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Hydrology and Earth System Sciences Discussions

Interactive comment on "

Snow cover dynamics and hydrological regime of the Hunza River basin, Karakoram Range, Northern Pakistan" *by* A. A. Tahir et al.

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RC 1. The theoretical hydro-climatic model of mountain systems suggests, that run-off is determined by more variables than considered in this study. It should be made clear that evaporation, sublimation, melting permafrost, different ablation procedures on debris covered or debris free glaciers have not been taken into consideration or only indirectly.

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Interactive Discussion

Discussion Paper

AR: We will add this statement to the results and discussion section to make the issue clear.

RC 2. The quality of meteorological data depends on the parameter chosen. In accordance with the authors statements temperature data are rather consistent. On the other hand precipitation data are useful (although not very accurate) for liquid rainfall, e.g. in summer. They become almost totally random for snowfall (the authors mention the reasons) and therefore with increasing altitude. In this case the combination of satellite data (providing a yes/no-information on existing snow coverage) and ground data (e.g. snow-pits) or information based on snow-cover/runoff models is an appropriate approach and might overcome to a great extent this bottleneck. Several studies come to similar conclusions: the maximum snowmelt input to runoff in the area under discussion originates from the altitudinal range between 4000-5500 m. This interval combines hypsometric characteristics and approximate values of vertical rainfall gradients (e.g. Winiger et al, 2005).

AR: Snowmelt runoff modeling in this catchment is carried out during our study and is discussed in detail in another research paper (resubmitted after moderate revisions) in the Journal of Hydrology. We will add this statement and reference to the Results and discussion/conclusion section.

RC 3. The quality of run-off data at Dainyor-Bridge should be discussed under the perspective of long-term trends.

AR: We will discuss it in the data section that the quality of SWHP stream flow data is reliable.

RC 4. The obviously different characteristics of glaciers in the Karakoram compared to other mountain areas (incl. Himalaya) should differentiate between retreating, stagnating and advancing (especially surging) glaciers. In the Karakoram the percentage of surging glaciers seems to be rather high (as Hewitt has shown in several case studies). An overall increase of snow-cover at high elevations is suggested, but has to be

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verified.

AR: The overall increase of the snow cover area is possibly due the glacier surging in results of heavy snowfall at high altitudes which pushes the snow mass downwards. This statement will be added in the revised manuscript.

RC 5. The analysis of time-series for the basin based on only 10-years of data should be discussed with more reserve.

AR: This comment is made by almost all the referees. We will discuss this issue with more precaution and results based on this time-series analysis will be stated as an assumption, as suggested.

Overall, the referee comments really helped us to improve the scientific quality of the manuscript.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 2821, 2011.