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Hydrology and Earth System Sciences Discussions

Interactive comment on "Analysis of feedback effects and atmosphere responses when 2-way coupling a hydrological land surface model with a regional climate model – a case study for the Upper-Danube catchment" *by* F. Zabel and W. Mauser

Anonymous Referee #2

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The paper by Zabel and Mauser present the results of the different way of coupling a Regional Climate Model (RCM) and a land surface hydrological model (LSHM). In particular as the title say it would like to show the feedback effects and the atmosphere responses when the different coupling are used. The paper refers to a previous paper Zabel (2012) and it is really similar to that one. Figure 1 for example is the same in both papers.The information in Figure 2,3 4 and 10 can be also found in the Zabel

(2012). The only differences in the new paper are that they show the effects of the two LSM (NOAH and PROMET) on the temperature and precipitation fields. This is my first concern. Can this justify a complete new paper?

So given that I also have other concerns. In the paper they always show (Figure 3 onward) the differences between the PROMET 2 way-coupled and the NOAH and they attribute the improvements for example of the summer months temperature bias to the coupling. But another important difference is the resolution. PROMET has a 1km resolution and the fluxes are calculated using a topography that has a much higher resolution compare to the 45km of the original. NOAH-LSM works any way at the coarse resolution of 45 km. How can we attribute the improvement to one or the other? Why the results of the off-line PROMET are not included?

Moreover the LSHM are mainly designed to fulfill the requests of the hydrological community, but from this paper we do see an improvement in the annual cycle of temperature and in the diurnal cycle for summer months temperature, but for precipitation the improvements are less clear. The main variable that hydro models need is precipitation, so I would have expected to find in the paper a more in depth discussion of why this is not happening. The authors state in the conclusions the "The impact on precipitation is difficult to diagnose" so how do we gain insight into the hydrological processes simulation?

As minor comments I would suggest the writer to have the paper read by a English mother tongue. There are left German sentence in the paper (caption of Table 1) and all the sentence structure looks very complex.

Zabel, F., Mauser, W., Marke, T., Pfeiffer, A., Zängl, G., and C. Wastl (2012): Intercomparison of two land-surface models applied at different scales and their feedbacks while coupled with a regional climate model, Hydrol. Earth Syst. Sci., 16, 1017–1031, doi:10.5194/hess-16-1017-2012

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