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Discussions

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Interactive comment on "Regional influence of ocean-climate teleconnections on the timingand duration of MODIS derived snow cover in British Columbia, Canada" *by* Alexandre R. Bevington et al.

Anonymous Referee #2

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General comments

This study investigates the regional effects of the Oceanic Niño Index (ONI) and Pacific Decadal Oscillation (PDO) on snow cover characteristics in British Columbia (BC). The strong relationships provided between snow cover and climate indices is not new but the regional analysis of changes of snow season has not been studied in detail for BC and there is a need to document these changes. The most concern is the limited length of MODIS data that cover few ONI and PDO events. However, this study provides a basis for futures studies testing longer-term relationships and the use of MODIS trend

data area common in the literature. Overall, the study is well organized and fits the scope of TC. The use of LOWESS interpolation is a novel approach but is not clear what advantages has in contrast from another cloud filled approach (e.g. Li et al, 2017; Khoramian Dariane, 2017).

Specific comments

Section 3.3. (Hydrozones)

The result shows latitudinal changes of magnitude of SDON, SDOFF, and SDDUR. Hammond et al (2018) showed a change of snow persistence in BC associated to elevation change with similar latitude and probably SD could have elevation relationship as well. I suggest running an elevation analysis to looking for elevation dependent factor in your 65 thousand locations. The elevation-latitude SD changing could be a great complement to current results.

Section 4.1. (MODIS processing)

The MODIS snow cover Collection 6 has been significantly revised and data content has been increased compared with the previous collection. For the MYD10A1 integrated a Quantitative Image Restoration (QIR) algorithm (Gladkova et al., 2012) to restore the Aqua MODIS band 6 to allow use exactly the same product for MYD10A1 and MOD10A1. I suggest including the advantages of the new collection of Aqua MODIS to highlight your novel cloud filled approach.

Section 5.1. (Workflow validation)

The NDSI threshold was 30. The previous Collection 5 had a threshold of 40 to define a pixel as snow but this fixed threshold doesn't work well in different vegetation cover condition. I suggest states the vegetation condition (as NDVI) range in your locations in order to define the limits of your NDSI threshold.

References

Gladkova, I., M. Grossberg, G. Bonev, P. Romanov and F. Shahriar, 2012: Increasing the accuracy of MODIS/Aqua snow product using quantitative image restoration technique, IEEE Geoscience and Remote Sensing Letters, 9(4):740-743. Li, X., Fu, W., Shen, H., Huang, C., and Zhang, L., 2017. Monitoring snow cover variability (2000–2014) in the Hengduan Mountains based on cloud-removed MODIS products with an adaptive spatio-temporal weighted method, Journal of Hydrology, 551, 314-327. Khoramian, A. and Dariane, A., 2017. Developing a Cloud-Reduced MODIS Surface Reflectance Product for Snow Cover Mapping in Mountainous Regions, Geosciences, 7.