

Overall comments

Hao's paper produced a daily cloud-free snow cover extent product with 500 m spatial resolution based on MOD09GA and MYD09GA land surface reflectance dataset in China. The new daily cloud-free snow product was also verified by snow depth observation from climate stations. The results show that the new snow cover product with higher overall accuracy than the standard MODIS daily snow product released by NSIDC, which provides a more reliable snow dataset for other related studies.

So far as we know, the NDSI threshold is the crucial parameter for snow detection by use of optical remote sensing data. However, the NDSI threshold varies with the snow depth, snow fraction, pollution, as well as different land-use types, which cause great difficulty in remote sensing mapping of snow cover at present. From the content of this paper, this paper analyzes the sensitivity of NDSI, that is, the effect of different land cover types on NDSI, then to find the optimal NDSI threshold for different land cover types in the study area. Especially in forest areas, the NDVI and NDFS were involved in decision tree classification.

The paper is scientifically sounding. I hesitate to say major revisions since it is mostly about reorganizing the paper structure and a few data process issues need to clarify, but quite a few minor revisions should be undertaken, and the editorial changes for language usage throughout the manuscript need to be addressed before publishing this manuscript to journal of Hydrology Earth System Sciences.

General Comments

1. The structure of the paper is not following the convention, the results and methods are mixed. I think the paper requires a better structural organization to improve its readability.
2. A large number of Landsat snow data are used in this paper, partly for training and partly for verification. But why is the new MODIS snow product verified eventually by the ground observation data from meteorological stations?
3. According to the characteristic curve of the snow reflection spectrum, snow cover usually has a high NDSI value in traditional cognition, but the NDSI value calculated by using surface reflectance in this paper shows that the NDSI of snow cover under

most land cover types is relatively low. If this is true because the MODIS standard product uses zenith reflectance rather than an atmospherically corrected product to calculate NDSI, the authors should highlight this conclusion in the Conclusion section.

Minor Comments

1. L15, surface reflectance data, a new daily MODIS snow cover extent (SCE) product from 2000 to 2020 over China has been produced.
2. L21, Against 362 China Meteorological Administration (CMA) stations, the validation results show...
3. L24, Biases ranging from 0.98 to 1.02, indicating that the SCEs given by the new snow product are neither overestimated nor underestimated significantly.
4. L26, clearly – obviously
5. L55, $NDSI \geq 0.4$
6. L57, The C6 snow product provides a standardized NDSI but does not redefine a new threshold of snow cover.
7. Suggest simplifying L48-57, and focusing on the idea of cloud removal algorithm in MOD10A1F snow product.
8. Line58, While the released MODIS snow products have...
9. L64-66, need a reference here.
10. Line68, add a summary of the current cloud removal algorithms for MODIS daily snow product.
11. L88-89, which version and period of MOD09GA and MYD09GA were used, and which year of MCD12Q1 was used in this study.
12. L90, land surface reflectance
13. L94, how do the Landsat OLI snow maps come from? Suggest making a spatial distribution map of Landsat images, distinguishing training data sets from validation data sets, and also including meteorological stations.
14. L107, resampled, and delete ‘or aggregated’
15. L109, Provide the period of climate stations data used.

16. Change the headline of the 3 sections to 'Method'.
17. L133-135. Please statement as clear as possible.
18. L136-138, during the preliminarily screening, what is the internal purpose of each threshold? Please explain.
19. In 3.1.2, put Table 1 into the results section, this part only focuses on the method used in this study. And the title of the table is 'Optimal NDSI thresholds over eight non-forest land-cover types', but the content of the table has the forest land cover, such as 'Evergreen Broadleaf Forest'.
20. In 3.1.3, the same suggestion is with 3.1.2.
21. L162, Eq. (1) is about NDSI, not NDFSI.
22. In 3.1.4, can you add a reference for the accurate evaluation of EAR surface temperature products? The LST and elevation thresholds were used for snow misclassification in high elevation areas in MOD/MYD10A1 V006, not for ice clouds.
23. L190, change the 'gap' to 'data gap'. And please clarify the source of the data gap, such as the cloud.
24. In 3.3.2, the results of Figure 5 should be in the Results section, here only focus method.
25. Combine the 3.2 and 3.4 into one section, and suggest deleting the content of the 3.2, 3.3, and 3.4 section.
26. Change the headline of 4 to Results.
27. Section '4.1 Accuracy metrics' should be in the Method section.
28. L258-262. Dose the Terre/Aqua MODIS SEC dataset were validate by ground measurements under clear sky?
29. In the 4.3 section, the accuracy varies from year to year, mainly due to ground observation, as the authors mentioned. Any other explanations?