Hydrology and
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Discussions

Interactive comment on "Modelling of snow processes in catchment hydrology by means of downscaled WRF meteorological data fields" *by* K. Förster et al.

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We wish to thank the two referees and Ryan Webb for their helpful comments on our manuscript. Their main criticism pertains to our application of observed precipitation time series instead of using downscaled precipitation fields for snowmelt simulations at both scales. It is argued that this change in methodology contradicts the general scope of the study, and title, abstract and introduction in particular. We believe the posted comments will be very helpful in the process of improving the manuscript.

First, as suggested by the editor, we would like to explain how we plan to cope with

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Interactive Discussion

Discussion Paper

this issue in order to improve our manuscript. Possibilities are to either retain the simulations that include precipitation, or to focus on a coherent downscaling methodology, which does not involve local observations.

We originally intended to present that meteorological fields, derived using dynamical downscaling, are suitable to drive different snowmelt models at several scales. This holds for all meteorological variables, except for precipitation. Hence, we decided to run the models using observed precipitation time series. This approach enables the evaluation of all other meteorological variables. However, the combined dataset is not in accordance with the downscaling methodology in general.

In order to show the deficiencies of downscaled precipitation, we decided to rerun all snowmelt simulations using simulated meteorological fields only, without any observations. This simulation approach corresponds to the general scope of the study as well as to the title, abstract, and introduction in particular. However, this approach results in significantly lower performance measures, when compared to the current approach, which relies on observed precipitation. These findings especially hold for the rain on snow event in March/April 2006.

In a next step we will discuss the results. This will be done by including the already available performance measures of simulations that rely on observed precipitation. Furthermore, we will adopt the suggestion to incorporate a comparative study, which was recommended by Anonymous Referee #2. We will compare the results of the temperature-index approach applied at the point scale for both input datasets (observed as well as simulated precipitation and temperature). Model performance will be evaluated with respect to melt runoff and snow depth. The latter should give a more comprehensive insight into the model's snowpack evolution, as proposed by Anonymous Referee #1.

Using observed precipitation in combination with downscaled data could be seen as an alternative for regions where e.g. only a few precipitation observations are available

and all other meteorological data are missing. We also tested a combined precipitation product, which relies on simple correction methods preserving spatial precipitation patterns and including observed data.

In a next step we will provide detailed answers for each comment.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 4063, 2014.