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The Cryosphere Discussions

Interactive comment on "Changes in seasonal snow cover in Hindu Kush-Himalayan region" *by* D. R. Gurung et al.

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The authors have conducted an interesting study on the assessment of trends in snow cover using MODIS imagery in the HKH region, where snow melt plays a critical role. They have applied their analysis on a very large area and have introduced a new method for cloud correction. For these reasons the paper is worth publishing, however there a number of major shortcomings that need to be addressed before the paper is acceptable for publication.

General remarks

1.The authors describe a cloud correction procedure that includes multiple steps (temporal filer, spatial filter and altitude based masking). This procedure seems effective,

but much to my surprise the authors continue their analysis using the standard uncorrected product from MODIS and this seems strange.

2.The cloud correction procedure was validated using a AWiFs image. However only one image was selected for validation and it is not clear whether this validation image itself is cloud free or whether it is subject to similar errors as the MODIS algorithm. It is suggested to review this validation and include at least a number of cloud free images for validation.

3.The authors present numbers on trends in snow cover throughout the paper. These number need to be rechecked as they seem counterintuitive sometimes. For example: In Table 1 strong positive trends in snow cover are identified for the western, central and eastern HKH, but the overall trend is negative. That seems unlikely. In addition the authors should mention the units of these trends correctly and from Table 1 it seems that none of the trends identified are significant as there are no bold figures.

4.The English of the paper needs to be improved an I recommend the paper to be edited by a native English speaker. In many case the articles are lacking for example. I have not made any language corrections now because an overall improvement is required.

5.The authors state that their results are different than those of Immerzeel et al. (2009), because they identify a negative trend of -1.25% for the entire HKH. It is however not shown whether this trends is significant. Immerzeel et al. (2009) also find a non-significant negative trend for the entire region. So this is not a fundamentally different finding. The only significant negative trend found by Immerzeel et al. is for the upper Indus basin during winter, whereas this study finds strong positive trends. This should be thoroughly discussed, because both studies use the same datasets. Although the area definitions and length of the time series are slightly different, this does not seem substantive enough for these contradicting conclusions.

6. Although I am not a meteorologist the correlation with the mean vertical velocity at

500 mb and snow cover seems strong and this needs more detail.

Specific remarks

P756, l8: similar to what?

P756, l17-22: This seems redundant because the trends have already been reported.

P758, l27-29: Even in summer there is a strong west-east gradient in snow cover.

P762, l4-9: It would be illustrative to show these thresholds.

Fig 3 – Fig 5: t is not clear if these graph are for individual points or areas. In addition it is also strange to correlate snow fall to snow cover because they are not necessarily related. The snow fall amounts seem very high (up to 15 meter / year?)

Interactive comment on The Cryosphere Discuss., 5, 755, 2011.