

Interactive comment on “Improving the global applicability of the RUSLE model – adjustment of the topographical and rainfall erosivity factors” by V. Naipal et al.

Anonymous Referee #1

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Comments on “Improving the global applicability of the RUSLE model – adjustment of the topographical and rainfall erosivity factors” submitted by V. Naipal et al. to Geoscientific Model Development.

General comments In this study, the authors attempted to improve the RUSLE, one of the most popular water erosion models, using fine-mesh topographic data and additional rainfall data. I agree that soil displacement caused by erosion is one of the underrepresented processes in the present biogeochemical and earth-system models. The RUSLE is a very simple solution to account for water erosion and then has been applied to various studies, without adequate validation. The authors proposed new parameterizations of slope and rainfall factors, leading to better representation of erosion

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distribution in comparison with observational data. Although there remain unsolved biases (e.g., in tropics), it looks a good advancement. The manuscript was well prepared and I did not find a serious logical fault. However, I have a suggestion that the global results should be presented and compared in a clearer manner. Currently, global erosion estimations were presented only in Table 7; no global map of erosion was presented (only specific factors). Therefore, it was difficult for me to understand the impact of improvements made in this study on global biogeochemical cycles. In conclusion, I suggest that the manuscript would be accepted after minor revision. In addition to the presentation of global results, I have a couple of minor comments as mentioned below.

Specific comments Page 3003 Line 15–16 It seems that the two variables, annual precipitation and precipitation intensity, are not independent each other. Did you check independence among the variables used in the regression analysis?

Page 3007 Line 14 I have some concern about the statement that “... and support practice (P) factors do not contribute significantly to the variation in soil erosion at the continental scale.” As you know, much efforts of soil management practice have been made to prevent erosion. In other words, I’m worrying about over-fitting in this study by putting too much focus on S and R factors.

Page 3007 Line 23–15 As mentioned above, presentation of the global results is not adequate for me. I suggest adding further comparisons among the simulations, such as global map and latitudinal distribution.

Page 3018 Table 1 The column “Temporal resolution” does not provide temporal resolution (e.g., daily, monthly, annual) but show only temporal period. Please correct the label or data in the column.

Page 3022 Table 5 Can you show R results by the unadjusted model for comparison?