Response to Reviewer #2 Comments

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We are very grateful to the reviewer's for his deep and thorough review of our manuscript, we also thank him for the effort and time put into the review of the manuscript. We revised our present research in the light of their useful remarques; the comment has been carefully considered and responded. Hope our revision has improved to a level of their satisfaction, and our manuscript will be accepted in this new form.

Comment 1: it is not clear to me the final aim of the paper and I don't agree with the general conclusion drawn in the lines 428-433. For which applications a such analysis could be useful? Gauged-corrected satellite precipitation products, such as the ones used in the study, have a latency of several months and cannot be used for flood or precipitation forecasting as stated by the authors (see Lines 88-90 or 91-92, respectively). For the specific case study (small poorly gauged basin) it would be more meaningful to test the capability of near-real time satellite precipitation products in reproducing rainfall and streamflow time series at hourly time step.

Response: The reviewer brings up an important point that concerns the interest of this study to potential readers, indeed your comment has been taken into account, thus a time step of 3H has been added to the analysis and used for the modeling of precipitation events.

This comment highlights an important logic of this study, this point is discussed in Line 87, Line 97: The study evaluated statistically and hydrologically the precipitation estimates of the GPM TRMM (3B42 V7) and (IMERG V5) satellites in relation to ground-based precipitation observations over the semi-arid Zat mountain catchment located in the Moroccan High Atlas, The aim of this research is to solve a major problem due to the irreparability of the precipitation measurement stations, which results in a large data deficiency, thus leading to difficulties in working on such scientific aspects as flood forecasting and water management. The objectives are (1) to evaluate and statistically compare the performance of IMERG V5 and 3B42 V7 precipitation products at multiple temporal scales in the Zat basin, (2) to analyze the precipitation detection capability of the 3B42 V7 and IMERG V5 satellite sensors, and (3) to evaluate the ability of the PPSs to reproduce small rainfall events and demonstrate their ability to provide meaningful information in hydrological modeling and flood forecasting.

Comment 2: If I well understood from lines 153-155, the comparison in terms of rainfall was made by comparing the in situ data against the data extracted from the pixel covering the in situ station. If so, how are the authors considering the different spatial resolution of TRMM 3B42 and IMERG V5? Moreover, how the satellite precipitation data are extracted for the flood simulation?

Response: Thank you for your remark; Line 151, Line 155: only explains the comparison methods used in the bibliography of this kind of approach. In our case, we used a direct comparison of the numerical data downloaded from NASA website (https://pmm.nasa.gov/data-access/downloads/trmm) with the in-situ data.

Comment 3: It is not specified which IMERG product (Early, Late or Final run) is used in the analysis

Response: We appreciate your comment, in this study we used IMERGV5 Final run recommended for general use.

Comment 4: some Figures and Tables, e.g. Figure 3 and 4 or Figure 6 and Table 5, represent the same information. Please, remove one of them in the revised version of the manuscript.

Response: As you recommended; all figures have been removed, Tables 2 and 3 illustrate all information related to the statistical analysis.

Table 2. Statistical metrics results of 3B42 V7 and IMERG V5 precipitation estimates at multiple time scales from 2012 to 2017.

	TRMM				GPM			
	3 Hours	Daily	Monthly	Yearly	3 Hours	Daily	Monthly	Yearly
CC	0,12	0,36	0,77	0,95	0,38	0,55	0,8	0,86
RMSE	1,5	1,03	2,18	16,75	1,48	1,24	3,01	22,41
Bais	0,21	0,26	0,33	0,22	0,38	1,22	1,46	1,49

Table 3. Contingency statistical metrics results of 3B42 V7 and IMERG V5 precipitation estimates at multiple time scales from 2012 to 2017.

	TRMM				GPM			
	3 Hours	Daily	Monthly	Yearly	3 Hours	Daily	Monthly	Yearly
POD	0,13	0,35	0,92	1	0,36	0,76	1	1
FAR	0,67	0,65	0,07	0	0,79	0,79	0,08	0
CSI	0,1	0,21	0,86	1	0,15	0,18	0,91	1
FBI	0,4	1,01	1	1	1,82	3,82	1,09	1

Comment 5: it is not clear to me how the authors construct Figure 5. If I well understood, Figure 5 illustrates the results of Table 4. How the authors built the boxplots?

Response: Indeed, we are absolutely agree with this comment, we have only one value of the coefficient of correlation for each time step. Although, the boxplot was elaborated by taking into account the coefficient correlation of the satellite precipitation data, it would not be a valid approach to apply because it does not make sense and was deleted.

Comment 6: some indexes (e.g., Nash-Sutcliffe) are not defined in the text.

Response: We thank you for this comment, this detail has been taken into consideration.

Comment 7: Figures 7-9 should be improved as they are hard to read.

Response: As recommended, all figures have been changed and their quality has been increased.