Hydrology and Earth System Sciences Discussions

Interactive comment on "Assessment of high-resolution satellite rainfall for streamflow simulation in medium watersheds of the East African highlands" *by* M. M. Bitew and M. Gebremichael

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Anonymous Referee #2 The paper evaluates the performance of high resolution satellite rainfall products for stream flow simulation at two different scale watersheds. Generally the paper attempts to describe interesting and relevant topic. However, the manuscript needs a considerable revision before publication.

Thank you for your useful comments.

Specific comments 1. Comments on the title of the paper: ": : :high resolution satellite rainfall: : :" it is good if you replace it with ": : :high resolution satellite rainfall products" In the title I don't think it is wise to use the word " east African highlands"

We have modified the title to read: "Assessment of Satellite Rainfall Products for Streamflow Simulation in Medium Watersheds of the Ethiopian Highlands: Effect of Product Type and Watershed Size"

2. Page 8215 line 3, ": : :no any weather radar: : :" is not clear. Is that data?

We have modified the sentence to read: "The region has no any ground-based radar for rainfall measurement, the rain gauge network is very sparse, and countries in the downstream of transboundary river basins have no access to the existing upstream rain gauge information."

3. Page 8216 line 9, ": : :there is no quantitative information on the estimation errors associated with the operational satellite rainfall products." It is not a good idea to conclude without reviewing enough research papers that have been done in the area. It seems you haven't seen at least the following articles: Dinku, T., Chidzambwa, S., Ceccato, P., Connor, S. J. and Ropelewski, C. F. (2008) 'Validation of high-resolution satellite rainfall products over complex terrain', International Journal of remote Sensing, 29:14, 4097- 4110. Dinku, T., Ceccato, P., Grover-Kopec, E., Lemma, M., Connor, S. J. and Ropelewski, C. F.(2007)'Validation of satellite rainfall products over East Africa's complex topography', International Journal of Remote Sensing,28:7,1503-1526

We have added the two references.

4. Page 8216 line 18-20, your justification for using SWAT is not robust

We have added the following sentence: "SWAT was also successfully used to model Ethiopian Highland watersheds in previous studies (e.g., Easton et al. 2010)."

5. Page 8217 line 21, you mentioned ": : :30-m USGS NED: : :". Is the 30m USGS NED available for areas outside US? If yes, you should support it with reference. Basically

the accuracy of NED is dependent on the source DEM used to develop the NED. So you have to mention which source DEM you used. It is also good if you can give us reference to all datasets you used.

We have modified the sentence to read: "We obtained the following SWAT inputs: elevation data from the 30-m USGS NED digital elevation model dataset (http://hydrosheds.cr.usgs.gov), soil texture data from the FAO Soil and terrain data map of East Africa (SEA) dataset, land use data from the Ethiopian Woody Biomass Inventory Strategic Planning Project, meteorological data from the nearby meteorological stations of the National Meteorological Agency of Ethiopia, and rainfall data from satellite rainfall estimates and rain gauge measurements."

6. Page 8223 line 10-12, "Depending on the main input, satellite rainfall algorithms can be grouped into two categories: those that use primarily microwave data (e.g., CMORPH, 3B42RT) and those that use primarily infrared data (e.g., PERSIANN)." This is redundant information because you have already mentioned the idea in P 8215 line 9, 10, and 11.

In the first case, we are classifying the products according to the primary source of data. In the second case, we are giving an overview of the source of data for high-resolution rainfall products. The classification is really important in this paper, as we are trying to compare and contrast the results according to their algorithm and watershed areas.

7. Page 8223 line13 "fare better". Do you mean "far better"

'fare better' is correct.

8. Page 8224 line 4-14. I feel a little an easy when you finally come to conclude about the performance of satellite stream flow simulation and effect of watershed size. Because you compared only two watersheds. You haven't given us enough scientific ground to conclude so. The idea of effect of watershed size is not there initially in your

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objective but finally comes as a surprise.

We have now added the effect of the watershed area both in the objectives and the title.

The title is now modified to read: "Assessment of Satellite Rainfall Products for Streamflow Simulation in Medium Watersheds of the Ethiopian Highlands: Effect of Product Type and Watershed Size".

The objective is now modified to read: "The purpose of this study is to assess the capability and limitation of satellite rainfall products as input into a hydrological model for streamflow simulation in a mountainous and medium-size watershed in Ethiopia, for four different satellite rainfall products and two different watershed sizes. " The conclusion actually mentions the range of the watershed area for which our results are valid, so our conclusion is technically correct. Section 3.3 discusses in further detail the results and the explanations for the results.