Hydrology and
Earth System
Sciences

Discussions

Interactive comment on "Climate change and runoff contribution by hydrological zones of cryosphere catchment of Indus River, Pakistan" *by* Kashif Jamal et al.

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We would like to thank Refree#1 for his thoughtful and constructive comments about our manuscript. We would like to give our response in four steps.

1- I do believe that SRM model use air temperature to estimate melt, they do not account for the influence of topographic shading, slope or aspect on melt rate. 2- As you mentioned that this kind of model can me only used in Hindukush region. This study area is in Hindukush and Karakorum region (missing in the manuscript) with limited data available. 3- We applied this simple model because of limited data available. The annual precipitation is around 375mm without considering any losses and the annual

streamflow is around 700mm within the study area. How we can apply a complex model even observed data does not represent the true hydrology in this region. 4- On the basis of some previous studies we selected this model. The studies stated that comparisons of temperature index models with full energy balance models found the performance of simple model is far better that energy based complex model when accurate meteorological information is not available (Réveillet et al. 2018; Magnusson et al. 2015).

Réveillet M, Six D, Vincent C, Rabatel A, Dumont M, Lafaysse M, Morin S, Vionnet V, Litt M (2018) Relative performance of empirical and physical models in assessing the seasonal and annual glacier surface mass balance of Saint-Sorlin Glacier (French Alps). Cryosphere 12:1367–1386. https://doi.org/10.5194/tc-12-1367- 2018. Magnusson J,Wever N, Essery R, Helbig N, Winstral A, Jonas T (2015) Evaluating snow models with varying process representations for hydrological applications. Water Resour Res 51(4):2707–2723. https://doi.org/10.1002/2014WR016498