

Interactive comment on “Assessing the benefit of snow data assimilation for runoff modelling in alpine catchments” by Nena Griessinger et al.

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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

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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)

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

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

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?

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?).

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

7) Table 1. Please give names to basins.

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.

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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..

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