

***Interactive comment on* “Evaluation of satellite rainfall estimates over Ethiopian river basins” by T. G. Romilly and M. Gebremichael**

Anonymous Referee #2

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This manuscript evaluates the performance of three acknowledged by the community satellite-based precipitation products in the area of complex terrain in Ethiopia. The performance is evaluated via a comparison of the satellite-based rainfall estimates (SRE) with rain gauge ground observations.

The study concentrates on six areas in Ethiopia where the large part is mountainous. That is an important aspect for SRE validation since rainfall in the mountainous regions is difficult to observe and little ground observations are produced.

This manuscript contains a good overview of the previous SRE performance evaluations and gives a clear picture of the Ethiopian regional landscape properties. A number of relevant previous works is mentioned. The manuscript is written in a clear

and an easy to understand manner.

The major problem of the manuscript is that there are very little interpretations for the obtained results, and that significantly reduces manuscript's value since as in this manuscript as it is there are very few new obvious findings comparing to the previous studies.

The major difference of this article from the previous study by Hirpa et al (2009) is in the enlarged study area (six river basins against one) but without findings interpretations the value of this manuscript is rather low.

Specific comments:

It is found by the authors that SRE performance decreases with the elevation and these findings are consistent with the previous studies. However it is not clear what is the value of these findings, since authors present their results in the numerical form but do not try to interpret them. Also very similar studies have been performed recently (see Hirpa et al. 2009*) and authors could try to employ those earlier findings to explain their results.

In the current manuscript a larger area of 6 river basins is analyzed and so the differences in SRE's performance in the northwestern and southeastern parts of the country are. However the manuscript lacks an explanation for this differences. It looks to me like PERSIANN comparing to CMORPH and TMPA produces lower rainfall volume for all areas, thus the reason for the smaller bias in the northwest where the TMPA and CMORPH overestimate rainfall volume significantly. This difference needs to be explained.

The nature of the rainfall during Kiremt and Belg season is essentially the same, it is mostly a convective rainfall but with different spatial distribution. It is not clear whether these two different precipitation seasons contribute to the differences in SREs performance or not.

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A good agreement of CMORPH and TMPA can be at least partially connected to the fact that MW precipitation estimates they both use come from the same data and partially the same retrieval algorithm since CMORPH utilizes GPROF precipitation estimates for TMI sensor (see Joyce et al, 2004). That is not mentioned.

Authors acknowledge the uncertainty in the rain gauge measurements. Is it possible to quantify? That might give a clue how much the performance of the satellite-based precipitation products is affected by this uncertainty, that is not clear at the moment.

Technical comments:

Introduction chapter does not include content description of the following chapters. Such description helps the reader a lot to orient in the article, consider adding it to the end of the introduction.

p. 7671/26: CCS acronym (in PERSIANN-CCS) is not explained p. 7672/10. Consider mentioning Table 1 with datasets comparisons apart from the study aim p. 7677/11: Since Goddard Profiling Algorithm is mentioned provide a direct reference to the algorithm description p. 7677/12: IR data was calibrated to the TMI measurements, that is not mentioned p. 7680/17, 18: bias term is used inconsistently, it's bias ratio throughout the chapter p. 7692/fig.4 : The values show "bias ratio", the caption and legend say "bias" only

* Article of Hirpa et al (2009) was actually published in 2010, see here: <http://journals.ametsoc.org/doi/full/10.1175/2009JAMC2298.1> The reference in the manuscript shall be changed.

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