

# ***Interactive comment on “Comparison and validation of eight satellite rainfall products over the rugged topography of Tekeze-Atbara Basin at different spatial and temporal scales” by Tesfay G. Gebremicael et al.***

## **Anonymous Referee #1**

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Authors conducted a comprehensive evaluation of eight remote sensing rainfall products over T-A basin. It is an important step before applying remote sensing rainfall in hydrologic and/or agricultural application. However, the quality of this manuscript should be further improved to meet the criteria of HESS. My main concerns are listed as:

1) The independent of gauged rainfall to satellite rainfall. As we know, authors are also mentioned that satellite products like TRMM are calibrated by gauged rainfall at monthly scale. Therefore, authors are required to identify whether the 34 stations

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were used by satellite rainfall products or not. If used, what kind of impact should be anticipated?

2) Some similar and new references are missed. Recently, several papers discussed the topography impacts on the satellite rainfall in mountainous regions, such as Tibet (Xu, 2017) and Mekong(He, 2017; Wang 2017), as:

–Xu R., F. Tian, L. Yang, H. Hu, H. Lu, and A. Hou (2017), Ground validation of GPM IMERG and TRMM 3B42V7 rainfall products over southern Tibetan Plateau based on a high-density rain gauge network, *J. Geophys. Res. Atmos.*, 122, doi:10.1002/2016JD025418.

–He, Zhihua, Long Yang, Fuqiang Tian, Guangheng Ni, Aizhong Hou, Hui Lu. Inter-comparisons of Rainfall Estimates from TRMM and GPM Multisatellite Products over the Upper Mekong River Basin. *JOURNAL OF HYDROMETEOROLOGY*, 18:413-430.

–He, Zhihua, Hongchang Hu, Fuqiang Tian, Guangheng Ni and Qingfang Hu. Correcting the TRMM rainfall product for hydrological modelling in sparsely-gauged mountainous basins. *Hydrological Sciences Journal*, 2017 VOL. 62, NO. 2, 306–318.

–Wang, Wei, Hui Lu, Tianjie Zhao, Lingmei Jiang, Jianchen Shi, Evaluation and Comparison of Latest GPM and TRMM Products over Mekong River Basin, *IEEE JOURNAL OF SELECTED TOPICS IN APPLIED EARTH OBSERVATIONS AND REMOTE SENSING*, 10(6), 2540-2549, DOI:10.1109/JSTARS.2017.2672786, 2017

3) GPM is not used in this study, but it should be introduced in the introduction part, as it is the state-of-art satellite rainfall product.

4) Information of eight products. It is recommended to include more details information of these eight products, since it would help to explain the different performances of them.

5) In evaluation statistics: it is recommended to use relative RMSE, and please use RRMSE to evaluate the performance of the eight products. A Taylor diagram may be a

good choice for comprehensive evaluation.

6) P11, L12-14, if authors want to compare the performance in wet months with that in dry months, please show the PBIAS, RRMSE, R of different period. Then, we can quantitatively evaluate the performance.

7) More discussion about why chirps outperforms others is needed! Why CMAP and GPCP are worst? Related to resolution?

Minor comments 8) P6, L9-11, please confirm which version of TRMM is used. If it is 3B42V7, it is not necessary to introduce 3B43 here.

9) P6, L11-19, it is better to change the order of these two paragraphs

10) P6, L17-18, please define the abbreviation of PM, IR, METEOSAT

11) P11, L31, similar findings from Xu et al (2017) in Tibet.

–Xu R., F. Tian, L. Yang, H. Hu, H. Lu, and A. Hou (2017), Ground validation of GPM IMERG and TRMM 3B42V7 rainfall products over southern Tibetan Plateau based on a high-density rain gauge network, *J. Geophys. Res. Atmos.*, 122, doi:10.1002/2016JD025418.

12) P13, L24, remove “of the rain”

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Interactive comment on *Hydrol. Earth Syst. Sci. Discuss.*, <https://doi.org/10.5194/hess-2017-504>, 2017.

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