1. I have some concerns about the novelty of the paper. Previous authors have also performed similar analysis in the Indus, which the authors rightfully cite. The authors seemed to have missed

Gurung, D. R. ; Kulkarni, A. V. ; Giriraj, A. ; Aung, K. S. ; Shrestha, B. ; Srinivasan, J. (2011) Changes in seasonal snow cover in Hindu Kush-Himalayan region The Cryosphere Discussions, 5 (2)

which seems important, as they also use a very similar cloud correction procedure. The authors should make clear why their study is considerably different than those previous studies.

Gurung et al., (2011) have used 8-daily MODIS snow products, while we have considered the daily MODIS snow products more suitable for our analysis, firstly, based on our taken assumptions for the temporal cloud filtering procedure, and secondly, considering the fact that the period of high agreement of snow classification between the MODIS Terra and MODIS Aqua is larger for their daily snow product than for their 8-day snow product (Wang et al., 2009). The cloud filtered daily snow product was then used in the further analysis of the present study.

The present study focuses on the snow cover climatology and it tries to indicate a possible link of snow cover changes with large scale circulations and with the changes in the water resources of the study area. In this regard, the study:

- practically selects study domains (i.e. basins) for analysis, based on stream flow measurement locations deployed by the Water and Power Development Authority (WAPDA), Pakistan as well as taking into account the contrasting hydrological regimes (nival/glacial) of these basins (Archer, 2003; Archer and Fowler, 2004). Such fact has led towards findings of different responses from the studied basins, mainly affected by distinct regional circulations active over the region.

- unprecedentedly presents the reliable (effected by minimum cloud cover to the extent possible) snow cover estimates for the considered basins, filling up an important data/analysis gap, and bears an operative value for the melt-runoff modelling studies and the water resources management in these study basins.

- provides the snow cover climatology against different topographic parameters and ascertains SLA-zone tendencies, providing further evidence of change in water resources of the study area, successfully linking such findings with recent hydro-climatic signals as well as to the socio-economic vulnerability observed over a recent decade to late 20th century.

- encourages understanding and establishing a relationship of snow cover with hydro-meteorological variables in order to complement the stream flow forecast.

Such novelties distinguish present study also with Immerzeel et al. (2009) and Tahir et al., (2011) (Page 13164, Line 24-26), in addition to the shorter periods considered for their analysis and ignoring cloud filtering procedure from the used 8-daily products. We will briefly mention such differences in the Introduction section of the revised manuscript.

2. The cloud correction procedure is straightforward and it seems effective, yet a real independent validation is not performed. The fact that snow cover estimates increase after application of the correction seems to be sufficient reason for the authors to conclude the approach works well. I think it should be tested if significant errors are made in estimating snow cover. One way to do this is to generate a random cloud cover, apply the correction and then validate it against the original image on a pixel basis.

This does need to take a lot of time and can be done for a few dates. least

We thank the referee for appreciating the effectiveness of our adapted cloud correction procedure. At Page 13155, Line 16-24, we illustrate the similar validation methodology of our cloud filtering technique, addressing the same concern raised by the referee. We state that two same day but independent observations (snow images) from the MODIS sensors aboard Terra and Aqua – acquired at different time of the day and processed with almost similar approach (Prajka and Blo¨schl, 2008) - were considered for the day with a maximum cloud cover difference between the two. Cloud cover of least cloudy image (in this case MODIS-Terra) was masked out from both of the snow images, which has made the MODIS-Terra snow image as a cloud-free image. Then cloud filtering has been applied over MODIS-Aqua snow image to remove its remaining cloud. The resultant MODIS-Aqua snow image was compared with the cloud-free MODIS-Terra snow image. The figure 4 spatially illustrates the performance of our applied validation procedure, whereas the results are summarized in Table 1 and at Page 13156, Line 23-26 and Page 13157 Line 1-5. We think that the "spatial scale performance" at Page 13156, Line 23 and "spatial performance" at Page 13155, Line 16 and Page 13156, Line 26 are misleading, so we will replace them with "validation".

