Response to editors

Tc-2022-45 "Towards Large-Scale Daily Snow Density Mapping with Spatiotemporally Aware Model and Multi-Source Data"

The authors greatly appreciate for your constructive comments and kind suggestions. We have corrected the manuscript accordingly. Below we will address each comment in a point-by-point answer:

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- Bold: comments of the editor
- blue words: answer of the authors
- Italics or red words: changes to the initial manuscript

Thank you once again for your help to our paper.

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Comments by Dr. Chris Derksen

1. Line 20: change to "20 potentially influencing variables."

We have modified in the manuscript.

15 2. Line 21: change to "an R2 of 0.531"

We have modified in the manuscript.

3. Line 24: change to "...the GWTNN model in capturing..."

We have modified in the manuscript.

4. Line 57: "For example, snow density was found to be lower at higher elevations, and even decreased by approximately 0.006 g/cm3 with each 100 m increase in elevation (Zhong et al., 2014)" Can you add specification to the geographic region for which this result from the Zhong et al study applies?

We have added the geographic region of this result in the manuscript.

5. Line 61: remove "In addition, the aspect also affects the snow density through radiation, because sunnyfacing slopes that experience" and just start the sentence with "Slopes with high radiation input will be more likely..."

25 likely.

We have modified in the manuscript.

6. Line 99: change 'various' to 'variable'

We have modified in the manuscript.

7. Line 101: change to "satellite data can provide information on the snow-related..."

30 We have modified in the manuscript.

8. Figure 1: remove the inset map. It is not needed given the geographic focus of the analysis.

Thank you for the suggestion. We truly agree with this. Considering that snow is mainly distributed in high altitude and high latitude areas, we made the small inset map in southern China to highlight the snow areas in Figure 1.

9. Line 145: change to "...different influencing variables on snow density."

35 We have modified in the manuscript.

10. Line 151: consider adding more detail to this statement: "In addition, the min-max normalization method is applied to normalize different influencing variables." Can you point to which variables are normalized in Figure 2?

Thanks for this comment. we have added the aim of normalization, and explained that all the influencing variables will be normalized except for MCD12Q1 data, as below.

2.3 Data Integration

In addition, to eliminate the influence of different dimensions, the min-max normalization method is applied to normalize different influencing variables except for MCD12Q1 data.

11. Line 232: change 'involved' to 'included'

45 We have modified in the manuscript.

12. Line 268: change to "...caused by greater forest cover..."

We have modified in the manuscript.

13. Line 346: change to "...also provides gridded daily snow density data..."

We have modified in the manuscript.

50 14. Line 398-399: remove "in different periods and regions."

We have modified in the manuscript.

15. Line 469: change to "...based on the observed snow density."

We have modified in the manuscript.

16. Line 480: I suggest adding an extra statement to the new text which emphasizes that the individual correlations with the 20 variables were generally weak, as you note on line 238.

We added an extra statement according in the manuscript, as below.

6 Conclusion

The individual correlations between snow density and 20 influencing variables are very week, with the maximum average correlation coefficient of only 0.123, and it is found that the vegetation variable LAI_HV, meteorological variable TP, snow variable SD, and topographic variables have a relatively close relationship to snow density.

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Thank you very much.

Comments by Polina Shvedko

65 The table is included as figure (Figure 4). Please re-label this as table and the references in the manuscript text must be adjusted accordingly. If the color spectrum of these tables is necessary and cannot be exchanged for footnotes, bold, or italic, then the table must be inserted as an image, but still be called a table.

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Thank you very much for this comment. Actually, the Figure 4a is a heat map with label rather than a table. the numbers in this figure are labeled to better illustrate the individual correlations in addition to the color spectrum. Hence, we suggest that the figure would be a better choice to present the result. In addition, the data in Figure 4b comes from Figure 4a, and Figure 4a and Figure 4b work together to reveal the correlations between snow density and its influencing variables. If we changed Figure 4a as a table, then Figure 4b is needed to be a separate figure. Considering the close relation between Figure 4a and Figure 4b, we suggest not to separate them. According to the above considerations, we suggest to keep Figure 4 as is. Hope our explanations could address your major concern. Thanks again.



Figure 4. Correlation coefficients between snow density and its influencing variables in each month (a), and the average value of the positive and negative correlation coefficients, where the main correlation marked as shade refers to the positive or the negative correlation that occurs in more months than the other (b).

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