Dear Juraj Parajka,

we would like to thank you for the positive feedback and the useful comments.

Please find below our replies as inserted blue text.

Kind regards,

Nena Griessinger, Jan Seibert, Jan Magnusson and Tobias Jonas

General comments

The study evaluates the value of external snow distributed input into a conceptual hydrologic model in alpine basins. Three different settings are compared for 20 basins in Switzerland. The results show that assimilation of snow improves the runoff model efficiency in basins with mean basin elevation above 2000 m a.s.l.

This is a nice compact study, I enjoyed reading it. The manuscript is clearly written, has a good structure and it is within the scope of the journal.

I have only a few minor comments which might be considered for revision. These include:

1) Introduction: I believe, there are some more relevant studies looking on the benefits of additional snow data in hydrologic model calibration or modelling. Please consider to extend the introduction section accordingly. (please see e.g. Udnaes et al.,2007, Parajka et al. 2007, 2008, or review in Parajka and Blöschl, 2012)

Thank you for the suggested literature which we will include.

2) Objectives: Is it the sensitivity (or runoff model efficiency) of conceptual hydrologic model to snow inputs, which is the main objective?

We will adapt the manuscript to clarify our objective, how different methods for simulating the snow cover influence runoff predictions.

3) P.3, l.9-10: "daily average values for the entire study"? Please clarify.

Thank you, we will clarify the description.

4) Results: It seems that the way DDF is estimated does affect the performance. Please consider to provide/discuss more detailed information about the sinusoidal function and snow density model used. Does it change with the elevation of the basins?

Thank you; DDF does not change with the elevation of the basins. To clarify the text which obviously raised questions, we will edit this section.

5) Model efficiency: I would suggest to consider extending results and showing also runoff model efficiency (NSE) for the entire calibration/validation periods (not only the selected snowmelt seasons). This might serve as a baseline for comparison with other studies, as well as to allow to evaluate the value of improved snowmelt for

the following seasons (e.g. are the soil moisture states/and hence runoff generation different for the three variants?).

The main objective of this study is to assess how different methods for simulating the snow cover influences runoff predictions. Therefore, we focus on a period spanning 60 days that is strongly affected by snowmelt. We agree that improved modeling of snowmelt might also affect runoff model performances later in the year. An analysis of the leave-one-out experiment for a snowmelt period of 120 days (see below Figure 1 and Figure 2) gave similar results as those shown in our study. The performances are generally lower than within the studied 60 days of snowmelt. We will point out and discuss this finding in the revised version.

6) Figure 2: Please consider to decrease the legend and increase the size of the maps.

Thank you, we will adapt the mentioned figure.

7) Table 1. Please give names to basins.

Thank you, we will adapt the mentioned table.

References:

Udnaes, H. Ch., Alfnes, E., and Andreassen, L. M. (2007). Improving runoff modeling using satellite-derived snow cover area? Nordic Hydrology, 38(1), 21-32

Parajka , J.,Merz, R. and Blöschl, G. (2007) Uncertainty and multiple objective calibration in regional water balance modelling: case study in 320 Austrian catchments. Hydrological Processes, 21 (4), 435-446.

Parajka, J. and Blöschl, G. (2008). The value of MODIS snow cover data in validating and calibrating conceptual hydrologic models. Journal of Hydrology, 358, 240–258.

Parajka, J. and G. Blöschl (2012) MODIS-based Snow Cover Products, Validation, and Hydrologic Applications, In: Eds (Ni-Bin Chang) Multiscale Hydrologic Remote Sensing: Perspectives and Applications, Chapter 9, CRC Press, 550 pp..

