This paper developed a new long-term soil erosivity dataset using the ERA5 reanalysis precipitation product, corrected by 1-min time-step meteorological observations. The core of this work lies in the use of high-frequency precipitation measurements, which however were not fully presented and discussed. For example, what's the difference between this 1-min precipitation data and ERA-5 hourly product/other previous datasets? Furthermore, what are the contributions of precipitation frequency and intensity, respectively, to soil erosivity? These questions are important, considering the authors mentioned these issues in the introduction part. Overall, this paper does provide a valuable dataset for the TP region which is vulnerable to soil erosion but is generally superficial in clarifying the advantages and differences of this dataset against previous efforts. Therefore, I can only recommend a major revision for this paper in its current form.

Response: Thanks for your constructive suggestions. We have added the analysis of the difference between the 1-min in-situ precipitation data and ERA-5 hourly data (**Line 253 – 269** and **Figure 4**). It is known that the rainfall erosivity is jointly determined by the erosive event rainfall amount and the maximum contiguous 30-min peak intensity. Our results have shown that the relatively slight overestimation of ERA5 in erosive event precipitation amount cannot offset the substantial underestimation of ERA5 in I_{30}, which jointly lead to the overall underestimation of the annual rainfall erosivity over the TP by using the ERA5 data.

On the other hand, we have further summarized the previous studies of the rainfall erosivity over the TP (**Line 74 – 97** and **Table 1**). Firstly, we reviewed the previous studies, which employed the empirical methods to estimate the rainfall erosivity over the TP (**Line 74 – 81**), and 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. Secondly, the application of various gridded precipitation for rainfall erosivity estimation were reviewed (**Line 89 – 95**). We have found that although the significant biases of various gridded precipitation data have been identified in the TP, however, the gridded data for rainfall erosivity estimation are not prequalified. The biases of rainfall erosivity estimates by using the gridded data have not been quantified and corrected. In addition, limited by the scarcity of the long-term in-situ precipitation observation (< 30 weather stations before 1990, 30 – 100 weather stations in 1990 – 2012), the long time series of the rainfall erosivity over the TP is hardly to product.

Since 2012, China Meteorological Administration (CMA) has built a dense network of weather stations over the TP, and there are more than 1500 weather stations in and around the TP regions. Based on a vast number of in-situ precipitation data with high temporal resolution for 7 years, we can obtain the precise values of rainfall erosivity by using the standard method recommended by the USLE model. Meanwhile, we also use the same method to estimate the long-term annual rainfall erosivity by using ERA5 precipitation data. The new annual rainfall erosivity data is reconstructed by correcting the ERA5-based rainfall erosivity.

Considering that the systematical biases of ERA5-based estimates, we employ multiplier factor map in the correcting process of this study, which has been widely used to correct the simulated precipitation using weather/climate forecast models. The multiplier factor map is generated by IDW method based on the multi-year averaged relative changes between the station-based and ERA5-based annual rainfall erosivity. Here, we made the hypothesis that the biases of ERA5-based annual rainfall erosivity transmitted from ERA5 data can keep stable at each grid by year. After the new data has been produced, we further tested its accuracy. Overall, the long-term ERA5 precipitation data with systematical biases in detecting erosive precipitation events and the short-term in-situ observations with high-precise are jointly employed to reconstruct a long time series of annual erosivity in the TP. This data is of great importance to understand the spatial-temporal evolution of the rainfall erosivity over the TP. The advantages of the newly generated dataset against previous studies are described in **Line 382 – 389**.

Minor comments

Lines 307-309: The previous soil erosivity products are also based on observed precipitation data. I cannot see any difference of the methodology of this paper from the previous ones. Contrarily, the IDW method is actually too simple for the TP region, where the terrain is complex.

Response: In the previous studies, the multi-year average rainfall erosivity map (*R* factor map) over the TP was directly interpolated by using IDW method based on the estimated rainfall erosivity values at dozens of weather stations. Given that the precipitation data from the weather stations with insufficient density, the released *R* factor map over the TP cannot yield realistic spatial distributions of the rainfall erosivity. Yue et al (2022) has reported that the biases of *R* factor over the TP was obviously larger than those in the other regions of China. Unlike the previous study, the IDW method in this study was used to generate the multiplier factor map, which was used to correct ERA5-based annual rainfall erosivity in this study.

Specifically, the multiplier factor values from 373 grids, which corresponded to appropriate 10% of the whole grids over the TP, were used to generate the multiplier factor map by IDW interpolation method. Notably, although the northwest region has scarce weather stations, the annual precipitation in these region is much less than other regions of the TP. In addition, the percentage of the grids with multiplier factor values in total grids was up to 15% in the hot spots of water erosion in the southern and eastern TP. On the southeast edge of the TP, the percentage of the available grid values were much higher.

We have tried our best to collect the latest precipitation data, especially the 1-min in-situ precipitation data from 1787 weather stations over the TP released by CMA, and we also believe that with the further development of the network of the weather stations, the accuracy of the rainfall erosivity estimates can be continuing to be improved.

Reference

Yue, T., Yin, S., Xie, Y., et al.: Rainfall erosivity mapping over mainland China based on high density hourly rainfall records, Earth Syst. Sci. Data., 14, 665-682, 2022.