

## ***Interactive comment on “Modelling long-term, large-scale sediment storage using a simple sediment budget approach” by V. Naipal et al.***

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The paper by Naipal et al is a quite interesting study on the implementation of erosion schemes to Earth system models. This an hot topic and this study is a significant contribution to existing literature. In particular, it provides a very flexible approach that can be adapted to any ESM. I believe that after some revisions the paper can be published. I have some comments detailed below that I hope will be helpful to improve the paper.

1. You used a modified version of the RUSLE equations without the support practice factor and then conclude that land use change is a driving factor of erosion. I think that you should discuss carefully how their conclusions would be impacted by the use of the support practice factor. In particular, how it could change the trends after the 1950's

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and during the middle age when animal traction was more and more used to plough.

2. You used a modified version of RUSLE on non-croplands areas whereas this equation has been developed on croplands areas. I missed few sentences to justify that the use of RUSLE makes sense also for forest and grassland.

3. It would have been quite interesting to know the sensitivity of your approach to the inputs coming from the MPI-ESM using simulations coming from other ESMs. I am aware that this is asking a lot of additional work to redo everything using other ESMs outputs therefore adding just few elements in the discussion will be enough but at least it is important to mention it and to discuss how the uncertainties from the ESMs results might impact your conclusions.

4. The discussion refers several times to the land use history but without enough references. Please document better this part.

Minor comments: L 133: You implicitly assume that movement of water during the flooding events do not induce erosion? If I understood well it should be clearly stated.

L 151: I am not sure to fully understand what at and bt mean physically. Please clarify.

L 355: Does it means that you use the same climate each year without inter-annual variability or do you repeat the sequence between 850 and 950 AD?

Fig. 4: Since it is scatter plot, you should fix the intercept to zero to have a better idea on how close to the 1:1 line the model is.

Supplementary material I 44: If I understood well these parameters are fixed during the simulations? Why not use the stock of organic C predicted by the MPI ESM?

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