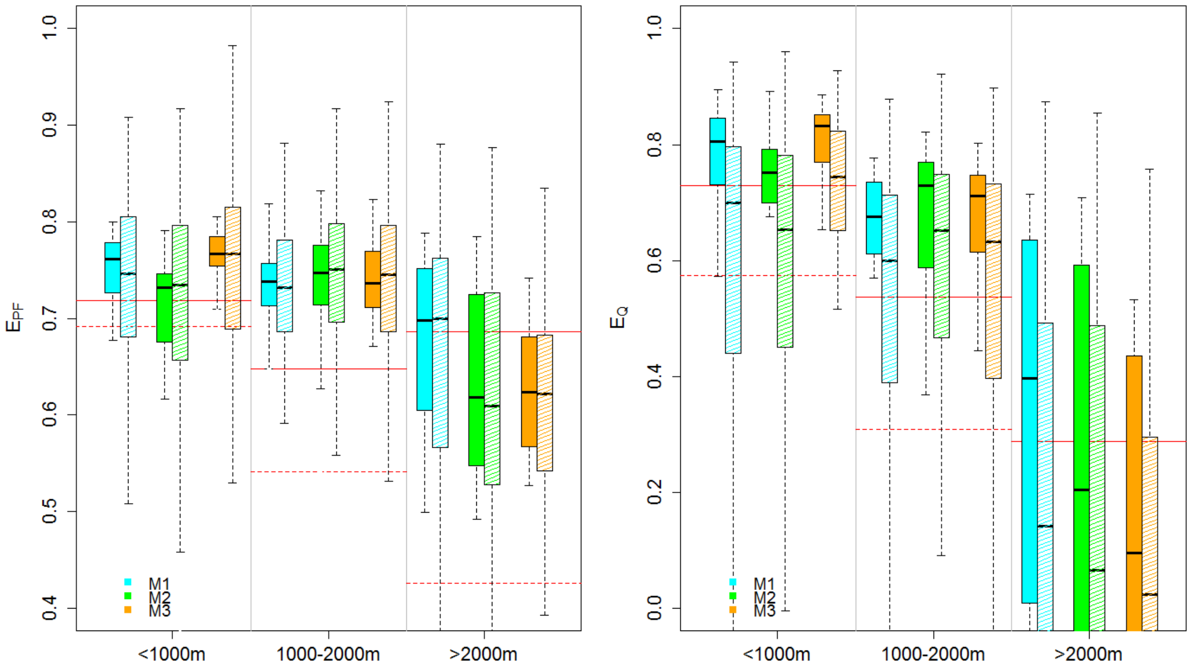

Figure 1: Results of the leave-one-out approach calculated for 120 days of melt. E_{PF} (left panel) and E_Q (right panel) for each elevation class and snowmelt model. For the individual elevation classes and melt models, the left box plots (darker colors) show the results for the calibration period, and the right box plots (lighter colors) show the results for the validation period. The whisker boxes represent the median (center line), the interquartile range (25-75th percentile; box outline) and highest/lowest performance within the interquartile range +/- 1.5 times of the interquartile range (whiskers). The benchmark performance is denoted by a solid red line (upper benchmark) and a dashed red line (lower benchmark), and the latter only displayed if within the range of the axis limits.

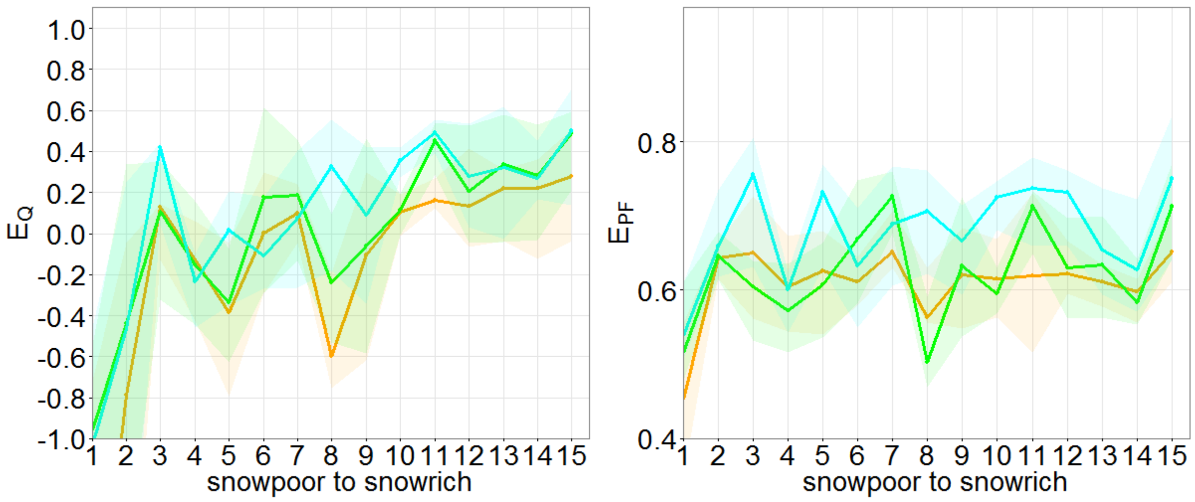

Figure 2: Results of the leave-one-out approach calculated for 120 days of melt for catchments with mean elevation above 2000 m.a.s.l. Median (solid lines) and interquartile (25-75th percentile, shading) range of E_{PF} (left panel) and E_Q (right panel) for validation years ordered from snow-poor (index=1) to snow-rich (index=15) years.