolution of SWE. However, using dynamic density in v2 also decreases SWE estimates, which are well below the SWE estimates from reanalysis products (Fig. 4 in Mortimer et al., 2022). Therefore, v1 is better when analyzing multidecadal timeseries and trends. Furthermore, the bias corrections improve the SWE estimates by increasing the general SWE level and thus correcting the SWE estimates closer to the real level. Therefore, the bias-corrected SnowCCI v1 is the most accurate SWE product for this analysis. We will revise the text to make the reasoning for using v1 instead of v2 clearer for the reader.

208-214 Availability of albedo estimates from ERA5 and ERA5-Land, and differences between them, have already been discussed in 2.1.
We will remove these sentences to avoid repetition.

261-265, Figure 1 Differences in SCE dominates differences in albedo, so should be discussed and shown first.
We will edit the text according to the comment.

Figure 2 Axis labels for the second row should show that this is change in SWE, not SWE.
We will edit the figure according to the comment.

393 "whether the positive trend"

We will edit the text according to the comment.

400 “deforestation”

We will edit the text according to the comment.

498-499 Is this intended to say that ERA5 and ERA5-Land are well correlated with observations of annual variability? That is not very obvious in Figures 10 and 11, but could be quantified.

Yes, this is what we intended to say. We will quantify this and will also edit the text so that this will be clear for the readers.

519 “the SWE values themselves”

We will edit the text according to the comment.

520 “a considerable difference”

We will edit the text according to the comment.

525 “uncertainties related to”

We will edit the text according to the comment.

The writing is generally good. I noted a number of incorrect commas, but the Finns have a word for reviewers who pay excessive attention to commas.

We will check the grammar throughout the text.