

The Cryosphere Discuss., referee comment RC1  
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## Comment on tc-2022-45

Anonymous Referee #1

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Referee comment on "Towards Large-Scale Daily Snow Density Mapping with Spatiotemporally Aware Model and Multi-Source Data" by Huadong Wang et al., The Cryosphere Discuss., <https://doi.org/10.5194/tc-2022-45-RC1>, 2022

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This work employed geographically and temporally weighted neural network (GTWNN) model to construct the daily snow density grid products in China, with the support of satellite, ground, and reanalysis data, which is useful for estimating water resources and predicting natural disasters. However, some important issues need to be addressed. The details are as follows.

1. In terms of abstract, the content needs to be specified and well organized. For instance, in Line 6 of this section, the detailed results supporting that the GTWNN model can improve the estimation of snow density should be given; and in Line 10, the specific models should be listed.
2. In the introduction, it is not clear why satellite, ground, and reanalysis data are used.
3. In the end of Section 2.1, the snow season is divided into three periods. Considering the climate and environment show great spatial heterogeneity in snow cover areas in China, this division of snow season should be expounded.
4. In terms of Equation 2, not all the variables are explained in detail.
5. The variables in Figure 2 should be explained in or below this picture.
6. How each kind of data are used specifically is not given in Section 2 or 3.
7. In Section 3.2, the title of this section is not appropriate for the content. In addition, how to evaluate the GTWNN model (such as the metrics to evaluate the performance) should be described.
8. In table 2, the details about each model are deficient.
9. The text and logic in the manuscript needs improved, particularly in the Results Section. For example, what's the relationship between Section 4.1 (Descriptive Statistics of Ground Observations) and other results? The position of Section 4.2.3 (Importance of the Influencing Variables for Snow Density Estimation) needs consideration.
10. Snow density and its CV in different snow cover regions vary apparently, as well as the monthly changes of snow density. While, the explications about these phenomena are limited in the present manuscript.