Reviewer #1

R1C0 Comment: The paper investigated the possible role of satellite-based rainfall data to estimate rainfall erosivity at global, continental and local scales. Besides, the application of a simple-linear function for CMORPH data correction was also conducted in this paper. The paper is interesting and is well organized. The layout of the manuscript conveys a clear presentation of the topic. However, I do have few questions regarding the content and results of this paper. Some major queries should be clarified before acceptance.

R1C0 Response: We would like to thank Reviewer #1 for reviewing our manuscript. We very much appreciate the encouraging comments and overall positive evaluation on our study. Point-by-point detailed responses to the specific comments are provided below. Thanks.

General comments

R1C1 Comment: Bothe abstract and conclusion should be improved. The authors should emphasize the contribution of this paper.

R1C1 Response: Thanks for highlighting this aspect. We see the point of Reviewer #1 and as suggested both abstract and conclusions will be modified to indicate the main contribution of this paper to the field. The main contribution is that we derived global rainfall erosivity based on the high-frequency (30-min) satellite-based product (CMORPH) and compare it to the station-based rainfall erosivity data (GloREDa). To the best of author's knowledge, all previous global studies that focused on satellite-based products used daily or monthly data and lacked the ability to compare their predictions with hourly and sub-hourly rainfall records. Therefore, such high-frequency data (CMORPH) can now be used as input to dynamic global soil erosion models with a better understanding of its performances and limitations.

R1C2 Comment: As the authors mentioned in the manuscript that many studies have conducted the satellite-based precipitation products for rainfall erosivity estimations. I wonder what's the difference between this paper and previous studies. Is there any significant improvement or contribution obtained in this paper?

R1C2 Response: Thanks for your remark. As indicated, all previous studies applied either daily or monthly data while only a few studies used high-frequency data but focused on local or regional scales and none of these at global scale. Thus, in our opinion this is the relevant difference and novelty in comparison to previous studies that used satellite-based data for the estimation of the global rainfall erosivity. Here, we wanted to test this new use of the satellite-based data and acquire a better understanding of the areas where results are adequate and those where significant under- or overestimations occur.

R1C3 Comment: Parts of the description are not in accord with Figures and Tables in the manuscript. For example, Fig. 1 (lines 159-160) and Table 3 (lines 213-215). Please check throughout the manuscript.

R1C3 Response: Noted with thanks. Yes, there are some technical issues that will be corrected in the revised version. Thank you for pointing to these issues.

R1C4 Comment: Table 1. The mean values calculated by CMORPH and ED indicated a significant different trend for Africa and Asia. Please provide possible reason.

R1C4 Response: Thanks for your remark. As suggested by the Reviewer #1 additional discussion about these results will be added to the manuscript. The main reason for differences lies in the fact that the ED concept indirectly uses the GloREDa results produced by Panagos et al. (2017). For example, for Africa only a small number of stations was used for the calculation of the global rainfall erosivity by Panagos et al. (2017). While for Asia a spatial rainfall erosivity pattern is similar (can also be seen from a similar Gini value in Table 1) but the absolute values of rainfall erosivity are different, which can be attributed to the issues related to the detection of rainfall by satellite-based products in mountainous regions (e.g., Stampoulis and Anagnostou, 2012) as well as limited amount of gauge-based data in data scare regions of Asia.

R1C5 Comment: Results obtained from CMORPH reveal a serious underestimation problem for annual scale, whereas results obtained for monthly scale overestimate the rainfall erosivity for six months. I wonder if this is reasonable.

R1C5 Response: Thanks for the comment. It should be noted that monthly rainfall erosivity comparison was only done for Europe (Table 4), since a global monthly rainfall erosivity maps have not yet been produced. Thus, Table 4 caption will be modified to better indicate this. Annual rainfall erosivity for Europe is more similar (Table 3).

R1C6 Comment: I am curious what is the CMORPH correction procedure? How do you get the equation (5)? It doesn't make sense to me that the correction equation did not adopt the information of CMORPH.

R1C6 Response: Noted with thanks. Both reviewers expressed some concerns regarding the proposed correction procedure. We see their point and we are willing to rephrase or remove this additional analysis from the revised version of the manuscript. The correction rests on a simple mathematical expression. This part can be removed since the proposed method was not very complex and it was more suitable for some engineering applications and not detailed scientific studies. Additional discussion about the needed corrections of the CMOPRH data will be added to the revised version of the manuscript. Thanks.

Other comments

R1C7 Comment: Line 187. What's R approach?

R1C7 Response: Thanks for your remark. R will be replaced with "rainfall erosivity" in the revised version.

R1C8 Comment: Line 189. Replace Oceania with North America (see Table 1).

R1C8 Response: Indeed, there was an error, this will be corrected. Thanks.

R1C9 Comment: Parts of the values displayed in Table 3 are incorrect. -40%, +11% and -56% (remove the %).

R1C9 Response: Noted with thanks. The “%” will be removed.