The Cryosphere Discussions

The Cryosphere Discuss., community comment CC1
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Comment on tc-2022-159

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Community comment on "Landsat, MODIS, and VIIRS snow cover mapping algorithm performance as validated by airborne lidar datasets" by Timbo Stillinger et al., The Cryosphere Discuss., https://doi.org/10.5194/tc-2022-159-CC1, 2022

It is interesting work on fractional snow cover estimation using multisource remote sensing data, including Landsat, MODIS, and VIIRS. Authors evaluate various algorithm and fractional snow cover products.

I have some comments for this excellent work:

1): Line 39-40: Please add a reference that can demonstrate the statement of "… the fraction of precipitation that falls as rain, rather than as snow …"

2): Line 110: "but these approaches are not available for the dates or areas considered in this analysis". I don't understand this sentence's meaning, can you give more explanations why these two methods (MODiMlab and *SnowFrac*) were not used in this study.

3): Lines 841-843: Changed "Bair, E. H., Stillinger, T., and Dozier, J.: Snow Property Inversion From Remote Sensing (SPIReS): A Generalized Multispectral Unmixing Approach With Examples From MODIS and Landsat 8 OLI, Ieee T Geosci Remote, 59, 7270-7284, 10.1109/Tgrs.2020.3040328, 2021a" to "Bair, E. H., Stillinger, T., Dozier, J., Snow Property Inversion from Remote Sensing (SPIReS): A generalized multispectral unmixing approach with examples from MODIS and Landsat 8 OLI, IEEE Trans. Geosci Remote Sens, 59, 7270-7284, 10.1109/TGRS.2020.3040328, 2021a"

4): Lines 847-848: Please modify the citation stye of "Bair, E. H., Stillinger, T., Rittger, K., and Skiles, S. M.: COVID-19 Lockdowns Show Reduced Pollution on Snow and Ice in the Indus River Basin., P Natl Acad Sci USA, 118, 2021b."

5): Line 150: What's your meaning of "fSCA can depend on the snow climate" ? Please give more explanations. Do you would like say that the fSCA depend on snow depth, density, and grain size?

6): Line 317: Please explain the selection of a threshold of 0.01 for converting fSCA to binary snow. Why not 0.1, or 0.2, 0.3?

Section 4.3.1 Upscaling

7) What's the difference of the validation experiment between that was in the data original scales (463 m, or 373m, or 30 m) and that was in the upscaling scales?

8) Fig. 5: When the canopy cover is over 0.5, these six products have lower RMSEs (Fig. 5a), however, f test are decreasing so fast (Fig. 5g). Why? It is so abnormal. Compared to Fig. 4, low f-test is corresponding to higher RMSE.

In addition, there is higher RMSE for VNP10A1F data at view zenith angle > 50 ° conditions (Fig. 5b), however, its f-test is so high, closing to 1 (Fig. 5h). Please confirm your data.

9) Figs. 4 and 5: The label "snow cover" in these two images are so confusing. I suggest that you modified it to another label word.