Interactive comment on “High-resolution fully-coupled atmospheric–hydrological modeling: a cross-compartment regional water and energy cycle evaluation” by Benjamin Fersch et al.

Anonymous Referee #2

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Review of ”Fersch et al. - High-resolution fully-coupled atmospheric–hydrological modeling: a cross-compartment regional water and energy cycle evaluation” The authors present a comprehensive effort in setting up, running and validating a WRF-hydro model run and comparing it to a non-hydro WRF setup. I have suggested major revisions and would like to see the following addressed before publication, but I would like to highlight, that with the changes made, the manuscript is indeed worthy of publication. I hope the comments can also be seen as improvements in readability.

Introduction: P2L2-4: The introduction seems to have an abrupt start. Does this first paragraph really have the phrasing to initially frame the story? At least, add “... and
magnitude...” after “spatial distribution”.


General intro: I believe an entire paragraph is missing here where the following is addressed: - What is the key relevance of this paper to the public and/or research domain? Why are you/we doing this? This is important but often overlooked. - What is new compared to previous Fersch/South-German studies as well as other studies? A lot of work is mentioned, but the relevance and new story here is overlooked. Please relate.

P7L8: Radolan reference?

P7L9-10: What is the uncertainty in doing this compared to using observations?

P7L3 to P8L6: I think this sections needs a paragraph that explains the key differences between WRF classic, WRF-H-SA and WRF-H-FC to be able to better understand the reasoning here.

P8L5: This “parameter set” has not yet been explained and confuses. What are these parameters? They belong to the atmospheric realm I believe and are therefore not hydrologic calibration parameters.

P9L2-11: Really hard to link between text and table (1). The schemes/physics as well as references do not match up and several domain levels are refereed to. Please elaborate/correct.

P9L17: “only subsurface and surface overland flow routing is...” -> ok, but then state what is not taken into account in the atmosphere link – the non-WRF-hydro expert does not know this (me included), but would have to guess.

Figure 1: Many site abbreviations, which are not really ‘learned’ when reading the
manuscript. I don’t know if a systemativ naming approach could be thought of.

P10L26-27: “Furthermore…” -> How was this done? Based on what? Which data?


P12L17: Computational resources - should these not be mentioned in the manuscript?

P12L20-P13L1: Why/how did you add the baseflow. I see it was necessary, but please elaborate why/how etc. Also – please link the the “_sh” runs in fig 4 + 5.

Table 3: For Am-PEI “coeff” and “expon” the values are larger than the suggest span in table 2.

Table 3: For the two parameters mentioned above as well as zmax = 1 (3 instances) and retdp ) = 5, the autocalibration seems to have hit a boundary limit, which could imply model deficiencies. Please mention/elaborate or re-run, using more sound limits.

P13L10: First sentence: Not understood. Limited – how?

Table 4-9: I think you should add MAE.

P20L6-13: Isn’t these just the latent heat results again? They look the same. If not, how are they different and why?

P20L6-9: Unclear which scenario is most realistic? Why not just use the best? Better word than scenario?
P22L3-4: Please see my previous comment on table 3 about the resulting parameters. “...often tuned to unrealistic values...”

P22L14-15: Why? Discuss/relate! This is a discussions section.

P26L19: Please write “(NSE)” after Nash Sutcliffe efficiency.

P28L8-9: Why was this the case?

P29L2: “For the validation period” -> has this been addressed previously?

P29L9-10: Why is this a problem (the 1h time steps)? If it corresponds to “SA” mode.


P30L15: I do not like the use of “hopefully”. If you had framed the relevance of the study in the introduction, then this paragraph would be more easily written.

Minor: Abstract: “Nominal” – use better wording?

P12L1: where “the” model. Sounds better to my taste.
