

Interactive comment on “Bias Correction of Satellite-Based Rainfall Estimates for Modeling Flash Floods in Semi-Arid regions: Application to Karpuz River, Turkey” by Mohamed Saber and Koray K. Yilmaz

Anonymous Referee #1

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GENERAL COMMENTS

This study investigates the utility of gauge-corrected satellite-based rainfall estimates in simulating flash floods at Karpuz River - a semi-arid basin in Turkey. Global Satellite Mapping of Precipitation (GSMaP) product was evaluated with the rain gauge network at monthly and daily time-scales considering various time periods and rainfall rate thresholds. Literature lacks of studies using satellite rainfall estimates for flash flood modelling therefore the paper is relevant and of interest for the readers of the journal. Despite this, I think the paper contains serious shortcomings and its presen-

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tation is very poor. The main drawback is the analysis of the rainfall which is carried out on a monthly basis while flash flood occurrence time scale is often sub-daily and even sub-hourly (in this respect the authors claim in the abstract that the analysis has been carried out at daily time steps but no daily results can be found in the paper). An analysis at hourly and daily rainfall would be more appropriate for the study. The interpolation of rain gauges on the GSMaP grid seems wrong (I see many artefacts in Figures 15 and 22). An adequate discussion of the potential error of the interpolation (5 stations for obtaining rainfall at $0.1^{\circ} \times 0.1^{\circ}$ degree on 2×1.5 degree area) should be present in the manuscript.

The presentation of the paper lacks of an appropriate organization: 1. Intro section rationale should be:

- A. Flash flood problems.
- B. Use of gauge rainfall network problematic because there are too little number of stations
- C. Possible alternative use of satellite data, problem with bias with satellite data,
- D. Bias correction improves the hydrological model.

In the way it is presented it is difficult to follow.

2. Datasets description is totally missing (GSMaP is not described at all) and study area is described twice in section 2 and in section 4.1. after the result section. In section 4.1. no further information is given about the catchment characteristics neither about the discharge time series, event selection and so on. Here, only additional info about the flash flood problem are given (material that fits more for the introduction section).

3. The number of figures is enormous and redundant. Tables often contain the same information of the figures. 4. Performance scores are inadequate. NSE is used in rainfall assessment and not in flood assessment. I think it would be interesting to

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use categorical performance scores (Probability of detection and False alarm ratio) for rainfall assessment and RMSE and use NSE in the flood part.

Based on that, I suggest the paper to be not acceptable and suggest to resubmit after being improved.

I also have other comments that I will list below in order of appearance in the manuscript indicating also their relevance. The authors could take them into account for improving the manuscript.

MODERATE: Pag. 3 lines 17-22 – Pag 4 lines 1-8. This part should be moved at the beginning of the manuscript.

MODERATE: Pag. 2 lines 19-20. It seems the sentence is not a consequence of what is written before. Consider moving after describing potential problems of bias in satellite rainfall estimates.

MINOR: Figure 1. Merge this figure with Figure 16.

MAJOR: Pag. 4 lines 21-22. Why do you assess rainfall at monthly time scale then?

MAJOR. Pag 6 line 1- GMap. Is not described in the text. Its description is relevant for the paper.

MODERATE: Section 3. Explain better the difference between the PBIAS and BIAS and what information they should give one with respect to the other.

MODERATE: Pag. 8 lines 17-20. Not clear.

MINOR: figure 10 contains the same information of table 3. Consider removing.

MAJOR. Section 3.1. point vs. grid comparison. Is not described in the methodology. What is the objective of this analysis?

MODERATE. Pag 16 line 1-10. Please try to describe better this part. It seems very important for the paper.

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MAJOR. Figure 15(a) distribution of rainfall is very strange. Please check.

MAJOR. Remove this section and merge with section 2.

MAJOR. Pag 21 lines 13-14. "various remotely ... model". Which are the other remotely sensed datasets used in the study?

MODERATE. Table 7. $R=0.6$ would probably mean $NSE < 0.5$. For flash flood analysis this is not a good performance score. Please discuss and add NSE in the tables.

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