

Hydrol. Earth Syst. Sci. Discuss., referee comment RC3  
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## Comment on hess-2021-225

Anonymous Referee #3

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Referee comment on "Evaluating and developing a model of specific degradation using geospatial analysis for sediment erosion management in South Korea" by Woochul Kang and Pierre Y. Julien, Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-225-RC3>, 2021

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There are a number of significant problems with this paper that would need to be addressed before it could be considered for publication, so I think it should be rejected in its current form.

Even if one believes that the sediment-delivery ratio is physically meaningful, rather than an artefact of the ways erosion rates have been analyzed historically (Parsons et al. doi: 10.1002/esp.1395), the fact that the paper considers them to be a good test of the modelled rates of erosion is highly problematic. There are common factors in the numerator and denominator of equation (12) that will lead to issues of spurious correlation. The "test" seems to be a comparison of whether the new model can fall somewhere within the bounds of the SDR estimated elsewhere, which is a target of over an order of magnitude. This target is missed in a non-negligible number of cases, and the text then turns to special pleading of why specific datasets are problematic. Either you believe your data or you don't!

I do not see the rationale for the structure of the regression model in equation (3). There are many critiques in the literature of the structure of (R)USLE. Furthermore, this is not the same structure, as it is the product of powers of the original variables.

Although the "proposed model" has a better RMSE, it seems to have more bias than the other models, overpredicting lower values, and underpredicting higher ones.

The description of "data mining" to produce alternative model structures is minimal and wouldn't allow the approach to be replicated. In the results, "meaningful parameters" are mentioned, but it is not clear what meaning they have. In particular, what is the physical meaning of "lowest elevation"?

The overall aim and rationale of the paper is vague. There seems to be an invaluable dataset underlying the paper that could be much better employed in estimated sediment fluxes in different locations.