

## ***Interactive comment on “Climate, tectonics or morphology: what signals can we see in drainage basin sediment yields?” by T. J. Coulthard and M. J. Van de Wiel***

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Review of ‘Climate, tectonics or morphology: what signals can we see in drainage basin sediment yields?’ by Coulthard and Van de Weil

This is a well written and easy to read paper. It examines the convoluted issue of what drives sediment transport – climate, tectonics or a combination of both? As stated the relative importance of the two processes is very much understudied. This paper using a robust modelling framework examines this issue.

This paper will appeal to both modellers and field workers. I can see it becoming a focus point of discussion and as such it needs to be able to converse with both camps.

C86

My own background is from a modelling perspective so my comments are going to be biased in that direction. However, the authors are entering an area of discussion where they have much to contribute.

Overall comment It would be good to have a discussion of how reliable the model is. This is important given that a paper such as this will be read by many others that may not have any knowledge of the robustness of the CAESAR model. Following on from this, the base data in Table 1 – is this representative of natural/current conditions? While it is impossible to validate the model for the uplift conditions, for the non-modeller and those not familiar with CAESAR there needs to be some reinforcement of its suitability for the application here. A statement regarding the accuracy/reliability of the model based on field data would be very helpful.

Specific comments 2nd last para on p69. The concept of ‘link’ and ‘conduit’ is introduced. Maybe more could be done with this. While I am reluctant to suggest opening up the paper to the complex issue of sediment delivery ratios, I feel a comment is needed here to clarify where this paragraph is going. This issue is complicated by the ongoing inference to SDRs throughout the paper.

Section 2. The modelling setup needs to be better described. Maybe I have missed it, but what is the DEM origin and scale? This is important to place the modelling in context. Is the DEM suitable to capture the relevant catchment features. This is a particularly important issue for those who are not familiar with the model or have a field background.

If there is no bedrock representation for the simulations, is CAESAR eroding into the bedrock assuming that it is soil/alluvial/colluvium? Alternatively, is the model eroding at a higher rate than what would be realistic if a bedrock DEM was employed? A better explanation is needed here.

I also wonder about the role of vegetation in the modelling. A comment needs to be made as to how this is managed in the model.

C87

Section 3.1. How realistic are the uplift scenarios here? This is not really discussed. Clearly this is a modelling study where different scenarios are assessed however there is little point examining situations that are clearly outside the scope of realism and therefore bias any findings.

Page 71, line 20. Should read 'Using the same. . . . .'

Page 73, line 10-16. What is the ratio here? Can you make some comment or suggestions? This may shed light on the sediment delivery ratio issue.

Section 4 Page 76, line 16. Should read 'These results provide us. . . . .' Page 76, line 22. I am left hanging with the question, are you eroding soil or bedrock given the uplift scenarios. This goes back to the previous query and needs clarifying. Page 77, sentence lines 3 and 4. Yes, but this comment is based on the model being correct and able to simulate these thresholds reliably. Again, are the uplift scenarios, lack of bedrock satisfactory/suitable?

Page 77, para starting line 7. There are a lot of ideas here. Maybe more could be done with the first half of the para discussing the signal attenuation. This is an important point of discussion in its own right. Then a new paragraph expanding on sediment delivery discussion.

Page 79, last sentence of Discussion. This is a really good point!

Figure 2 showing the different outputs was near impossible to read for me. Please increase the size of the fonts and line differentiation.

Overall, an interesting and thought provoking paper.

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