

## ***Interactive comment on “High-Resolution Virtual Catchment Simulations of the Subsurface-Land Surface-Atmosphere System” by Bernd Schalge et al.***

**Anonymous Referee #3**

Received and published: 23 February 2017

This paper discusses the use of the COSMO-CLM LAM together with PARFLOW within the TerrSysMP platform to simulate catchment characteristics as a virtual reality. The study contributes to the idea of providing downscaled model data for assimilation, particularly for those compartments where there are typically no observations available. This dearth of measurements makes this an interesting and important work. Regarding the modelling section, initialization is very important for good representation of land surface atmosphere feedbacks, particularly in a ‘climate’ mode downscaling with no data assimilation. In this regard the authors have considered the land and subsurface parameters carefully, and have run a reasonable spin-up of the simulation for soil moisture, aspects which are often poor or missing in simulations. The approach also

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presupposes that important process are well captured by the model, particularly in a statistical sense for those variables where a downscaling is not expected to reproduce actual distributions, such as precipitation. But the authors take great care to explain these issues, and justify their approach. Consequently I am quite satisfied with this paper, and only have specific comments on structural points. 1. I am missing a short section at the start of the modelling methods where you lay out the complete model chain, all domains on one fig, vertical levels, parameterisations used, simulation duration, and integration time. At the moment it is spread throughout the text, which drifts rather between details on each domain, with elements about CLM and PARFLOW coming in between. This makes it difficult for modellers, particularly those unfamiliar with COSMO, to see what has been done. This is especially confusing because you appear to be running Parflow in an offline mode driven without feedback – is that correct? Perhaps you can make this clearer. You could add a single paragraph for the model chain and simulation at the beginning before then going into detail on each component, without adding too much text. This small repetition will be appreciated by modellers, particularly those who would like to cite the paper purely for justifying their own model configuration – quite common. 2. To me the authors’ use of the term Virtual Reality, sounds almost like it should have a Trademark (TM) after it, and suggests that something completely new is being done by running a catchment simulation – which we know is simply not true. I would suggest at least not mentioning this term as much. You can also use the words ‘downscaling’ and ‘simulation’ too. In summary though, I suggest that this is a well-structured paper and recommend its publication with these minor revisions.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., doi:10.5194/hess-2016-557, 2016.

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