

***Interactive comment on* “Estimation of future glaciation and runoff in the Tanimas basin, Eastern Pamirs” by W. Hagg et al.**

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We fully support the statement of the referee that reliable estimates of the water balance terms are essential and we hope that we can provide more evidence by the following.

Glacier mass balance: the value of 1.1 m/yr is reasonable, this is at least indicated by the few information sources mentioned. We agree that “moderate” is a bit misleading. We meant “moderate” in the sense of “not extreme”, the value is well within the range reported for the European Alps during the same period (between -0.3 m/yr for Kesselwandferner and -1.6 m/yr for Sarennes, WGMS 1993). Maybe “average” would be more appropriate than “moderate”.

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The basin precipitation of approx. 300 mm is determined by the station data, by the correction factors for rain and snow and by a vertical lapse rate of 5.7%/100m, which was found by calibration. An annual value of 600 mm (generated by higher correction factors and/or lapse rate) would result in much higher snow accumulation and thus in unrealistic glacier mass balances.

Evapotranspiration (ET): the original HBV version by Bergström (1976) was developed for vegetated areas, but the HBV-ETH version (Renner und Braun 1990) was also used in vegetation-free head watersheds (e.g. Braun et al. 2000), where only evaporation occurs. The referee is completely right to doubt the value for ET on non-glaciated parts of the catchment in regard to the low precipitation sums, but the soil moisture routine works on a lumped basis, not distinguishing between glaciated and non-glaciated parts. This means that also evaporation on melting ice surfaces is considered here, which explains the (relatively!) high values in the dry catchment.

Model calibration

Although questions of parameter uncertainty are definitely important and a major issue for conceptual modeling, they are beyond the scope of this contribution. It is not our aim to test the sensitivity and error ranges of the model. The presented approach is of pragmatic and applied nature, this is why the results of only one parameter set found by manual calibration are presented. There is only one true physical parameter set and we tried to get as close to it as possible by carefully constraining the value ranges of parameters according to our experience in the region. We want to understand the hydrological processes involved and are convinced that we do this best by a stepwise manual calibration, which results in one parameter set.

References

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