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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Comparing TRMM 3B42, CFSR and ground-based rainfall estimates as input for hydrological models, in data scarce regions: the Upper Blue Nile Basin, Ethiopia" *by* A. W. Worqlul et al.

Anonymous Referee #1

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The paper "Comparing TRMM 3B42, CFSR and ground-based rainfall estimates as input for hydrological models, in data scarce regions: the Upper Blue Nile Basin, Ethiopia" evaluate the suitability of satellite-based rainfall products: TRMM and CFSR for hydrologic modeling propose. The objective of this study is clear, the structure of the paper is easy to follow and most figures and tables are appropriated express what authors want to demonstrate. However, I have two major concerns about this study.

First, my biggest concern of this study is although the objective of the paper itself is

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clear, I failed to understand the methodology authors presented: using a modeling approach to test the suitability. Obviously in this case study, a simple data analysis (as authors did in Figure 4) already demonstrates that TRMM is not a good input data for hydrologic models. The long-term climatology showed that TRMM has different monthly pattern and different annual volume in precipitation than observation, and one do not need to run the model to know that TRMM is not suitable. For other case study area this might be different, then I would suggest authors change their study area.

Second, even in the area that TRMM and CFSR has similar long-term climatology and a model is needed to test their suitability, the calibration process authors presented is not well designed. Bad model preferences can be related to several different reasons not only just bad input data. In this paper, authors calibrated their model separately with different satellite-based rainfall products; therefore, their results are a mix of input uncertainty and (calibrated) parameter uncertainty. For the area that TRMM and CFSR has similar long-term climatology (again, not the case here), the method used in the paper will not be able to tell us whether the bad model preferences is due to input data or calibration bias. In my opinion, authors should design their experiment in the following steps: 1) choose physically-based models; 2) calibrate model only used observation data and 3) validate model preferences with satellite-based rainfall products. In this way, both model structure uncertainty and parameter uncertainty are controlled so the different results are for sure coming from input data uncertainty.

I cannot recommend to accept this paper because of these concerns. I also have some specific comments below.

Abstract p2083 Line 22: Why is it a surprise that ground based data performed better than satellite-based products? Ground based data should be considered as truth data that satellite-based products try to calibrate to.

Model calibration and validation p2089 Line 25: What do you mean by calibrated manually? Do you mean trial and error? There are a lot of powerful calibration methods

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(like genetic algorithm as a widely used one) quickly available for any programming language (VB, Matlab, R). Why don't you use these methods?

Results and discussion p2091 Line 4 – Line 6: Corresponding to my first general comment. By this analysis, you already know modeling results from CFSR will be better than TRMM because you can overcalibrate your model when your input has too much water (like CFSR) but overcalibration will not generate water (like TRMM).

Results and discussion p2094 Line 7 – Line 8: This is exactly an example of parameter uncertainty. "Fraction of hillside area" in Table 2 and FC and PERC in Table 3 shows that different parameters pair can result in similar model preference. Therefore, you won't be able to quantify the true effect of input rainfall theoretically.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 2081, 2015.