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Geoscientific Model Development Discussions
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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 #2

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In this paper the authors present an analysis of the suitability of alternative methods for calculating slope and erosivity factors in the RUSLE model for global application. Advances to global erosion estimation are critical for improving current understanding of soil security, biogeochemical cycling, and water resources and as such are of broad relevance and importance to geoscientific modellers. The work presented provides clearly outlined, interesting advances in this area and as such I recommend this paper for publication subject to minor revisions that I believe will improve the clarity of the results. The manuscript text overall is very clearly written, however I suggest modifications to the tables and figures.

Detailed comments:

Abstract: line 5, sentence word order a little scrambled, '(RUSLE) model is due to...' add comma after model, and move 'is' to after 'basis,'

Abstract: line 17, word order, reverse 'in' and 'good'

Introduction: line 12, biogeochemical components have become increasingly important - add references.

Pg 2998, line 14 - why is a 3x3 pixel window chosen? Is it purely because this is the smallest moving window? What is the influence of this choice? Can changing window size in different topographical regions help?

Figure 2: I would find it useful if the original RUSLE estimation was shown as well as a difference. Figure 2: caption 'redisch'

Figure 3 and 6: Why is Switzerland presented differently to the other two regions? I would prefer a uniform representation, unless there is a rational for this, in which case it should be presented.

Figure 4: more explanation of figure in the caption would be useful.

Pg 3004, line 5, how is this evaluated? Using the r squared? In how many cases are the Renard Freimund R factors kept?

Climate zones - I struggled to find a definition of the climate zones to begin with, but I see there's a description of some of he zones in Table 5. Signposting the reader to the definitions earlier in the text would be helpful, and providing definitions for all the climate zone codes would also be useful.

Pg 3004, line 22, should this be Table 5 rather than 3?

Figures 5 needs to be improved. The layout and sizing of the plots needs to be consistent. I would find it easier to evaluate the results if the plots were given equal axes such that the one-to-one line always lies on the 45 degree diagonal, and the axes were the same between 1 and 2. Units should be mentioned.

GMDD

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Figure 6 and text that refers to it, care should be taken to highlight that Switzerland is no longer a truly independent test given that this data has been used in the regressions. This doesn't invalidate the work, the improvements for Spain are impressive, but it should be discussed.

Section 4.2: I think it's important to provide mapped results for the erosion models as this is the end point for the work. Means do not tell the whole story and mapped output would help illustrate the discussion.

Pg 3008, line 19, What's happened in the north west of the US with the adjusted model? Perhaps the authors can comment.

Perhaps the authors can comment on using the RUSLE which gives a erosion rate for an average annual climate and then comparing that

Pg 3009 Can you say something more definitive here? You can see where the model is overestimating, and you know the K and C factors for these areas - are there trends here, i.e. is it systematically overestimating in regions dominated by arable land covers?

Pg 3011, line 21 spelling: performs

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