

Hydrol. Earth Syst. Sci. Discuss., referee comment RC3  
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## Comment on hess-2021-556

Anonymous Referee #3

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Referee comment on "Development and validation of a new MODIS snow-cover-extent product over China" by Xiaohua Hao et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-556-RC3>, 2022

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This study proposes a new MODIS snow-cover-extent product over China. The optimal NDSI thresholds varying with land cover types are extracted, the NDVI-NDFSII decision rules specific for snow discrimination in forest areas are optimized, and an HMRF gap-filling technique, which can simultaneously assimilate temporally and spatially neighbouring information, is imported. The need for such an approach is well justified and the authors cite ample relevant literature. The study provides examples demonstrating the successful performance of the method. The paper is basically well-written and presented.

There are a few important and minor comments/mistakes that are listed below and should be taken into account.

Line 38, "on the other hand", where is "on the one hand".

Line 53, "the MODIS band 4 (0.55  $\mu\text{m}$ ) and band 6 (1.6  $\mu\text{m}$ ) reflectance" should be "the reflectance of MODIS band 4 (0.55  $\mu\text{m}$ ) and band 6 (1.6  $\mu\text{m}$ )".

Line 54, "distinguish snow cover or not" should delete "or not".

Line 58, "research" should be "studies".

Line 78, the use of GEE is not motivated from the above text.

Line 80, "surface cover" should be "land cover".

Line 88, "chiefly" should be deleted.

Line 88-91, all of the definite articles before the acronyms should be deleted. All of the "us" also need to be deleted.

Line 102, only the snow-depth product has linkage?

Line 106, "too" should be deleted.

Line 108-115, why was snow-depth data used to validate SCE product? It is not a snow depth product. This need explanation in the text.

Line 118 and 234, "paper" should be changed to "study".

Line 119, "Sect." should be "Sec." or "Section".

Line 154, "NDIS" should be "NDSI".

Line 167, "≥" should be "greater than".

Line 187-191, I suggest to move Subsection 3.2 to the front of Subsection 3.1, and to combine Subsection 3.2 and 3.1. The authors should give a general introduction of the method first, and then present the details. There is the same problem in Subsection 3.4 and 3.3.

Line 281, "this section" should be changed to "we".

Table 3, 4, 5, and 6, OE is just one minus PA and CE is just one minus UA, thus OE and CE are not need to show if you use PA and UA, and PA and UA are not need to show if you use OE and CE.

Line 338 and 340, I suggest to delete "Under the support of several national programs of China" and "Toward this".

Line 345, "and finally" should be change to "finally".

Figure 1, 2, 3, 4, and 6 use "non-snow", but "snow-free" is used in the text and Figure 7.

Figure 3, "Number density colorbar" should be "Number density".

The parentheses in the caption of the figures should be deleted.