Hydrology and Earth System Sciences Discussions

Hydrol. Earth Syst. Sci. Discuss., referee comment RC2
https://doi.org/10.5194/hess-2021-556-RC2, 2022

Comment on hess-2021-556

Anonymous Referee #2

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-RC2, 2022

This manuscripte produced a new MODIS snow cover product over China. It includes Terra SCE and Aqua SCE datasets, as well as a cloud-gap-filled SCE dataset. Validation against with in situ snow depth measurements, these products show obvious improvements than standard MODIS SCE products. The produced snow cover extent product could be a significant dataset for climate change research.

Despite of its significance, several issues still need to be resolved before a possible publication to HESS. 1) OLI snow product is very important for optimal NDSI thresholds, and how do you obtain them? You should describe it more sufficiently; 2) Organization of the paper should be improved, especially section 3. I am confused by the first two paragraphs of section 3. Why you introduce how to obtain the samples here? I think maybe putting them in section 2 is better. More importantly, you should show a flowchart first in section 3.1. Otherwise, it is difficult for readers to understand how you will produce SCE from MOD09GA or MYD09GA. There is a same problem for section 3.2. I would suggest you reorganize this section. 3) Some minor errors that may need to be modified are listed as follows.

Minor comments and suggestions:

- Line 48-55: People who are unfamiliar with MODIS snow products may be difficult to understand your introduction on these products. I would suggest you give a clearer description.
- Section 2.1 line 88-93: You should introduce the MOD09GA, MYD09GA and MCD12Q1 concisely.
- Section 2.2: See the first suggestion. A simple introduction on the OLI snow maps is definitely needed.
- Section 3. 3.1.1 line 130-138: Preliminarily screening, it is repeat for the last two graphs.

- Section 3.1.2 line 154: Optimized NDSI thresholds, "However, as expected, only using the NDIS criterion seems not accurate enough to discriminate snows over those forest land-cover types, except the "Evergreen Needleleaf Forest" (due to its sparse distributions in China)." Change "NDIS" to "NDSI"!
- Section 3.1.4: Postprocessing based on surface temperature and DEM, how to determine the threshold of surface temperature screen?
- On Figure 2, please provide the full name of Figure 2.
- Section 3.3.2, line 230: "For the aggregated SCE data"-> "For the aggregated SCE".
- Section 4.1: Confuse matrix is a commonly-used tool to evaluate the products relevant to classes. It seems this section is unnecessary.
- Section 4.3, line 268-270: This may be attributed to different snow/non-snow number distributions in nature among different years, and varying sample numbers caused by different ground measurements available in different years. I cannot understand "different snow/non-snow number distributions in nature among different years".
- Section 5.2, line 325-335: for the two examples, are they all covered by forest?
- Line 355: During our validations or comparisons, we found this phenomenon is somewhat common in the edges of snow-cover areas and the forest areas of Northeast China. Very awkward sentence. Please consider revising it.
- Section 6, line 345: finally, a totally cloud-free SCE is mapped through replacing the residual gaps with auxiliary passive microwave snow-depth data. Is "finally the residual gaps are all filled according to the implication given by a auxiliary passive microwave snow-depth dataset" better?
- Section 6, line 350: "by a series of processes filling cloud-induced gaps". It seems wordy here because you just mention them in the above paragraph!