

Ann. Geophys. Discuss., referee comment RC1
<https://doi.org/10.5194/angeo-2021-29-RC1>, 2021
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Comment on angeo-2021-29

Anonymous Referee #1

Referee comment on "Snow cover variability and trend over the Hindu Kush Himalayan region using MODIS and SRTM data" by Nirasindhu Desinayak et al., Ann. Geophys. Discuss., <https://doi.org/10.5194/angeo-2021-29-RC1>, 2021

This work requires more rigor. The authors are requested to modify the manuscript as per the following comments.

Page 1:

- i) Do the authors think the period 2000-2017 can be considered long enough to be termed "long term"? Since the focus is on snow cover the authors are requested to be clear wherever they mention glaciers.

- ii) Why did the authors choose to use coarser resolution MODIS in presence of higher resolution Landsat data?

iii) The authors are requested to consider rewriting the Abstract for better readability.

- iv) The authors present some important figures with large variation (like 74-7900 years). This is quite a large deviation to be considered good for a scientific prediction. Please define clearly what are the "other parameters" which are assumed to be unchanged. How is it justified to consider a "no-change" situation?

Page 2:

- i) The authors are requested to cite the following article where they mention the "anthropogenic emissions of soot..."

-Gautam et al., "Satellite observations of desert dust-induced Himalayan snow darkening", Geophysical Research Letters, 2013.

- ii) In the section discussing the "Regional warming and decrease in snow cover", the authors are requested to separate the discussion between the changing state of snow cover and glaciers over the Himalayan region. Furthermore, it is difficult to summarize the information presented in this section and the idea still appears quite vague.

Page 3:

- i) The authors are requested to separate the increasing temperature and precipitation since it is counterintuitive to visualize that both together cause decrease in persistent SCA.

- ii) The authors are requested to cite the following article, which discusses the seasonal variation in snow cover and its altitudinal trend, in the section discussing the "Seasonal changes in snow cover".

-Muhuri et al., "Snow cover mapping using polarization fraction variation with temporal RADARSAT-2 C-band full-polarimetric SAR data over the Indian Himalayas", IEEE JSTARS, 2018.

Page 4:

- i) Line 105-111: The authors are requested to cite a recent work discussing the performance of the snow cover mapping algorithms in mountainous areas affected by forests and topographic shading.

-Muhuri et al., "Performance Assessment of Optical Satellite Based Operational Snow Cover Monitoring Algorithms in Forested Landscapes", IEEE JSTARS, 2021.

Page 5:

- i) The authors are requested to introduce terrain shadow masks in their analyses. Terrain shadow changes as a function of the time of the year due to solar elevation angle variation. These are the regions of ambiguity. Shadow masks will provide a more robust touch to this work.

Page 8:

- i) Fig 5 a): The authors are requested to plot the elevation range wise snow cover extent histogram as plotted in the following article,

-Muhuri et al., "Snow cover mapping using polarization fraction variation with temporal RADARSAT-2 C-band full-polarimetric SAR data over the Indian Himalayas", IEEE JSTARS, 2018.

- ii) In the trend analysis how did the authors take into account the errors in the snow detection algorithm? How did the authors deal with partially or completely cloud covered conditions? How did the authors handle the snow cover in forested areas? There is little discussion regarding these issues in the manuscript.