We will more clearly describe the adopted validation methodology in the revised manuscript. We will also extend our validation procedure to some more dates within the validation period (year 2004) and the results will be presented in the revised version of the manuscript.

3. Figure 3 shows the impact of the cloud filtering. I do not understand legend in the figure and it is not referred to in the text. What is 1MODnMYD, 3SpatialFilered, etc.

We will change the legend to a more readable form and we will refer it in the text as well.

4. Correlation with large scale atmospheric modes are tricky to my opinion and care should be taken in assessing the skill. In table 3 the results are shown. I am not sure whether these results are really significant. I would suspect that he correlation would be significant for most basins as they are not far from each other and we are considering a very large scale phenomenon here. For some basins and seasons even the sign of the correlation is opposite. This warrant at least a thorough discussion and also inclusion of literature to other studies that have attempted to derive such relations, such as
Robock, A. (2003). Land surface conditions over Eurasia and Indian summer monsoon rainfall. Journal of Geophysical Research, 108(D4). doi:10.1029/2002JD002286
Shaman, J., & Tziperman, E. (2005). The Effect of ENSO on Tibetan Plateau Snow Depth: A Stationary Wave Teleconnection Mechanism and Implications for the South Asian Monsoons. Journal of Climate, 18(12), 2067–2079. doi:10.1175/JCLI3391.1
Immerzeel, W. W., & Bierkens, M. F. P. (2009). Seasonal prediction of monsoon rainfall in three Asian river basins: the importance of snow cover on the Tibetan Plateau. International Journal of Climatology, 30, 1835–1842. doi:10.1002/joc

We thank referee to point out various studies establishing snow cover correlation with regional circulations, we will add the relevant studies in the revised version of the paper. In Table 3, the statistically significant values are shown in italic (90%), bold (95%) and bold-italic (99%). Though, the study basins are not far from each other, we speculate the reason why the correlation for most of the basins is not significant, that these basins feature contrasting hydrological regimes (nival/glacial), which are in turn influenced by the complex terrain features of HKH ranges hosted by them. The opposite sign of the correlation is mainly found for the Kabul and Jhelum basins, which are relatively low altitudinal/latitudinal basins and extend into hotter climate. These basins are least influenced by the solid precipitation input under westerly disturbances, rather they receive substantial moisture input from the

summer monsoon during July-September both in liquid (at lower elevations) and solid (at higher elevations) form. We will discuss it in more detail in the revised version of the manuscript.

5. The assessment of the snow cover trends is a key aspect of the study, but nothing is mentioned about the significant of these trends. This is essential. Figure 8 shows those results and I think it is a bit odd to add a boxplot with the elevation distribution of glaciers to this plot.

We will report the significance of the trends shown in Figure 8. The inclusion of a box-plot in Figure 8 helps in showing that the SLA-Zones are situated well below the median elevation of the glaciers for the study basins.

6. The writing could be more to the point and concise and I find the text for the paper quite long. Also the English should be edited by a native speaker.

We will try to make the text more concise and to the point. For the English, we will get it go through a native English speaker.

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Immerzeel, W. W., Droogers, P., de Jong, S. M., and Bierkens, M. F. P.: Large-scale monitoring of snow cover and runoff simulation in Himalayan river basins using remote sensing, Remote Sens. Environ., 113, 40–49, 2009.

Parajka, J. and Bl¨osch, G.: Spatio-temporal combination of MODIS images – potential for snow cover mapping, Water Resour. Res., 44, W03406, doi:10.1029/2007WR006204, 2008.

Wang, X., Xie, H., Liang, T., and Huang, X.: Comparison and validation of MODIS standard and new combination of Terra and Aqua snow cover products in northern Xinjiang , China, Hydrol. Process., 429, 419–429, doi:10.1002/hyp.7151, 2009.