The authors attempted to generate a new dataset of R factor on TP. This work is useful to for water erosion modelling. I recommend a major revision. Please find bellow my suggestions for the current paper.

1. Abstract: The spatial resolution of the generated gridded annual rainfall erosivity dataset should be added.

Response: Done. Please refer to **Line 17** in the revised manuscript (MS).

2. Introduction: I suggest the authors add more information of the previous studies about the *R* factor on the TP.

Response: As you suggested, the previous studies about *R* factor on the TP have been extended in the Introduction Section. First, we reviewed the previous studies, which employed the empirical methods to estimate the rainfall erosivity over the TP (**Line 74 – 84**). We found that the accuracy of the estimated rainfall erosivity in the TP are largely reduced by the current empirical estimation models and the scarcity of the historical weather stations. Second, the application of various gridded precipitation for rainfall erosivity estimation were reviewed (**Line 89 – 97**). We noted that significant biases of various gridded precipitation data have been identified in the TP, however, the gridded data for rainfall erosivity estimation are not prequalified, and the biases of estimated rainfall erosivity by using the gridded data have not been quantified and corrected. Besides, the previous studies have been summarized in **Table 1**.

3. Precipitation data: The detail information of the ERA5 data should be included in this section.

Response: Done. We have added the description of the ERA5 precipitation data in Line **146 – 150** in the revised MS.

4. The accuracy of the ERA5 data should be examined at the weather stations.

Response: We have analyzed the performance of the ERA5 precipitation data in the

terms of erosive precipitation characteristics over the TP, and found that ERA5 systematically overestimated the erosive annual amount, erosive annual precipitation frequency, and mean erosive event precipitation amount, but largely underestimated mean I_{30} for erosive events. These biases of the ERA5 data in identifying the erosive precipitation events will transmit to the rainfall erosivity estimates over the TP. Therefore, it is necessary to correct the ERA5-based rainfall erosivity estimates to improve the accuracy. Please refer to **Section 4.1 (Line 253 – 269)** and **Figure 4** for details in the revised MS.

5. The procedure of how to reconstruction *R* factor in 1950-2012 is important. However, no more information could be found in the methodology section. I would suggest the authors to rewrite this section to make this part more clearly.

Response: As you suggested, we have rewritten the Methodology Section. Generally, three steps are used to reconstruct the annual rainfall erosivity for the Tibetan Plateau with the 0.25° spatial resolution in 1950-2020 (**Line 159 – 164 and Figure 2**). We firstly calculated the annual rainfall erosivity by using the standard method of rainfall erosivity calculation based on the 1-min in-situ precipitation observations and 0.25° hourly ERA5 gridded precipitation data, respectively. Secondly, the performances of the ERA5 are systematically assessed in the terms of the detecting accuracy of the precipitation for erosive events and the estimation accuracy of ERA5-based annual rainfall erosivity. Thirdly, the annual rainfall erosivity data for the TP is generated by correcting the ERA5-based annual rainfall erosivity values.

Our study has found that ERA5 data has systematical biases in identifying the characteristic of the erosive precipitation events, including significant underestimation of the mean I_{30} for erosive precipitation events and relatively slight overestimation of the mean erosive precipitation amount, which jointly lead to overall underestimation of annual rainfall erosivity estimates by using ERA5 data. Therefore, it is necessary to correct the biases of the ERA5-based annual rainfall erosivity estimates.

In the post-processing of the simulated precipitation using weather/climate forecast models, it is always supposed that the model biases could keep stable, and consequently the relative changes between the in-situ and modeled precipitation are commonly used to correct the modeled precipitation for accuracy improvement (e.g. Fick et al., 2017; Cucchi et al., 2020; He et al., 2020). Here, taking the method of precipitation correction for a reference, we make the hypothesis that the biases of ERA5-based annual rainfall erosivity transmitted from the ERA5 data can also keep stable at each grid. Then, the relative changes between the station-based and ERA5-based annual rainfall erosivity are used to correct the ERA5-based estimates. After the correction, the performance of the corrected values is further examined. To make the method used in this study more clearer, we have rewritten the **section 3.3**. Please refer to **Line 216 – 244** for details in the revised MS.