Hydrology and Earth System Sciences Discussions

Hydrol. Earth Syst. Sci. Discuss., referee comment RC1
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Comment on hess-2021-243

Anonymous Referee #1

Referee comment on "Multiscale assessment of TRMM (3B42 V7) and GPM (IMERG V5) satellite precipitation products over a Mediterranean mountainous watershed with sparse rain gauges in the Moroccan High Atlas (case study of Zat basin)" by Myriam Benkirane et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2021-243-RC1, 2021

General comments:

The authors present a test of flood modeling for the Zat basin in Morocco. They used the contingency table to evaluated the two satellite products (TRMM (3B42 V7) and GPM (IMERG V5) and then they used the two products to reproduce the observed discharge using the SCS-CN model at a daily time scale. I find the paper is easy to follow and well written. However, I find that the paper lacks a correct methodology in flood modeling and I do not see the novelty in this paper or the problematic issue detailed in the introduction. I suggest the rejection of the paper. If a revised paper is resubmitted, it needs to be reconsidered and re-reviewed.

Several major concerns need to be addressed before they can be considered. To list a few (more details can be found in the specific comment section below):

- I found a mismatch in the GPM IMERG V5 satellite data. This version starts in 2014 until now. How did you work on the 2010-2014 period? Whereas the product only covers the period 2014-2017 of your data series.

- The authors did not justify the choice of precipitation products, why TRMM and GPM? Are these products never used in flood modeling in Morocco?

- I do not see a detailed introduction that points the problem issue that the paper can solve

- The daily time step is not recommended for small basins (majority of Mediterranean basins) (<1000km²) where the response time is very small (Borga et al., 2008). How can this time step help in flood forecasting?

- The statistical evaluation of precipitation products is an essential step before their use. The threshold you used at the daily time scale is correct (0.5mm) but you cannot use it at the monthly and yearly time step. Because it will always be detected by satellite products. You have to use one threshold for each time step.

- Figure 5: How did you get the boxplot? You only have one coefficient correlation value for each time step.

- I do not understand how you chose the event that represents a season? Does the magnitude of the floods change from season to season? Can you clarify more this point with references

- The calibration of flood events requires a validation step, otherwise, how can we justify that the product can be used in flood forecasting? You need to add a validation step.

- Figures 7, 8, 9, and 10 are just screenshots of the HEC-HMS platform please provide clear figures.

Specific comments:

Introduction:

- Line 66: JXAX or JAXA?

- Line 80: is there no paper published in the same study area (High Atlas of Morocco)?

- Line 85: "Observations" or observation. In the observed data section, you showed only one rain gauge.

- Line 88: "Analyze the precipitation detection ability of 3B42 V7 and IMERG V5 satellite

sensors” Please keep the same order of your products as in line 87

Study Area and datasets:

- Line 95 and Figure 1: Please locate the Tensift basin and the highest mountain of Toubkal. Is it in the same basin?

- Line 97: ‘’Is located’’ instead of ‘’is found’’

- Line 100: ‘’Upstream” instead of “Downstream”

- Line 104: Average Range? Please provide one average value of rainfall.

- Line 106: Add a reference.

- Line 113: ‘’These stations”. You are working with one rain gauge please be clear in the data selection.

- Line 119: You don’t need to convert UTC to summertime (UTC+1) it is not the case for Morocco.

- Line 121: The GPM product started in March 2014. How did you evaluate the product between September 2010 and February 2014?

- Line 121: (Table 1) please keep the same order of products

- Line 122 and Line 131: Please keep the same order of products

- Line 126: Hou et al., 2014 reference is about the GPM product, not the TRMM

- Line 144: The website is for TRMM, not GPM

Methodologies:

- Line 150: What do you mean by: “increasing the point precipitation data”?

- Line 151: The TRMM product has only one pixel over the basin. How it is representative to compare one pixel to 6 pixels for GPM. Also, you need to mention the number of pixels for each product over the study basin.

- Line 152: The interpolation method can be only used for the GPM product, not for the Rain gauges

- Line 156: replace “reproduce” with “estimate”

- Line 157: “the rainfall measurements stations”. Please, be precise: you use only one gauge station.

- Line 164: What observations?

- Line 168: Delete “Including”

- Line 170: The Pearson Correlation Coefficient is not the same as the correlation coefficient in line 168?

- Table 2: Bias is in mm. You divided by the time length and the Ratio is not a unit.

- Line 199: how did you select the events that represent each season? Please clarify this point

- Figure 2: Delete the underlines in the input box

Results:

- Figure 3A: The different plots of rainfall sources must be with a dotted line for one or two products to compare between them and to identify them. With the continued line the observed precipitation is hidden by the TRMM and GPM products.

- How the GPM V5 product can be before 2014?

- Figure 4A: How many zeros for each product compared to the observed precipitation. The main problem in the daily correlation is the number of zeros in the observed precipitation. Did you apply any kind of filter? Can you please, discuss a little bit the results by comparing the correlation results with other papers in Morocco?

- Figure 5: How did you get the boxplot and you only have one value per correlation?

- Line 288: "High" instead of "low"

- Figure 6: the high values of POD and low values of FAR at monthly and yearly time scale is related to the low threshold (0.5mm). Can you please discuss these results by comparing them to other papers in the same region?

- Line 308: How can you identify that selected events are the most representative of the data series?

- Table 6, 7, 8, and 9: Must be in the table list not integrated into the Figure 7, 8, 9, and 10.

Please consider adding the values of other parameters (Transfer Function and Recession).

The calibration of the parameters will automatically give good results please consider adding more events and consider adding the validation step.

References:

Borga, M.; Gaume, E.; Creutin, J.D.; Marchi, L. Surveying flash floods: Gauging the ungauged extremes. Hydrol. Process. 2008, 22, 3883–3885 https://onlinelibrary.wiley.com/doi/abs/10.1002/hyp.7111

References that might help:

- Camici, S., Massari, Ciabatta, L., Marchesini, I., Brocca, L., Which rainfall score is more informative about the performance in river discharge simulation? A comprehensive assessment on 1318 basins over Europe, Hydrol. Earth Syst. Sci., 24, 4869–4885, 2020 https://doi.org/10.5194/hess-24-4869-2020

- Camici, S., Ciabatta, L., Massari, C., Brocca, L., How reliable are satellite precipitation estimates for driving hydrological models: a verification study over the Mediterranean area, Journal of Hydrology (2018), doi: https://doi.org/10.1016/j.jhydrol.2018.06.067

- Ward, E., et al., 2011. Evaluation of precipitation products over complex mountainous terrain: a water resources perspective. Advances in Water Resources, 34, 1222–1231. doi:10.1016/j. advwatres.2011.05.007

- Xue, X., et al., 2013. Statistical and hydrological evaluation of TRMM-based multi-satellite precipitation analysis over the Wangchu basin of Bhutan: are the latest satellite precipitation products 3B42V7 ready for use in ungauged basins? Journal of Hydrology, 499, 91–99. doi:10.1016/j. jhydrol.2013.06.042