

## ***Interactive comment on “Effect of changing vegetation on denudation (part 2): Landscape response to transient climate and vegetation cover” by Manuel Schmid et al.***

### **Anonymous Referee #2**

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The paper uses an established landscape evolution model (Landlab) to evaluate the effects of precipitation and vegetation cover change separately and combined on a myr time scale. It is timely and addresses the important question in earth science if vegetation is a main driver of denudation, and hence fits well into ESurf. Thank you for letting me review this manuscript; I am not a landscape evolution modeller, and hence it was a challenge for me, and I have to leave more technical comments to the experts. I find the topic and results fascinating though. My perspective is more process-orientated, and this is also where my criticism, but also fascination originates in. Sorry for the delay. I find the paper overall well written, but it is too thick in times. The discussion suffers from being too long at the one side, but could gain a lot from a comprehen-

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sive figure that summarizes the outcomes conceptually. Please consider that not all people who are interested in this topic have experience in landscape evolution models, and have potentially never seen the outputs of Landlab before. This is also especially important with regards to the Figure captions, which are often not specific enough. Please also add something to the title that clarifies the type of study, e.g. the time period considered or/and that it is a landscape evolution model study. I have two main criticisms that made the paper more cumbersome to understand; the first regards the origin of the vegetation cover and the oscillation part of the paper, it is not clear on which base you chose these assumptions. The second is that the title covers a large topic; however the interpretation of your output is quite limited and stays very close to the model output. It doesn't include literature or discussion points from studies outside of the landscape evolution world, e.g. the effects of knickpoint retreat, or an interpretation from the process-domain, e.g. denudation rates on deforested catchments without vegetation cover (rates summarized e.g. in Montgomery, 2007). From my perspective, there are two ways to resolve this, either you claim a larger importance and add e.g. an overall conceptual figure and include literature from other fields, or you modify the title and narrow it to the landscape evolution world, which is what I would opt for. I think this would also reduce the weight of earlier criticism of the paper which I understand where it comes from. The fact that you apply an average vegetation cover, hillslope denudation and river incision is represented in the same equation, and that there is no representation of groundwater in the model justifies the question what the significance of the study is, and I suggest to try to do a better job in clarifying this. In parts it sounds like the reason for this paper is to develop the model setup for the following papers, which doesn't really help to assess how your paper advances science. Generally, I find the mix between a setup of non-natural conditions (e.g. precipitation without vegetation change) in combination with the “loose” tuning to the Chilean catchments problematic. If you would like to investigate the effects of both, precip and veg independently, then why not use a catchment that has equally distributed aspects and slopes, so that you can make more comprehensive interpretation of how catchment topography controls

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the flux? Please try to avoid to mention that you will model the evolution of the catchments in more detail later, this leaves the taste of salami-slicing. The study should stand for itself. The same is also true regarding the companion paper. I miss more references in the method section, so that it is clear what of the approach is “best practice”, and which you developed yourself or used for the first time. Figure 17: Please explain more in detail where these result come from; e.g. the dotted line in b should look more like in a in the grey field?

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